SARCCUP Optimization Using the Decision-Support Model

DSM Scenarios and Findings
PA 23 Meeting
December 5, 2017
Presentation Outline

• DSM Scenarios
• Summary Results
• Decision Process and Dependencies
• Recommendations
• Next Steps
DSM Model Overview

• Maximize the storage of wet year SWP water to produce “dry year yield”
• Simulate operations
• Identify any constraints
• Optimize operations and quantify the benefits and costs
• Determine ultimate size of the bank
DSM Scenarios Evaluated

• Scenario 1 – Maximize Exchanges (Baseline)
  – Production wells and treatment in Chino/IEUA
  – San Jacinto Recharge Project
  – La Sierra pipeline

• Scenario 2 – New Facilities to Deliver Non-MWD Supplies (Sac Valley purchases)
  – Baseline Feeder Extension, SBBA production wells
  – RPU facilities, SBBA production wells
  – Riverside-Corona Feeder, Cannon Campbell pipeline, SBBA production wells

• Scenario 3 – Chino Basin Bank Resizing
  – Reduce Chino Bank to 48,000 AF and 0 AF
  – Add storage at OCWD (36,000 AF) and WMWD (10,500 AF)

• Scenario 4 – Local Conveyance with Reduced Chino Bank
  – Baseline Feeder Extension and RPU + Cannon Campbell
  – Reduced Chino Bank size and OCWD/WMWD bank storage
Information/Modeling Updates

• Cost Assumptions
  – Reviewed and refined substantially

• Model Enhancements
  – Capacity limits, cost approach, available supply refinements

• Chino Basin losses
  – Refined estimate of one time, five percent loss for Chino Basin
  – Losses are now consistent with all other basins

• Baseline Feeder Extension costs and limits
  – Grant application costs were found appropriate
  – Five SBBA extraction wells
  – BFE constrained by quantity of treated water demand

• OCWD infrastructure needs
Scenario Summary Results – Scenario 1 (Maximize Exchanges)

- **SBVMWD Table A only**
  - Low Cost ($165/AF)

- **Sac Valley Purchase**
  - Expected Cost ($350/AF)
  - Low Cost ($165/AF)
Scenario Summary Results – Scenario 2
(New Facilities to Deliver Non-MWD Supplies)

- Riverside-Corona Feeder + Cannon Campbell + SBBA Wells
- RPU + Cannon Campbell + SBBA Wells
- Baseline Feeder Extension + SBBA wells
Scenario Summary Results – Scenario 3 (Resizing Chino Bank)

Chino (0 TAF), OCWD and WMWD banks (48 TAF)

Chino (48 TAF), OCWD and WMWD banks (48 TAF) compensate
Scenario Summary Results – Scenario 4 (Resize Chino Bank with New Conveyance)

Chino (48 TAF), OCWD and WMWD banks (48 TAF) + Baseline Feeder Extension + RPU + Cannon-Campbell + SBBA Wells

Chino (48 TAF), OCWD and WMWD banks (48 TAF) + RPU + Cannon-Campbell + SBBA Wells
## Summary of Modeling Results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Dry Year Yield (AF/Yr)</th>
<th>Unit Cost ($/AF, includes capital cost recovery)</th>
<th>Capital Cost Recovery ($/AF)</th>
<th>Capital Cost ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A – Maximize Exchanges</td>
<td>45,600</td>
<td>$1,150</td>
<td>$62</td>
<td>$51</td>
</tr>
<tr>
<td>2.1A – New Conveyance (Baseline Feeder Extension)</td>
<td>46,300</td>
<td>$1,220</td>
<td>$123</td>
<td>$102</td>
</tr>
<tr>
<td>2.2A – New Conveyance (RPU + Cannon Campbell)</td>
<td>45,800</td>
<td>$1,220</td>
<td>$87</td>
<td>$72</td>
</tr>
<tr>
<td>2.3A – New Conveyance (Riverside-Corona Feeder + Cannon Campbell)</td>
<td>45,800</td>
<td>$1,360</td>
<td>$247</td>
<td>$203</td>
</tr>
<tr>
<td>3.1A Chino Resize (Chino 48 TAF, OCWD 37 TAF, WMWD 10.5 TAF)</td>
<td>45,900</td>
<td>$1,110</td>
<td>$78</td>
<td>$64</td>
</tr>
<tr>
<td>3.2A Chino Resize (Chino 0 TAF, OCWD 37 TAF, WMWD 10.5 TAF)</td>
<td>35,100</td>
<td>$1,080</td>
<td>$73</td>
<td>$46</td>
</tr>
<tr>
<td>4.1A Chino Resize (Chino 48 TAF, OCWD 37 TAF, WMWD 10.5 TAF) + BFE + RPU + Cannon Campbell</td>
<td>46,100</td>
<td>$1,230</td>
<td>$139</td>
<td>$115</td>
</tr>
<tr>
<td>4.2A Chino Resize (Chino 48 TAF, OCWD 37 TAF, WMWD 10.5 TAF) + RPU + Cannon Campbell</td>
<td>45,900</td>
<td>$1,220</td>
<td>$102</td>
<td>$84</td>
</tr>
</tbody>
</table>
Decision Process and Dependencies

What storage contributions to consider?

**Storage Options**
- SBBA, San Jacinto, Chino
- SBBA, San Jacinto, Reduced Chino, OCWD, WMWD

What conveyance is desirable/permmissible?

**Maximize Exchanges (MWD Conveyance)**
- Chino wells, SBBA wells, SJ recharge project, La Sierra pipeline

**Independent Conveyance**
- Baseline Feeder Extension
- RPU/Cannon Campbell
- Riverside-Corona Feeder
- Chino wells, SBBA wells, SJ recharge project, La Sierra pipeline
- RPU/Cannon Campbell
- Baseline Feeder Extension
MWD Policy Uncertainties

1. **Storage of MWD member agency water in SBV Bank - outside of MWD Service Area**

   MWD can only bill for water when it crosses the meter into their system. Consistent with MWD policies, MWD will not allow MWD member agencies to purchase then store water outside their service area to bring it back in at a later date.

   - **OPTION 1:** Valley stores its own water, for benefit of SARCCUP (energy cost paid by SARCCUP agencies at the time its stored?); when MWD moves the water into its system via in-lieu SWP delivery of Valley’s water, MWD pays the $100/AF to Valley that includes energy cost, and MWD member agencies pay Full Service Rate to MWD at time of delivery, and get reimbursed energy cost by Valley. SARCCUP agencies cannot exceed 50% of total available SBV water for purchase, counts as Extraordinary Supply. This option is preferred by MWD.

   - **OPTION 2:** MWD purchases/obtains physical storage in Valley’s bank; MWD buys 100% of the water & stores it (water is all MWD-agency water); SARCCUP agencies can purchase up to 50% of the water in the future, when in allocation as it counts as Extraordinary Supply water, at the full rate in effect at the time of ‘take’. MWD staff not sure if this option would fly with mgt.
2. Once MWD member agencies have purchased Valley Surplus SWP water and stored in their banks (i.e., within MWD service area), is there a cost associated with in-lieu deliveries provided via MWD at the time of “take”? 

- Yes, it’s different water. Let’s say Valley surplus water is purchased by Western and stored in IEUA’s bank for future use. Western then calls for the water:
  
  i. IEUA pumps it and uses it locally and foregoes their MWD delivery of the same volume
  
  ii. Western then asks MWD to deliver that in-kind amount to them *in addition* to their normal MWD deliveries
  
  iii. Western pays for that additional increment of MWD water at the current MWD rate at the time of delivery, and that additional water may be counted as Extraordinary Supply
3. Does MWD allow for wheeling of non-Table A water (i.e. SAC Valley/transfer water) through Valley’s system for delivery directly to MWD member agency?

- This question was not resolved by staff; MWD needs legal input

- MWD did state that any scenario cannot compete with MWD’s purchase of water or harm MWD in any way

- For example, demands on MWD are diminished by another agency providing supply to meet a MWD member agency demand
Recommendations

• Determine storage contributions first
  – SBBA, Chino, San Jacinto, OCWD, WMWD Basins
  – Recommendation: SBBA (64 TAF), Chino (50 TAF), San Jacinto (19.5 TAF), OCWD (36 TAF), WMWD (10.5 TAF)

• Resolve MWD policy issues to determine whether independent conveyance is desired/useful for SARCCUP

• Match conveyance facilities with storage and MWD policy findings
  – e.g. Riverside Public Utilities pipeline and Cannon Campbell pump station required if Riverside bank is included,
  – e.g. No independent conveyance would be recommended if MWD policy does not color water to SARCCUP agencies on “put”
  – Recommendation: Chino/IEUA South Zone production wells, San Jacinto Recharge Project, La Sierra pipeline, Riverside Public Utilities pipeline, Cannon Campbell pump station
A Proposal for the Sharing of SARCCUP Local Match Costs

PA 23 Committee
December 5, 2017
(Draft)
Initial Grant Concept

Chino Basin

EMWD
IEUA
OCWD
SBVMWD
WMWD

San Jacinto Basin

EMWD
IEUA
OCWD
SBVMWD
WMWD

Elsinore Basin

EMWD
IEUA
OCWD
SBVMWD
WMWD

San Bernardino Basin

EMWD
IEUA
OCWD
SBVMWD
WMWD

BLF
Initial Cost Sharing Arrangement

Total SARCCUP Project Cost = $100 million
DSM Results: Scenario 3.1A (Recommendation)
### SARCCUP

Local Match Cost Sharing Refinement

<table>
<thead>
<tr>
<th></th>
<th>PM/WUE/MP-DSM</th>
<th>Arundo Removal</th>
<th>Habitat Restoration</th>
<th>Water Bank Infrastructure*</th>
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</thead>
<tbody>
<tr>
<td>EMWD</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>IEUA</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>OCWD</td>
<td>✓</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBVMWD</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>WMWD</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
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</tbody>
</table>

* *Water bank infrastructure benefits are based on the capital projects in scenario 3.1A*
### SARCCUP Scenario 3.1A
Capital Program Cost Sharing Recommendation

<table>
<thead>
<tr>
<th></th>
<th>PM/WUE/MP-DSM</th>
<th>Arundo Removal</th>
<th>Habitat Restoration</th>
<th>Water Bank Infrastructure</th>
<th>Total Share</th>
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<tbody>
<tr>
<td><strong>EMWD</strong></td>
<td>$636,649</td>
<td>$0</td>
<td>$0</td>
<td>$6,923,133</td>
<td>$7,559,782</td>
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<tr>
<td><strong>IEUA</strong></td>
<td>$636,649</td>
<td>$0</td>
<td>$0</td>
<td>$6,923,133</td>
<td>$7,559,782</td>
</tr>
<tr>
<td><strong>OCWD</strong></td>
<td>$636,649</td>
<td>$2,488,053</td>
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<td>$0</td>
<td>3,124,702</td>
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<td><strong>SBVMWD</strong></td>
<td>$636,649</td>
<td>$0</td>
<td>$5,034,282</td>
<td>$0</td>
<td>$5,670,931</td>
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<tr>
<td><strong>WMWD</strong></td>
<td>$636,649</td>
<td>$0</td>
<td>$0</td>
<td>$6,923,133</td>
<td>$7,559,782</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$3,183,245</strong></td>
<td><strong>$2,488,053</strong></td>
<td><strong>$5,034,282</strong></td>
<td><strong>$20,769,399</strong></td>
<td><strong>$31,474,979</strong></td>
</tr>
</tbody>
</table>

(a) Locally funded cost share is 37.1% of project cost (total project = $84,849,560).
SARRCUP Operational Examples

• Developed to demonstrate different SARCCUP Bank operating scenarios in line with Metropolitan Water District (MWD) policies

1. San Bernardino Valley Water District Surplus State Water Project Water
   • Direct Delivery using SARCCUP facilities
   • In-Lieu Exchange using MWD facilities

2. Non-State Water Project Transfer Water
   • Wheeled through MWD facilities
   • Wheeled through Valley facilities (+ SARCCUP facilities)

• Take-aways, under all scenarios:
  – SARCCUP Agencies and MWD made whole
  – SARCCUP Banks operating in line with MWD Policies
  – SARCCUP MWD member agencies receive Extraordinary Supply credit
SARRCUP Operational Examples (cont’d)

1. San Bernardino Valley Water District Surplus State Water Project Water
   - Direct Delivery using SARCCUP Facilities - Example A
Example A – Put: WMWD purchases available Valley Surplus SWP Water for storage in Chino Basin

IEUA

Chino Basin

IEUA Banks 1,000 AF
In Chino Basin
For WMWD

MWD Member Agencies

1,000 AF

State Water Project

Valley

SBBA

OCWD

Orange County

WMWD

Elsinore & Riverside

EMWD

San Jacinto

1,000 AF

2,000 AF

Valley Surplus
Example A – Put$: WMWD purchases available Valley Surplus SWP Water for storage in Chino Basin

- IEUA
  - Chino Basin
  - IEUA Banks 1,000 AF in Chino Basin For WMWD
  - 1,000 AF Recharged

- OCWD

- WMWD
  - Elsinore & Riverside

- EMWD
  - San Jacinto

- Valley
  - State Water Project
  - 1,000 AF
  - 2,000 AF

- SBBA

- MWD Member Agencies
  - 666 $/AF x 1,000 AF
  - 1,000 AF
  - 100 $/AF x 2,000 AF
  - Valley Surplus

Recharged Costs

50 $/AF x 1,000 AF
Example A – Take$: WMWD calls on its banked supply from Chino Basin – Delivery via Direct Delivery

IEUA Extracts 1,000 AF From Chino Basin For WMWD

State Water Project

Valley

SBBA

OCWD

WMWD

EMWD

Orange County

Elsinore & Riverside

San Jacinto
SARRCUP Operational Examples (cont’d)

1. San Bernardino Valley Water District Surplus State Water Project Water

   • Direct Delivery using SARCCUP Facilities - Example A
   • In-Lieu Exchange using MWD facilities – Example B
Example B – Put: EMWD purchases available Valley Surplus SWP Water for storage in Chino Basin

MWD Member Agencies

State Water Project

IEUA

Valley

SBBA

OCWD

WMWD

EMWD

Orange County

Elsinore & Riverside

San Jacinto

IEUA Banks 1,000 AF In Chino Basin For EMWD

1,000 AF

1,000 AF

1,000 AF Recharged

2,000 AF Valley Surplus
Example B – Put$: EMWD purchases available Valley Surplus SWP Water for storage in Chino Basin

EMWD Member Agencies

IEUA

666 $/AF x 1,000 AF

1,000 AF

100 $/AF x 2,000 AF

2,000 AF

State Water Project

Valley

SBBA

IEUA Banks 1,000 AF In Chino Basin For EMWD

IEUA

1,000 AF Recharged

1,000 AF

50 $/AF x 1,000 AF Recharge Costs

666 $/AF x 1,000 AF

OCWD

WMWD

EMWD

Orange County

Elsinore & Riverside

San Jacinto

IEUA

666 $/AF x 1,000 AF

1,000 AF

Valley Surplus

MWD Member Agencies

Chino Basin

1,000 AF
Example B – Take: EMWD calls on its banked supply from Chino Basin – Delivery via In Lieu

IEUA Extracts and uses locally 1,000 AF of EMWD Banked Water In Lieu of a MWD Delivery
Example B – Take$: EMWD calls on its banked supply from Chino Basin – Delivery via In Lieu

IEUA Extracts and uses locally 1,000 AF of EMWD Banked Water In Lieu of a MWD Delivery

State Water Project

Start Here

Chino Basin

IEUA

770 $/AF x 1,000 AF

Normal Delivery Plus

1,000 AF (Extraordinary Supply)

150 $/AF x 1,000 AF

Extraction Costs (?)

Normal Delivery Less

1,000 AF

OCWD

WMWD

EMWD

SBBA

Orange County

Elsinore & Riverside

San Jacinto
1. San Bernardino Valley Water District Surplus State Water Project Water
   - Direct Delivery using SARCCUP Facilities – Example A
   - In-Lieu Exchange using MWD facilities – Example B

2. Non-State Water Project Transfer Water
   - Wheeled through MWD facilities – Example C
Example C – SARCCUP Agencies purchase 5,000 AF of Non-SWP Transfer Water and Wheel 4,000 AF through MWD’s System.
Example C$ – SARCCUP Agencies purchase 5,000 AF of Non-SWP Transfer Water and Wheel 4,000 AF through MWD’s System

State Water Project

Start Here

1,000 AF

Non-SWP Transfer

4,000 AF

100% Non-SWP Transfer

1,000 AF

20% of Non-SWP Transfer

1,000 AF

25% of MWD Wheel $ +20% Non-SWP Transfer

1,000 AF

25% of MWD Wheel $ +20% Non-SWP Transfer

1,000 AF

25% of MWD Wheel $ +20% Non-SWP Transfer

25% of MWD Wheel $ +20% Non-SWP Transfer

SARCCUP Operating & Finance Committee

$Cost to Wheel 4,000 AF thru MWD

20% of Non-SWP Transfer

25% of MWD Wheel $ +20% Non-SWP Transfer

25% of MWD Wheel $ +20% Non-SWP Transfer

OCWD

WMWD

EMWD

SBBA

San Jacinto

Orange County

Elsinore & Riverside

Chino Basin

IEUA

Valley
SARRCUP Operational Examples (cont’d)

1. San Bernardino Valley Water District Surplus State Water Project Water
   - Direct Delivery using SARCCUP Facilities – Example A
   - In-Lieu Exchange using MWD facilities – Example B

2. Non-State Water Project Transfer Water
   - Wheeled through MWD facilities – Example C
   - Wheeled through Valley facilities (+ SARCCUP facilities) – Example D
Example D – SARCCUP Agencies purchase 5,000 AF of Non-SWP Transfer Water and Wheel it through Valley’s System

SARCCUP Operating & Finance Committee

State Water Project

Start Here

Valley

SBBA

5,000 AF Non-SWP Transfer

Chino Basin

2,000 AF

La Sierra Pipeline

1,000 AF

Santa Ana River

OCWD

Orange County

WMWD

Elsinore & Riverside

EMWD

San Jacinto

1,000 AF Existing Connections

4,000 AF RPU Cannon PS
Example D$ – SARCCUP Agencies purchase 5,000 AF of Non-SWP Transfer Water and Wheel it through Valley’s System

1. State Water Project
   - Start Here
   - 100% of Water & Wheeling Costs

2. Valley
   - 5,000 AF Non-SWP Transfer

3. SARCCUP Operating & Finance Committee
   - 80% of Water & Wheeling Costs

4. IEUA
   - 20% Water & Wheel $ +25% Trans. Costs

5. Chino Basin
   - 2,000 AF
   - La Sierra Pipeline
   - Santa Ana River
   - 1,000 AF

6. OCWD
   - 20% Water & Wheel $ +25% Trans. Costs
   - Orange County

7. WMWD
   - 4,000 AF
   - RPU Cannon PS
   - Elsinore & Riverside

8. EMWD
   - 1,000 AF Existing Connections
   - San Jacinto

Transport Costs would include deliveries to agencies that use facilities/pipeline connections.
SARRCUP Operational Examples - Summary

• Take-aways, under all scenarios:
  – SARCCUP Agencies and MWD made whole
  – SARCCUP Banks operating in line with MWD Policies
  – SARCCUP MWD member agencies receive Extraordinary Supply credit

• Next steps
  – Meet with MWD staff and new AGM to finalize terms
  – Develop final SARCCUP-MWD Operating Agreement
Santa Ana River Conservation & Conjunctive Use Project

PA 23 HOLE CREEK RESTORATION UPDATE

Heather Dyer, Water Resources Project Manager/Biologist
San Bernardino Valley Municipal Water District
May 2013 – HCP idea grew out of a meeting between Valley District and Ren Lohofner, former Regional Director of US Fish and Wildlife Service (USFWS)

September 2013 – Phase I: HCP Scoping Study approved

April 2014 – Phase 2: HCP Team was assembled and plan development began

2018 – CEQA/NEPA Process

2019 – Incidental Take Permit Expected

http://www.uppersarhcp.com/
Endangered Species
“Incidental Take” Coverage for Over 60 Covered Activities

• New projects construction and operations

• Existing Facilities Operations & Maintenance

• New or existing projects with Hydrologic Effects to Santa Ana River
  • Stream Diversions for groundwater recharge
  • Increased capacity of basins
  • Reductions in WWTP effluent
HCP PERMITTEES

1. San Bernardino Valley Municipal Water District
2. San Bernardino Valley Water Conservation District
3. San Bernardino Municipal Water Department
4. Western Municipal Water District
5. East Valley Water District
6. West Valley Water District
7. Riverside Public Utilities
8. San Bernardino County Flood Control District
9. Inland Empire Utility Agency
10. City of Rialto
11. Metropolitan Water District of Southern California
12. Orange County Water District
13. Southern California Edison
SARCCUP ELEMENTS

- **Water Use Efficiency**: Conservation-Based Rates Support, Water-use Efficient Landscaping Design
- **Groundwater Banking**: “Put and Take” Conjunctive Use Facilities
- **Habitat Improvement**: Arundo Removal & Santa Ana Sucker fish habitat restoration
SARCCUP TRIBUTARY PROJECTS

- 3.5 Miles Stream Habitat
- > 41 Acres Native Riparian Habitat
- ~ $10 Million Construction
  ($5m Local Partner, $4m Prop 84)
LOWER HOLE CREEK

- Highly urbanized stream
- Connected to Santa Ana River below Van Buren Blvd.
- This area of river has new importance to sucker population
Hole Creek Hydrology

- Baseflow ~1.5 cfs
- Flood flows can quickly exceed 3,000 cfs+
Hole Creek Preliminary Design

- Excavate accumulated sediment, remove trash and debris from channel.
- Construct new banks and floodplain.
- Enhance 2,100 ft of channel downstream of Jurupa Ave.
- Stabilize eroding channel.

Legend:
- Existing Hole Creek Channel
- Redesign Channel at Confluence
- Stabilize Bank
- Excavate Floodplain
- Construct New Bank and Floodplain
- Remove Non-Natives and Revegetate with Natives
- Parcel Ownership
- 5 ft LIDAR Contour

Channel Profiles and Cross-Sections

- Field topographic survey used to supplement LiDAR elevations used in design development
30% Restoration Design – Jurupa Outlet

- Habitat Structures
- New Floodplain
- Bank Stabilization
30% Restoration Design – Van Buren Outlet

- Lay Back Eroding Banks & Revegetate
- Remove Concrete Lining & Construct Step-Pools
30% Restoration Design – Bank Stabilization

Eroding Bank Delivering Fine Sediment to Channel

Bank Stabilization Detail
30% Restoration Design-Habitat Details and Performance Modeling

2D Modeling of Depths and Velocity Vectors of a Rock Groin Structure with Scour Pool Designed to Enhance Sucker Habitat
30% Restoration Design - Habitat Details and Performance Modeling

2D Modeling of Depths and Velocity Vectors of a Wood Structure with Scour Pool Designed to Enhance Sucker Habitat
GOAL: INCREASE SUITABLE SUCKER HABITAT
SUMMARY

- Hole Creek Prop 84 Funding (Grant and Local Match)
  - $99k – Design
  - $996k – Construction

- Finishing the 30% Design Work and evaluating additional HCP opportunities at Lower Hole Creek.

- CEQA/Permitting for Tributaries - January 2018
- Construction 2019 (Likely Hole Creek and Anza first)
QUESTIONS?

Heather Dyer
Water Resources Project Manager
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909-387-9256
Santa Ana River Conservation & Conjunctive Use Project

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DRAFT
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Heather Dyer
Water Resources Project Manager
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909-387-9256
Santa Ana River Conservation and Conjunctive Use Program – Project Schedule Updates

Presenter: Brian Dietrick

December 5, 2017
# SARCCUP Schedule Roll-Up (By Agency)

<table>
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Extended to 2018 Q1

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**SAWPA Conservation Project**

- **Construction**
  - Conservation Rates - Outreach
  - Conservation Rates - Implementation
  - OCCK Smartscape - Implementation
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* No task currently included for permitting.
Santa Ana River Conservation and Conjunctive Use Program – Project Schedule Updates

Presenters:
Scott Goldman
Brian Dietrick

December 5, 2017