S A W P A

SANTA ANA WATERSHED PROJECT AUTHORITY

11615 Sterling Avenue, Riverside, California 92503 • (951) 354-4220

AGENDA

SPECIAL MEETING OF THE
PROJECT AGREEMENT 23 COMMITTEE

Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)

Committee Members:
Thomas P. Evans, Vice President, Board of Directors of the Western Municipal Water District
Joe Grindstaff, General Manager, Inland Empire Utilities Agency [Vice Chair]
Douglas Headrick, General Manager, San Bernardino Valley Municipal Water District [Chair]
Paul D. Jones, General Manager, Eastern Municipal Water District
Michael Markus, General Manager, Orange County Water District

THURSDAY, AUGUST 25, 2016 – 1:30 P.M.

1. CALL TO ORDER (Douglas Headrick, Chair)

2. PUBLIC COMMENTS

Members of the public may address the Committee on items within the jurisdiction of the Committee; however, no action may be taken on an item not appearing on the agenda unless the action is otherwise authorized by Government Code §54954.2(b).

3. APPROVAL OF MEETING MINUTES: JULY 28, 2016 5

Recommendation: Approve as posted.

4. COMMITTEE DISCUSSION ITEMS

A. RMC PROGRAM MANAGEMENT SERVICES FOR SARCCUP
Introduction of Brian Dietrick, P.E., Deputy Program Manager, RMC Water & Environment
Presenter: SAWPA

Recommendation: Receive and file.

B. DISCUSSION REGARDING ROLES, RESPONSIBILITIES AND WORKFLOW CONCERNING PROJECT PROPONENTS, RMC CONSTRUCTION MANAGEMENT AND SAWPA GRANT ADMINISTRATION.....11
Presenter: SAWPA

Recommendation: Receive and file.

C. GRANT AGREEMENT AND SUB-AGREEMENT STATUS.....15
Presenter: SAWPA

Recommendation: Receive and file.

D. STATUS UPDATE ON THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (MWD) AGREEMENT
Presenter: EMWD

Recommendation: Receive and file.

E. DRAFT FUNDING TERMS AND CONCEPTUAL PROJECT SCENARIOS STATUS
Presenter: WMWD

Recommendation: Receive and file.

F. SARCCUP AGREEMENTS DEVELOPMENT TIMELINE STATUS
Presenter: OCWD

Recommendation: Receive and file.

G. SARCCUP CONJUNCTIVE USE DESIGN STANDARDS UPDATE
Presenter: OCWD

Recommendation: Receive and file.

H. OVERVIEW OF THE CONJUNCTIVE USE DECISION-SUPPORT MODELING (PA23#2016.5).....27
Presenter: SBVMWD

Recommendation: Review the final draft of SARCCUP Decision Support Model Scoping Technical Memorandum, particularly the list of questions to be answered by the model provided on page 16 thereof, and provide any feedback to the planning managers.

5. REVISE REGULAR PA 23 COMMITTEE MEETING SCHEDULE

Recommendation: Regular meetings of the PA 23 Committee shall be held immediately following the regular meetings of the PA 22 Committee, but no earlier than 8:30 a.m., on the fourth Thursday of every month, at 11615 Sterling Avenue, Riverside, California.

6. CONSIDER RESCHEDULING SEPTEMBER 22, 2106 REGULAR MEETING

7. COMMITTEE MEMBER REQUESTS FOR FUTURE AGENDA ITEMS

8. ADJOURNMENT

PLEASE NOTE:

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Clerk of the Board at (951) 354-4230. Notification at least 48 hours prior to the meeting will enable staff to make reasonable arrangements to ensure accessibility to this meeting.

Materials related to an item on this agenda submitted to the Committee after distribution of the agenda packet are available for public inspection during normal business hours at the SAWPA office, 11615 Sterling Avenue, Riverside, and available at www.sawpa.org, subject to staff's ability to post documents prior to the meeting.

Declaration of Posting

I, Kelly Berry, Clerk of the Board of the Santa Ana Watershed Project Authority declare that on Friday, August 19, 2016, a copy of this agenda has been uploaded to the SAWPA website at www.sawpa.org and posted in SAWPA's office at 11615 Sterling Avenue, Riverside, California.

/S/

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Kelly Berry, CMC

2016 – Project Agreement 23 Committee Regular Meetings Fourth Thursday of Every Month (NOTE: Unless otherwise noted, all Committee meetings begin at **9:00 a.m.** and are held at SAWPA.)	
August 25, 2016	November 17, 2016*
September 22, 2016	December 22, 2016
October 27, 2016	
* Meeting date adjusted due to conflicting holiday.	

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PROJECT AGREEMENT 23 COMMITTEE
Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)
REGULAR MEETING MINUTES
July 28, 2016

COMMITTEE MEMBERS PRESENT

Thomas P. Evans, Vice President, Board of Directors of the Western Municipal Water District
P. Joseph Grindstaff, General Manager, Inland Empire Utilities Agency [Vice Chair]
Douglas Headrick General Manager, San Bernardino Valley Municipal Water District [Chair]
Paul D. Jones, General Manager, Eastern Municipal Water District
Michael Markus, General Manager, Orange County Water District

ALTERNATE COMMITTEE MEMBERS PRESENT [Non-Voting]

John Rossi, General Manager, Western Municipal Water District [Alt]

COMMITTEE MEMBERS ABSENT

None

MEMBER AGENCY STAFF PRESENT

Eastern Municipal Water District
Kelley Gage
Brian Powell

Inland Empire Utilities Agency
Sylvie Lee

Orange County Water District
Greg Woodside
Adam Hutchinson

San Bernardino Valley Municipal Water District
Bob Tincher

Western Municipal Water District
Craig Miller
Tim Barr

Santa Ana Watershed Project Authority
Celeste Cantú
Larry McKenney
Rich Haller
Mark Norton
Kelly Berry

OTHERS PRESENT

Brian Dietrick, RMC Water & Environment; Tyler Old, Public Financial Management

1. CALL TO ORDER (Doug Headrick)

The regular meeting of the PA 23 Committee was called to order at 9:03 a.m. by Chair Headrick at the Santa Ana Watershed Project Authority, 11615 Sterling Avenue, Riverside, California.

2. PUBLIC COMMENTS

There were no public comments.

3. APPROVAL OF MEETING MINUTES: JULY 12, 2016

MOVED, approve July 12, 2016 meeting minutes.

Result:	**Adopted (Unanimously; 5-0)**
Motion/Second:	Evans/Grindstaff
Ayes	Evans, Grindstaff, Headrick, Jones, Markus
Nays:	None
Abstentions:	None
Absent:	None

4. COMMITTEE DISCUSSION ITEMS

A. SARCCUP PROJECT MANAGEMENT SERVICES – CONSULTANT SUPPORT (PA23#2016.1)

Mark Norton gave an oral presentation on the Agreement for Services with RMC Water and Environment to provide project management services in support of the Santa Ana River Conservation and Conjunctive Use Program (SARCCUP). A total of eight proposals were received and thereafter considered by a review committee composed of the planning managers from each of the SARCCUP member agencies. Representatives from the top four proposing firms were interviewed and fee proposals were reviewed. It was agreed among the SARCCUP planning managers that some tasks and costs could be eliminated since some would be undertaken by the SARCCUP agencies. The review committee unanimously recommended entering into an agreement with RMC Water & Environment for a five-year period (the life of the project); the anticipated not-to-exceed amount of the five-year agreement is $1,284,489. Task orders will be issued on an annual basis over the five-year term of the agreement. Below is a breakdown of the anticipated task order amounts by fiscal year.

FYE	Task Order Amount
2017	310,429.00
2018	260,515.00
2019	240,927.00
2020	257,114.00
2021	215,505.00
Total Amount	**$ 1,284,489.00**

Larry McKenney noted that pending approval of a PA 23 Committee FY 16-17 budget, Committee actions such as this require ratification by the Commission. The Commission will be asked to ratify this action of the PA 23 Committee at the next regular meeting.

MOVED, approve an Agreement for Services with RMC Water and Environment with a term through December 31, 2021, for project management services to support the Santa Ana River Conservation and Conjunctive Use Program (SARCCUP), and authorize Task Order No. RMC504-401-01 in the not-to-exceed amount of $310,429.

Result:	**Adopted (Unanimously; 5-0)**
Motion/Second:	Jones/Markus
Ayes	Evans, Grindstaff, Headrick, Jones, Markus
Nays:	None
Abstentions:	None
Absent:	None

B. SAWPA PA 23 COMMITTEE BUDGET PREPARATIONS (PA23#2016.2)

Mark Norton led a discussion on PA 23 Committee Budget preparation, and reviewed the following agenda packet items: (1) SARCCUP: Funding by Task, (2) SARCCUP: Funding by Agency; and, (3) SAWPA Labor Hours. It was noted that staff would continue to work with planning managers to discuss forthcoming additions to the Budget Category/Task column to include items such as land and easement purchases and certain outside costs to SARCCUP member agencies.

Project Administration costs (SAWPA/RMC) are projected at $2M – approximately $1.3M for RMC costs and $692,000 for SAWPA. A discussion ensued regarding grant administration, the 5% grant administration set-aside amount ($3.2M) and distribution of excess funds for project purposes, including distinction between SAWPA tasks and RMC tasks.

Grindstaff suggested establishing as a policy that if we underspend grant administration costs, excess funds would go toward administrative costs for the project. Markus requested clarification of the auditing process and level of effort involved. Evans noted it is equally important that the project implementers demonstrate the same level of detail and performance – efficiency, quality of work, etc.

Future budget preparation should include a side-by-side itemization of SAWPA and RMC tasks, and each line item in the budget that has a program administration aspect to it should be separated out. The addition of a reconciliation column to the SARCCUP: Funding by Agency table was requested.

This item was for informational purposes; no action was taken on Agenda Item No. 4.B.

C. STATUS UPDATE ON THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (MWD) AGREEMENT

Paul Jones provided an oral update on recent discussions with MWD staff. A future meeting has been proposed for the second week of August.

This item was for informational purposes; no action was taken on Agenda Item No. 4.C.

D. DISCUSSION OF DRAFT FUNDING TERMS, CONCEPTUAL PROJECT SCENARIOS, AND THE AGREEMENT DEVELOPMENT TIMELINE

John Rossi provided and reviewed a handout showing concept modeling of Chino Basin storage (put) and recovery (take) scenarios, and emphasized it is a work in progress and actual numbers will vary depending on a number of factors. It was determined that the data should be reviewed by planning staff and comments provided to WMWD staff, who will

continue to work with consultants Brian Dietrick and Tyler Old and provide revisions for a more in-depth discussion at a future meeting to include operating scenarios for each of the banking facilities.

This item was for informational purposes; no action was taken on Agenda Item No. 4.D.

E. STATUS UPDATE ON THE DWR AND SAWPA GRANT AGREEMENT (PA23#2016.3)

Mark Norton provided an oral update on the DWR and SAWPA Grant Agreement. SAWPA staff met with DWR the week of July 18 and resubmitted comments to DWR based on their remarks. Land purchase costs will now been included. Adjustment of the end date to September 2021 has been requested.

This item was for informational purposes; no action was taken on Agenda Item No. 4.E.

F. STATUS UPDATE ON THE SUBGRANTEE AGREEMENTS BETWEEN SAWPA AND THE SAWPA MEMBER AGENCIES (PA23#2016.4)

Mark Norton provided an oral update on the subgrantee agreements between SAWPA and the SAWPA member agencies. Subgrantee agreements will not be signed until after the DWR grant agreement has been executed.

This item was for informational purposes; no action was taken on Agenda Item No. 4.F.

G. SITES RESERVOIR PROJECT: WATER SUPPLY INVESTMENT OVERVIEW

Chair Headrick provided a PowerPoint presentation on the Sites Reservoir Project and its water supply investment potential. The SBVMWD Board recently authorized participation in Phase I of this project. Committee members interested in investing were encouraged to contact Headrick for additional information. It was the consensus of the Committee that Headrick place this item on a future meeting agenda for discussion and consideration.

Joe Grindstaff left the meeting at 10:27 a.m., and did not return.

This item was for informational purposes; no action was taken on Agenda Item No. 4.G.

5. SET REGULAR PA 23 COMMITTEE MEETING SCHEDULE

Chair Headrick called for a motion to set the regular meeting schedule as proposed, noting there may be a need to reschedule some future meetings.

MOVED, regular meetings of the PA 23 Committee shall be held at 9:00 a.m., on the fourth Thursday of every month, at 11615 Sterling Avenue, Riverside, California.

Result:	**Adopted (Unanimously; 4-0)**
Motion/Second:	Jones/Evans
Ayes	Evans, Headrick, Jones, Markus
Nays:	None
Abstentions:	None
Absent:	Grindstaff

6. FUTURE AGENDA ITEMS

Discussion of rescheduling the September 22, 2016 regular meeting.

7. ADJOURNMENT

There being no further business for review, Chair Headrick adjourned the meeting at 10:39 a.m.

Approved at a Special Meeting of the Project Agreement 23 Committee on Thursday, August 25, 2016.

_____
Douglas Headrick, Chair

Attest:

_____
Kelly Berry, CMC
Clerk of the Board

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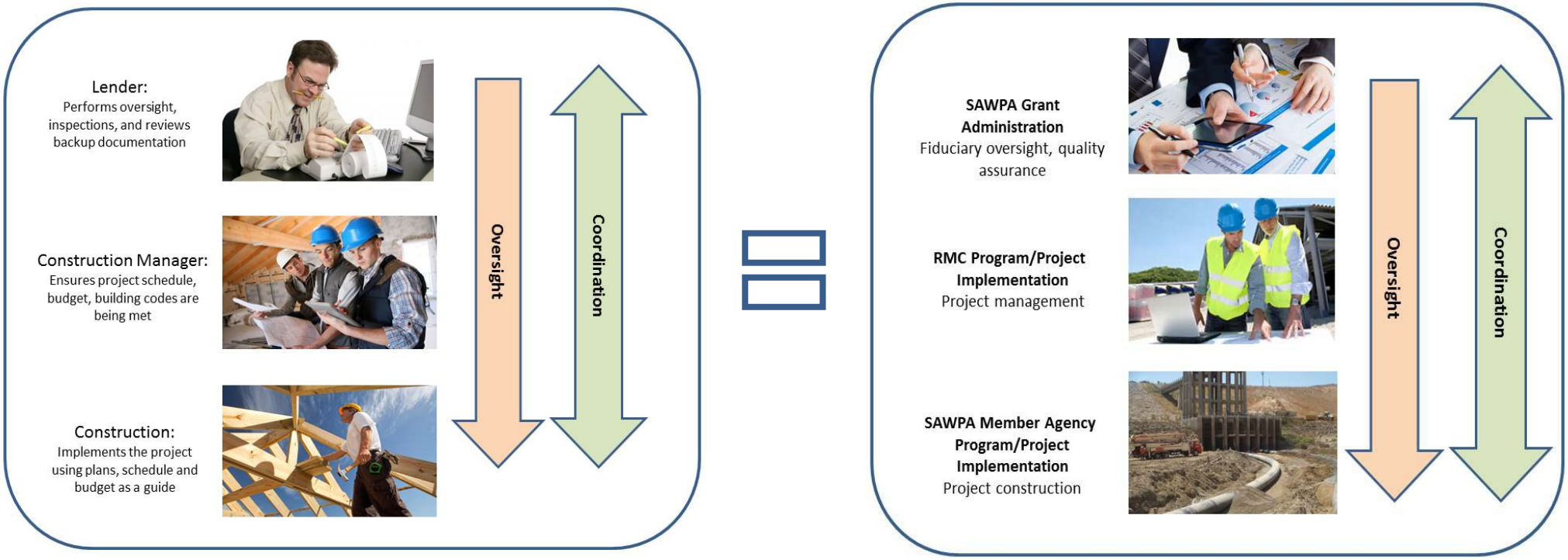
Workflow: SAWPA Proposition 84 2015 Round Grant Administration,

RMC Program/Project Implementation and Member Agencies

Comparison Using Home Building Analogy:



Background:

As shown in the above schematic, SAWPA performs oversight on behalf of the SAWPA Commission and as an agent of the State in order to ensure quality assurance and compliance with State Regulations. Through its role as the grant administrator, SAWPA staff in the Engineering and Operations Department is responsible for oversight, verifying the benefits that have been promised to the State for each of the projects receiving grant funds, reviewing contracts as the projects face needed changes mid-implementation, and ensuring compliance with applicable laws and grant agreements.

Using the home building analogy shown above, the SAWPA Engineering and Operations Department performs their tasks like a lending institution. In the 2015 Round, they will continue to confirm all the invoice values and validate the costs based on the backup provided for the three projects (which include 12 components). Any differences they find through their ongoing oversight will be documented and coordinated with each of the project proponents before they are submitted to the State.

SAWPA's Planning Department serves as the advocate for all projects receiving grant funding and coordinates with them to ensure they have all the information they need such as meeting continuing eligibility requirements of the State. They also create the contracts between SAWPA and each of the project proponents.

The RMC consultant to one of the 2015 Round projects will serve as it's project manager, which is equivalent to the construction manager in the home building analogy above since RMC will ensures the six components of SARCCUP (Arundo Removal, Santa Ana Sucker Habitat, Elsinore Basin Conjunctive Use, San Jacinto Basin Conjunctive Use, Chino Basin Conjunctive Use and San Bernardino Basin Conjunctive Use) are completed on time and in schedule. Their tasks include hosting bi-weekly check-ins with each component's construction manager to track and encourage project progress. They will also provide a tracking system for entry and storage/retrieval of all project level invoices, and review all invoices prior to sending them to SAWPA who provides oversight.

The 2015 Round will be the fourth and largest round of funding for Proposition 84, and this separation of responsibilities between the project proponents, one of which has hired RMC, and the Engineering and Operations Department is consistent in each preceding round.

This process for creating auditable documentation and ensuring project completion consistent with the grant agreements by the project proponent is not unique to the 2015 Round. Each round of funding requires the project proponents to create invoices and manage their timelines and budget. While one entity does this work, there needs to be a firewall between the entities that approves their submittals.

Prop 84 2015 Round Grant Administration

Projects in 2015 Round:

Orange County Sanitation District (One Component Project)

Riverside County Flood Control District (Three Component Project)

Santa Ana River Conservation and Conjunctive Use Program (Eight Component Project)

Background: The following shows actual expenses in FYE 2015 and FYE 2016 for Prop 84 2015 Round Grant Administration before the larger workload of crafting the associated agreements and administering the Prop 84 2015 Round of grant funding begun. Also provided is the projections (in hours and associated dollars) by Fiscal Year for Prop 84 2015 Round Grant Administration. Built into the projections are the savings that the RMC consultant will provide as they manage the SARCCUP Project and prepare documents for submittal to SAWPA. If there is savings at the end of the grant, those unused dollars are fungible and can be redirected by action of the SAWPA Commission to other projects as was done with the Riverside County Flood Control District L.I.D. Testing & Demonstration Facility Project also managed through a State grant with SAWPA. Two additional fiscal years beyond the current grant's schedule are projected as our experience has shown that rarely are all projects completed within five years.

Prop 84 2015 Round Grant Administration: SAWPA Annual Labor Shown By Hours

	FYE 2017 Projections	FYE 2018 Projections	FYE 2019 Projections	FYE 2020 Projections	FYE 2021 Projections	FYE 2022 Projections	FYE 2023 Projections	Total
General Manager	36	36	36	36	36	36	36	252
Executive Counsel	36	36	36	36	36	36	36	252
Water Resources & Planning Manager	48	48	48	48	48	48	48	336
Senior Watershed Manager	240	132	132	132	132	132	132	1032
Engineering & Operations Manager	72	72	72	72	72	72	72	504
Quality Control Manager	1140	1140	1140	1140	1140	1140	1140	7980
Admin. Assistant II	24	24	24	24	24	24	24	168
Chief Financial Officer	48	48	48	60	60	60	60	384
Accountant/Project Manager	84	72	72	72	72	72	72	516
Total	**1728**	**1608**	**1608**	**1620**	**1620**	**1620**	**1620**	**11424**

Prop 84 2015 Round Grant Administration: SAWPA Annual Labor Shown By Associated Dollars

	FYE 2015 Actuals	FYE 2016 Actuals	FYE 2017 Projections	FYE 2018 Projections	FYE 2019 Projections	FYE 2020 Projections	FYE 2021 Projections	FYE 2022 Projections	FYE 2023 Projections	Total
Total	**$ 39,970**	**$ 107,254**	**$ 313,556**	**$ 310,742**	**$ 329,386**	**$ 353,187**	**$ 374,378**	**$ 396,841**	**$ 420,651**	**$ 2,645,965**

LEGEND:

- Administrative Department
- Engineering/Operations Department
- Executive Department
- Finance Department
- Planning Department

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GRANT AGREEMENT WORK PLAN

PROJECT 4: Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)

IMPLEMENTING AGENCY: SAWPA and its Five Member Agencies which include Eastern Municipal Water District (EMWD), Inland Empire Utilities Agency (IEUA), Orange County Water District (OCWD), San Bernardino Valley Municipal Water District (SBVMWD), Western Municipal Water District (WMWD)

PROJECT DESCRIPTION:

The purpose of SARCCUP is to implement a collaborative program that improves the Santa Ana River Watershed's water supply resiliency through development of additional dry-year yield (DYY). It will also conserve water, promote water use-efficiency, and improve habitat for a native, threatened species which will help facilitate obtaining permits from the State and Federal wildlife agencies for water supply projects along the Santa Ana River. The SARCCUP programs and projects will support implementing the One Water One Watershed 2.0 IRWM Plan Goals. SARCCUP generally consists of the following components:

1. **SARCCUP Habitat Improvement - invasive weed removal and habitat creation/restoration:** Remove approximately 640 acres of the invasive weed *Arundo Donax* in the Santa Ana River Watershed and construct about 40.5 acres of riparian vegetation for the Santa Ana sucker fish in order to obtain permits for various water supply projects such as the Enhanced Recharge in Santa Ana River Basins.
2. **SARCCUP Water Use Efficiency - water use efficiency and water conservation:** Expand the existing water use efficiency project that received grant funding during the IRWM 2014 Drought Round to provide support to approximately five (5) agencies for conservation-based water rate structures. Implement the Smartscape Program in the Santa Ana River Watershed.
3. **SARCCUP Conjunctive Use Program - creating approximately 180,000 acre feet (AF) of DYY over a ten year period:** Create a diversified Conjunctive Use Program that can be used to store wet-year water and then pump that water during droughts, providing DYY. Construct recharge ponds and/or extraction wells in the following banking locations:

Basin	Storage (AF) (Approximate Amounts)
Chino	96,000
Elsinore	4,500
San Bernardino	60,000
San Jacinto	19,500
TOTAL	**180,000**

Budget Category (a): Direct Project Administration

Task 1 Project Management

The SAWPA member agencies and SAWPA will maintain the grant agreement including compliance with grant requirements, and preparation and submission of supporting grant documents and coordination with the Grantee, largely through consultant support (with consultant oversight provided by SAWPA staff). The SAWPA member agencies and SAWPA will form a new Project Committee with representatives from each of the five SAWPA member agencies. SAWPA will perform Project Committee administration and coordination for the Project Committee. The Project Committee will make policy decisions and direct the expenditure of grant funds for this Program while SAWPA staff will provide staff administration support. SAWPA will coordinate with the five SAWPA Member Agencies (EMWD, IEUA, OCWD, SBVMWD, and WMWD). The SAWPA member agencies, largely through consultant support, will prepare invoices including relevant supporting documentation for submittal to DWR via the Grantee. The SAWPA member agencies and SAWPA will perform administrative responsibilities associated with the SARCCUP components such as coordinating with partnering agencies and utilizing consultants/contractors as needed.

Deliverables:

- Environmental Information Form (EIF) for all components
- Financial Statements for all components
- Invoices for all components
- Project Agreement forming the new Committee
- Other Applicable Project Deliverables for all components as needed

Task 2 Labor Compliance Program

The SAWPA member agencies and SAWPA will take all measures necessary to ensure compliance with applicable California Labor Code requirements for each applicable component, including, preparation and implementation of a labor compliance program or including any payments to the Department of Industrial Relations under Labor Code Section 1771.3.

Deliverables:

- Proof of labor compliance for each applicable component upon request

Task 3 Reporting

The SAWPA member agencies and SAWPA will prepare progress reports detailing work completed during reporting period as outlined in Exhibit (G) of this agreement. The SAWPA member agencies will submit reports to the Grantee for review and inclusion in a progress report to be submitted to DWR.

The SAWPA member agencies and SAWPA will prepare Draft Project Completion Report and submit to DWR via the Grantee for DWR Project Manager's comment and review no later than 90 days after project completion. The SAWPA member agencies and SAWPA will prepare the Final Report addressing Grantee/DWRs comments. The report shall be prepared and presented in accordance with the provision of Exhibit G.

Deliverables:

- Project Progress Reports for all components
- Draft and Final Project Completion Report for all components

Budget Category (b): Land Purchase/Easement

Task 4 Land Purchase/Easement

Property lots or portions of lots within the project area will be purchased as necessary for construction in the SBVMWD, WMWD and EMWD service areas.

Deliverables:

- All appraisal and related acquisition documents for the Conjunctive Use components from EMWD, SBVMWD and WMWD

Budget Category (c): Planning/Design/Engineering and Environmental Documentation

Task 5 Feasibility Studies

The five SAWPA member agencies will develop a Master Plan for the SARCCUP Conjunctive Use Program to take advantage of approximately 1 million AF of available groundwater storage in the Santa Ana River Watershed to capture available excess supplies during wet years. The Master Plan, which will be funded entirely by the SAWPA member agencies, is intended to assist in identifying operational constraints in the SARCCUP Conjunctive Use Program and the needs to overcome these in current or potential future phases. The Master Plan will utilize a decision support model (model) and take into consideration the watershed's hydrology, planned and existing facilities, and groundwater put and take scenarios in order to better define agreements and needs for future expansion. The SAWPA member agencies divided the Master Plan development into two-steps with the first step being the development of a model. This model, which can be updated by the staff from the SAWPA member agencies, will enable the agencies to optimize the proposed SARCCUP Conjunctive Use Program facilities with the overarching goals to simulate the anticipated operations of the facilities, quantify the benefits, quantify the costs and help identify future phases of the SARCCUP Conjunctive Use Program.

The five SAWPA member agencies will develop the necessary institutional agreements for the SARCCUP Conjunctive Use Program in order to store and convey through such methods as direct pumping or in lieu transfers approximately 180,000 AF to different wholesale water agencies in the Santa Ana River Watershed over a ten year period.

The agreements will reflect the result of evaluating alternative cost allocation methods and their impacts in order to define a price per AF for the water that is utilized for the SARCCUP Conjunctive Use Program

EMWD will prepare a preliminary design report for SARCCUP Conjunctive Use Program to allow implementation in the San Jacinto Basin in EMWD's service area. The results from this study will be used for California Environmental Quality Act (CEQA) documentation and for final design.

Within WMWD's general service area, Elsinore Valley Municipal Water District will complete a well siting study/report for the Aquifer Storage Recovery (ASR) wells in the Elsinore Basin. The results from this study will be used for CEQA documentation and for final ASR design for the SARCCUP Conjunctive Use Program Implementation in the Elsinore Basin.

Deliverables:

- Master Plan for the Conjunctive Use component
- Institutional agreements for the Conjunctive Use component
- San Jacinto Basin Preliminary Design Report for the Conjunctive Use component from EMWD
- Elsinore Basin Siting Study/Report for the Conjunctive Use component from WMWD

Task 6 SARCCUP CEQA Documentation

The SAWPA member agencies will prepare and circulate a Notice of Preparation (including tribal notification to the California Native Heritage Commission). The agencies will prepare draft Programmatic Environmental Impact Reports (PEIR) and release document for public review, file a Notice of Determination with State Clearinghouse and prepare a letter stating no legal challenges (or addressing legal challenges). The PEIR will provide a baseline environmental document to comply with CEQA and support future site-specific projects as they are funded and implemented by each SAWPA member agency. While the water use efficiency and conservation-based rates tasks are not anticipated to qualify as a "Project" under CEQA and therefore, makes its CEQA documentation unnecessary, the PEIR will consider these components of SARCCUP in its evaluation.

EMWD will prepare an EIR to address CEQA with a possible NEPA document. EMWD's EIR will reference the SARCCUP PEIR for the program. SBVMWD will circulate a Notice of Preparation (including tribal notification to the California Native Heritage Commission). SBVMWD will prepare draft EIR for the SARCCUP Habitat Improvement Implementation (Santa Ana sucker fish component) and release document for public review. SBVMWD will file Notice of Determination with State Clearinghouse. SBVMWD will prepare letter stating no legal challenges (or addressing legal challenges).

Deliverables:

- Copy of Notices of Preparation from all components as needed
- Draft and Final EIRs, and Notice of Determinations from all components as needed
- No Legal Challenges letters (or addressing legal challenges) from all components as needed.

Task 7 SARCCUP Permitting

Each SAWPA member agency will identify federal, state, and local permits required for the SARCCUP programs and projects during preliminary and final design. Permits may include:

- CEQA Documentation and Public Review;
- U.S. Army Corps of Engineers (USACE) Section 404 Permit;
- State Water Resources Control Board (SWRCB) Section 401 Permit;
- California Department of Fish & Wildlife (CDFW) 1602 Permit;
- California Department of Public Health (CDPH) Use Permit;
- Local Construction/Encroachment Permit;
- Caltrans Encroachment Permit;
- Federal Emergency Management Agency (FEMA) Letter of Map Amendment (LOMA);
- County Flood Control District Construction Permits;
- County Well Drilling and/or modification permits;
- Storm Water Pollution Prevention Program (SWPPP) and General Construction Permit.

Additional permits may be required and will be obtained as necessary.

Deliverables:

- Copy of all required permits from all components as needed

Task 8 SARCCUP Design

Task 8.1SARCCUP Conjunctive Use Program Implementation in the Chino Basin

IEUA will arrange with the retail water agencies in its service area and the Chino Basin Watermaster to recharge the groundwater basin through; wet-water recharge and in-lieu recharge. Distribution of the DYY supply would be by exchange, Baseline Feeder supply to SBVMWD, groundwater pumping to OCWD, interconnections to WMWD.

Task 8.1.1 Baseline Feeder Extension

IEUA will complete preliminary and final design on the Baseline Feeder which will be extended from its current termination near Cactus Avenue in Rialto approximately 6.5 miles to San Sevaine Creek near the border of Rancho Cucamonga and Fontana. IEUA will design the length, dimension, alignment, and appurtenances of the extension so the extension has an approximate 60 cubic feet per second (cfs) capacity and be similar to the existing nominal 48-inch diameter feeder; possibly up to 60-inch diameter. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and basis of design report (BOD). Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.1.2 Municipal Interties on Baseline Feeder Extension

IEUA will complete preliminary and final design on the extension alignment to provide recharge water discharge to San Sevaine Channel and interties for connection to Fontana Water County and Cucamonga Valley Water District. IEUA will design capacities so the facilities can perform at at an expected flow of about 10-15 cfs each, which will depend on evaluation of the connecting systems, and the final design analysis. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and basis of BOD. Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.1.3 Turnout on Baseline Feeder to San Sevaine Creek

IEUA will complete preliminary and final design on the Baseline Feeder extension to reach or cross the San Sevaine Creek and complete a turnout to the creek or tributary storm drain for discharge of water for recharge at basins downstream of the turnout. IEUA will design capacities so the facilities can perform at an expected flow of about 20 cfs which will depend on hydraulics analyses, supply water facilities, and the final design analysis. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and BOD. Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.1.4 Diversion on San Sevaine Creek to Recharge Basin

IEUA will complete preliminary and final design on the increasing the diversion capacity to Jurupa Basin downstream of the Baseline Feeder extension by constructing a diversion gate into the flood control channel water at the existing diversion on San Sevaine Creek. IEUA will design the new structure so the facilities can likely duplicate the existing 4-foot sluice gate, piping, and controls. IEUA will design the new diversion to increase the existing capacity for imported water diversion up to 15 cfs allowing for final capacities to be determined during the final design stages. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and BOD. Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.1.5 Turnout on Devil Canyon-Azusa Pipeline into San Antonio Creek

IEUA will complete preliminary and final design of a turnout on the existing Devil Canyon Azusa Pipeline to allow water to service multiple purposes such as diverting water into San Antonio Creek for recharge at downstream recharge sites in Chino Basin and/or Orange County, as well as providing a point of

connection for the Water Facilities Authority to receive water for treatment and deliver water in Chino Basin. IEUA will design the turnout capacity so the facilities can perform at an expected flow of about 40 cfs for recharge and up to 20 cfs for Water Facilities Authority, allowing the ultimate flow to depend on hydraulics analyses, supply water facilities, and the final design analysis. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and BOD. Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.1.6 Production Wells in Chino/IEUA South Zone

IEUA will complete the screening and evaluation of existing inactive production/agricultural wells in the southern pressure zone of IEUA's recycled water distribution system for rehabilitation. IEUA will complete the design of plumbing the wells to take groundwater into the recycled water system to replace recycled water delivered to OCWD. Each well will have a target capacity of approximately 1,000 gallons per minute or a total for all three wells of approximately 3,000 gallons per minute. Wells will have old pumping equipment removed, as needed. New pumping equipment and appurtenances will be analyzed during the planning phase taking into account regulations. Additionally, downhole rehabilitation and possible lining may be required to achieve desired production rates and may be analyzed based on possible geotechnical work. The plumbing of wells into the IEUA recycled water distribution system will be designed. Preliminary design work will include the following supporting work: geotechnical investigation, topographic survey, and BOD. Using the BOD and supporting documents, IEUA will produce 100% (Final) design, plans and specifications.

Task 8.2 SARCCUP Conjunctive Use Program Implementation in the San Jacinto Basin

EMWD will complete preliminary and final design on facilities to augment San Jacinto Upper Pressure Sub-basin by approximately 19,500 AFY.

EMWD will design development of an estimated 39-acre recharge basin, Mountain Avenue West. Complete the design of recharge ponds so the range in depth from about 10 to 15 feet, berms so they range from approximately 3 to 6 feet above existing ground, and perimeter fencing so it includes approximately two to three access gates. EMWD will design the pipelines so they include approximately one to three 20 to 30 inch laterals from the existing 33 inch diameter raw water pipeline to the recharge ponds, and are at a length about 700 feet. EMWD will plan for flow and pressure control facilities with a meter section which can be used to regulate the flow of water into the ponds. EMWD will design the described facilities by completing preliminary design work (will include the following supporting work: geotechnical investigation, topographic survey, and BOD). Using the BOD and supporting documents, EMWD will produce 100% (Final) design, plans and specifications.

EMWD will design the amenities for a walking/jogging path with conservation-focused informational signage along the perimeter of the recharge site. EMWD will design the landscaping to include drought tolerant plants and drip irrigation.

EMWD will design three (3) new extraction wells and associated distribution pipelines so the pipelines connect the wells to the existing potable water distribution system (with one pipeline per well). EMWD will design the length of the pipelines, location of the wells and the distance to the distribution system by completing preliminary design work (will include the following supporting work: geotechnical investigation, topographic survey, and BOD). Using the BOD and supporting documents, EMWD will produce 100% (Final) design, plans and specifications.

Task 8.3 SARCCUP Conjunctive Use Program Implementation in the San Bernardino Basin Area

SBVMWD will design the facilities necessary to remove approximately 20,000 AF of water from the San Bernardino Basin Area (SBBA) with approximately 60,000 AFY of storage and deliver to the Metropolitan

Water District of Southern California (MWDSC) system. SBVMWD will design the facilities which will include five (5) wells and an associated transmission pipeline and an expansion phase to the Redlands Pump Stations which includes three additional 20 CFS pumps. SBVMWD will complete the preliminary design work (will include the following supporting work: geotechnical investigation, topographic survey, and BOD). Using the BOD and supporting documents, SBVMWD will produce 100% (Final) design, plans and specifications.

Task 8.4 SARCCUP Conjunctive Use Program Implementation in the Elsinore Basin

WMWD will design two dual-purpose ASR wells needed to expand the existing WMWD conjunctive use program, comprised of as many of eight ASR wells, to approximately 15,000 AF. WMWD will design will include selecting well sites and analyzing the need for minor distribution pipelines, perhaps covering distances of 1,500 feet each, with the actual lengths of each well pipeline depending on the final locations of the wells and the distance to the distribution system. WMWD will complete the preliminary design work (will include the following supporting work: geotechnical investigation, topographic survey, and BOD). Using the BOD and supporting documents, WMWD will produce 100% (Final) design, plans and specifications.

Task 8.5 SARCCUP Habitat Improvement Implementation

Task 8.5.1 Arundo Donax Removal

OCWD will design the removal of approximately 640 acres of Arundo Donax along the Santa Ana River above Prado Basin by coordination with its partners by identifying access into the river systems, equipment needed and the amount of labor required to operate equipment and apply herbicide.

Task 8.5.2 Santa Ana Sucker Fish Habitat Improvements

Task 8.5.2.1 Anza Drain

SBVMWD will conduct site preparation by analyzing locations for non-native tree removal (as well as clearing and grubbing, hazardous soil removal), create a water diversion plan, prepare earth work (such as channel excavation, gravel placement, liner, erosion control, and instream woody material), and prepare plans for infrastructure, seeding, planning, irrigation system installation, signage and fencing.

Task 8.5.2.2 Old Farm Road

SBVMWD will conduct site preparation by analyzing locations for non-native tree removal (as well as clearing and grubbing, hazardous soil removal), create a water diversion plan, prepare earth work (such as channel excavation, gravel placement, liner, erosion control, and instream woody material), and prepare plans for infrastructure, seeding, planning, irrigation system installation, signage and fencing.

Task 8.5.2.3 Lower Hole Creek

SBVMWD will conduct site preparation by analyzing locations for non-native tree removal (as well as clearing and grubbing, hazardous soil removal), create a water diversion plan, prepare earth work (such as channel excavation, gravel placement, liner, erosion control, and instream woody material), and prepare plans for infrastructure, seeding, planning, irrigation system installation, signage and fencing.

Task 8.5.3.4 Hidden Valley Wetlands

SBVMWD will conduct site preparation by analyzing locations for non-native tree removal (as well as clearing and grubbing, hazardous soil removal), create a water diversion plan, prepare earth work (such as channel excavation, gravel placement, liner, erosion control, and instream woody material), and prepare plans for infrastructure, seeding, planning, irrigation system installation, signage and fencing.

Deliverables:

- BOD Reports for all components from EMWD, IEUA, OCWD, SBVMWD, WMWD
- Engineer's Cost Estimate for all components from EMWD, IEUA, OCWD, SBVMWD, WMWD
- 100% Design Plans and Specifications for all components from EMWD, IEUA, OCWD, SBVMWD, WMWD

Task 9 Project Monitoring Plan

SAWPA and the SAWPA member agencies will develop and submit a Project Monitoring Plan that encompasses each component of SARCCUP. Along with the Project Performance Measures Table provided by DWR project manager, the Project Monitoring Plan (as described in Exhibit J) will include baseline conditions, a brief discussion of monitoring systems to be used, methodology of monitoring, frequency of monitoring, and location of monitoring points.

Deliverables:

- Project Monitoring Plan for all components from EMWD, IEUA, OCWD, SBVMWD, SAWPA

Budget Category (d): Construction/Implementation

Task 10 Construction Contracting

The SAWPA member agencies will undertake activities necessary to secure a contractor and award the contract for each component include: develop bid documents, prepare advertisement and contract documents for construction contract bidding, conduct pre-bid meeting, bid opening and evaluation, selection of the contractor, award of contract, and issuance of notice to proceed.

Deliverables:

- Bid documents for all components as needed
- Proof of Advertisement for all components as needed
- Award of contract for all components as needed
- Notice to proceed for all components as needed

Task 11 Construction Administration

The SAWPA member agencies will review contractor submittals, answer requests for information, and issue work directives. A engineering construction observer will be on site for the duration of the Project. Construction observer duties will include: documenting of pre-construction conditions, daily construction diary, preparing change orders, addressing questions of contractors on site, reviewing/ updating project schedule, reviewing contractor log submittals and pay requests, forecasting cash flow, notifying contractor if work is not acceptable.

Deliverables:

- Notice of Completion for each component as needed

Task 12 Construction/Implementation Activities

Construction activities will likely include, but are not limited to the following:

Task 12.1 SARCCUP Conjunctive Use Program Implementation in the Chino Basin

IEUA will construct the following facilities: Baseline Feeder Extension, Municipal Interties on Baseline Feeder Extension, Turnout on Baseline Feeder to San Sevaine Creek, Diversion on San Sevaine Creek to Recharge Basin, Turnout on Devil Canyon-Azusa Pipeline into San Antonio Creek, Production Wells in Chino/IEUA South Zone.

Task 12.1.1 Baseline Feeder Extension

IEUA will extend the Baseline Feeder by approximately 6.5 miles with an approximately 48 inch pipeline, from Cactus Ave and Baseline and an outfall on San Sevaine Creek in the Chino Basin. It is anticipated the extension will have an approximate 60 cubic feet per second (cfs) capacity and be similar to the existing nominal 48-inch diameter feeder; possibly up to 60-inch diameter.

Task 12.1.2 Municipal Interties on Baseline Feeder Extension

IEUA will construct an intertie for Cucamonga Valley Water District and Fontana Water Company to take potable water from the Baseline Feeder Extension from SBVMWD. Capacities are expected to be about 10-15 cfs each, will depend on evaluation of the connecting systems, and the final design analysis.

Task 12.1.3 Turnout on Baseline Feeder to San Sevaine Creek

IEUA will construct a Baseline Feeder turnout allowing discharges to San Sevaine creek or tributary storm drain for discharge of water for recharge at basins downstream of the turnout. Its capacity will likely be about 20 cfs, will depend on hydraulics analyses, supply water facilities, and the final design analysis.

Task 12.1.4 Diversion on San Sevaine Creek to Recharge Basin

IEUA will construct a new 4-foot sluice gate and piping cutting into the flood control channel wall of Jurupa Basin to allow an increased rate of diversion of imported water to Jurupa Basin. A rubber dam may also be installed along the flood control channel. Diversion will likely be of State Water Project water from MWDSC or SBVMWD water from the Baseline Feeder extension. The new diversion will likely increase the existing capacity for imported water diversion up to 15 cfs; final capacities will be determined during the final design stages.

Task 12.1.5 Turnout on Devil Canyon-Azusa Pipeline into San Antonio Creek

IEUA will build a dual purpose turnout for delivery of SBVMWD imported water for 1) direct recharge in Chino or Orange County Basins, and 2) delivery, treatment, and use as in-lieu recharge in Chino Basin). The turnout capacity will likely be up to 40 cfs for recharge and up to 20 cfs for Water Facilities Authority, but will depend on hydraulics analyses, supply water facilities, and the final design analysis

Task 12.1.6 Production Wells in Chino/IEUA South Zone

IEUA will plumb existing inactive production/agricultural wells in the southern pressure zone of IEUA's recycled water distribution system for rehabilitation to take groundwater into the recycled water system to replace recycled water delivered to OCWD. Each well will have a target capacity of approximately 1,000 gallons per minute or a total for all three wells of approximately 3,000 gallons per minute. Wells will have old pumping equipment removed, as needed. New pumping equipment and appurtenances will be added based on regulations and final design. Additionally, downhole rehabilitation and possible lining will likely be required to achieve desired production rates. Wells will be plumbed into the IEUA recycled water distribution system.

Task 12.2 SARCCUP Conjunctive Use Program Implementation in the San Jacinto Basin

EMWD will construct the following facilities: 39-acre, approximately 10-15 feet deep Recharge Basin Development and Amenities and Extraction Wells (3 wells total each with a capacity of 1,500 gpm, drilled to a depth of approximately 1,200 feet) and Associated Pipelines. The pipelines will include approximately one to three 20- to 30-inch laterals from the existing 33-inch diameter raw water pipeline to the recharge ponds, about 700 feet in length. Pipelines will connect the groundwater wells to the existing potable water distribution system. One pipeline will be needed for each well. The length of each well discharge pipeline will depend on the final locations of the wells and the distance to the distribution system, which we have estimated at about 1,200 feet each and diameter of approximately 12 to 18 inches depending on capacity of the well. The Amenities will include a walking/jogging path with conservation-targeted informational signage along the perimeter of the recharge site. This will also include drought-tolerant landscaping with drip irrigation.

Task 12.3 SARCCUP Conjunctive Use Program Implementation in the SBBA

SBVMWD will construct the facilities necessary to remove water from the SBBA and deliver to the MWDSC system through developing construction plans and utilizing a construction contractor(s). These facilities will include: approximately five (5) Production Wells at up to approximately 1,000 feet deep (estimated to produce from approximately 2,400 to 3,650 gallons per minute) and approximately 15,000 feet of Transmission Pipelines and an additional approximately 20 CFS pumps at the expanded Redlands Pump Station.

Task 12.4 SARCCUP Conjunctive Use Program Implementation in the Elsinore Basin

WMWD will construct two dual-purpose ASR wells will be constructed within the WMWD general service area by the Elsinore Valley Municipal Water District within its own retail water service area through developing construction plans and utilizing a construction contractor(s). One well will be located in the northern portion of the Elsinore Basin, and one will be located in the southern portion of the same basin referred to as the Back Basin. Each well will be estimated to operate at an average flow rate of approximately 1,000 gallons per minute (GPM). Each well will need a distribution pipeline to connect to the nearby water distribution system. The depth of the two ASR wells will ultimately depend on the final locations selected. Similar wells in the area rage from approximately 760 to 2,100 feet deep.

Task 12.5 SARCCUP Habitat Improvement Implementation

The construction and implementation of the habitat improvement component of the project includes the following elements:

Task 12.5.1 Arundo Donax Removal

OCWD will remove approximately 640 acres of Arundo Donax along the Santa Ana River just upstream of Prado Basin in Riverside County by utilizing heavy machinery in the floodplain, herbicide and maintenance sweeps by working with its partners.

Task 12.5.2 Santa Ana Sucker Fish Habitat Improvements

Task 12.5.2.1 Anza Drain

SBVMWD will construct the Anza Drain habitat restoration project in Riverside County through non-native tree removal, clearing and grubbing, hazardous soil removal, installing infrastructure, earth work such as channel excavation, erosion control, irrigation system installation, signage, fencing and overseeing five years of plant establishment maintenance and performance monitoring.

Task 12.5.2.2 Old Farm Road

SBVMWD will construct the Old Farm Road habitat restoration project in Riverside County through non-native tree removal, clearing, grubbing, hazardous soil removal, installing infrastructure, earth work such as channel excavation, irrigation system installation, signage, fencing and overseeing five years of plant establishment maintenance and performance monitoring.

Task 12.5.2.3 Lower Hole Creek

SBVMWD will construct Lower Hole Creek habitat restoration project through non-native tree removal, clearing, grubbing, hazardous soil removal, installing infrastructure, earth work such as channel excavation, irrigation system installation, signage, fencing and overseeing five years of plant establishment maintenance and performance monitoring.

Task 12.5.2.4 Hidden Valley Wetlands

SBVMWD will construct Hidden Valley Wetlands habitat restoration project through non-native tree removal, clearing, grubbing, hazardous soil removal, installing infrastructure, earth work such as channel excavation, irrigation system installation, signage, fencing and overseeing five years of plant establishment maintenance and performance monitoring.

Task 12.6 SARCCUP Water Use Efficiency Implementation

This will include the work required for the implementation of the water use efficiency component of SARCCUP. It consists of the following two elements:

Task 12.6.1 Conservation-Based Water Rates

SAWPA and the SAWPA member agencies will utilize the existing Project Committee, known as the Project Agreement 22 Committee that includes a representative from each of the five SAWPA member agencies and was formed during implementation of the project funded by the IRWM 2014 Drought Round. The Project Agreement 22 Committee will make policy decisions and direct the expenditure of grant funds for this Task while SAWPA staff will provide administrative staff support to the Committee and coordinate with the five SAWPA member agencies. SAWPA will prepare contracts with retail water agencies for conservation-based water rates and recommend contract awards to the Project Agreement Committee for approval. SAWPA staff will implement the Task so retail water agencies are aware of the SARCCUP Project and execute the contracts (i.e. outreach and onboarding), the retail water agencies make progress toward completing the tasks in their individual contracts once executed, and the retail water agencies meet the conditions of the Grant Agreement. Outreach workshops in Santa Ana River Watershed (total of up to 2 workshops) will be held targeting the watershed's retail water agencies' elected officials and staff. These workshops will review the tools available to the retail water agencies for adopting conservation-based rates. Conservation-based rate structures will be implemented by approximately five water agencies. Funding will be provided to approximately five retail agencies, through the contracts approved by the Committee, for items needed to adopt conservation-based rate structures such as: an implementation of a rate study, billing support needs, acquisition of weather data, Proposition 218 notices, etc. A policy will be developed by the Committee that specifies the reimbursement process for agencies. The policy will include stipulations on water conservation reporting. Tools may be developed to assist the up to five retail water agencies to adopt conservation-based water rates. These tools may include information to determine outdoor budgets and local weather data. This component will be an extension of the Conservation Based Reporting Tools and Rate Structure Implementation Project under the Proposition 84 IRWM 2014 Drought Grant Agreement.

Task 12.6.2 Smartscape

The Smartscape Program will be implemented to provide, on an as-needed basis as requested by the SARCCUP project proponents, education and outreach, training and communication services about drought tolerant landscaping design, installation and maintenance. This support will includes conducting training workshops and seminars for homeowners, landscape professionals and water retail support agency staff; operation of a phone hotline to answer questions; distribution of training manuals, brochures, flyers and reports; social media posts; and outreach to local schools. The support will also assist entities that have drought tolerant landscaping and need assistance with their landscape needs to adapt to site specific soil, water and vegetation conditions. Orange County Coastkeeper and Inland Empire WaterKeeper, SARCCUP partners, will assist in the implementation of this Task. SAWPA and the SAWPA member agencies will utilize the existing Project Agreement 22 Committee. The Project Committee will make policy decisions and direct the expenditure of grant funds for this Task while SAWPA staff will provide administrative support to the Committee and collaborate with the five regional water agencies as well as Orange County Coastkeeper and Inland Empire WaterKeeper. SAWPA staff will oversee Orange County Coastkeeper and Inland Empire WaterKeeper throughout implementation of the Task.

Deliverables:

- Photographic documentation for all components, except the Water Use Efficiency Implementation component, from EMWD, IEUA, OCWD, SAWPA, SBVMWD, WMWD
- Map products showing final completed project areas for Santa Ana Sucker Component and Arundo Component from OCWD and SBVMWD
- Engineer's certification for the Conjunctive Use component from EMWD, IEUA, SBVMWD, WMWD
- Record drawings for the Conjunctive Use component from EMWD, IEUA, SBVMWD, WMWD
- Documentation of participating agencies in workshops, including sign-in sheets for the Conservation Based Water Rates Component from SAWPA
- Resolutions of adoption of conservation based rate structures for the Conservation Based Water Rates Component from SAWPA
- Outreach materials for the Conservation Based Water Rates and Smartscape Components from SAWPA

COMMITTEE MEMORANDUM NO. 2016.5

DATE: August 25, 2016

TO: Project Agreement 23 Committee

FROM: Planning Managers

SUBJECT: Consider Questions to be Answered by the Decision-Support Model for SARCCUP

Recommendation

Review the final draft of *SARCCUP Decision Support Model Scoping Technical Memorandum*, particularly the list of questions to be answered by the model provided on page 16 thereof, and provide any feedback to the Planning Managers.

Discussion

In January of this year, Inland Empire Utilities Agency, Eastern Municipal Water District, Orange County Water District, San Bernardino Valley Municipal Water District and Western Municipal Water District (Agencies) selected CH2M to develop a decision-support model that could be used to optimize the proposed Santa Ana River Conservation and Conjunctive Use Project facilities with the overarching goals to (1) simulate the anticipated operations of the facilities, (2) quantify the benefits, (3) quantify the costs and (4) help identify future phases of SARCCUP. This project has been generally divided into the following tasks:

Task 1 – Gather Data (complete)
Task 2 – Develop Overarching Goals and Priorities (95% complete)
Task 3 – Develop Decision Support Model (in process)
Task 4 – Run Model to Optimize SARCCUP (starting this month)
Task 5 – Final Report and Model Documentation
Task 6 – Training

CH2M recently delivered a final draft of a technical memorandum for Task 2 (attached) which provides the overarching goals and priorities for the model, based on discussions with the Planning Managers. The Planning Managers are asking the Project Agreement 23 Committee to review the memo and, in particular, the questions the decision-support model is intended to

answer which can be found on page 16 of the memorandum, and to provide any feedback to the Planning Managers at this meeting.

Background

Proposition 84, The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, authorized over $1.5 billion for water supply and water quality projects (Chapter 2) throughout the State of California. The funding was allocated by region with the Santa Ana [watershed] region being allocated $114 million under Chapter 2 and the Santa Ana Watershed Project Authority (SAWPA) being chosen, by the region, to administer the grant funds. So far, the State has released funding under Prop 84 three times. The first round provided $13 million, the second round provided $16 million, the "drought round" provided $12 million and the final round provided about $60 million after taking into account the administrative costs for the Department of Water Resources. Of the $60 million awarded during the final round, the SARCCUP project received $55 million.

SARCCUP was originally conceived when the Agencies decided to explore the possibility of developing one, or more, watershed-scale projects that would provide benefits to the entire watershed and might only be feasible given a large grant, or other, funding.

The Agencies worked collaboratively to develop SARCCUP, a watershed-scale program that at the time of the application to the OWOW Steering Committee, generally consists of the following project elements:

1. **Arundo removal and habitat creation/restoration projects for Santa Ana Sucker ($7.5 million grant request); savings 2,000 acre-feet per year (AFY):** remove the remaining 500 acres of arundo in the watershed which will save about 2,000 acre-feet per year and construct about 3.5 miles of habitat for Santa Ana Sucker in order to obtain permits for various water supply projects such as the Enhanced Recharge in Santa Ana River Basins Project.
2. **Water use efficiency ($2 million grant request); savings 7,439 AFY:** expansion of the existing water use efficiency program that received grant funding during Proposition 84, Round 2 to provide 1$/SF to remove 1.5 million square feet of turf and provide funds to help up to five (5) agencies switch to a water budget based rate structure.

3. **Create water banks in the watershed ($48 million grant request); dry year yield 60,000 AFY:** create a diversified, upstream water bank that can be used to store wet year water and then pump that water during droughts, providing dry year yield. Recharge ponds and/or extraction wells will be constructed to develop the following banking locations:

Basin	Storage (AF)	Dry Year Yield (AF/Y) for 3 Years
Chino	96,000	32,000
Elsinore	4,500	1,500
San Bernardino	60,000	20,000
San Jacinto	19,500	6,500
TOTAL	**180,000**	**60,000**

Staff from the Agencies have been working together to plan the overall implementation of SARCCUP and have been working on the Master Plan task which is funded entirely by the Agencies as part of their local share. The Agencies divided the Master Plan development into two-steps with the first step being the development of a decision-support model (model). CH2M was selected for this project at a total cost of about $250,000 which is being shared equally amongst the Agencies.

Attachment:

- *SARCCUP Decision Support Model Scoping Technical Memorandum – Final DRAFT*

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TECHNICAL MEMORANDUM

SARCCUP Decision Support Model Scoping Technical Memorandum - DRAFT

PREPARED FOR: SARCCUP Team

PREPARED BY: Armin Munévar/CH2M

Marcelo Reginato/CH2M

Jessica Prince/CH2M

DATE: August 15, 2016

Introduction

In May of 2014, the Eastern Municipal Water District, Inland Empire Utilities Agency, Orange County Water District, San Bernardino Valley Municipal Water District and Western Municipal Water District (Agencies) entered into a Memorandum of Understanding (MOU) to collaborate in the exploration, analysis and implementation of one or more projects including any future projects and programs that will provide benefits to the entire watershed. Together, these Agencies make up the joint powers authority known as the Santa Ana Watershed Project Authority (SAWPA). The Agencies identified the need for a decision support model (DSM) to optimize the conjunctive use element of the Santa Ana River Conservation and Conjunctive Use Project (SARCCUP) for the Santa Ana River watershed. The DSM will also be used to support future master planning efforts by identifying necessary facilities and operations to optimize, and possibly expand, the conjunctive use element of SARCCUP.

This brief model scoping document outlines the general approach proposed for the development of the SARCCUP DSM (Task 2).

Goals and Objectives

The primary goal of the conjunctive use element is to maximize the storage of wet year imported water supplies that could be pumped during dry years to produce "dry year yield". The DSM will be used to simulate operations and demonstrate that the aggregate yield and water supply reliability generated by the SARCCUP is greater than the status quo of independent management of resources. It is also expected that the cost of water from SARCCUP will be lower than the cost of independent management of resources.

Phase 1 of SARCCUP will develop an 180,000 acre-foot (AF) groundwater bank storage program with capacity to recharge and store 60,000 acre-feet per year (AFY) during each of three wet years in a decade and extraction facilities to withdraw 60,000 AFY in each of three dry years in a decade. SARCCUP management will also include the ability to utilize transfers and exchanges of other water supplies in lieu of recharging and extracting banked water.

In support of the future development of a SARCCUP Master Plan for the conjunctive use element, the Agencies have engaged CH2M to develop a Santa Ana River watershed-wide DSM to optimize the conjunctive use element of SARCCUP. The objective of the DSM project is to simulate anticipated

operations of the proposed SARCCUP facilities, identify potential constraints and needed facilities, optimize the operation, and quantify the benefits and the costs.

This document is intended to serve as a roadmap for the model development. It explains the overall modeling methodology and specific modeling logic for the key components of the DSM that will be used to represent the system. Additionally, the document describes the scenarios and types of model outputs and metrics that will be utilized to evaluate the performance of the SARCCUP Phase 1 facilities and operations over a range of conditions. During the actual development of the DSM, additional SARCCUP operational rules or changes to the modeling approach may be necessary. The final model documentation will include an updated description of the modeling methodology and logic included in the final model.

Modeling Platform

The SARCCUP DSM will be developed in the general system dynamics modeling platform named GoldSim. GoldSim is a general simulation software solution for dynamically modeling complex systems in business, engineering, and science. GoldSim supports decision and risk analysis by simulating future performance while quantitatively representing the uncertainty and risks inherent in all complex systems. Organizations worldwide use GoldSim simulation software to evaluate and compare alternative designs, plans, and policies in order to minimize risks and make better decisions under uncertainty. GoldSim, 1) can handle all the complexities of the system, 2) provides for ease of use and alternative analysis, 3) provides a state-of-the-art modeling platform so as to not become outdated in a short time, 4) allows for ease of linkage to other analysis tools used by the agencies, 5) can be enhanced by agency staff and, 6) is relatively economical.

GoldSim makes available two versions of its software, the “pro” and the “player” versions. GoldSim models are developed with the GoldSim Pro version of the software. The pro version gives the user full control of the model design and development, including model equations, inputs and outputs, and controls which variables will be exposed to the user in the player version. The player version is a runtime version of the software, is free of charge, and can be downloaded from the GoldSim website. The player version allows the user to change input variables, interact with the user interfaces (dashboards), to run the model, and to view and export results. However, with the player version, the user cannot change the internal model equations or variables except those that were explicitly exposed during the model development. A “pro” version of GoldSim will be provided and agency staff will be trained how to use the software to enhance the model and run the model.

The GoldSim modeling platform has the ability to achieve the following objectives:

- The ability to customize operating rules or simulation procedures
- The ability to transfer information with existing external dynamic link libraries (DLLs)
- The ability to iterate within a time-step to solve non-linear problems and perform pseudo-optimization
- The ability to create submodels for subsystem partitioning or forecast-based decision-making
- The ability to perform probabilistic simulation for use in alternative proposed project analyses, climate change studies, or stochastic simulations.

Other factors that were considered important are the ability of the modeling platform to understand various hydraulic units, data exchange between other programs or spreadsheets, and the handling of array constructs.

The SARCCUP DSM model files will include GoldSim files, Microsoft Excel input and output spreadsheets, and a range of post processing files. The post processing tools will be developed to facilitate the interpretation of the model results.

Optimization Approach

The SARCCUP DSM will utilize a guided optimization approach to determine the range of operations and needed facilities in order to minimize the net cost of delivery of SARCCUP supply to the Agencies. Optimization approaches include (1) an objective function that is to be minimized (or maximized), (2) decision variables that are typically adjusted to achieve optimization, and (3) constraints that provide physical or operation limits on the optimization.

For the SARCCUP DSM, the objective function can be described as:

- Achieve recharge and extraction of SARCCUP water, while minimizing net cost of delivery of SARCCUP supply to agencies
- where, SARCCUP costs are the sum of:
  - Cost of Purchased Supply +
  - Cost of Recharge Conveyance +
  - Cost of Recharge +
  - Cost of Extraction +
  - Cost of Regional Conveyance or Wheeling +
  - Cost of Exchanges

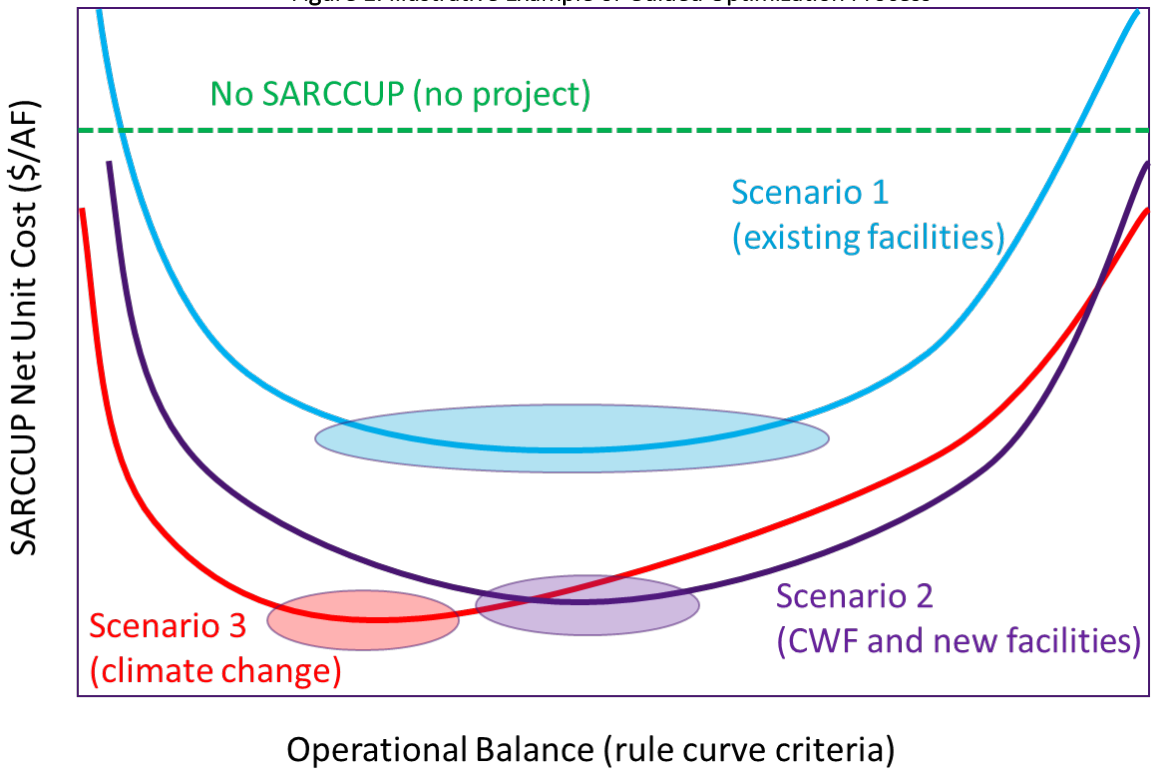
A unit net cost will be computed over the time horizon of the simulation (2020-2040) as the total SARCCUP cost (sum as described above) divided by the total SARCCUP deliveries. This unit net cost (or postage stamp rate) will serve as the primary objective function to be optimized through the DSM.

The optimization will be guided through rule-based criteria (decision variables) that determine the amount or balance of storage to target in each SARCCUP bank storage for each agency, the bank volumes that should trigger storage exchanges, and the bank volumes that limit storage exchanges. These criteria are similar to reservoir “rule curves” that are used to target storage balancing in surface water reservoirs.

The rule curves will be variables and GoldSim optimization methods will be utilized to search for the range of “optimal rule curves” that minimize the SARCCUP unit cost. Hundreds of individual rule curves will be explored through this process and automated methods will narrow these to a range that produce the lowest unit costs. This process is conceptually illustrated on Figure 1. On this figure the “optimal” regions are those shaded and may be different depending on the scenario.

The constraints are primarily related to assumed infrastructure and policy that may limit the water available for SARCCUP, the ability to recharge or extract SARCCUP water, or the ability to convey water through the regional system to deliver to SARCCUP member agencies. These are further discussed under the Regional Water Conveyance section.

Figure 1. Illustrative Example of Guided Optimization Process

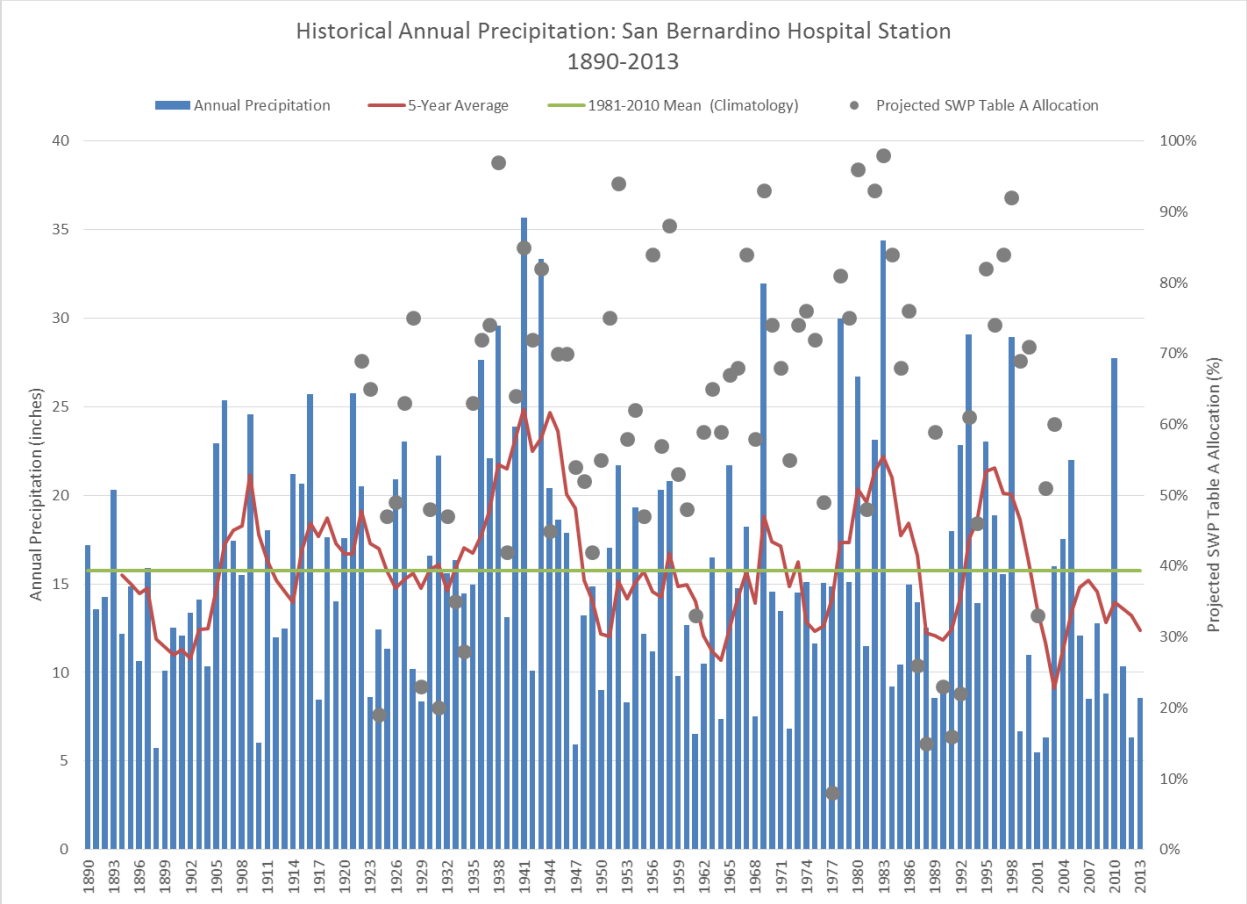


Hydrology and Availability of SARCCUP Supply

As currently envisioned, supply for SARCCUP groundwater bank would originate from water purchases from Valley District (excess SWP Table A supplies) and from willing sellers that would use the State Water Project for conveyance. Based on recent water transfer markets, it is assumed that there would be willing sellers (pre-1914 water rights) in all wet, or above-average years, when SARCCUP would be purchasing water.

Water purchased in the Sacramento Valley must flow downstream, be transferred across the Sacramento-San Joaquin Delta, and move through the SWP system south of the Delta before delivery into the SARCCUP area. The CALSIM II model simulations performed for the Department of Water Resources 2015 SWP Delivery Capability Report will be utilized to estimate both the SWP allocation in future years and the amount of SARCCUP purchased supply that could actually be transferred to southern California. Figure 2 shows the historical annual and 5-year precipitation in San Bernardino in comparison to the projected SWP Table A allocation based on the Delivery Capability Report for 1922-2003 hydrologic conditions. While in some years there is a corresponding wet year (San Bernardino) with high SWP Table A allocation, this correlation is not consistent. This poor correlation is expected, as the water supply for the SWP is generated in the Sacramento Valley with a very different hydrologic regime, than that of the service areas of SARCCUP agencies.

Figure 2. Local Hydrology and Projected SWP Table A Allocation

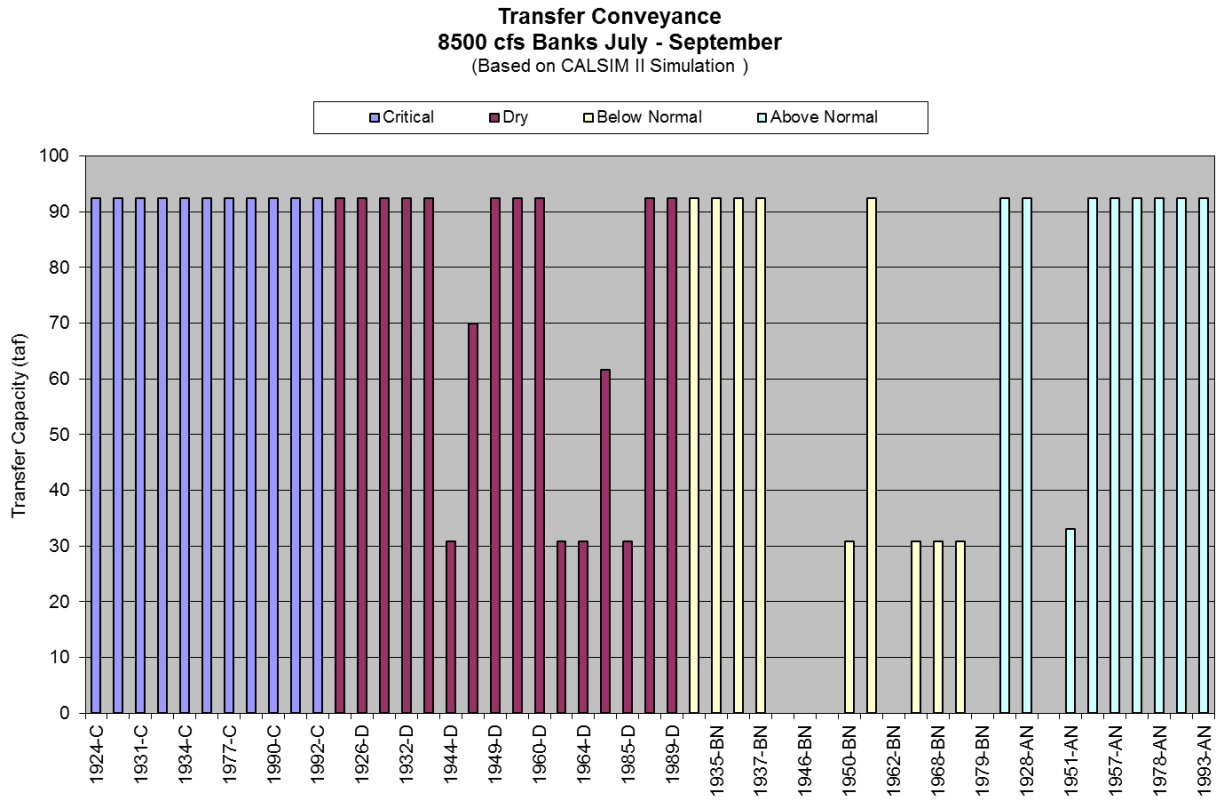


As mentioned above, the actual amount of SARCCUP supply from north of the Delta that can be conveyed into the watershed will be limited to the amount of capacity available in the Delta. CH2M will estimate the amount of capacity available in the Delta using an offline Water Transfer Tool developed by CH2M that operates as a post-processor to CALSIM II studies. The tool will determine whether capacity is available in the Delta to transfer SARCCUP water, given the fishery and water quality regulatory conditions. Figure 3 shows an example of the results from this tool for an assumed 92,000 AFY purchase. Under some hydrologic conditions and operational assumptions, less than half of the purchased quantity was capable of being transferred due to restrictions on the SWP operations. The Water Transfer Tool will be updated for the latest assumptions included in the CALSIM II modeling of the SWP Delivery Reliability Report and annual purchase supplies will be limited to that which can be recharged in the SARCCUP. The annual purchase amounts will be flexible input into the tool and can be adjusted by the user.

SWP operational scenarios will include the current National Marine Fisheries Service and U.S. Fish and Wildlife Service Biological Opinions in the Delta, varying delta conveyance (existing or California Water Fix), and climate change projections.

Water that is available for import into the SARCCUP area will be assumed to be available from May 1 through September 30 and reflect some ability to regulate supplies on the SWP. Water will be imported at the earliest opportunity beginning May 1, and, if not fully imported by September 30 due to limits within the SARCCUP service facilities it will be assumed lost (no carryover). The loss of transferred supply will be a very unlikely occurrence due to the relatively small quantities considered, and the large recharge and storage capacity available within the SARCCUP banks.

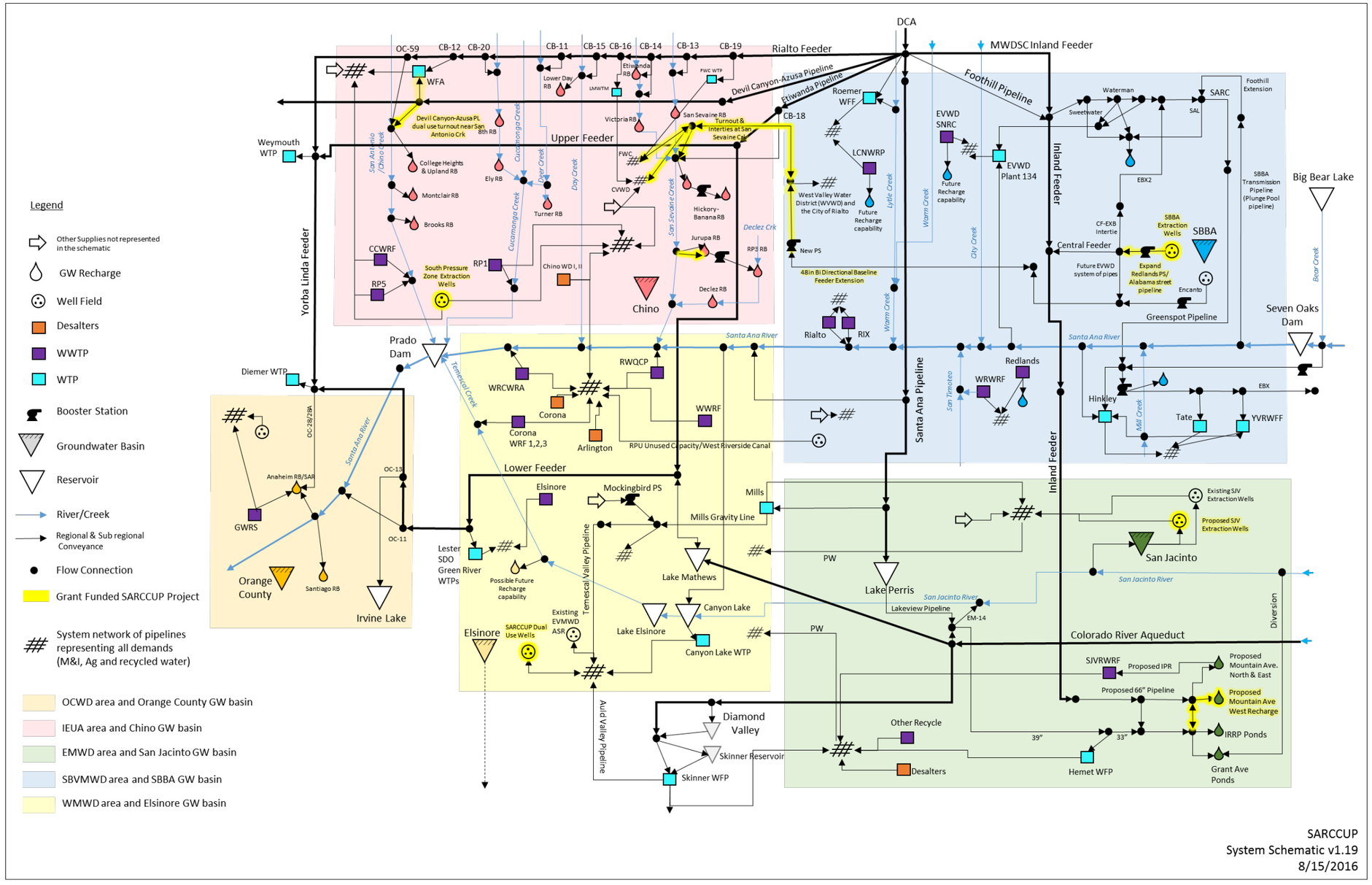
Figure 3. Illustrative Example of SWP Transfer Capacity from the Water Transfer Tool (assumed 92 TAFY purchase)



Regional Water Conveyance

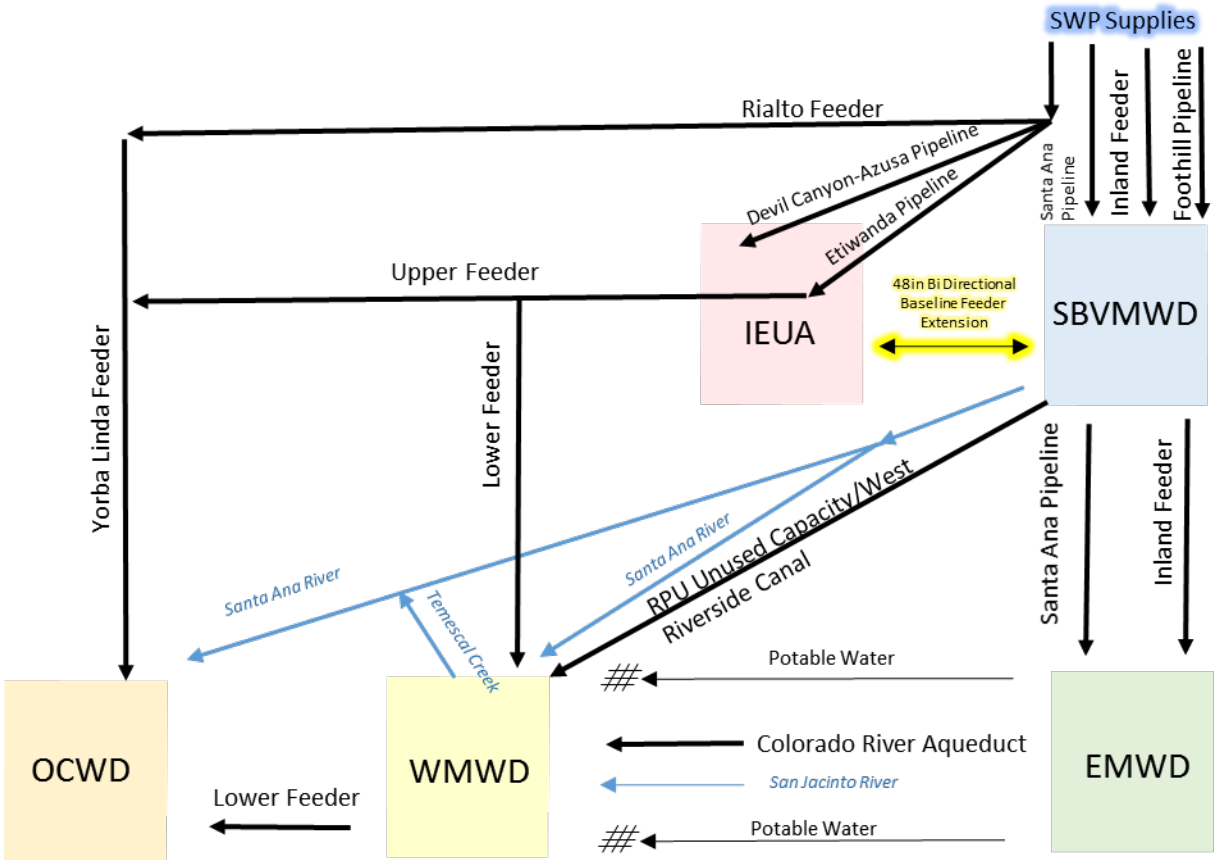
The SARCCUP DSM regional water conveyance schematic is a simplified representation of the real system. The system simplification is enough to cover all the necessary features to evaluate SARCCUP operation without adding details that are either irrelevant or of minor impact to the project operations. The CH2M team developed a system schematic which demonstrates the interconnectivity of the regional infrastructure, groundwater banks, and proposed SARCCUP projects. The schematic is critical to the conceptualization of the system and the major elements involved in the decision support model. Figure 4 shows the first draft of the SARCCUP system schematic which also includes facilities that are not specifically needed by SARCCUP. In general, the schematic includes the imported water interconnections, groundwater basins, and important agency water supplies that influence the ability to convey or store water.

Figure 4. SARCCUP System Schematic
Updated as of July 29, 2016



During model development, facilities that are not needed for SARCCUP are removed using a top down approach that starts by identifying the core elements (groundwater basins, main connections, grouped total extraction, and grouped recharge) and then adds detail, wherever necessary. The connectivity among the agencies that demonstrates how water can be recharged and then extracted and conveyed to the agencies is the backbone of the system. Both the connectivity and the cost of conveyance will ultimately dictate the optimal, or lower cost, operation of the groundwater bank. The resulting model is presented on Figure 5. Each link on the figure will have physical and operational limitations (e.g capacity, losses, seasonality, pump stations etc.), and a cost for moving water. The cost will be based on simulated operations.

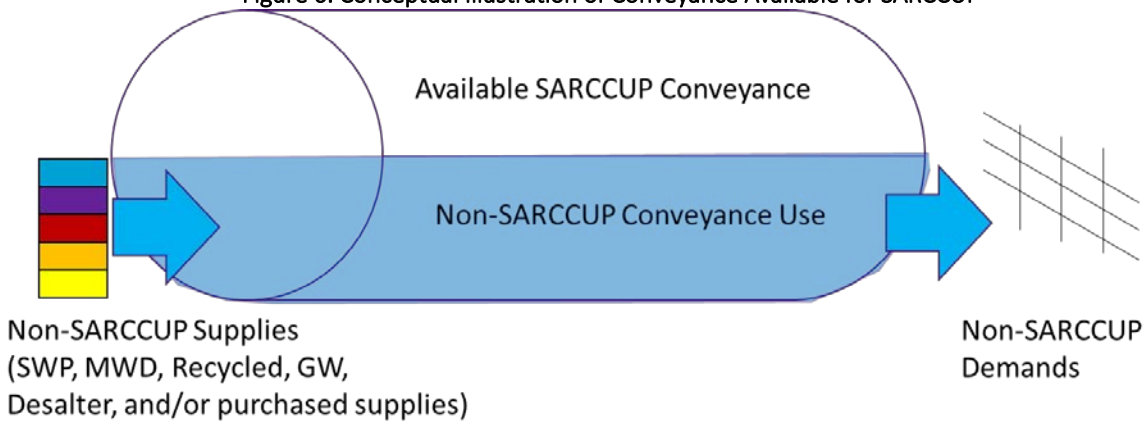
Figure 5. Simplified Conceptual System



The system presented in Figure 5 may be expanded to include additional limitations within the individual agencies which could result in a final model that looks more like Figure 4.

SARCCUP and agency conveyance capacity could limit the ability to move SARCCUP water to recharge basins or to the agencies. Local, or non-SARCCUP, water will be given priority over SARCCUP water in non-SARCCUP conveyance facilities. Figure 6 graphically depicts the use of non-SARCCUP water in the regional and local conveyance system and illustrates the capacity available for SARCCUP conveyance.

Figure 6. Conceptual Illustration of Conveyance Available for SARCCUP



Recharge and Extraction

Recharge and extraction availability could limit the total amount of water that can be stored or removed from individual SARCCUP groundwater banks. The following sections explain the logic for recharge and extraction.

Recharge

The recharge of the SARCCUP water banks will be mainly driven by available capacity, target storage, and preferences (cost or other basis).

In the DSM, when water is available for recharge, as discussed in the Hydrology and Availability of SARCCUP Supply section, recharge will occur up to the maximum recharge capacity or up to available bank storage capacity, whichever is less. Additionally, conveyance limits in the network will be taken into consideration and could further limit the amount of permissible recharge.

A list of recharge facilities (recharge basins and injection wells) available to the SARCCUP were identified and captured on the model schematic. Table 1 includes a summary of the recharge capacity by groundwater basin. It is assumed that water can recharge the SARCCUP groundwater banks only through these facilities and only when SARCCUP supply is available. Each facility will have a maximum recharge capacity that could be changed via model dashboards. Recharge capacity can be increased over time or to reflect different infrastructure scenarios. There will also be an option to specify the percentage of time that the percolation basin or recharge wells are operational or the season that they will be operating. Regulatory constraints may also be included, as needed, as they could influence the ability to recharge.

Table 1. Groundwater Basin Recharge Capacity

	Total Recharge Capacity (AFY)		Comments
Groundwater Basin	**Existing**	**Expanded**	
Chino[1]	90,500	90,500	Data provided from A. Campbell
SBBA[2]	435,200	873,200	Data provided from B. Tincher
San Jacinto[3]	30,000 - 40,000	60,000 - 70,000	San Jacinto Water Supply Evaluation Long-Term Water Supply Scenarios
Elsinore[4]	3,000	3,000	Supply from MWD

Notes:

[1]Includes the following facilities: 8th, Banana, Brooks, College Heights, Declez, Ely, Etiwanda Debris Basin, Hickory, Jurupa, Lower Day, Montclair, RP-3, San Sevaine, Turner, Upland, and Victoria

[2]Includes the following facilities: SAR Spreading Grounds, Devil Canyon and Sweetwater Basins, Waterman Basins, East Twin Creek Spreading Grounds, Mill Creek, Cactus Basin, Patton Basins, LCN WRP Ponds, Redlands Recharge Basins, Proposed Lytle Creek Recharge Basin, Proposed Cajon Creek Recharge Basin, Proposed Cable Creek Recharge Basin, Proposed City Creek Recharge Basin, Proposed Plunge Creek Recharge Basin, Proposed Mission-Zanja Creek Recharge Basin, Proposed San Timoteo Creek Recharge Basin, and Proposed Warm Creek Recharge Basin

[3]Includes the following facilities: IRRP Ponds, Grant Ave. Ponds, Proposed Mountain Ave. West Recharge Facilities

[4]From the Draft 2015 EVMWD UWMP, Chapter 6.0

In the DSM, the decision to recharge one basin over another will be based on definable criteria such as the target storage levels for each groundwater banks. The target storage levels will be explored initially, and eventually optimized to achieve the lowest unit SARCCUP cost.

Extraction

In the DSM, the decision to begin a “take” (extraction) will be based on the regional supply conditions. Two factors will be considered: (1) local precipitation and (2) whether MWD is likely to be allocating supplies. Building on the criteria that were used for the SBVMWD Bunker Hill Conjunctive Use Project, if the 5-year running average precipitation is lower than the long-term mean, this will be considered a “locally dry” year. Similarly, if MWD is allocating supplies, this would also be considered “locally dry”. If these conditions occur, then the operation for that year will be aligned with a take operation.

Extraction will be limited by the maximum extraction capacity of the well fields of a specific basin. The SARCCUP well fields with their respective capacity are presented on the system schematic and summarized by basin in Table 2.

Table 2. Groundwater Basin Available Extraction Capacity

Groundwater Basin	Total Extraction Capacity (AFY)		Comments
	Existing	Expanded	
Chino[1]	0	4,800	Data provided from A. Campbell
SBBA[2]	7,500	45,000	Data provided from B. Tincher
San Jacinto[3]	16,600	49,700	Data provided from B. Powell EMWD_DSM_SuppliesDemands02.xlsx
Elsinore			New Facility

Notes:

[1]Includes the following wells: South Pressure Zone Extraction Wells

[2]Includes the following facilities: Baseline Feeder Wells, BHCUP Wells, Proposed SARCCUP SBBA Wells Existing is 2015 and fully expanded is 2020.

[3]Includes the following facilities: Hemet/San Jacinto Water Management Plan area Extraction Wells: San Jacinto Upper Pressure (EMWD and IRRP Wells), Hemet South, and Canyon. Existing is 2015 and fully expanded is 2040

Extractions from a groundwater bank(s) by an agency will be a function of the amount(s) the agency has in the bank(s) and on the cost to move the water from the bank(s) to the agency.

The cost to move extracted water will include: extraction, conveyance or wheeling, and exchanges.

SARCCUP extraction capacity will be equally shared among agencies for each model time step. This will be true when demands are equal to, or exceed, the extraction capacity and all of the agencies have equal amounts stored in the banks. If an agency does not have the demand to fully utilize its extraction capacity at a specific basin, the idle capacity will be equally shared among the remaining agencies, if needed. Also, it is assumed that all of the agencies will have similar extraction operations and the extraction target (60 TAF over 3 years of storage) will be used during local, dry periods.

Groundwater Storage and Accounting

The model will create water bank "accounts" for each agency.. The first step will be to create a virtual SARCCUP GWB. The general virtual account will be used to keep track of the total SARCCUP GWB water volume that an agency has at any point in time and to manage maximums that could be taken or stored in the SARCCUP GWB. The second step will be to create five accounts in the four individual groundwater banks. The individual accounts at each groundwater banks will be used to limit the water amount that can be physically drawn from a specific bank and to indicate when storage transfers or in–lieu transfers will be necessary. A more detailed explanation of the logic for the two steps process is described below.

General

Every unit of SARCCUP supply water recharged at a SARCCUP facility will go into a virtual groundwater bank account. Every unit of SARCCUP stored water that is extracted via a SARCCUP extraction facility will be deducted from the corresponding agency's account that is utilizing the supply. This virtual account will keep track of the total water volume that an agency has in the SARCCUP groundwater bank, at any given time.

A maximum SARCCUP GWB volume will be determined by the five SARCCUP agencies. Initially the maximum 180 TAF of storage proposed for SARCCUP Phase 1 will be equally divided by the Agencies (36 TAF/agency). Stored water transfers will be utilized, which would result in an agency having more than 36 TAF of storage in the SARCCUP GWB. A storage above 36 TAF is acceptable as long it does not interfere with recharge of other accounts. Agencies would always have a guaranteed 36 TAF of storage in the bank.

Losses

SARCCUP DSM will initially assume two losses in the system. First, losses will be assumed during the recharge process (evapotranspiration, rejected recharge, etc). Second, losses of stored groundwater can occur. Recharge losses will initially be assumed to be 5% of the recharge. Storage losses are not well known, but losses are likely a couple percent of the recharge volumes. The losses will charged equally to all agencies utilizing the same groundwater basin.

Basin Specific Accounting

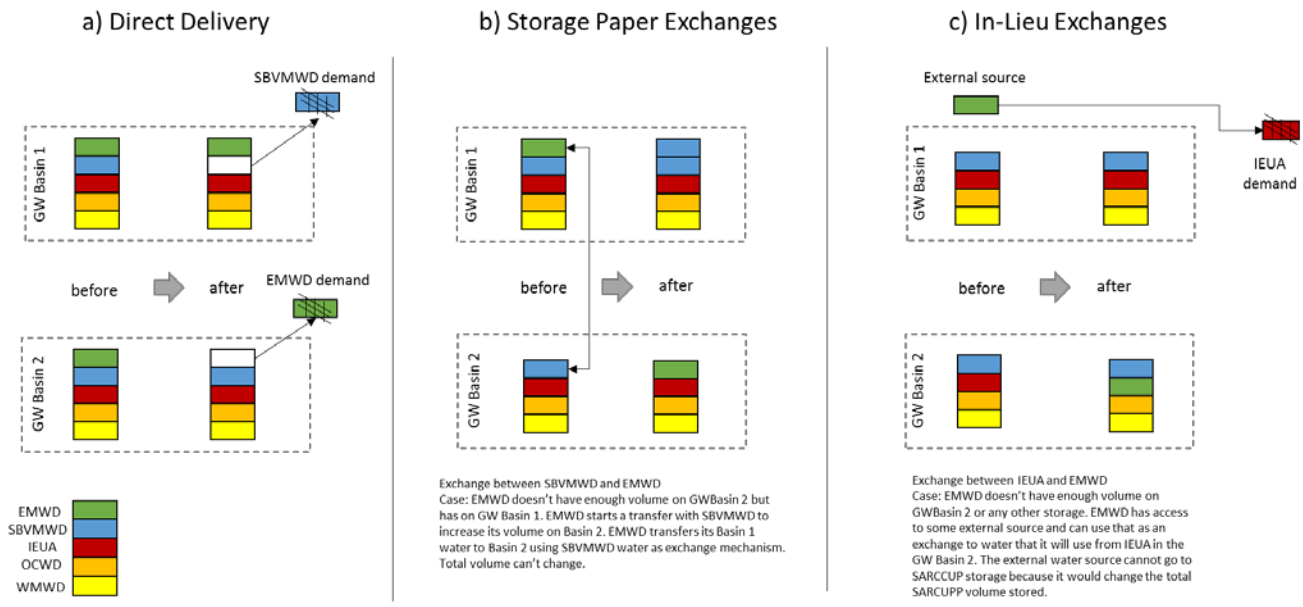
Five agency accounts will be created at the four groundwater banks: Chino, SBBA, Elsinore, and San Jacinto. Each bank account will be tracked separately by agency, and also cumulatively as the entire SARCCUP bank volume.

Deliveries

Delivery of SARCCUP stored water will occur in years triggered as “locally dry”. Under these conditions, delivery will be targeted to meet the agency-specific SARCCUP demand.

Deliveries can occur through three main mechanisms: (1) direct delivery to an agency, (2) transferred storage via agreements, or (3) in lieu exchanges that include external water sources to the SARCCUP supply. Figure 7 illustrates the different possible ways an agency may receive water. Each one of these delivery mechanisms is described in more detail below.

Figure 7. Conceptual Illustration of Conveyance Available for SARCCUP



Direct Delivery

It is assumed that agencies that have a bank in their service area will tap into that bank first since it is the lowest cost. Each agency will have a preferred groundwater bank to access (based on cost of extraction and conveyance) and extractions from that preferred will occur as long as the supplies in its account do not have a zero balance. When an agency does not have enough storage in its own account, and no other accounts within the bank are available for a transfer, a transfer from another basin can occur if it is the least expensive option considering direct delivery, storage exchange, and in-lieu exchange. Direct transfers from a non-local basin will be constrained by conveyance connectivity and capacity. The current connectivity among agencies and groundwater basins are presented in Table 3. Costs will be assigned for each cell of Table 3 so there will be a preference in case of direct transfers among basins. In the case when groundwater storage has been exhausted for one agency either storage exchange or in-lieu exchanges may be needed.

Table 3. Matrix of Direct Delivery/Transfers Among Agencies

		From Agency System/GW Basin			
		Elsinore GW Basin	Chino GW Basin	SBBA GW Basin	San Jacinto GW Basin
To SARCCUP Agency	OCWD	Dual use ASR wells to Temescal Creek to SAR	South Pressure Zone Extraction Wells to SAR	SBBA Extraction Wells 48 inch baseline feeder extension Devil Canyon –Azuza Pipe Yorba Linda Feeder or SAR	San Jacinto Extraction Wells CRA or San Jacinto creek Dual use ASR wells Temescal creek SAR
	WMWD	Dual use ASR wells	Chino Desalter	RPU Wells unused capacity/West Riverside Canal	CRA or San Jacinto Creek San Jacinto Extraction Wells Potable pipe network
	IEUA	x	South Pressure Zone Extraction Wells, Member Agency Wells	SBBA Extraction Wells 48 inch baseline feeder extension	x
	SBVMWD	x	48 inch baseline feeder extension	SARCCUP Wells RPU Wells MWDSC Inland Feeder	x
	EMWD	x	x	Alabama Pipe Central Feeder Inland Feeder	San Jacinto Extraction Wells

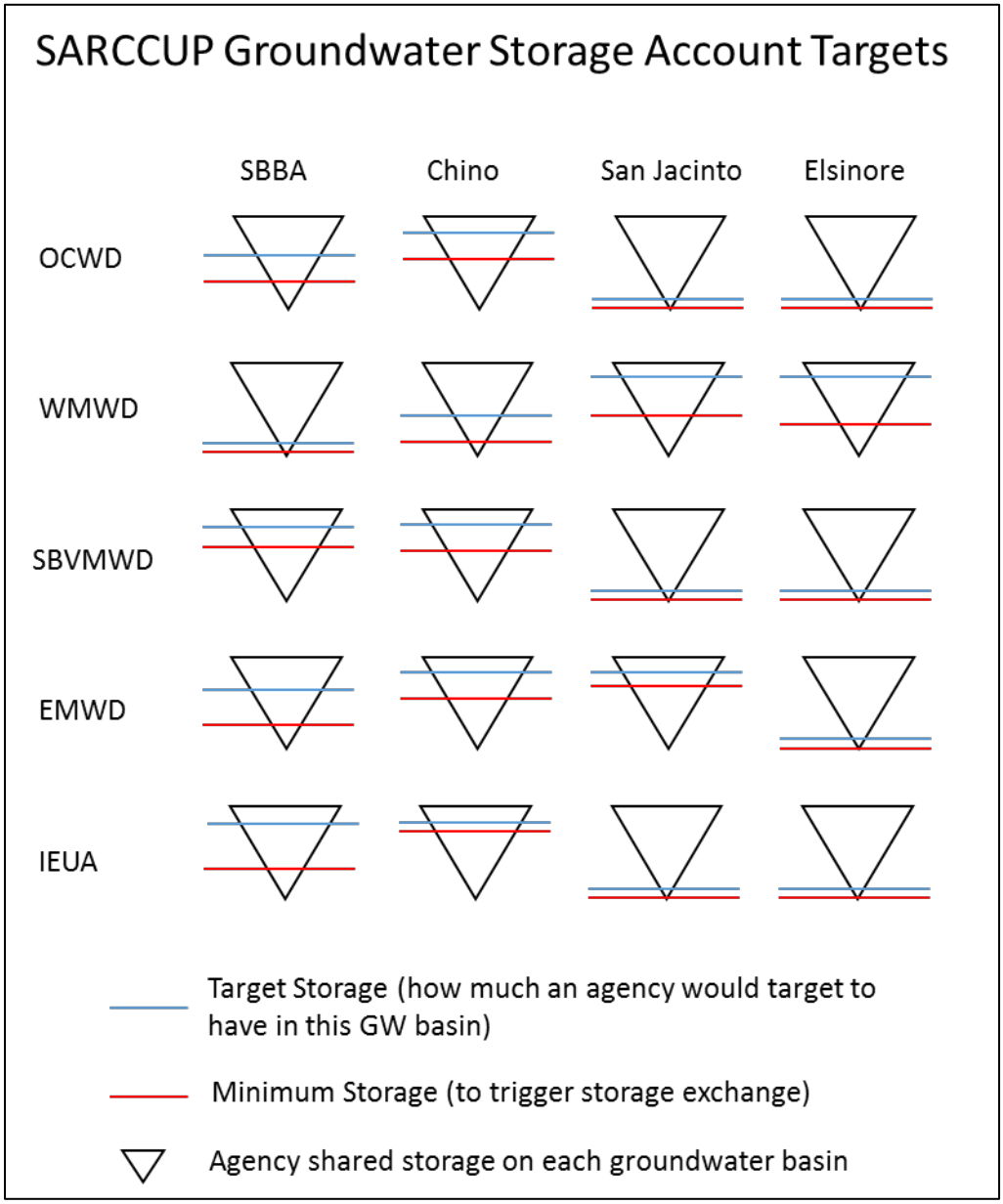
SARCCUP projects:

- Dual use ASR wells
- Southe Pressure Zone Extraction Wells
- 48 inch baseline feeder extension
- SBBA extraction wells
- Alabama st. pipeline/Redlands PS
- San Jacinto Extraction wells

Storage Exchanges

When storage for an agency drops below a threshold, target volume, in a bank, it will trigger the need for more water by a storage exchange. The storage exchange will move water from an account of one agency to that of another. For example, if EMWD's storage in the San Jacinto basin dropped below its threshold but SBVMWD still had water in San Jacinto and EMWD still had water in SBBA, EMWD could do a storage exchange thereby obtaining SBVMWD's water in San Jacinto in exchange for giving SBVMWD EMWD's stored water in SBBA.

Figure 8. Conceptual Illustration of groundwater storage accounts and triggers to determine storage exchanges



The model will include a logic to determine when, how much, from which agency and to which basin a storage exchange will happen and will keep an accounting. At any water transfer event there will be at least 2 agencies involved, the agency in need requesting the transfers (Recipient) and the agency (or agencies) that will provide the exchange water and will be compensated in another basin exchange. The four main questions to address when doing a storage transfer are:

When to do an exchange? The timing of storage transfer will be reviewed annually and based on a target volume that each agency will have in each groundwater basin and the threshold volume to trigger a storage exchange.

How much to exchange? The amount of exchange will be limited to the volume necessary to return one agency's volume in a bank back to its target volume, the in-lieu capabilities, and the stored water available from other agencies (an agency's account will not be allowed to drop below its own target to make another agency meet its target).

Which account should provide the water? Once an agency has triggered the need for an exchange (EMWD as an example in Figure 7b) and, has storage in other banks to execute the exchange, the next step is to decide which account will supply the exchange water. First it has to be an account that has available water for exchange (volume above its target) and second it will consider the potential cost savings to an agency by doing a transfer rather than direct delivery by comparing the cost of direct extraction plus conveyance (in our Figure 1b example that agency would be SBVMWD). It is possible that more than one agency will be competing for the transfer of another agency's stored. In that case the available volume will be equally divided.

Where the water provider will be compensated? The volume requested by an agency (EMWD on the Figure 7b example) will be exchanged to another agency (SBVMWD in Figure 1b example). The exchange will start in a basin that the agency requesting exchange has storage (EMWD in Figure 7b example), and it would be the most expensive basin that the agency would have direct access or has no direct access. It will exchange the volume with SBVMWD at that basin. In case there is not enough volume to be transferred, the agency in need will go to the next most expensive basin for direct access until it exchanges the whole volume.

The different input values for costs and storage targets will determine the most efficient way to operate the system and extract water from the SARCCUP GWB.

In-lieu Exchanges

In-lieu exchanges can occur when non SARCCUP supplies are used in storage exchanges or to save the pumping cost of extractions. The main assumptions are that an agency has triggered a storage exchange but either does not have volumes in other basins to do an exchange or other agencies do not have volumes to use in a transaction. In-lieu sources will not go into SARCCUP storage, but will be delivered directly. Using the example from Figure 7c, assuming that EMWD does not have any volume in Bank 1, EMWD could purchase MWD water (external source) and deliver to the IEUA so that EMWD would receive IEUA's amount of water in Bank 1. In-lieu exchanges could also happen amongst MWD member agencies whereby one MWD member agency would make its portion of MWD water available in exchange for the other agency's stored IEUA water. Exchanges will be the lowest cost method of moving water amongst the agencies so they will be given the highest priority. In-lieu exchanges could happen automatically as the last resource to meet demands or happen based on a user defined schedule. A list of possible in-lieu exchanges with costs will have to be created identifying agencies and maximum volumes that can be exchanged.

In-lieu exchanges must have the preference to be delivered at upstream locations where the water could end up in a recycled water facility and used multiple times. Upstream demands that can be used as in-lieu exchanges must be identified. Sources other than MWD water must be identified. For example, agency A can do in-lieu exchanges with agency B using MWD water, Colorado River water, the other stored water, or using recycled water not connected to SARCCUP.

Initial Conditions

Initial conditions for the SARCCUP DSM are primarily related to the starting volumes the SARCCUP groundwater banks and hydrologic starting conditions. Preliminary DSM simulations will occur with empty SARCCUP banks and hydrologic conditions that best reflect the recent sequence of dry years. Sensitivity runs will be prepared to assess the impact of the initial conditions on preliminary results. Adjustments may be considered after reviewing these results.

Calibration and Validation Approach

Model calibration and validation will be a function of available historical data. As a starting approach, we will provide a comparison of the current model for the most recent five years historical deliveries and main conveyance flows, as available. Two main sets of variables will be calibrated and tested through the validation step: (1) SARCCUP agency and regional water demand forecasts by sector (municipal and industrial, and agricultural); and (2) SARCCUP network flows to reflect water agency understanding and provided capacities. The primary variables that will be adjusted during calibration will be the timing and distribution of individual supplies for each agency (monthly basis) to achieve flows in the conveyance network that reflect historical observations.

Period of Analysis

The period of analysis for the calibration and validation will be established based on available data, but is expected to include deliveries for years 2010 – 2015 with a focus on recent historical flows and supplies. The goal is to capture dynamics both within and outside of recent historical drought periods.

The future planning period will be for 2020 – 2040. This timeframe is consistent with current 2015 UWMPs and OWOW Plan as well as the SARCCUP project implementation schedule.

Calibration

All calibration will be performed on monthly and annual simulation results. Mean and root mean square error will be the primary statistical measures for the quality of calibration.

Validation

Once model development and calibration have been completed, a separate historical period will be selected to validate the model, if possible. Validation is performed to evaluate the strength and weakness of the model when operated on an independent data set and most closely represents the model performance as it will be used in the true forecast mode. All validation will be performed on monthly and annual simulation results. Mean and root mean square error will be the primary statistical measures for the quality of validation.

Scenarios

A number of scenarios will be run to answer the following questions:

1. What is the cost of SARCCUP water and how does it compare to the cost of water without SARCCUP?
2. How does the California Water Fix impact SARCCUP?
3. Where are the “bottlenecks” in SARCCUP, if any? What recharge/extraction facilities would be required to alleviate specific bottlenecks?
4. Where in the watershed does extra recharge or extraction capacity exist without new facilities?
5. What facilities would be needed to increase the storage capacity to _____ AF and the dry year yield to _____ AFY?
6. What if OCWD were to only receive treated wastewater via the SAR? Would that stretch water supplies and reduce costs in the watershed?

To answer the above questions, the following scenarios will be run (at a minimum):

- Baseline – Baseline operations without SARCCUP (No Project scenario)

- Scenario 1 –SARCCUP planned facilities and existing SWP
- Scenario 2 – Scenario 1 with California Water Fix
- Scenario 3 – Scenario 1 with future climate change assumptions
- Scenario 4 – Scenario 1 where all deliveries to OCWD will be exchanges with treated wastewater being delivered to OCWD via the Santa Ana River. This will test the hypothesis that the watershed can reduce costs and stretch supplies further by using water more times before it reaches the ocean.

These scenarios will be initially developed and discussed with the SARCCUP DSM team. Following review, additional scenarios will likely be developed.

Results

Model results will be presented in model dashboards using the GoldSim user interface. Additional results, or processing of results, will be developed in MS Excel.

At a minimum, the following results will be included in the model output:

- Accounting of recharge by Agency and by Banks
- Accounting of extractions by Agency and by Banks
- Total SARCCUP Storage by agency, overall and by basin
- Net cost ($/AF) of operation
- Use of major conveyance and SARCCUP facilities

User Interface and Dashboards

The user interface of the SARCCUP DSM will consist of a series of linked dashboards to allow model initial conditions and input assumptions to be set, scenarios to be defined, and model results to be viewed and exported.

A number of primary dashboards will be developed for the model interface:

- Dashboard to control the time window of the simulation and stochastic simulation
- Dashboard to control the supplies, time to enter recharge model and time to enter extraction mode
- Dashboard to control target storage tables for each agency/groundwater basin
- Dashboard with tables to input cost of recharge, conveyance and extraction
- Dashboard showing a simplified system and how the water is being moved
- Dashboard with SARCCUP groundwater bank storage by individual groundwater basin
- Dashboard showing the overall net cost of a SARCCUP unit of water

Model dashboards will be developed in conjunction with the SARCCUP team and will be developed iteratively to ensure user needs are being satisfied.