AMERICAN RIVER BASIN STUDY

MEMORANDUM OF AGREEMENT

By and Between

U.S. Department of the Interior,

Bureau of Reclamation, Mid-Pacific Region

and

Placer County Water Agency

El Dorado County Water Agency

Regional Water Authority

City of Sacramento

City of Roseville

City of Folsom

The United States Department of the Interior, Bureau of Reclamation, the Placer County Water Agency (PCWA), the City of Roseville (Roseville), the El Dorado County Water Agency (EDCWA), the City of Sacramento (Sacramento), the City of Folsom (Folsom), and the Regional Water Authority (RWA) agree to work collaboratively to perform the American River Basin Study (ARBS) as part of the WaterSMART Basin Study Program. This Memorandum of Agreement (MOA) establishes the terms that will guide the performance of the Study.

This MOA is intended to facilitate cooperative efforts for mutual provision of services and support, and technical assistance by the Parties in the conduct of meeting the objectives and scope of this MOA.

The purpose of the ARBS is to evaluate existing and potential future imbalances between water supplies and demands in American River Basin and propose a range of strategies which may be employed to alleviate or mitigate identified imbalances. Along with other strategies, the ARBS will include an evaluation of integrated water management strategies to improve regional water supply reliability within the American River Basin and to improve Reclamation's flexibility in operating Folsom Reservoir to meet flow and water quality standards, and protect fish species listed under the Federal Endangered Species Act in the lower American River and the Sacramento-San Joaquin Delta.

The ARBS area encompasses the entire American River Watershed which covers 2,140 square miles from Sacramento Valley to the peaks of the northern Sierra Nevada mountains west of Lake Tahoe; together with the adjacent North American and South American Groundwater Sub-basins as designated in the California Department of Water Resources Bulletin 118.

The Plan of Study (POS) for the ARBS is included as Attachment A. The POS has been prepared pursuant to Reclamation's Basin Study Directives and Standards and includes a detailed work program, budget(s) and schedule. The Plan of Study may be updated, without amendment to this MOA, from time-to-time consistent with such Directives and Standards, provided that all substantive revisions are agreed to by all parties through the Key Personnel as identified in Section 5(D).

ARTICLES

1. Definitions

A. Reclamation - United States Department of the Interior, Bureau of Reclamation.

B. Non-Federal Partners - Non-Federal Partners means PCWA, Roseville, EDCWA, Sacramento, Folsom, and RWA.

C. Parties - Reclamation and the Non-Federal Partners.

D. In-Kind Services - Services provided by a Non-Federal Partner that substantially contributes to the completion of the work task or task identified.

E. Confidential Information - Privileged or confidential trade secrets or commercial or financial information under the meaning of 5 USC 552(b)(4).

F. Intellectual Property - Any invention that is legally protected through patents, copyrights, trademarks, and trade secrets, or otherwise protectable under Title 35 of the United States Code, under 7 USC 2321, et seq., or under the patent laws of a foreign country.

G. Key Personnel - Reclamation and Non-Federal Partner Agency representatives to the ARBS Executive Steering Committee; Reclamation and Non-Federal Partner Agency representatives to the ARBS Project Management Team as identified in Section 5(D) - Notices and Key Personnel.

H. Subject Invention - Any invention or other Intellectual Property conceived or first reduced to practice under this MOA which is patentable or otherwise protectable under Title 35 of the United States Code, under 7 USC 2321, et seq., or under the patent laws of a foreign country.

2. Authorities and Financial Obligations

A. Reclamation's authority to enter into this MOA:

1. Reclamation Act of June 17, 1902 (ch. 1093, 32 Stat. 388; 43 U.S.C. 372, et seq.) and acts amendatory thereof and supplementary thereto.

2. Title IX, Section 9503 of the Omnibus Public Land Management Act of 2009 (P.L. 111-11, 123 Stat. 991).

B. Non-Federal Partner's statutory authority to enter into this MOA:

1. PCWA is authorized to enter into this MOA by Board of Directors Resolution 17-05 dated January 19, 2017.

2. Roseville is authorized to enter into this MOA by City Council Resolution 17-06 dated January 18, 2017.

3. EDCWA is authorized to enter into this MOA by Board of Supervisors Resolution WA-1-2017 dated February 8, 2017.

4. Sacramento is authorized to enter into this MOA by City Council Resolution 2017-0033 dated January 19, 2017.

5. Folsom is authorized to enter into this MOA by City Council Resolution 9863 dated January 10, 2017.

6. RWA is authorized to enter into this MOA by Board of Directors Resolution 2017-02 dated January 12, 2017.

C. Cost Sharing: The costs of the ARBS will be shared between Reclamation and the Non-Federal Partners in the following amounts:

1. Reclamation: Not to exceed $830,000

2. Non-Federal Partners: Not to exceed $1,856,000

The Non-Federal Partners' financial contributions will be in the form of in-kind products and services, predominately modeling analyses and staff participation. Reclamation's financial contribution to the Basin Study shall not exceed 50 percent of the total cost. All or part of the Non-Federal Partners' share may be provided as in-kind services. Valuation of in-kind services shall be in accordance with 2 CFR Part 200, Cost Principles for State, Local, and Indian Tribal Governments (OMB Circular A-87).

D. Financial Obligations: This MOA is not a funding document and does not authorize the obligation or transfer of funds. If a subsequently identified activity or project is identified that may require Reclamation to expend funds received from the Non-Federal Partners for investigations, surveys, construction work, or any other development work incident thereto involving operations similar to those provided for by the Reclamation law, a Contributed Funds Agreement, pursuant to the Sundry Civil Expenses Appropriations Act for 1922 (43 USC 395) will be required. Funds contributed by Non-Federal Partner(s) will only be used to pay for costs incurred by Reclamation or its contractors associated with completing the tasks described in this MOA or modifications to this MOA.

E. Anti-Deficiency Act: All activities, responsibilities, and commitments made under or pursuant to this MOA are subject to the availability of appropriated funds and each Agency's budget priorities, as determined by each Agency, and neither the Non-Federal Partners nor Reclamation are obligated in any way under this MOA to expend appropriations or to enter into any contract, assistance agreement, Contributed Funds Agreement, or other financial obligation. No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. 1341.

3. Publications, Reports, and Confidentiality

A. Publications: The Parties understand and agree that this MOA may be disclosed to the public in accordance with the Freedom of Information Act or California Public Records Act. Subject to the requirements of Section 3(C) – Confidentiality, and preservation of rights in Subject Inventions, a party may publish information developed for the ARBS prior to its official release provided:

1. The other Parties are allowed to review the manuscript at least sixty (60) days prior to submission for publication, and

2 The publication shall acknowledge this MOA and the contributions of each party's personnel.

B. Reports: The results of this MOA and science, engineering, and technology data that are collected, compiled, and evaluated under this MOA shall be shared and mutually interchanged by Non-Federal Partners and Reclamation. A final report summarizing all data shall be submitted to Reclamation and the Non-Federal Partners through the key contacts identified in Section 5(D) - Notices and Key Personnel within the performance period of this MOA, as defined in Section 4(A) - Term. The final report will be in the public domain, and will be published on Reclamation's Basin Study website.

C. Confidentiality: Any Confidential Information used in this MOA or ARBS shall be clearly marked "CONFIDENTIAL" or "PROPRIETARY" by the submitter and shall not be disclosed by the Recipient without permission of the owner. To the extent a party orally submits its Confidential Information to the other Parties, the submitting party will prepare a document marked "CONFIDENTIAL" embodying or identifying in reasonable detail such orally submitted Confidential Information and provide the document to the other Parties within thirty (30) days of disclosure.

No party shall be bound by confidentiality if the Confidential Information received from another party:

Is already available to the public or known to the recipient;

Becomes available to the public through no fault of the recipient;

Is non-confidentially received from another party legally entitled to it; or

Is required to be released pursuant to the Freedom of Information Act.

It shall not be a breach of this MOA if the Non-Federal Partners are required to disclose the Confidential Information by a valid order of a court or other government body, or as otherwise required by law, including without limitation the California Public Records Act, or as necessary to establish the rights of a party under this MOA; PROVIDED THAT the Non-Federal Partner(s) shall provide prompt prior notice thereof to Reclamation to enable Reclamation to seek a protective order or otherwise prevent such disclosure, and PROVIDED FURTHER THAT the Confidential Information otherwise shall continue to be confidential.

D. Intellectual Property: Unless otherwise agreed by the Agencies, custody and administration of inventions made as a consequence of, or in direct relation to, the performance of activities under this MOA shall remain with the respective inventing party. In the event that an invention is made jointly by employees of the Parties or an employee of a Party's contractor, the Parties shall consult and agree as to future actions toward establishment of patent protection for the invention.

4. Term and Termination

A. Term: This MOA shall take effect upon the approval of the Parties and, unless terminated per Section 4(C) - Termination, will expire three (3) years and six (6) months from the date of the last signature to this MOA. Any Contributed Funds Agreement(s) entered into pursuant to this MOA will be limited to an initial period of performance not to exceed the term of this MOA, although they may be renewed for additional periods of performance not to exceed the term of this MOA for any renewal period as mutually agreed to by the Parties to this MOA and the subject Contributed Funds Agreement.

B. Amendment: If a party desires a modification in this MOA, the Parties shall confer in good faith to determine the desirability of such modification. Such modification shall not be effective until a written amendment is signed, and dated by the authorized representatives of the Parties, provided that any party may provide notice to all other parties of any change in the Key Personnel without amendment to this MOA.

C. Termination: A party may terminate its participation in this MOA prior to its expiration at any time, with or without cause, and without incurring any liability or obligation to the other Parties, by giving the other Parties at least ninety (90) calendar days prior written notice of termination.

5. General

A. Authorities not altered: Nothing in this MOA alters the statutory authorities or any other authorities of the Non-Federal Partners or Reclamation. This MOA does not supersede or void existing agreements between the Non-Federal Partners and Reclamation.

B. Liability: It is understood and agreed that no party to this MOA shall be responsible for any damages or injuries arising out of the conduct of activities governed by this MOA,

except to the extent that such damages and/or injuries were caused by the negligent or wrongful acts or omissions of its employees, agents, or officers. Reclamation's liability shall be limited by the Federal Tort Claims Act, 28 USC 2671, *et seq.*

C. Limitations: This MOA sets out the Parties' intentions and objectives and does not direct or apply to any person outside the Non-Federal Partner(s) and Reclamation. This MOA is not intended to, and does not create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by anyone against the United States, its agencies, its officers, or any person.

D. Notices and Key Personnel: Notices between the Parties and copies of correspondence among the scientific and/or technical representatives of each party that interpret or may have a bearing on the legal effect of this MOA's terms and conditions shall be sent to the key personnel below. Reclamation's key personnel are authorized to perform scientific and/or technical activities falling within the Scope of this MOA.

Non-Federal Partner Key Personnel:

Mr. Andy Fecko
Director of Resource Development
Placer County Water Agency
144 Ferguson Road
Auburn, CA 95604
afecko@pcwa.net
(530) 308-4507

Mr. Ken Payne
Interim General Manager
El Dorado County Water Agency
4110B Business Drive
Cameron Park, California 95682
kpayne@municipalcon.com
(916) 425-0734

Mr. Marcus Yasutake
Environmental and Water Resources Director
City of Folsom
50 Natoma St.
Folsom, CA 95630
myasutake@folsom.ca.us
(916) 351-3528

Mr. Richard D. Plecker, P.E.
Environmental Utilities Director
City of Roseville
2005 Hilltop Circle
Roseville, CA 95747
rplecker@roseville.ca.us
(916) 774-5714

Mr. James Peifer
Policy and Legislation Manager
City of Sacramento
1395 35th Avenue
Sacramento, CA 95822
jpeifer@cityofsacramento.org
(916) 808-1416

Mr. Rob Swartz
Manager of Technical Services
Regional Water Authority
5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610
rswartz@rwah2o.org
(916) 967-7692

Reclamation:
Regional Planning Officer
Bureau of Reclamation
2800 Cottage Way, MP-700
Sacramento, CA 95826
916-978-5060

E. Subcontracting Approval: A party hereto desiring to obtain and use the services of a third party via contract or otherwise shall give prior notice to the other Parties, including details of the contract or other arrangement. This requirement is to assure that confidentiality is not breached and rights in Subject Inventions are not compromised.

F. Assignment: No party has the right to assign this MOA or any of its responsibilities hereunder.

G. Endorsement: The Non-Federal Partner(s) shall not in any way state or imply that this MOA or the results of this MOA is an endorsement by the Department of the Interior, Federal Government, or Reclamation of its organizational units, employees, products, or services except to the extent permission is granted by an authorized representative of Reclamation.

H. Regulatory Compliance: The Parties acknowledge and agree to comply with all applicable laws and regulations of the state, Federal, and local environmental, cultural,

and paleontological resource protection laws and regulations as applicable to the activities or projects for this MOA. These regulatory compliance requirements may include but are not limited to, the National Environmental Policy Act (NEPA) including the Council on Environmental Quality, the Department of the Interior regulations implementing NEPA, the Clean Water Act, the Endangered Species Act, consultation with potentially affected Tribes, and consultation with the State Historic Preservation Office.

I. Disputes: Any dispute arising under this MOA, which cannot be readily resolved, shall be submitted jointly to the key personnel officials, identified in Section 4(D) - Notices and Key Personnel. Each party agrees to seek in good faith to resolve the issue through negotiation or other forms of nonbinding dispute resolution processes mutually acceptable to the Parties. Pending the resolution of any dispute or claim pursuant to Section 5(I), the Parties agree that performance of all obligations shall be pursued diligently.

J. Force Majeure: No party shall be liable for any unforeseeable event beyond its reasonable control not caused by the fault or negligence of such party:

1. Which causes the party to be unable to perform its obligations under this MOA; and

2. Which it has been unable to overcome by the exercise of due diligence.

3. This includes, but is not limited to, flood, drought, earthquake, storm, fire, pestilence, lightning and other natural catastrophes, epidemic, war, riot, civil disturbance or disobedience, strikes, labor dispute, failure or sabotage of the party's facilities or any order or injunction made by a court or public agency.

K. Relationship between the Parties: The Parties are and shall remain independent contractors and nothing herein shall be construed to create a partnership, agency, joint venture, or teaming agreement between the Parties.

L. Severability: The illegality or invalidity of any provision of this MOA shall not impair, affect, or invalidate the other provisions of this MOA.

M. Governing Law: The construction, validity, performance, and effect of this entire MOA shall be governed by the laws applicable to the Government of the United States of America in accordance with applicable Federal Law as interpreted by Federal Courts.

N. Waiver: The failure of a party to enforce any term hereof shall not be deemed a waiver of any rights contained herein.

O. Invalid Provision: In the event any provision of this MOA is determined to be invalid or unenforceable under any controlling law, the invalidity or unenforceability of that provision shall not in any way affect the validity or enforceability of the remaining provisions of this MOA.

P. Counterparts: This MOA may be executed in counterparts and each such counterpart shall be equally effective.

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

Name Andrew Fecko - Div. Resource Development
Placer County Water Agency

5/15/17
Date

Name
El Dorado County Water Agency

Date

Name
Regional Water Authority

Date

Name
City of Sacramento

Date

Name
City of Folsom

Date

Name
City of Roseville

Date

Reclamation:

Regional Director
Mid-Pacific Region

6/28/2017
Date

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

Name
Placer County Water Agency

Date

Name
El Dorado County Water Agency

5-17-17
Date

Name
Regional Water Authority

Date

Name
City of Sacramento

Date

Name
City of Folsom

Date

Name
City of Roseville

Date

Reclamation:

Regional Director
Mid-Pacific Region

6/28/2017
Date

APPROVED AS TO LEGAL
FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

Name Placer County Water Agency	Date
Name El Dorado County Water Agency	Date
Name Regional Water Authority	5/15/17 Date
Name City of Sacramento	Date
Name City of Folsom	Date
Name City of Roseville	Date

Reclamation:

Regional Director Mid-Pacific Region	6/28/2017 Date

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

Name
Placer County Water Agency

Date

Name
El Dorado County Water Agency

Date

Name
Regional Water Authority

Date

Name
City of Sacramento

6/1/17
Date

Name
City of Folsom

Date

Name
City of Roseville

Date

Reclamation:

David G. Murillo
Regional Director
Mid-Pacific Region

6/28/2017
Date

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

APPROVED AS TO FORM:

CITY ATTORNEY

City of Folsom Signature Page

MEMORANDUM OF AGREEMENT FOR THE AMERICAN RIVER BASIN STUDY

CITY OF FOLSOM, A Municipal Corporation:

5/23/2017
Date

Evert W. Palmer, City Manager

ATTEST:

Christa Freemantle, City Clerk 5/24/17 Date

FUNDING AVAILABLE:

James W. Francis, CFO/ Finance Director 5/19/17 Date

ORIGINAL APPROVED AS TO CONTENT:

Marcus Yasutake, 5/17/19 Date
Environmental & Water Resources Director

ORIGINAL APPROVED AS TO FORM:

Steve Wang, City Attorney 5/19/17 Date

Folsom File No. 174-21 17-003
Res 9863 01/10/2017

35037

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

_____ _____
Name Date
Placer County Water Agency

_____ _____
Name Date
El Dorado County Water Agency

_____ _____
Name Date
Regional Water Authority

_____ _____
Name Date
City of Sacramento

_____ _____
Name Date
City of Folsom

_____ _____
Name Date
City of Roseville

Reclamation:

David G. Murillo 6/28/2017
Regional Director Date
Mid-Pacific Region

APPROVED AS TO LEGAL
FORM AND SUFFICIENCY
Steph L Rahn
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

IN WITNESS WHEREOF, the Parties have caused this MOA to be executed.

Non-Federal Partners:

Name Placer County Water Agency	Date
Name El Dorado County Water Agency	Date
Name Regional Water Authority	Date
Name City of Sacramento	Date
Name City of Folsom	Date
Name City of Roseville	5-30-17 Date

Reclamation:

Regional Director Mid-Pacific Region	6/28/2017 Date

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

ATTACHMENT A

PLAN OF STUDY
AMERCIAN RIVER BASIN STUDY

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

March 20, 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
Basin Study D&S	*Reclamation Manual, Directives and Standards, WTR 13-01*
COR	Contracting Officer's Representative
CVP	Central Valley Project
CMIP5	Coupled Model Intercomparison Project Phase 5
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
EDCWA	El Dorado County Water Agency
EID	El Dorado Irrigation District
ESA	Endangered Species Act of 1973, as Amended
ESC	Executive Steering Committee
GCM	global climate model
FERC	Federal Energy Regulatory Commission
Folsom	City of Folsom
HUC	hydrological unit code
LTO FEIS	2015 Final Environmental Impact Statement for Coordinated Long-Term Operation of the CVP and SWP
M&I	municipal and industrial
MFP	Middle Fork American River Project
MOA	Memorandum of Agreement
N/A	not applicable
NEPA	National Environmental Policy Act
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
RPAs	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
TSC	Technical Services Center
USACE	U.S. Army Corps of Engineers
Water Board	State Water Resources Control Board
WTR	Water Management and Development

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 realize the potential of regional water reliability and adequately address the potential changes in dominating precipitation form from snow to rainfall, in seasonal distribution of precipitation, and 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 changing climate conditions 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 American River is a major tributary to the Sacramento River. Sacramento and adjacent metropolitan areas is the largest growth area in northern California in the past two decades and in the near future with a significant need to align the vision and climate adaptation strategies for sustainable basin-wide water management. The purpose of the American River Basin Study (ARBS or Study) is to develop the data, tools, analyses, and adaptation strategies specific to the American River Basin within the broad context of the SSJRBS. The ARBS will further evaluate the application of these adaptation strategies, and supplement with compatible actions and initiatives by local agencies to improve regional water supply reliability, while enhancing Reclamation's flexibility in operating Folsom Reservoir to meet flow and water quality standards in the Delta and protect endangered fishery species in the lower American River.

The ARBS will examine strategies to integrate or better coordinate local and Federal water management practices, incorporate new scientific information on climate change that are specific for the American River Basin, and address significant recent changes in conditions and regulatory requirements related to the CVP and regional water management including but not limited by Biological Opinions for endangered fishery species protection and protection of the Sacramento-San Joaquin Delta, and the State of California's (State) Sustainable Groundwater Management Act and water rights administration in drought conditions.

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 cooperatively develop the ARBS. The non-Federal Partners fully recognize that the ARBS is not a decision document. The final, completed ARBS will neither request nor propose any new feasibility study pursuant to Public Law 111-11 nor any new federal construction authority.

1.2 Plan of Study

As described in *Reclamation Manual, Directives and Standards, WTR 13-01* (Basin Study D&S)[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 and all components required in Basin Study D&S shown in Table 1-1.

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

Table 1-1. Basin Study D&S Requirements in American River Basin Study Plan of Study

Basin Study D&S 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
Basin Study D&S = *Reclamation Manual, Directives and Standards, WTR 13-01*
WTR = Water Management and Development

[1] WTR = Water Management and Development. https://www.usbr.gov/recman/wtr/wtr13-01.pdf.

1.3 Study Objectives

Under the "new normal" of potentially changing climate conditions, the ARBS will improve the resolution of regional climate data and develop regionally-specific climate projections and adaptation strategies, building on findings from the SSJRBS. The ARBS will:

- Further refine the assessment of water supplies and demands for the American River Basin
- Address regional demand-supply imbalance and infrastructure deficiencies under the existing and future climate change conditions.
- Improve regional collaboration for sustainable water resources management.
- Improve coordination of local and Federal water management to improve regional water supply reliability and to increase Reclamation's operational flexibility of Folsom Reservoir to meet all purposes of the CVP.
- Align water management tools, strategies, and planning efforts of Reclamation and water agencies 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 potential changes in climate 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, as Amended (ESA); water quality issues (including salinity levels); flow and water dependent ecological resiliency; and flood control and/or management.
- Develop adaptation and mitigation strategies specific to the American River Basin within the broad context of the SSJRBS to address imbalances between current and future supplies and demands identified through the Study analysis.
- 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 Geographic Location

Figure 1-1 shows the Study Area 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 includes major cities like cities of Sacramento, Roseville, Lincoln, Folsom, Rancho Cordova, Auburn and Placerville.

The Study Area encompasses three 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. It contributes about 15 percent of the total Sacramento River flow below its confluence in the City of Sacramento. Additional major reservoirs in this basin include the Union Valley Reservoir on Silver Creek with a capacity of 230,000 acre-feet, owned and operated by Sacramento Municipal Utility District (SMUD)); and PCWA's Hell Hole Reservoir on the Rubicon River with a capacity of 208,000 acre-feet; and French Meadows Reservoir on the Middle Fork American River with a capacity of 135,000 acre-feet.

- **Non-Federal Partners' Service Areas Outside of the American River Watershed** – This represents areas outside of the American River Watershed in adjacent watersheds of the Bear River and Cosumnes River that are served by non-Federal Partners with American River water.

- **North and South American Groundwater Subbasins** – The North American Subbasin and South American Subbasin of the Sacramento Valley Groundwater Basin 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.

Chapter 2 provides additional resource related information for the Study Area, including demographic and water supply conditions.

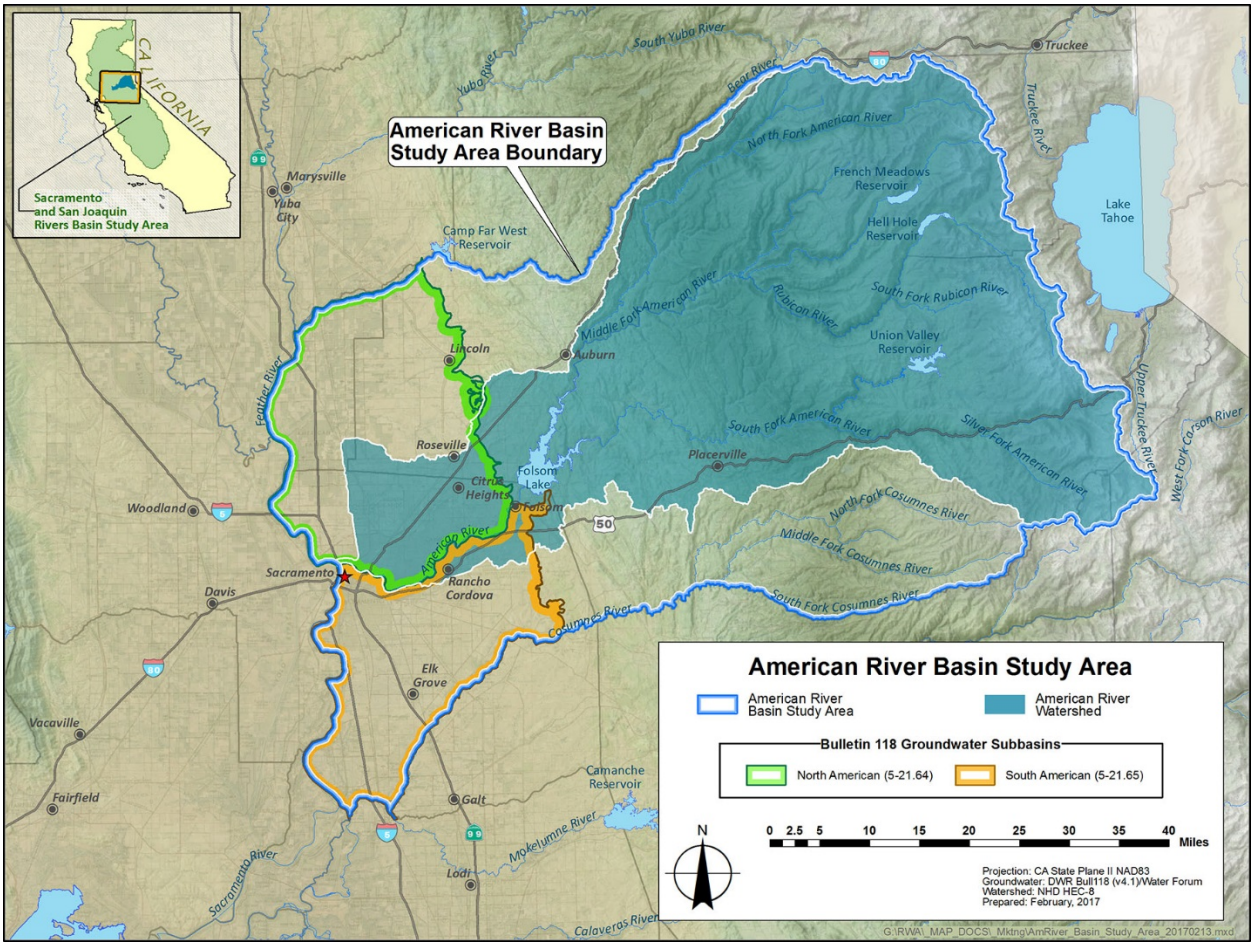

Figure 1-1. American River Basin Study Area Map

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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. Severe drought conditions precipitated statewide water right curtailments, severely reduced contract allocations, mandatory extraordinary conservation measures, and relaxed regulatory flows and water quality requirements for environmental protection. These measures were in addition to the increased regulatory requirements over the past decades that have further constrained Reclamation's flexibility in operating Folsom Dam to meet all authorized project purposes of the CVP, stressing the already overburdened American River watershed.

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 system-wide.

In late 2015, stored water was insufficient for local water right diversions and their CVP contract delivery, threatening water supply to over one million people in the American River Basin, and Reclamation operated Folsom Reservoir under temporary relaxation of the flow and water quality requirements under their water rights and ESA permits. The system was severely overwhelmed by the persistent drought conditions. However, 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 characteristics.

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

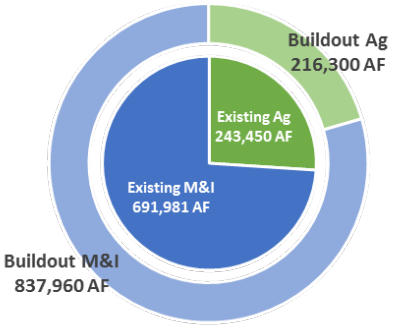
Reclamation's recently completed SSJRBS outlines major impacts from potential climate change on water supply, fish and wildlife protection, and flood management due to reductions in snowpack and changes in seasonal runoff. In the American River Basin, the potential effects of a changing climate have 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 provides a large portion of the storage necessary to regulate runoff for water supply. Warming conditions and changes in precipitation patterns 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 as the "first responder" 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 fulfill this responsibility in a mutually beneficial way. Reclamation's last watershed planning effort – the American River Water Resources Investigation (1998) – 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 adapt to evolving climate conditions. These issues must be resolved if the competing needs for regional water supply reliability, CVP systemwide delivery reliability, and endangered species protection in the lower American River and beyond are to be met in a balanced way 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 projected climate conditions, 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 increase from about 935,000 acre-feet per year to over 1 million acre-feet per year with planned development.

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 CVP contract deliveries and environmental water management. Major 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. 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 the buildout condition.[3,4]

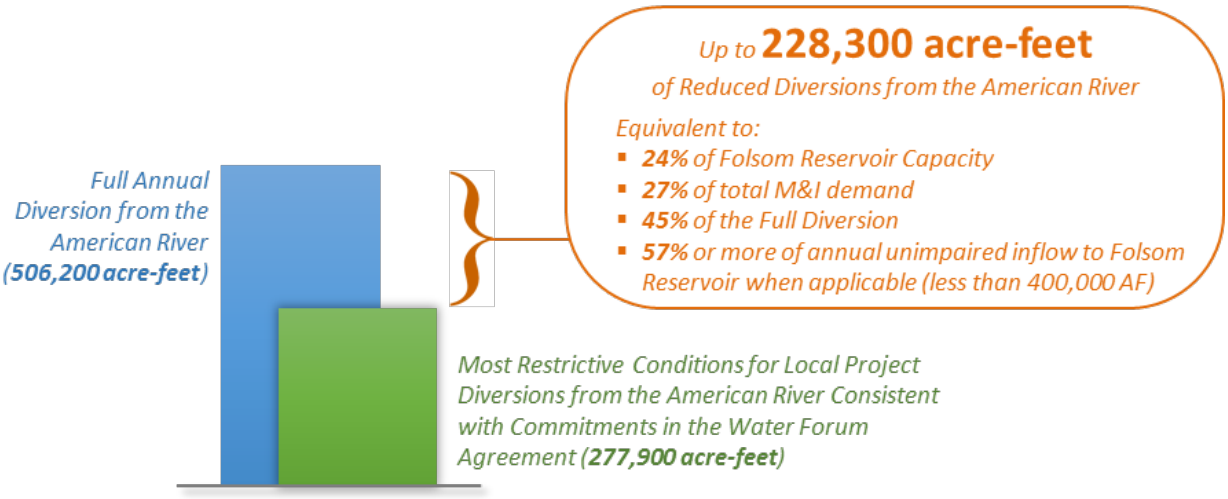
- **Revised CVP Operations** – CVP operations have changed significantly since the 1990s in response to new statutory and regulatory requirements related to fish and wildlife protection, water quality and other environmental-related purposes. Examples include the Central Valley Project Improvement Act 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's (Water Board) water right decisions requiring Reclamation and the California Department of Water Resources (DWR) to meet flow and water quality standards in the Delta; and Reasonable and Prudent Alternatives (RPAs) and other requirements in successive Biological Opinions governing the long-term operation of the CVP in coordination with the State Water Project (SWP). Progressing changes in CVP operations have contributed to a gradual reduction in CVP contract water allocations system-wide.

  In addition to the water rights held by local water agencies (described later), the CVP provides the Sacramento-Placer 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 (LTO FEIS), 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 the "first responder" to meet Delta flow and water quality requirements prescribed by the Water Board and the Biological Opinions and their respective RPAs prescribed by both the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration Fisheries. As a result, reductions in available CVP M&I water supplies and subsequent reductions in CVP American River Division contract deliveries pursuant to the shortage provisions are consistently identified in the

[3] The buildout condition is the maximum level of development permitted in the General Plan of a city or county, based on planning tools like land carrying capacity analysis or cumulative impact assessment.
[4] This potential imbalance is subject to refinement in the Study, including incorporating climate change effects on demand projection for all water agencies in the region.

LTO FEIS and other programmatic environmental analyses governing CVP/SWP-wide operations as the outcomes of the increasing regulatory requirements outside of the basin.

- **Water Right Curtailments and Facility Constraints** – In addition to CVP contracts, 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 rights) or their priority of use in the region are protected by California water laws when compared to CVP deliveries out of the basin. Accordingly, water under these rights has historically been viewed as 100 percent reliable. However, in response to the ongoing drought, in 2014 and 2015, the Water Board issued curtailments on water right diversions throughout the State, including those of some senior pre-1914 rights, impacting water supply reliability of those water agencies in the American River Basin with water rights. Further, access to CVP supplies became limited by historically low storage in Folsom Reservoir resulting from competing interests for CVP deliveries and releases downstream to meet Reclamation's required flow and temperature management targets. In 2015, even though they still had a legal right to divert water, many water agencies with water right diversions from Folsom Dam were close to losing their intake's physical ability to access water in Folsom Reservoir. These regulatory and physical infrastructure constraints have redefined the vulnerabilities of water supply reliability for many water users. With climate change, the intensity and frequency of extreme conditions that exacerbate these constraints is likely to increase.



- **Differences between Federal and Local Project Operation Constraints** – 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, which Reclamation is not a signatory and thus, cannot enjoy the benefits from intended balancing resource management. As a result, for water management planning purposes, Reclamation assumes that local water agency diversions would continue to occur, but many local water agencies have committed in the Water Forum Agreement to reduce (or redirect to the Sacramento River) future diversions from the American River to protect the fishery in the lower American River. A collaborative solution with Reclamation is required for the

ARBS to reconcile the differences and creating a mutually beneficial future diversion scenario that is also integrated with regional conjunctive use practice as envisioned in the Water Forum Agreement and Reclamation's American River Water Resources Investigation. For example, PCWA has a projected shortage of up to 34,000 acre-feet per year in its wholesale treated water service area in western Placer County due to their commitment in seeking a Sacramento River diversion through exchange with Reclamation in lieu of future water right diversion and CVP contract delivery from the American River to provide protection of the fishery in the lower American River; however, neither the exchange agreement nor necessary infrastructure are yet in place.

- **Climate Change** – Existing imbalances in the American River Basin for both consumptive use and environmental purposes are likely to 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, declining snowpack due to more precipitation falling as rain, reduced runoff, and increasing sea level elevations. With projected changes in climate, 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 in the timing of runoff, significant mitigation actions will be needed to maintain water supply reliability and to make the region more resilient to extreme events. The specific impacts in the American River Basin need to be further quantified for purposes of developing appropriate mitigation and adaptation strategies.

Nature of Imbalances

Likely imbalances in the American River Basin under climate change conditions relate to both water quantity (for consumptive uses) and water quality (for the management of temperature and flows for protection of endangered fishery species). They are also closely related to Reclamation's operation of Folsom Reservoir. These imbalances pose major water supply reliability challenges for the non-Federal Partners that are seeking to bridge the gap between their long-term supply and demand, and Reclamation's CVP operations (including operation of Folsom Reservoir) for multiple authorized purposes consistent with a broad range of statutory and regulatory requirements. For example, water releases from Folsom Reservoir for flow and temperature management must be balanced with local needs for consumptive uses. The imbalances between supply and demand in the American River Basin, as well as the CVP/SWP system as a whole, are expected to be significantly amplified by future 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 from Folsom Reservoir for previously mentioned reasons. Climate changes are

expected to 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 by the end of the century 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 originally intended and expanding purposes. The potential for Folsom Reservoir to serve as a reliable water source is likely to degrade further over time under projected climate 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 (about 49 percent of its total demand), and PCWA projects shortages of up to 34,000 acre-feet per year (about 38 percent of its total M&I demand). For the American River Basin as a 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 increasing difficulty in balancing the operation of Folsom Reservoir to meet local, regional, and CVP-wide needs and obligations.

2.3 Previous Work, Available Data and Tools, and Technical Focus

Many water agencies in the study area divert water from the lower American River based upon 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.

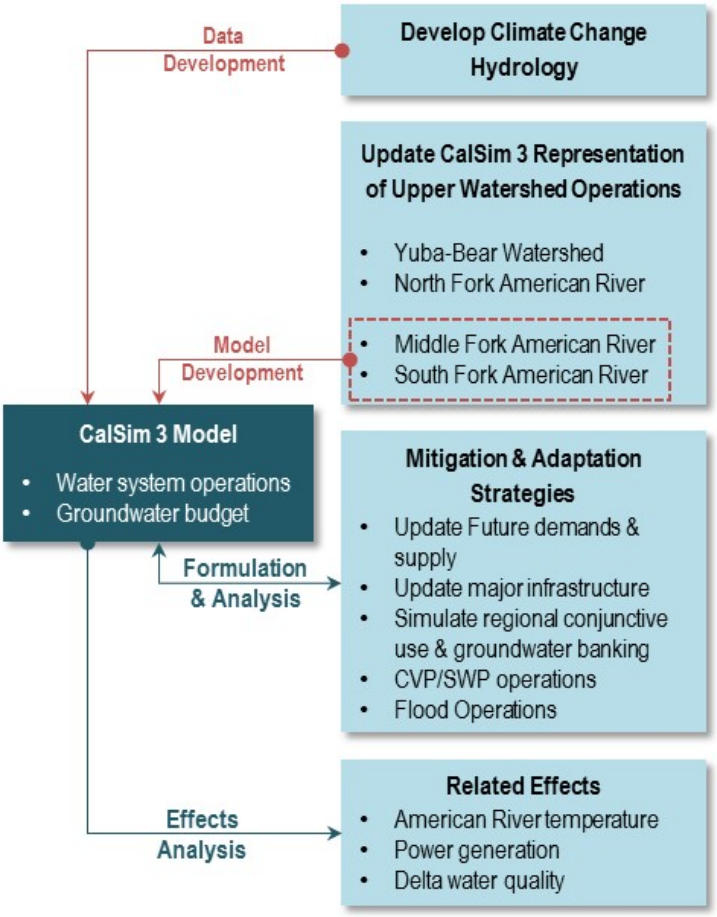
Example Datasets and Modeling Tools Available for the American River Basin Study for Application or Reference

- Climate Data – Bias corrected and downscaled climate projections (Reclamation; from SSJRBS)
- WEAP – Hydrology projections (Reclamation from SSJRBS based on DWR California Water Plan Update; further refinements are required)
- VIC – Statewide hydrology projections prepared by the State of California
- 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 groundwater subbasins

Reclamation and the non-Federal Partners have had initial discussions and are in agreement on model selection and intended applications. However, they are subject to further discussions and evaluation as the Study progresses.

For the ARBS, aligning the vision of water management in the American River Basin and adjacent areas needs to have both Reclamation and local non-Federal Partners agreeing on the assumptions and tools which are intended to be used in the basin study. In particular, Reclamation and the non-Federal Partners recognize the importance of having a technical evaluation methodology consistent with Reclamation's other model tools, including those which may be used for the recently-initiated ESA consultation for long-term CVP and SWP operations. The model selection and study methodology proposed for the ARBS are subject to further discussions and evaluation as the Study progresses.

CalSim 3 will be used as the main analytical tool to conduct integrated surface water and groundwater analyses and regional and system-wide operations, per recommendation from Reclamation's Technical Service Center (TSC). Compared with its predecessor (CalSim II), CalSim 3 is a new model developed by Reclamation and DWR with an embedded groundwater module for integrated surface water-groundwater analysis. The current version of CalSim 3 has already detailed representations of regional water operations by water agency and initial representation of the upstream watershed operations above Folsom Reservoir.



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 agencies in the region,
- Representation of the upper watershed (with anticipated additional refinement by the ARBS), and
- Capability for full integration with the existing groundwater model for the North and South American groundwater subbasins.

For this Study, additional 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 hydrologic input for CalSim 3.

- Refined representation of the upper watershed of the American River (North, Middle, and South forks) by

mapping existing upper watershed models created by local water agencies into CalSim 3.

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. It may be cost-effective to adopt the same approach and data set used by the SSJRBS, and update the WEAP model with additional refinements for the American River upper watershed, supported by available long-term records. However, since the ARBS is approved as a stand-alone basin study, Reclamation and the non-Federal Partners considered other existing climate data and hydrology information that may provide additional benefits. After extensive discussions among the technical teams from Reclamation and the non-Federal Partners, the Study will rely on the VIC model hydrology for the system and apply the same methodology to refine the data and information in the American River Basin. This agreement is based on several factors: (1) TSC prefers the VIC model over the WEAP model for producing climate change hydrology, and (2) the VIC model hydrology was produced by the State and used by the California Water Commission for its Water Storage Investment Program, providing additional potential benefits in aligning the planning efforts with the ongoing system evaluation and major project development methodology.

Demand in the American River Basin has not yet matured. The time required to reach the buildout demand depends on the economic conditions and other factors. It may vary by 10 to 15 years or more. It may also vary from one subregion to another. This makes a transient change analysis challenging. The non-Federal Partners are more interested in the larger scale of adaptation actions (e.g., a new reservoir for EDCWA, the RiverArc project for PCWA, a regional groundwater bank, etc.) than the timing/sequence of adaptation actions. In that case, a period change analysis would be more appropriate. However, Reclamation and the non-Federal Partners may consider the need of a transient change analysis as the Study progresses.

The non-Federal Partners have an interest in focusing on the buildout conditions. Therefore, the period change analysis will be conducted for both year 2070 and year 2100. A period change analysis for year 2070 will reflect the buildout conditions of all local agencies and long-term climate change conditions. The referenced year was selected to be consistent with the future time used by the California Water Commission and likely, in Reclamation’s future ESA consultation on the long-term operation of the CVP. It is possible to use a slightly closer referenced year; however, using any referenced year closer than 2060 may be problematic for the aforementioned reason – the demand in the American River Basin may not be mature. A 2100 analysis may be useful to show how much more stressed the water management conditions may be in the further distant future.

The overall goal of climate change hydrology methodology selection is to allow for more detailed development of hydrology, greatly improving the accuracy of runoff estimates and timing in the American River Basin. 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, Middle, and South forks and tributary streams. These models have been applied to evaluate alternatives of their facility operations for water supply, power generation, and temperature management to support water resource initiatives within the basin, including: Federal Energy Regulatory Commission (FERC) re-licensing for PCWA's MFP, FERC re-licensing for SMUD's 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, representation of the Middle Fork and South Fork of the American River in CalSim 3 will be updated to better represent hydrology and operations upstream of Folsom Reservoir. 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. One of the key tasks for the ARBS will be to map the OASIS model into CalSim 3 to ensure a fully integrated model that includes upstream operations as well as the broader CVP/SWP system operation.

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 model 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 relevant legal determinations.

2.4 Study Approach

There are three key components of the ARBS:

1. For the **projected supply and demand imbalance**, 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. Potential impacts of climate changes to demand projections will be considered, where available and provided by non-Federal Partners. The 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 assessment**, 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 possible future climate changes and the effectiveness of identified mitigation and adaptation strategies.

3. For the **trade-off analysis**, adaptation strategies identified in the SSJRBS that are applicable to the American River Basin, including structural improvements, operational improvements, and institutional/administrative improvements, will be refined and supplemented with regionally-compatible initiatives to address local water supply-demand imbalances. Applicable strategies will be refined to achieve the identified ARBS objectives to address projected climate change impacts to supplies and demands, 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).

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

Chapter 3
Study Management Requirements

3.1 Study Management Structure

Reclamation and the non-Federal Partners will implement an ARBS management structure that is fully integrated and allows joint partnership at all levels. Figure 3.1 depicts the management structure of the ARBS

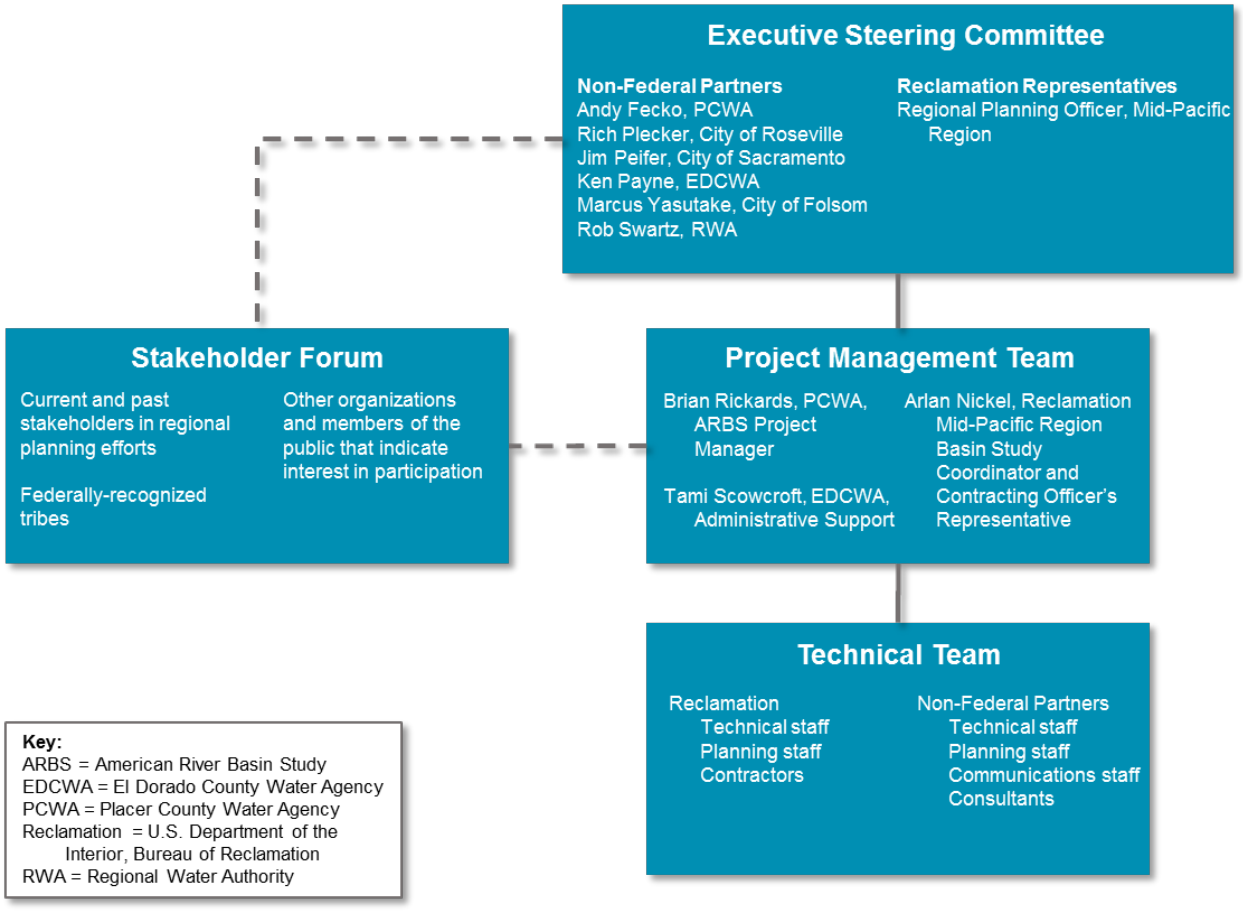


Figure 3-1. American River Basin Study Management Structure

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] "Responsible" describes where the work is done, who is responsible for carrying out an activity.
"Accountable" describes where the buck stops, who is held accountable.
"Consulted" describes the parties who need to be consulted prior to completing the activity.
"Informed" indicates the parties who need to be updated and informed about the outcome of the activity but do not need to be involved regularly during 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, consider and make decisions regarding issues 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 engage a defined 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), Reclamation's Basin Study Coordinator and Contracting Officer's 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 and the Reclamation Basin Study Coordinator and COR will be jointly responsible for the following:

- 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 Basin Study Coordinator and 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 Basin Study Coordinator and 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 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 the non-Federal Partners' technical, planning, and communications staff and consultants, and Reclamation technical and planning staff and contractors. Participation of individual Technical

Team members will be task-dependent, under the direction of the PMT. 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 solicit interest for active participation. The ARBS will have a website for Study information and instructions for participating in the Stakeholder Forum. The PMT will communicate directly with participants in the Stakeholder Forum. The Stakeholder Forum is for information purposes only and thus, 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 information identified in the approved MOA and POS will be documented in a memorandum from Reclamation's Regional Director to the Director of Policy and Administration. Corresponding approved changes will be documented in an amendment to the MOA and POS as necessary.

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 is to prepare the ARBS MOA and POS. When completed, the MOA provides the agreements on approach and scope that will guide completion of the Study. The POS will be also attached to the MOA and will serve as the project management plan for Reclamation and the non-Federal Partners for the Study.

Description. The POS was prepared through technical scoping with Reclamation and the non-Federal Partners' staff to detail the technical activities for the ARBS. A detailed roles and responsibility matrix is included in the POS to clarify the lead, coordination, 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. Non-Federal Partners are committed to the Study and with full collaboration with Reclamation, facilitate the POS development as a parallel cost-share task for approving the MOA (see Table 4-2).

Deliverables

- Draft and Final POS (completed through this POS).
- Draft and Final MOA.

Task 2 – Climate Change Data and Model Development

This task provides the major technical data and tools to be used for the Study.

Subtask 2.1 Global Climate Change Model Downscaling and Hydrological Modeling

Purpose. This subtask will prepare downscaled climate and runoff projections for the American River Basin.

Description. One major intent for the Study is to form a unified dataset and tools for future Federal and local/regional planning activities in the American River Basin that will also be consistent with Reclamation's major system-wide initiatives and actions such as the ESA consultation for long-term CVP and SWP operations. This subtask will be conducted with Reclamation's TSC as the lead in coordination with the non-Federal Partners to determine the best modeling approach.

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 to assemble 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.

Downscaled GCM data and statewide hydrology will be obtained from the recent climate change modeling efforts conducted by the California Water Commission, using the VIC model. The refined-scale VIC model for the upper American River watershed will be developed by TSC updating the coarse-grid VIC model to accommodate the resolution for the non-Federal Partners' OASIS models, which simulate the operation in the watershed upstream of Folsom Reservoir. Since CalSim 3 will be developed at a consistent scale and resolution as the OASIS models, the resulting hydrology will be used for CalSim 3 input in the subsequent planning (Task 4). Refined hydrology can improve the accuracy of projected operations in both volume and timing, and will benefit the Study and the non-Federal Partners' future operation studies for their facilities.

Specifically, TSC will develop necessary hydrologic input that support two period-change analyses (2070 and 2100). Reclamation and the non-Federal Partners may reconsider a transient change analysis as the Study progresses. The Study will use the full Coupled Model Intercomparison Project Phase 5[5] (CMIP5) dataset and established methods to organize the ensembles for the possible range of climate change conditions. The selection of ensemble-informed scenarios often consider 5 scenarios: Q1 (drier, less warming), Q2 (drier, more warming), Q3 (wetter, more warming), Q4 (wetter, less warming), and Q5 (central tendency). At the minimum, the Study will focus on Q2 and Q5. Reclamation and the non-Federal Partners may consider other ensemble-informed scenarios as the Study progresses.

Deliverables

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

Subtask 2.2 CalSim 3 Model Refinement

Purpose. Reclamation and non-Federal Partners have identified CalSim 3 as the main analytical tool to support planning under the Study. This subtask will update the monthly CalSim 3 representation of the local project operations on the North, Middle, and South Forks of the

[5] http://cmip-pcmdi.llnl.gov/cmip5/

American River upstream of Folsom Reservoir, and update regional infrastructure representation and agency-specific water supply portfolios.

Description. This subtask is to develop the CalSim 3 base model for application, including the refinements in local agency's portfolio of water supply and use and the refinement of the upstream operation based on recent work by non-Federal Partners.

CalSim 3 currently include specifications of water management in the CVP/SWP system and the upper watersheds of the Yuba and Bear rivers, and the North, Middle, and South forks of the American River. 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).

The current CalSim 3 also contains the operation 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 will 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. These models and data will be provided by the non-Federal Partners as cost-share efforts (see Table 4-3). As a result, the current 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 geo-referenced 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, others 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 provide water budgets for local water agencies so that the local and regional water supply reliability can be assessed.

Deliverables

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

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 common set of modeling data and tools to be used in future Federal and local planning efforts is a critical intent for the Study. This includes Reclamation's review of several models (and their associated assumptions and logics) for acceptance. This includes the temperature models for the upper American River basin, Folsom Lake, Lake Natoma, and lower American River; and the OASIS models for upper American River Basin (to be incorporated into CalSim 3 in Task 2.2). This subtask will be done in parallel to Subtasks 2.1 and 2.2 for efficiency and progress, though close coordination under the PMT. Under the direction of the PMT, model assumptions and operations will also be reviewed periodically to ensure consistency with Reclamation's ongoing statewide initiatives and actions, including but not limited by, the ESA consultation for long-term CVP and SWP operations.

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 stream 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 may have an effect on future demands for M&I and agricultural uses 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. It is assumed that the demand scenarios would be matched with hydrology scenarios to provide a reasonable analysis to bracket the effects on the overall supply and demand imbalance, representing up to three total combined scenarios for evaluation purposes.

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. The assessment timeframe will extend to the end of the century (2100).

Description. Using the tools and data developed under Task 2 and the demand scenarios developed under Subtask 3.1, a water supply and demand assessment will be conducted to identify imbalances and vulnerabilities under a range of potential future climate change conditions. The projected future demands at buildout conditions will be based on the non-Federal Partners' buildout water demand information 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 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 application of basin-specific adaptation strategies in Subtasks 4.2 and 4.3.

Description. The evaluation criteria are for measuring the potential accomplishments or other considerations of the basin-specific adaptation strategies. Criteria and metrics may include (but are not limited to) the following:

- Achieving and maintaining a desired level of water supply reliability 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 development of evaluation criteria and metrics will be an iterative process starting with those basic ones for the performance indices for imbalance identification, and later additional criteria and metrics for evaluating the potential accomplishments and considerations for the identified management actions and adaptation options in Subtask 4.4. The iterative process is critical for Reclamation and non-Federal Partners to gain focus as the Study progresses. The criteria and metrics will also be built on the ones used by non-Federal Partners in their Regional Reliability Study (one of the cost-share studies; see Table 4-3) for consistency and alignment. Subject to further refinement, the preliminary set of evaluation criteria and metrics for the Regional Reliability Study include, but not limited by, contribution to objectives in improving water supply reliability during dry or emergency conditions, and meeting current and future resources needs with more expanded water supply portfolio, project readiness and implementability considerations, and others,

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 Adaptation Strategy and Portfolio Refinement

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

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 strategies, leveraging the information available from the SSJRBS. Concept-level evaluation and screening of adaption strategies for regional application will be conducted using available information.

The screened adaptation strategies may be grouped into portfolios of similar strategies to aid in their evaluation and reduce the modeling effort necessary to analyze multiple strategies which may have similar attributes. The adaptation strategies, including portfolios, will then be

evaluated and compared. This evaluation and comparison may use a mix of quantitative and qualitative information. Following the initial evaluation, the strategies or portfolios may be further refined to enhance their desired attributes to provide for an improved ability to model their performance under a variety of different climate and socioeconomic scenarios.

Deliverables

- Draft and Revised Draft Adaptation Strategy and Portfolio TM.

Subtask 4.3 Option Evaluations (Analytical Evaluation)

Purpose. This subtask will evaluate and compare the options formulated in Subtask 4.4.

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 at Reclamation Reservoirs
- 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

Based on the options developed in Subtask 4.4, this subtask is to conduct analytical evaluations using the basin study tools and assumptions developed under Task 2, 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 identified adaptation strategies will be also evaluated using the CE-QUAL-W2 temperature models developed by the non-Federal Partners, the CVP/SWP hydropower production spreadsheet model and its equivalent hydropower production tools for upstream facilities, and DSM2 for Delta water quality.

Deliverables

- Draft and Revised Draft Option Modeling Assumption TM.
- Revised CalSim 3 operational logic for regional operations, if applicable (in electronic format).

Subtask 4.4 Development of Options to Address Existing and Projected Gaps between Supplies and Demands

Purpose. This subtask will identify and evaluate both existing and proposed local options, including local agency actions or options which are currently being utilized, or are proposed to be used to manage water supplies and demands in the American River Basin. The relative efficacy of the options identified will be analyzed for performance changes under the climate change scenarios developed in Subtask 3.1. The performance and efficacy of the options will be further tested against the adaptation strategies developed through the study process in Subtask 4.2 to determine which strategies provide the most robust benefits and advantages for water management in the American River Basin.

Description. Conduct document review and coordinate with water agencies within the American River Basin to identify and inventory ongoing or proposed options to meet future water supply needs regionally and/or manage demands within the individual service area boundaries. Such local agency options may include but are not necessarily limited to:

A. Non-Structural Options:

- Operational changes
- Legal and institutional changes
- Water conservation and efficiency
- Water marketing
- Drought contingency measures
- Inter-basin transfers using existing facilities
- Conjunctive surface and groundwater use

B. Structural Options:

- Upgrades, rehabilitation, or replacement of existing facilities
- Water recycling and reuse facilities
- Desalination (brackish or seawater) facilities
- Use of an intertie to connect two water distribution systems
- Any facilities needed to implement non-structural changes

- Development of new facilities, including conveyance and storage facilities

Evaluate Identified Options. Prioritize and analyze existing and proposed local agency water management options to determine how they may perform under a range of future climate conditions with application of the adaptation strategies identified through the study process. The options will be ranked and prioritized in this subtask under criteria and metrics developed in Subtask 4.1, and supported by the analytical evaluation in Subtask 4.3. To be prioritized for analysis, options must have a measurable or specified effect on Basin supplies, demands, or operations. The analysis will include an evaluation of the environmental, economic/financial, and social benefits or impacts of the options considered. The study will also identify potential institutional, legal and regulatory constraints affecting the options considered.

Deliverables

- Draft and Revised Draft Option Evaluations TM

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 upon 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 Studies D&S.

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. The schedule and content for each review are available in Attachment B. 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 incorporated where relevant and appropriate. Each set of review comments will be documented in 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, findings, 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 addressed, and a final study report will be prepared.

Deliverables

- Draft and Final ARBS Report.

Task 8 – Stakeholder Outreach and Involvement

Purpose. This task is to prepare a Communication and Outreach Plan, implement the plan, and document the process.

Description. Preparation of the Communication and Outreach Plan needs to 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 Communication and Outreach 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 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 (completed as part of the POS development).
- 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. The lead of each task will be the party responsible for completing the task under the PMT's direction to meet the Study needs. In some cases, co-leads will be assigned for different parts of the same task. A coordinator will facilitate task implementation. A reviewer will review work products for adequacy and acceptance. A commenter will provide input on any public-facing products.

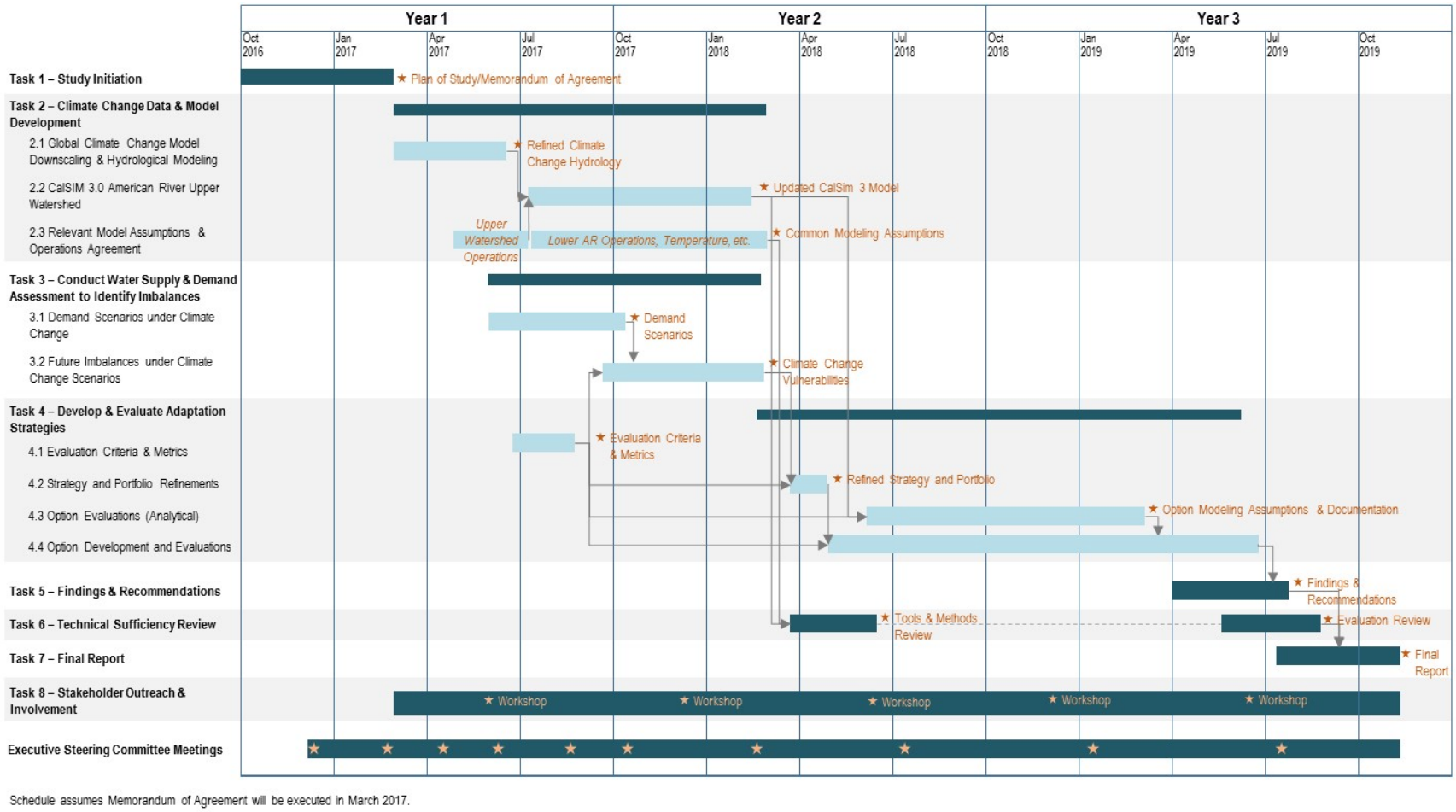
4.3 Study Schedule

The anticipated ARBS schedule is presented by task and subtask in Figure 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	• Reviewer	• Commenter
Subtask 2.2 – CalSim 3 Model Refinement	• Reviewer	• Reviewer	• Lead • Coordinator	• Reviewer	• Commenter
Subtask 2.3 – Relevant Model Assumptions and Operations Agreement	• Co-Lead	• Reviewer	• Coordinator	• Co-lead	• Commenter
Task 3 – Conduct Water Supply and Demand Assessment to Identify Imbalance					
Subtask 3.1 – Demand Scenarios under Climate Change	• Reviewer	• Reviewer	• Coordinator	• Lead	• Commenter
Subtask 3.2 – Future Imbalances under Climate Change	• Reviewer	• N/A	• Lead	• Reviewer	• Commenter
Task 4 – Develop and Evaluate Adaptation Strategies					
Subtask 4.1 – Evaluation Criteria and Metrics	• Coordinator • Reviewer	• N/A	• Co-lead	• Co-lead	• Commenter
Subtask 4.2 – Adaptation Strategy and Portfolio Refinement	• Coordinator • Reviewer	• N/A	• Co-lead	• Co-lead	• Commenter
Subtask 4.3 – Option Evaluations (Analytical Evaluation)	• Coordinator • Reviewer	• N/A	• Co-lead	• Co-lead	• Commenter
Subtask 4.4 – Option Development and Evaluations	• Coordinator • Reviewer	• N/A	• Co-lead	• Co-lead	• Commenter
Task 5 – Findings	• Coordinator • Reviewer	• N/A	• Lead	• Review	• Commenter
Task 6 – Technical Sufficiency Review	• Lead	• Reviewer (per request)	• Coordinator	• Review	• N/A
Task 7 – Final Report	• Coordinator • Reviewer	• N/A	• Lead	• Review	• Commenter
Task 8 – Stakeholder Outreach and Involvement	• Co-lead	• N/A	• Coordinator	• Co-lead	• 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



Schedule assumes Memorandum of Agreement will be executed in March 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.

Cost Share Points of Contact

The total cost of the ARBS is estimated at $2.686 million. Reclamation will provide up to $830,000 as the Federal cost-share partner ($650,000 in Reclamation staff time and contractor support with an additional $180,000 in Reclamation project management labor and administrative costs projected by the Region to co-manage the ARBS). Note that the current budget for the ARBS is $650,000, and the additional $180,000 for the Region's study administration would be requested after the ARBS is initiated. 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 and COR, 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:
COR = Contracting Officer's Representative
PCWA = Placer County Water Agency
Reclamation = U.S. Department of the Interior, Bureau of Reclamation

Table 4-2. 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	**$1,213,400** [5]	**$ -**	**$ 255,000**	**$ 70,700**	**$1,539,100**
Subtask 2.1 – Global Climate Change Model Downscaling and Hydrological Modeling	• Obtain downscaled GCM data for the American River Basin from SSJRBS • Refine the SSJRBS WEAP model for American River Basin • Develop refined runoff hydrology for CalSim 3 using WEAP hydrological model, using downscaled GCM data	*$ -*		*$ 80,000* [4]	*$ 22,200*	*$ 102,200*
Subtask 2.2 – CalSim 3 Model Refinement	• 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 to be incorporated into CalSim 3, and temperature models	*$ 424,200* [5]		*$ 40,000*	*$ 11,100*	*$ 475,300*

Table 4-2. 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**	**$ 101,700**
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**	**$ 834,700**
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 – Adaptation Strategy and Portfolio Refinement	• Identify and screen adaptation strategies and portfolios for regional applicability • Refine regionally-applicable adaptation strategies and portfolios	*$ 42,300* [5]		*$ 10,200*	*$ 2,900*	*$ 55,400*
Subtask 4.3 – Option Evaluations (Analytical Evaluation)	• Option 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. 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]	
Subtask 4.4 – Option Development and Evaluations	• Develop options to address existing and future gaps between supplies and demands, based on existing and proposed local options and initiatives • Evaluate the identified options for potential accomplishments based on the evaluation criteria and metrics	*$ 289,100* [5]		*$ 69,800*	*$ 19,300*	*$ 378,200*
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 for this Study.
3 Reclamation Project Management includes estimated labor and administrative costs necessary for the Region to support the ARBS over its 3-year duration.
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 (see Table 4-3) 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

Description of Complementary Cost-Share Efforts[1]	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	$ 63,000	
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	Mar 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 facilitate the exchange of future American River diversions and use of surplus water from the Sacramento River to benefit the Sacramento-Placer 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	Mar 2016 – Feb 2018
		Subtask 2.3	$ 134,000	

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

Description of Complementary Cost-Share Efforts[1]	Proponent(s)	ARBS Task	Cost Share	Cost-Share Schedule
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 facilitate the exchange of future American River diversions and use of surplus water from the Sacramento River to benefit the Sacramento-Placer 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	Subtasks 2.2 and 2.4	$ 62,000	Mar 2016 – Feb 2018
		Subtask 2.3	$ 34,000	
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 facilitate the exchange of future American River diversions and use of 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	Subtasks 2.2 and 2.4	$ 42,000	Mar 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
		Subtasks 4.2 and 4.4	$ 200,000	
ARBS Strategy and Portfolio Refinement, and Option Development and 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 and portfolio refinement, and options development and evaluation in Subtasks 4.2 through 4.4, using the tools developed under Task 2.	EDCWA, Folsom, PCWA, Roseville, Sacramento	Subtasks 4.2 and 4.4	$ 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 (continued)

Description of Complementary Cost-Share Efforts[1]	Proponent(s)	ARBS Task	Cost Share	Cost-Share Schedule
		Task 1 Total	**$ 25,500**	
		Task 2 Total	**$ 1,190,000**	
		Task 3 Total	**$ 30,000**	
		Task 4 Total	**$ 450,000**	
		Task 8 Total	**$ 4,500**	
		TOTAL (All Tasks)	**$ 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

Note:

1 The efforts include specific products and technical resources to participate the ARBS development; they does not include non-Federal Partner staff time.

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

March 20, 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 (PM), Reclamation's Basin Study Coordinator and 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). PCWA will also provide the ARBS PM, and EDCWA will provide administrative support for the PMT.

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 agencies 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. Regional Planning Officer, Mid-Pacific Region

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), PMT, 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 Study initiation to prepare the POS and MOA and the subsequent ARBS development, 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 PM of potential and pending activities intended as a method to keep the ESC informed.

Plan of Study for the American River Basin Study

Attachment B – Technical Sufficiency Review Plan

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Mid-Pacific Region

March 20, 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).

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 – Planning Objectives.** This review will cover the identified supply and demand imbalance and the planning objectives for adaptation strategy. 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 refinement of adaptation strategy and portfolio for regional applicability included in Subtask 4.2, Adaptation Strategy and Portfolio Refinement.

- **Technical Sufficiency Review #4 – Option Identification and Evaluations.** This review will cover evaluation of the options based on existing and proposed local actions and initiative to address the identified gaps between supplies and demands in Subtask 4.4, Development of Options, and evaluated under Subtask 4.3, Option Evaluations (Analytical 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 will be incorporated where relevant and appropriate.

[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

March 20, 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). The PMT will be comprised of the ARBS Project Manager (PM), the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) Basin Study Coordinator and Contracting Officer Representative (COR), and administrative support staff.

Goals for Communication and Outreach

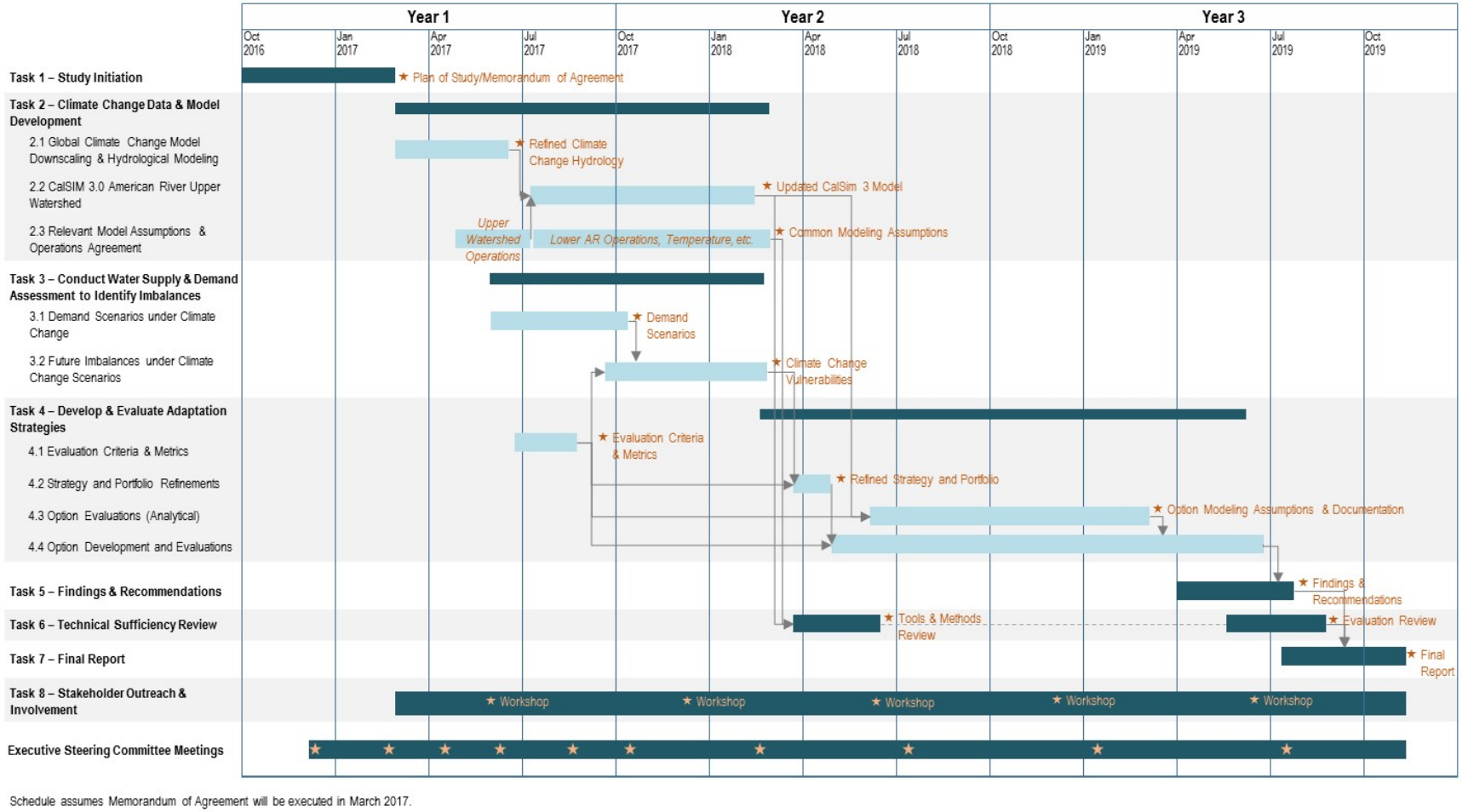
Goals for communication and outreach include:

- 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 March 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 ARBS 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. Both the Stakeholder Forum and the general public are considered outreach audiences for the purposes of this plan, and opportunities for information updates and engagement will be provided throughout the development process of the ARBS.

For members of the public and some interested parties ("general public") who are not interested in a Stakeholder Forum-level of participation in the ARBS, the PMT will provide information and updates via emails or the ARBS website, 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.

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 Basin Study with six (6) non-Federal Partners. The non-Federal Partners and Reclamation are co-managing the preparation of the ARBS. The ARBS is intended to be completed within 3 years of the formal start date.
- The ARBS will include development of detailed hydrologic analysis and models for the American River Basin, with consideration of the impacts of potential future climate change conditions.
- 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 the latter half of 2019.

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 website will be created by PCWA on its organizational website. This website will be updated regularly to include content on ARBS development, upcoming meetings and workshops, meeting materials, and ARBS documents. Reclamation may have a webpage on its official website that will provide a brief description of the Study with a hyperlink to the ARBS website for up-to-date information. The other non-Federal Partners may consider implementing a similar measures.

The goal of the ARBS website 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 PM and the Reclamation Basin Study Coordinator and COR will be the primary points of contact for inquiries.

Contact Information

As required in *Reclamation Manual, Directives and Standards, WTR 13-01,* contact information for Reclamation staff and the non-Federal Partners conducting the ARBS will be distributed to interested stakeholders. The information will be included in the Website for public use.

ARBS Cost-Share Partner Contact Information		
Entity	Reclamation	PCWA
Contact Person	Arlan Nickel Mid-Pacific Region Basin Study Coordinator and COR, 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:
COR = Contracting Officer's Representative
PCWA = Placer County Water Agency
Reclamation = U.S. Department of the Interior, Bureau of Reclamation

News/Press Releases

In an effort to maximize public outreach, news/press releases will be developed and issued by the ESC (in cooperation with Reclamation's Public Affairs Office) at key milestones 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 website or by contacting the ARBS PM and Reclamation's Basin Study Coordinator and COR. 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, Contractor, 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

March 20, 2017

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

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**