Santa Ana River Conservation and Conjunctive Use Program – Detailed Project Schedule

SAWPA

Presenter:
Brian Dietrick

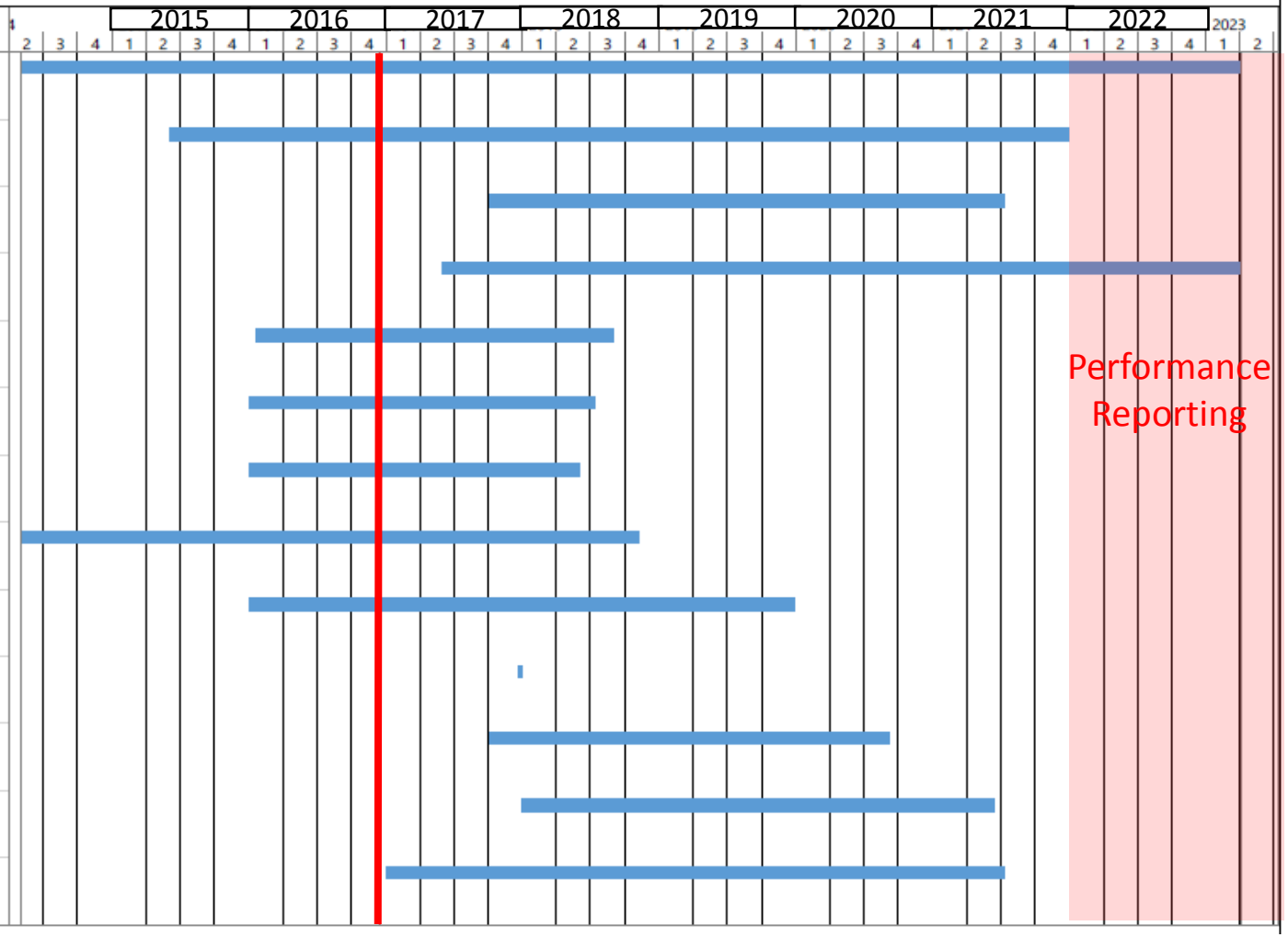
December 22, 2016

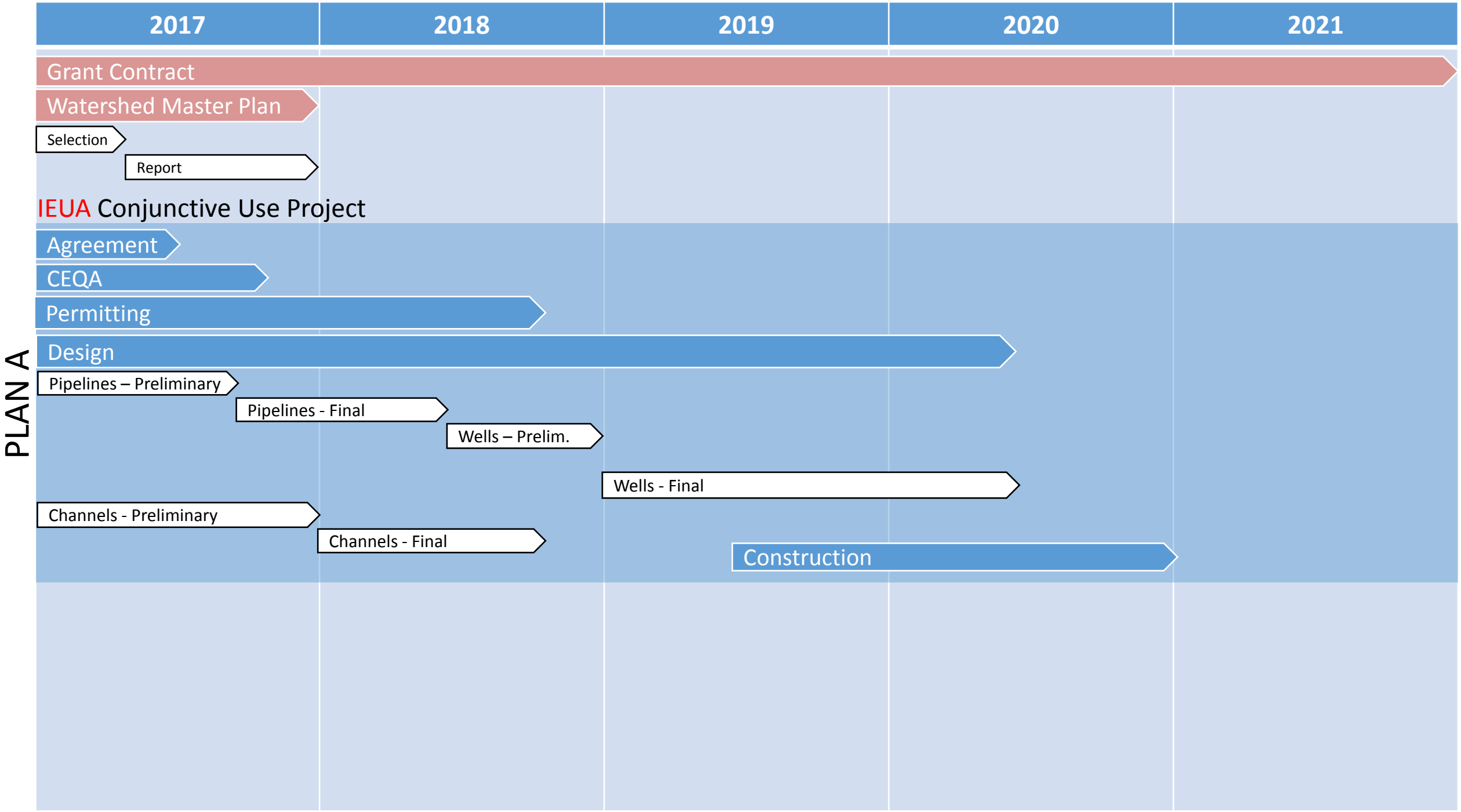
RMC water and environment
WOODARD &CURRAN
National Experience. Local Focus.

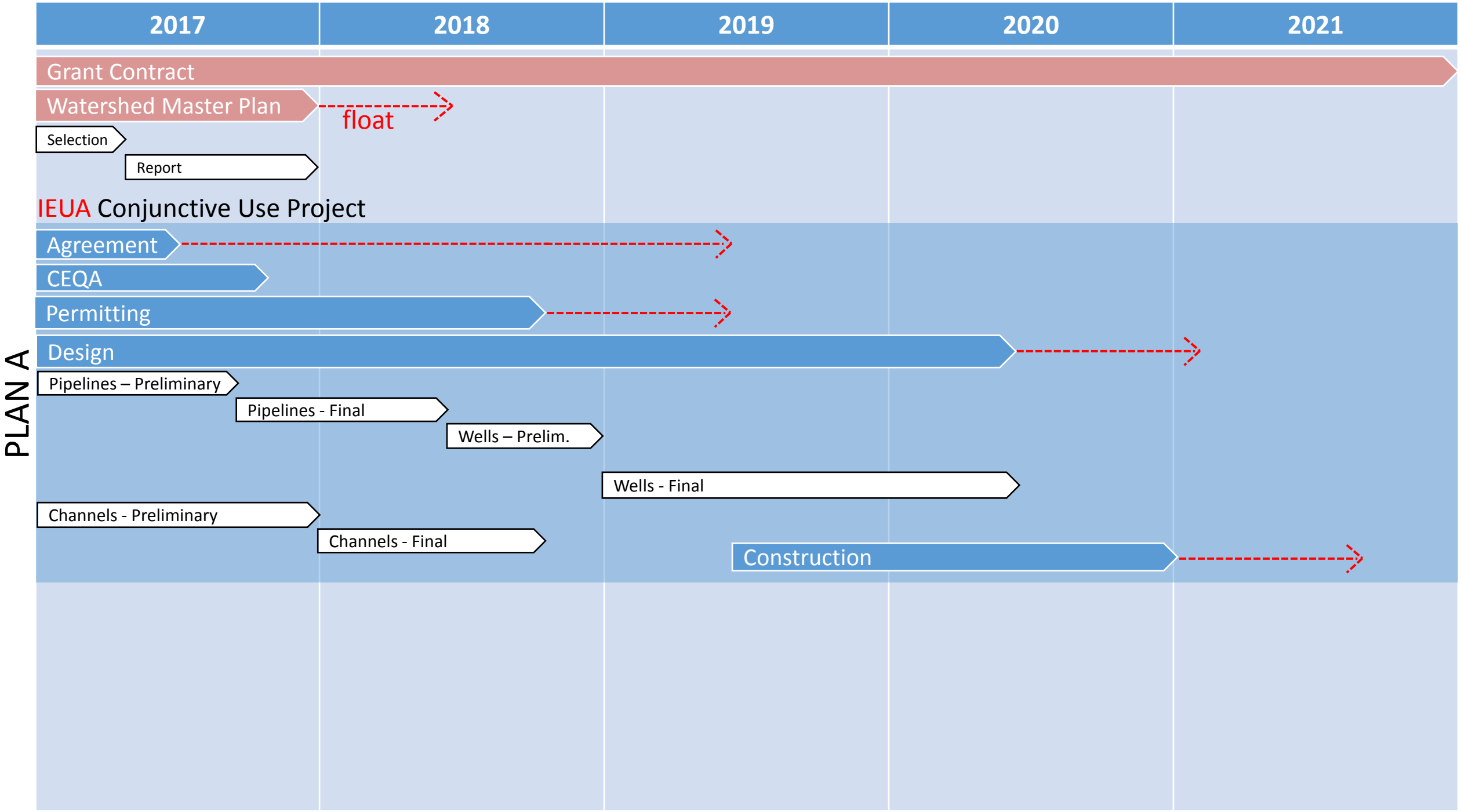
A Detailed Project Schedule was developed by combining the SARCCUP Program Schedule, the CEQA Schedule, the Agreement Schedule, and various edits from the agencies.

Santa Ana River Conservation & Conjunctive Use Program (SARCCUP) Schedule

ID	Task Name	Start	Finish
1	SARCCUP	Thu 5/1/14	Mon 4/3/23
2	Task 1: Project Management	Mon 6/1/15	Mon 12/27/21
25	Task 2: Labor Compliance	Thu 10/5/17	Wed 7/7/21
31	Task 3: Reporting	Wed 5/31/17	Mon 4/3/23
59	Task 4: Land Purchase/Easement	Mon 1/18/16	Thu 8/30/18
68	Task 5: Feasibility Studies	Fri 1/1/16	Thu 7/12/18
75	Task 6: CEQA Documentation	Fri 1/1/16	Thu 5/31/18
93	Task 7: Permitting	Thu 5/1/14	Wed 11/7/18
99	Task 8: Design	Fri 1/1/16	Wed 12/25/19
130	Task 9: Project Monitoring Plan	Thu 12/21/17	Thu 12/28/17
137	Task 10: Construction Contracting	Thu 10/5/17	Wed 9/2/20
149	Task 11: Construction Administration	Thu 12/28/17	Wed 6/9/21
156	Task 12: Construction/Implementation	Mon 1/2/17	Wed 7/7/21




2017
2018
2019
2020
2021
Grant Contract
Watershed Master Plan
Selection
Report
IEUA Conjunctive Use Project
Agreement
CEQA
Permitting
Design
Pipelines – Preliminary
Pipelines - Final
Wells – Prelim.
Wells - Final
Channels - Preliminary
Channels - Final
Construction
PLAN A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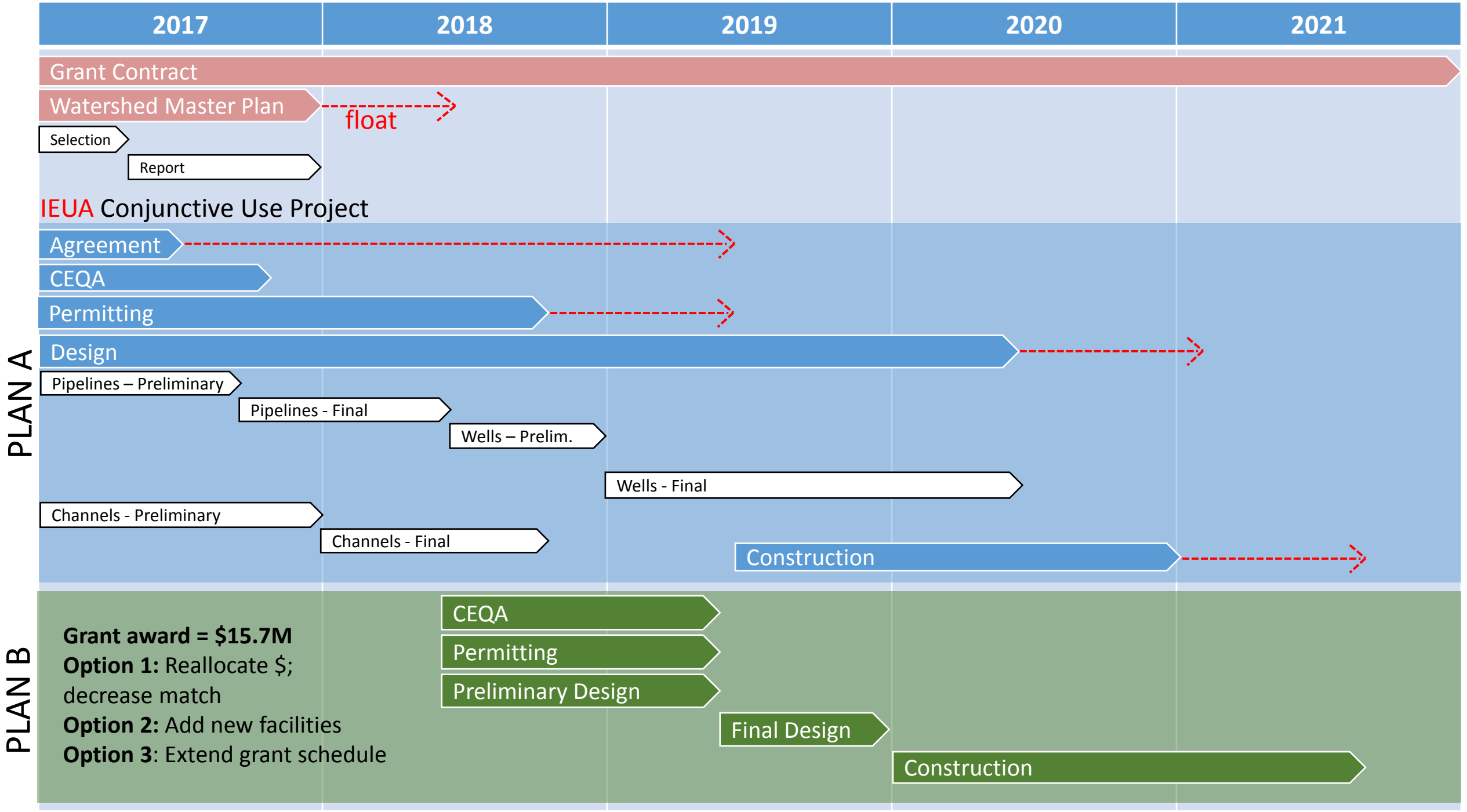
Pipelines - Final
Wells – Prelim.
Wells - Final
Channels - Preliminary
Channels - Final
Construction
PLAN A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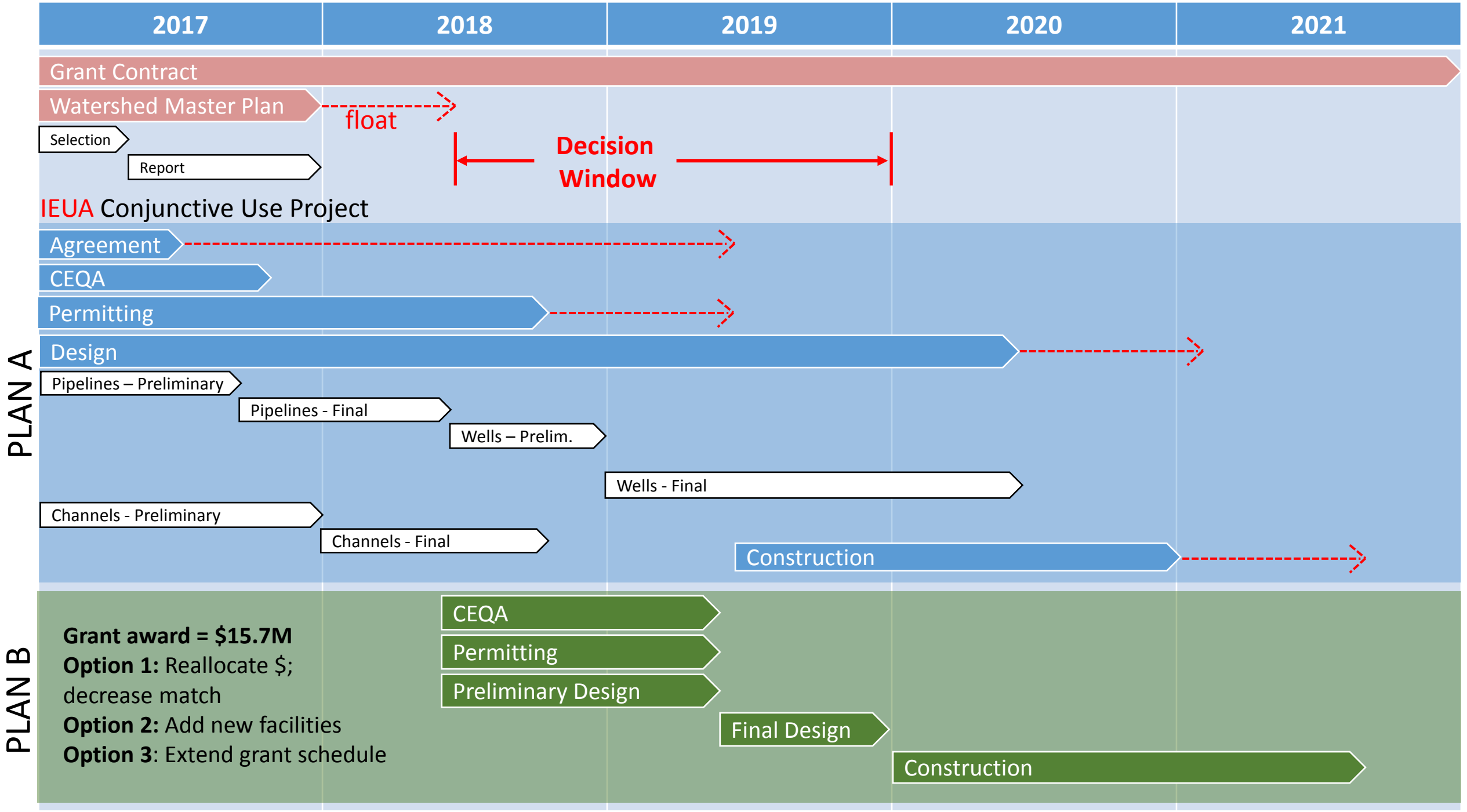
Agreement
CEQA
Permitting
Design
Pipelines – Preliminary
Pipelines - Final
Wells – Prelim.
Wells - Final
Channels - Preliminary
Channels - Final
Construction
PLAN A
PLAN B
Grant award = $15.7M
Option 1: Reallocate $; decrease match
Option 2: Add new facilities
Option 3: Extend grant schedule
CEQA
Permitting
Preliminary Design
Final Design
Construction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Agreement
CEQA
Permitting
Design
Pipelines – Preliminary
Pipelines - Final
Wells – Prelim.
Wells - Final
Channels - Preliminary
Channels - Final
Construction
PLAN A
PLAN B
Grant award = $15.7M
Option 1: Reallocate $; decrease match
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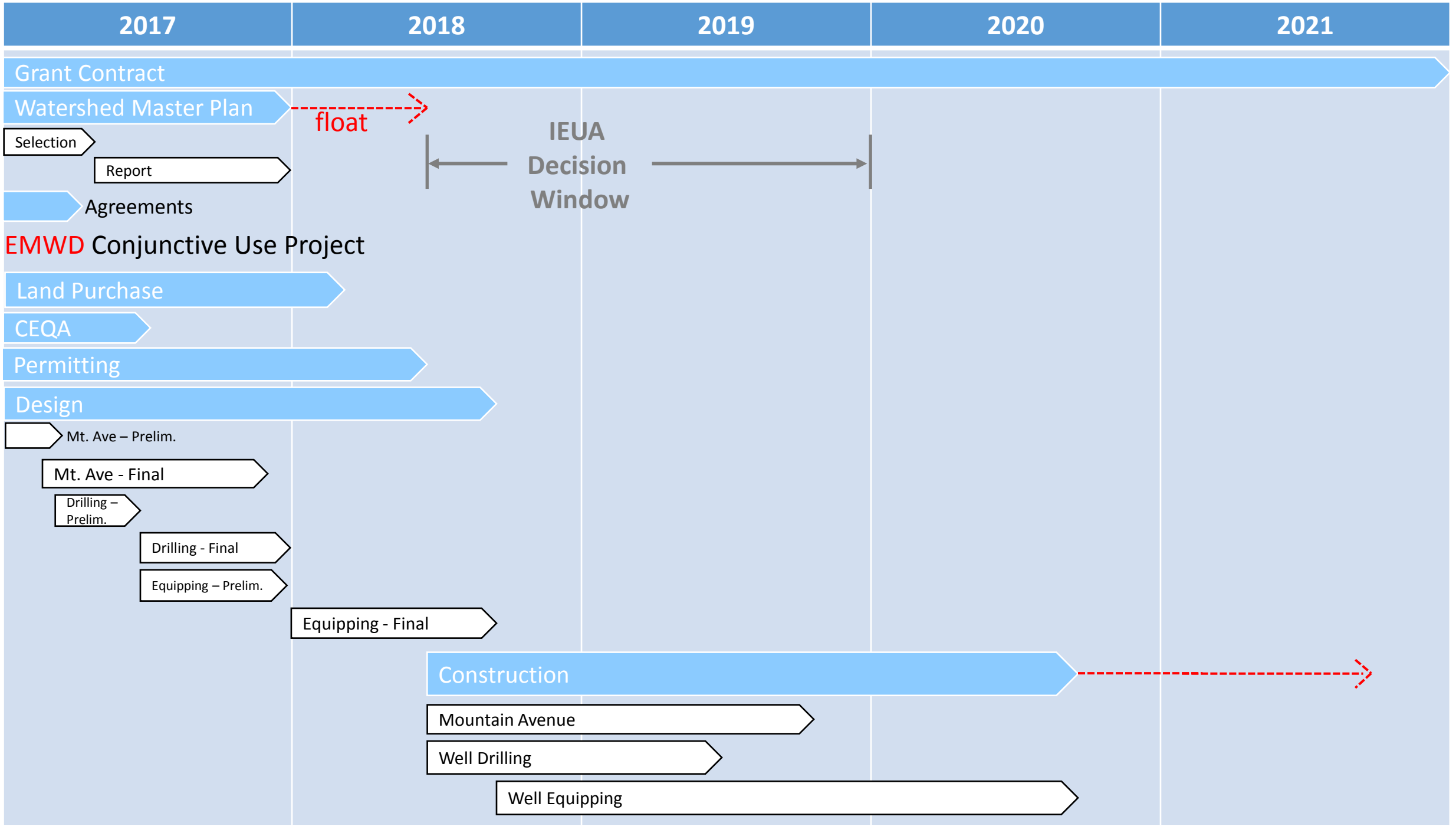
Option 3: Extend grant schedule
CEQA
Permitting
Preliminary Design
Final Design
Construction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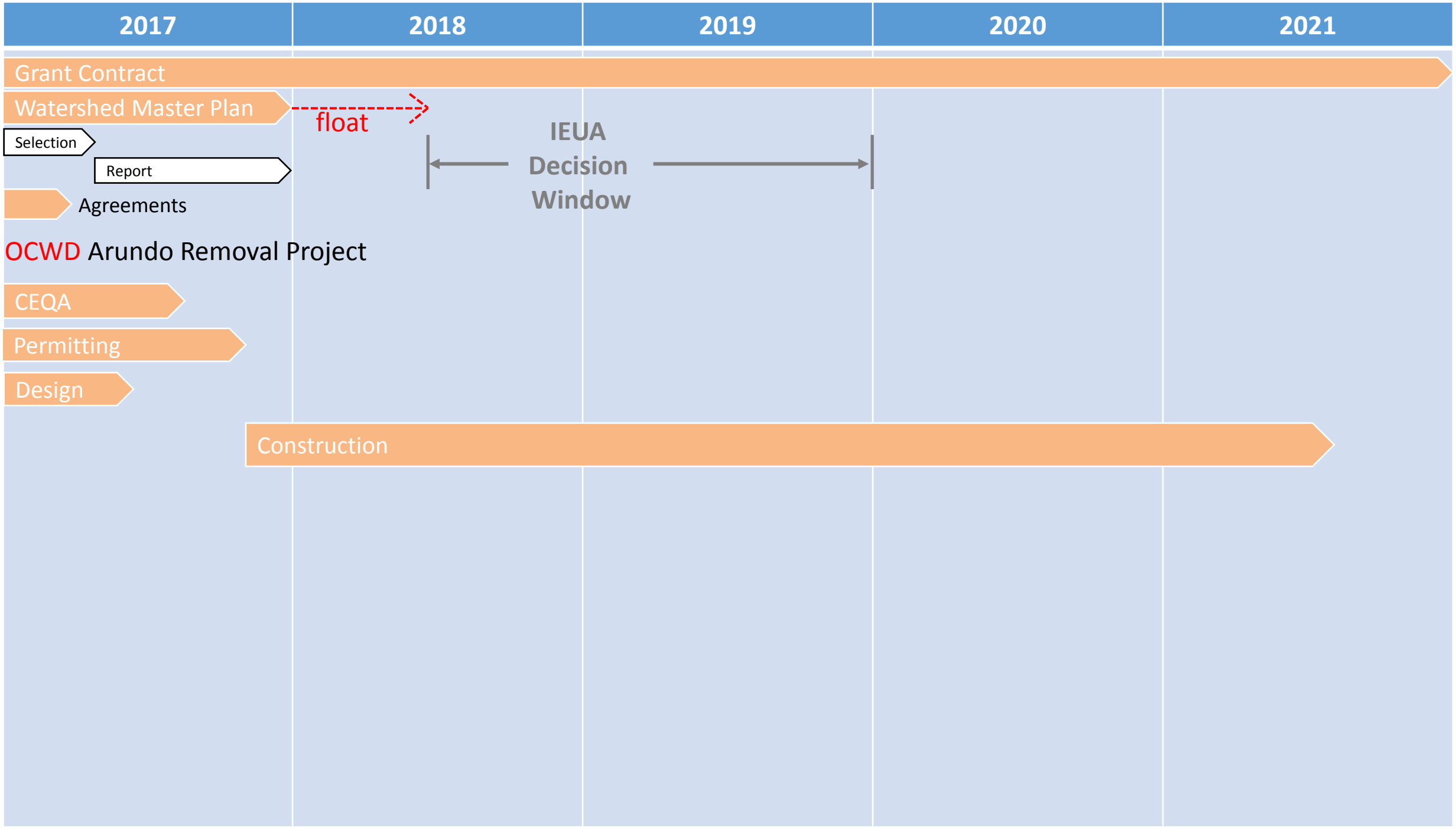
Decision
Window
Agreements
EMWD Conjunctive Use Project
Land Purchase
CEQA
Permitting
Design
Mt. Ave – Prelim.
Mt. Ave - Final
Drilling – Prelim.
Drilling - Final
Equipping – Prelim.
Equipping - Final
Construction
Mountain Avenue
Well Drilling
Well Equipping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Watershed Master Plan
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Selection
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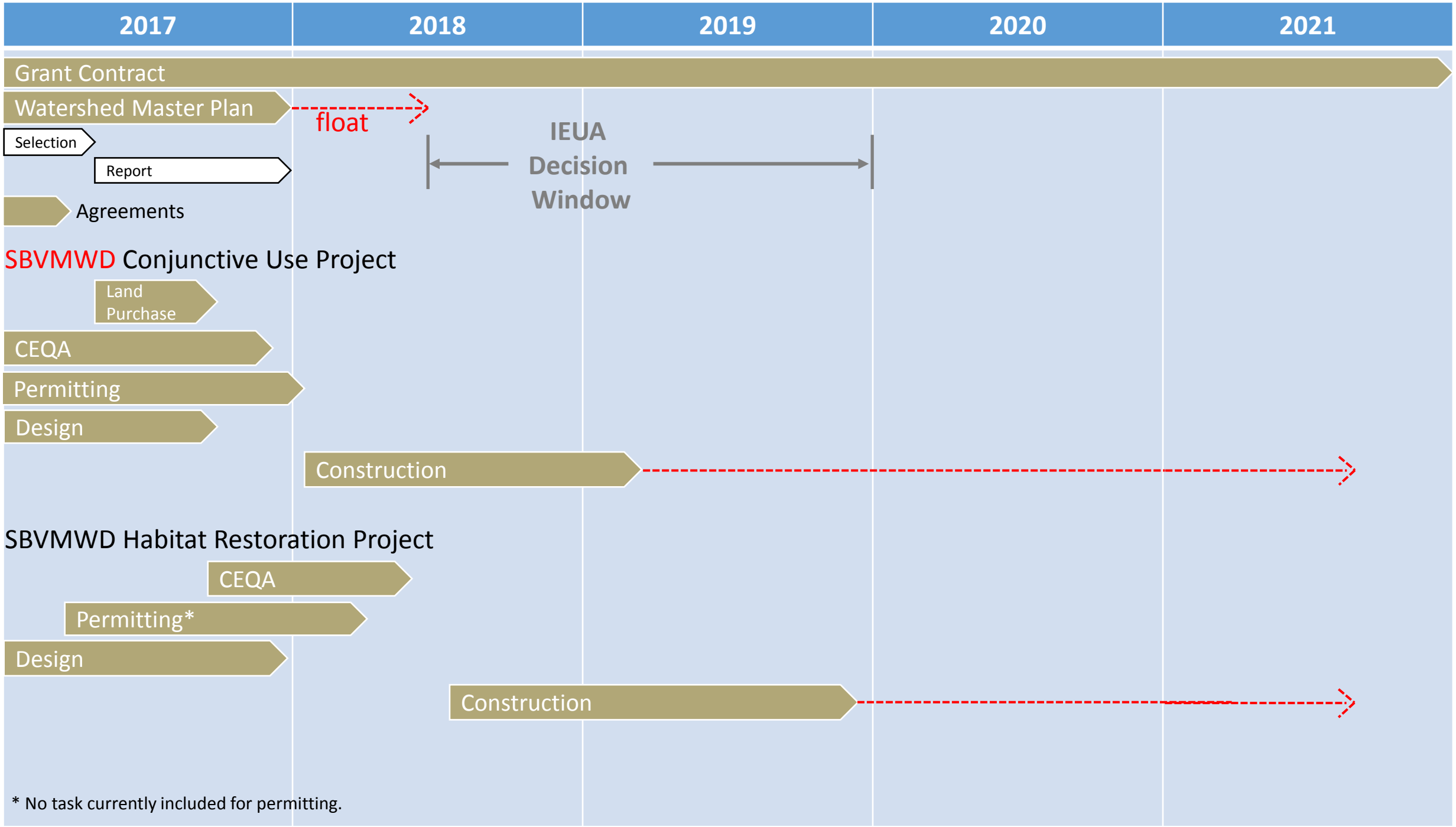
IEUA
Decision
Window
Agreements
OCWD Arundo Removal Project
CEQA
Permitting
Design
Construction


2017
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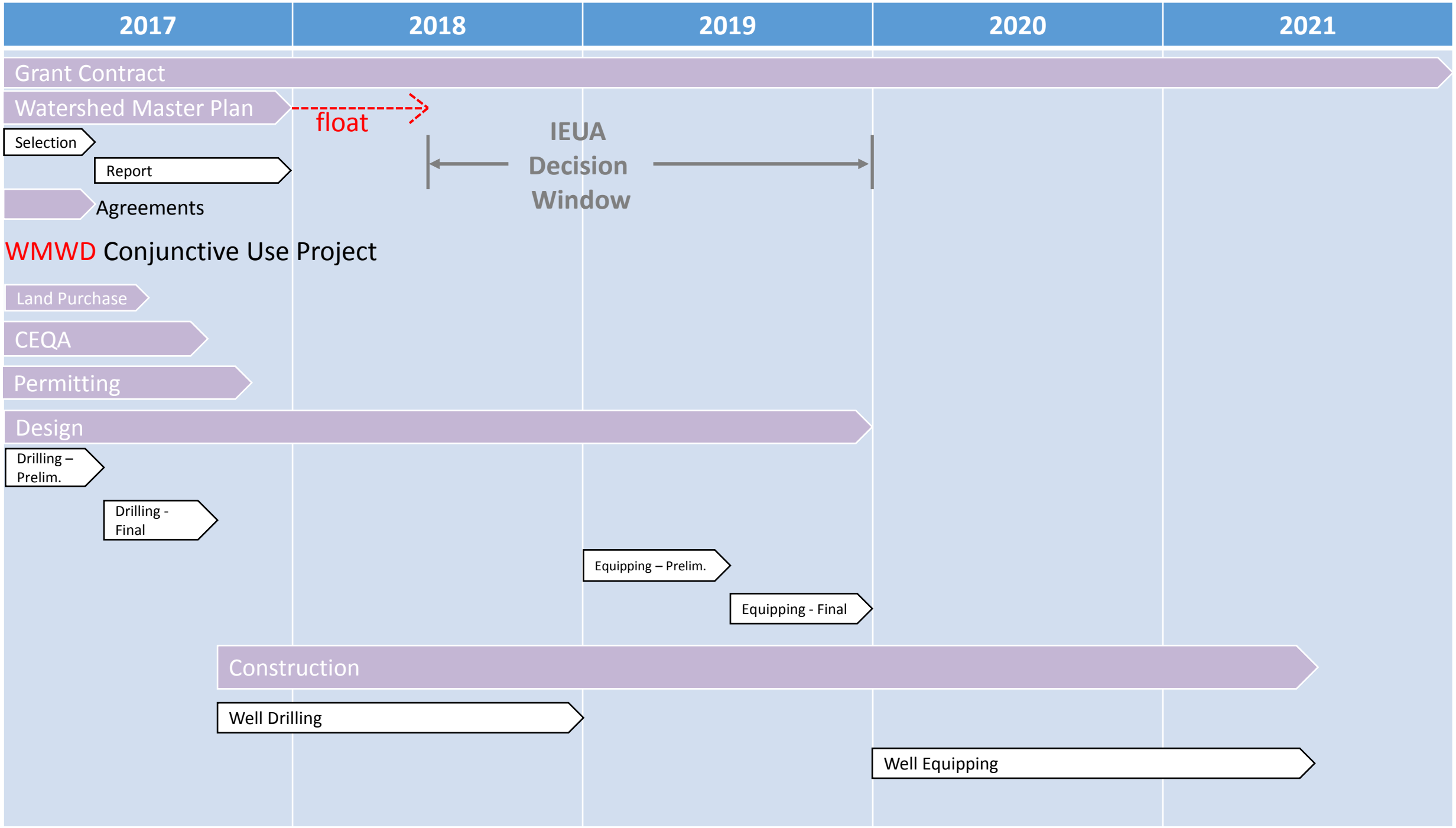
Grant Contract
Watershed Master Plan
float
Selection
Report
IEUA
Decision
Window
Agreements
SBVMWD Conjunctive Use Project
Land
Purchase
CEQA
Permitting
Design
Construction
SBVMWD Habitat Restoration Project
CEQA
Permitting*
Design
Construction
* No task currently included for permitting.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2021
Grant Contract
Watershed Master Plan
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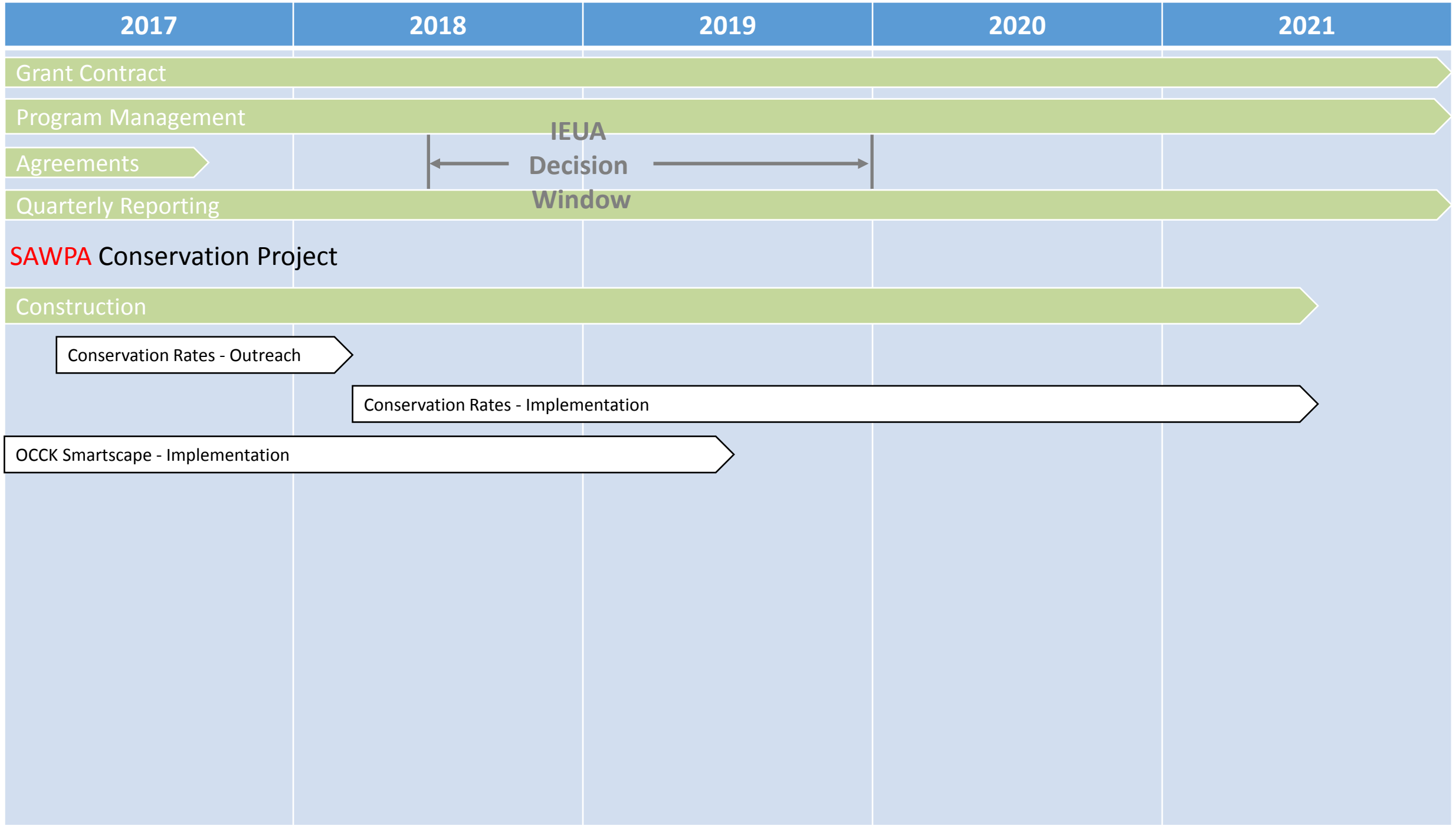
Selection
Report
IEUA
Decision
Window
Agreements
WMWD Conjunctive Use Project
Land Purchase
CEQA
Permitting
Design
Drilling – Prelim.
Drilling - Final
Equipping – Prelim.
Equipping - Final
Construction
Well Drilling
Well Equipping


2017
2018
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2020
2021
Grant Contract
Program Management
Agreements
IEUA
Decision
Window
Quarterly Reporting
SAWPA Conservation Project
Construction
Conservation Rates - Outreach
Conservation Rates - Implementation
OCCK Smartscape - Implementation

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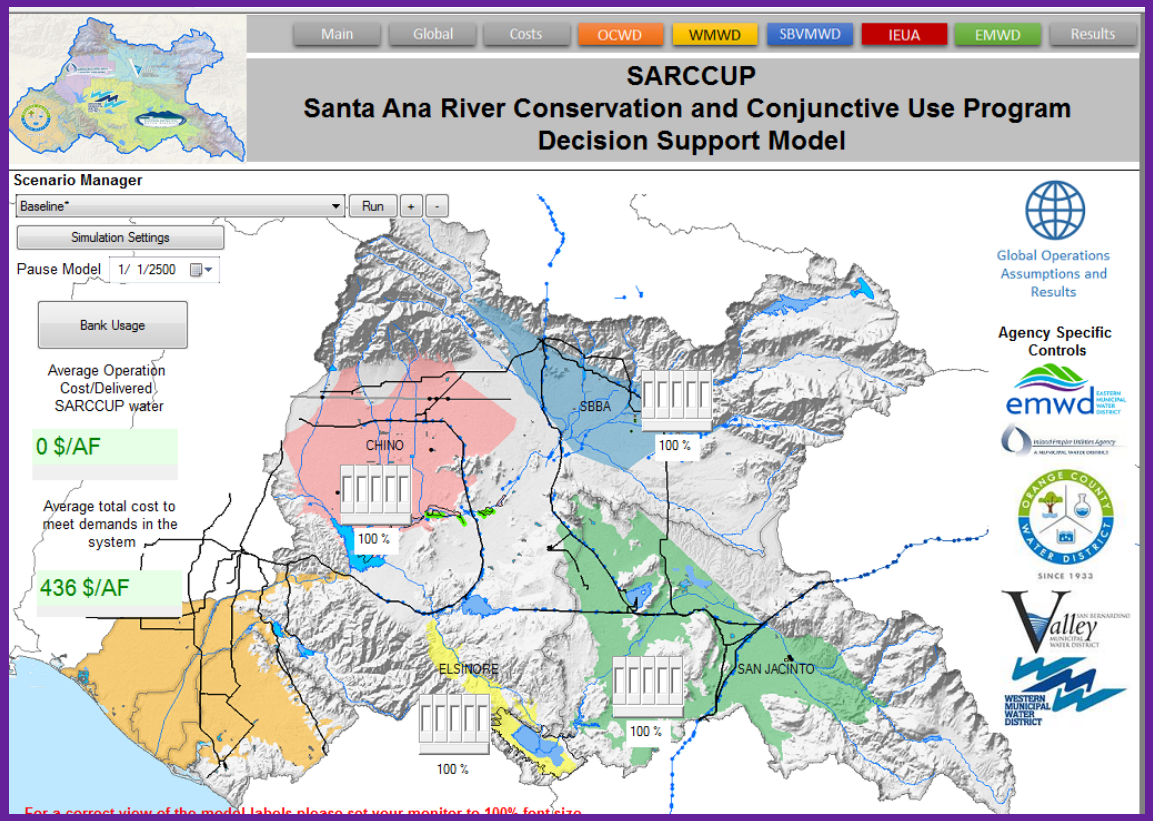
Santa Ana River Conservation and Conjunctive Use Program (SARCCUP) Decision-Support Model

DSM Overview

December 22, 2016



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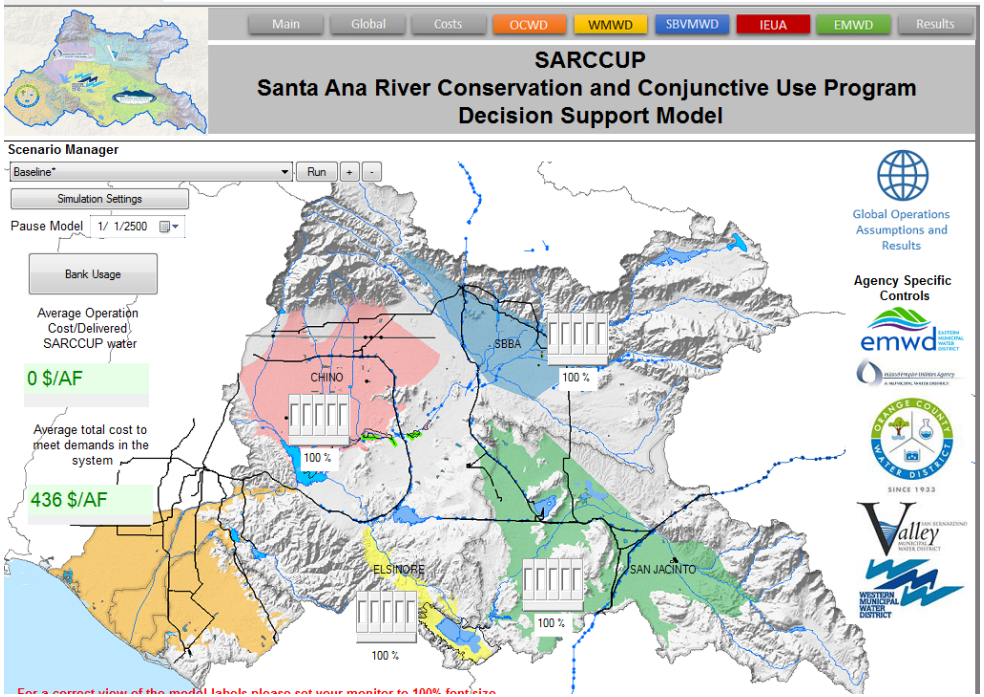
Presentation Outline

- SARCCUP DSM Goals and Objectives
- DSM Overview
  - Model overview
  - System Representation
  - SARCCUP Operations
  - Optimization Approach
  - User-Interface
- SARCCUP Scenarios
- SARCCUP Preliminary Modeling Results
- Uncertainties and Future Work

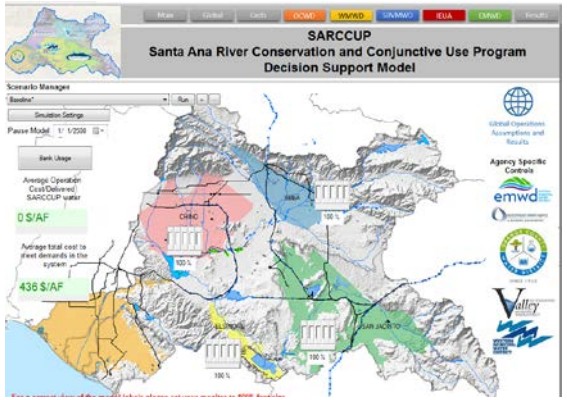
Goals and Objectives

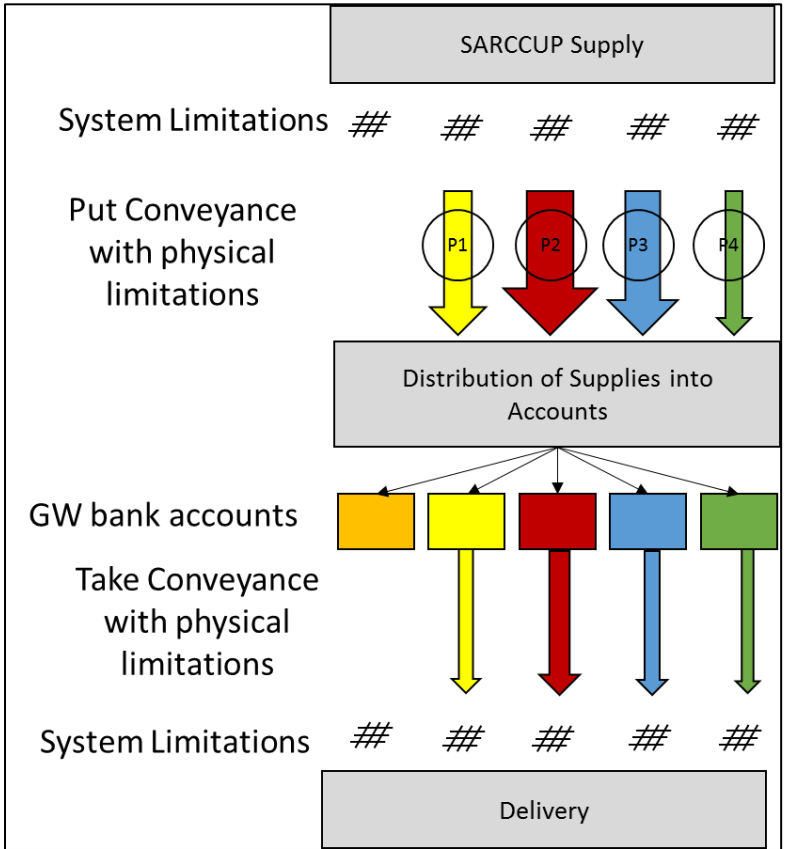
- Maximize the storage of wet year imported water supplies to produce “dry year yield”
- Simulate operations and demonstrate the aggregate yield and water supply reliability generated by the SARCCUP
- Decision Support Model to simulate anticipated operations of the proposed SARCCUP facilities, identify constraints and facilities,
- Optimize operations and quantify the benefits and **costs**



Decision Support Model Overview

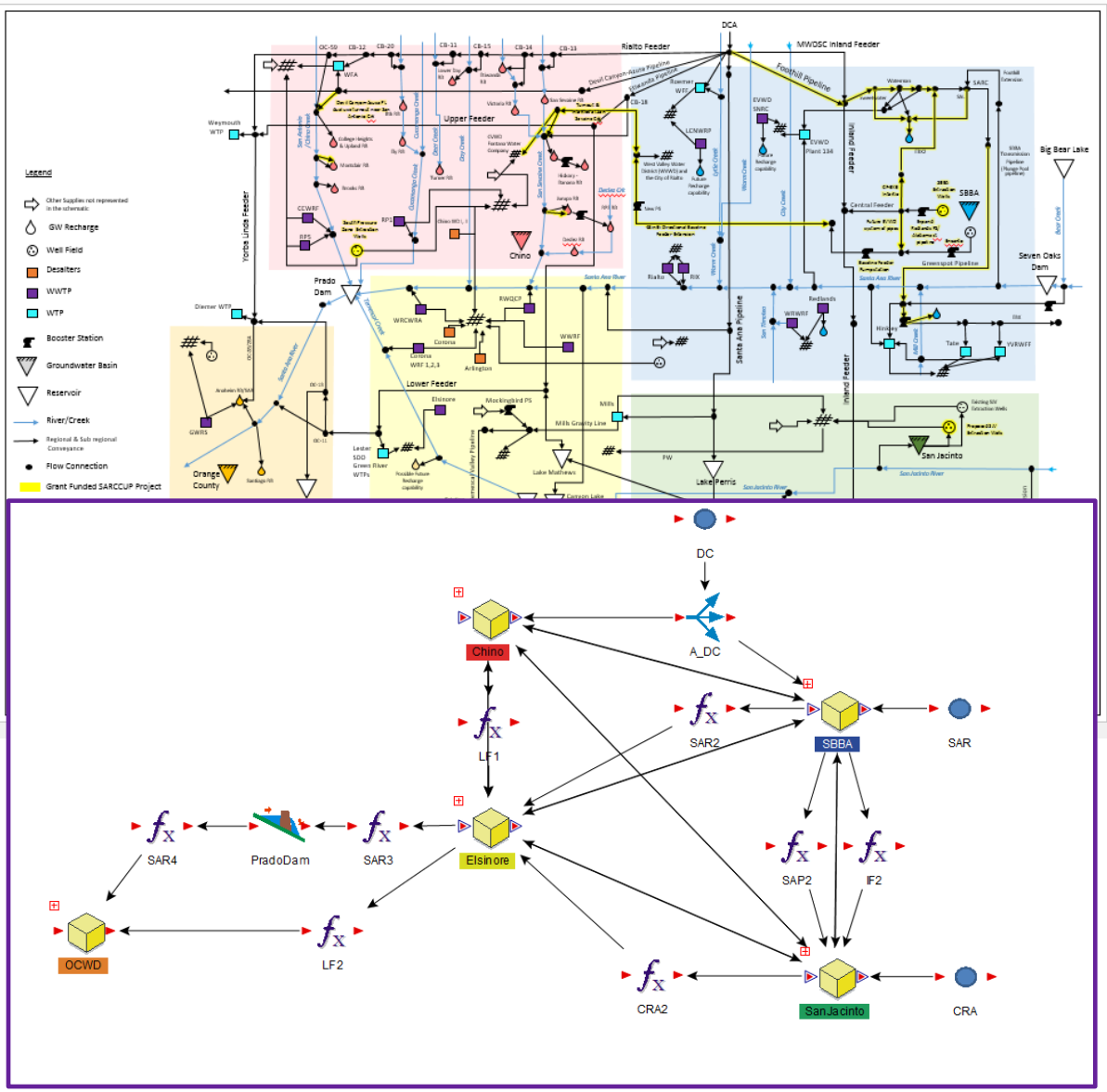
- GoldSim Modeling Platform
- System Description
- System Operations
  - Future Agency Water Supplies and Demands
  - Availability of Supply for SARCCUP
  - Timing of SARCCUP Extraction
  - Recharge and Extraction (put/take)
  - Groundwater Storage and Accounting
  - SARCCUP Deliveries
- Cost and Optimization Approach





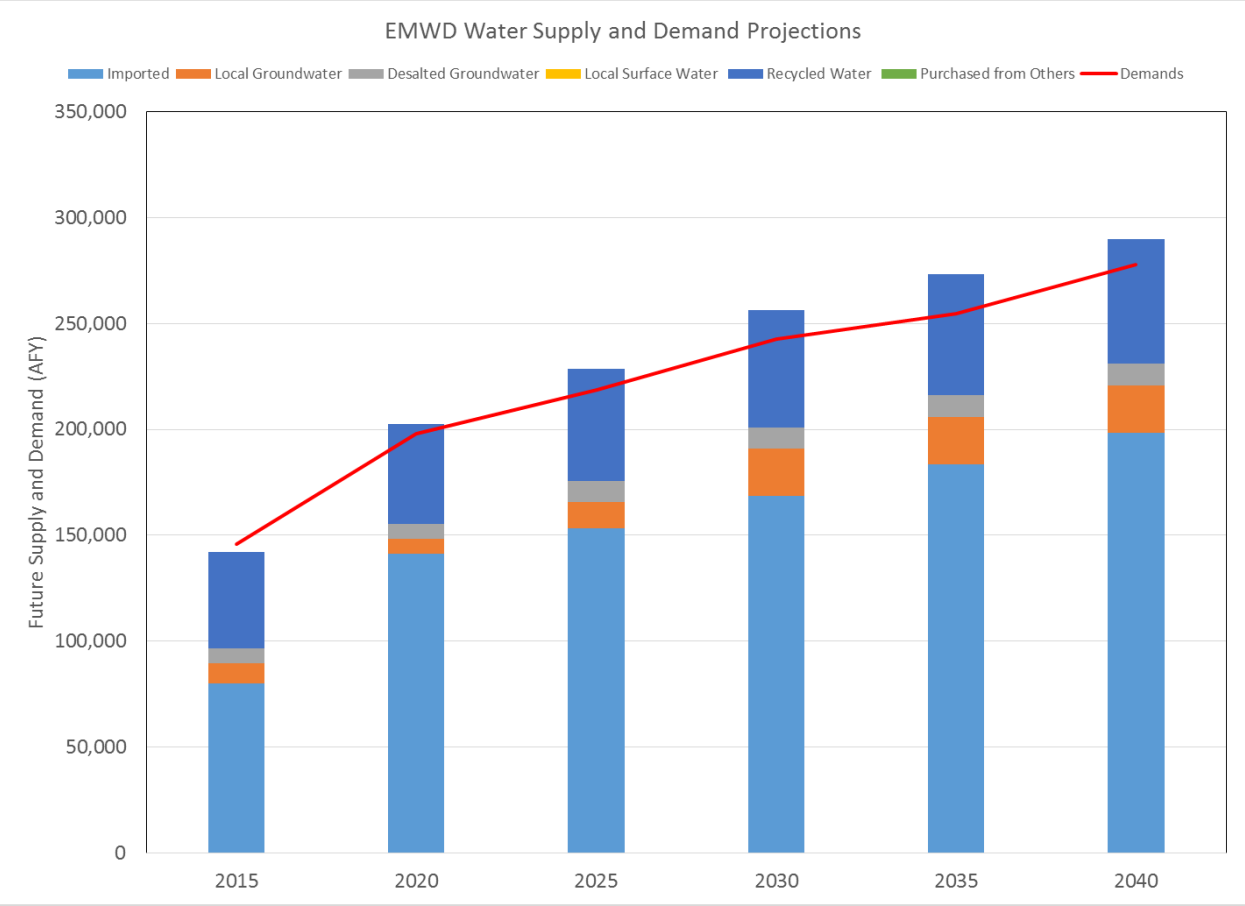
SARCCUP DSM System Representation

- Simplified network of system includes:
  - Service areas for SBVMWD, IEUA, EMWD, WMWD, and OCWD
  - Imported and local supplies
  - Demands
  - Groundwater basins
  - Regional conveyance
  - Recharge and extraction facilities
  - Proposed SARCCUP facilities



Projection of Future Baseline Water Supply and Demands

- Data collected from 2015 UWMPs for each agency
- Mostly reconciled with additional agency review
- Supply in excess of demands was assumed not needed – imported supply decreased

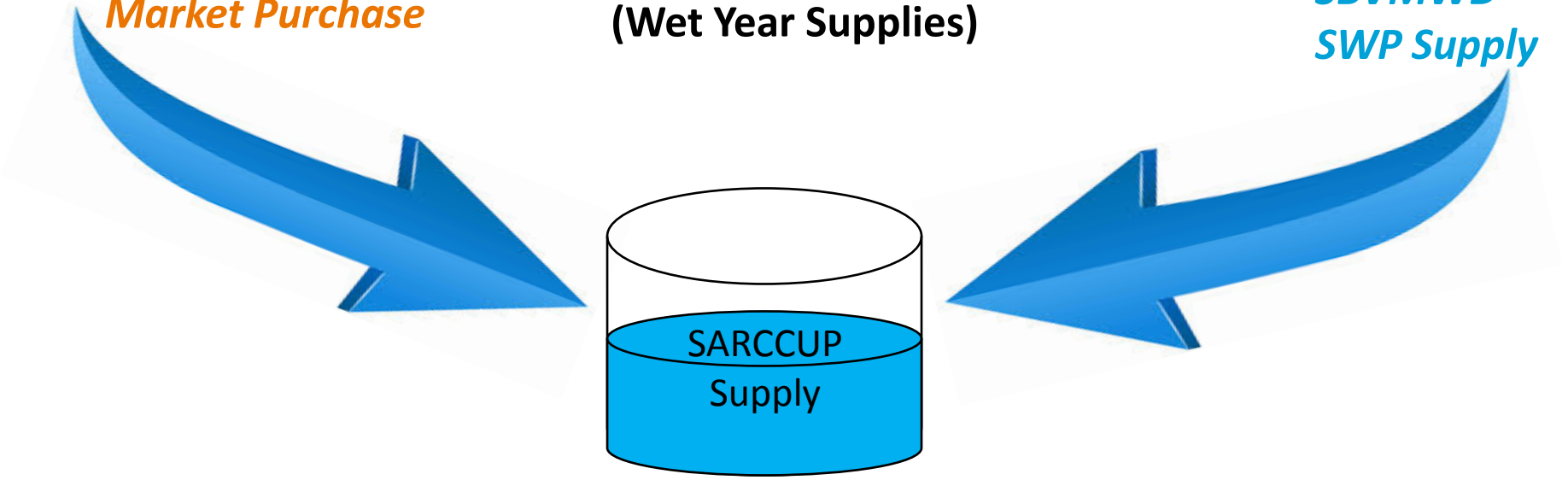


Available Supply for SARCCUP

SWP Transfer Market Purchase

Two Sources of Supply Available (Wet Year Supplies)

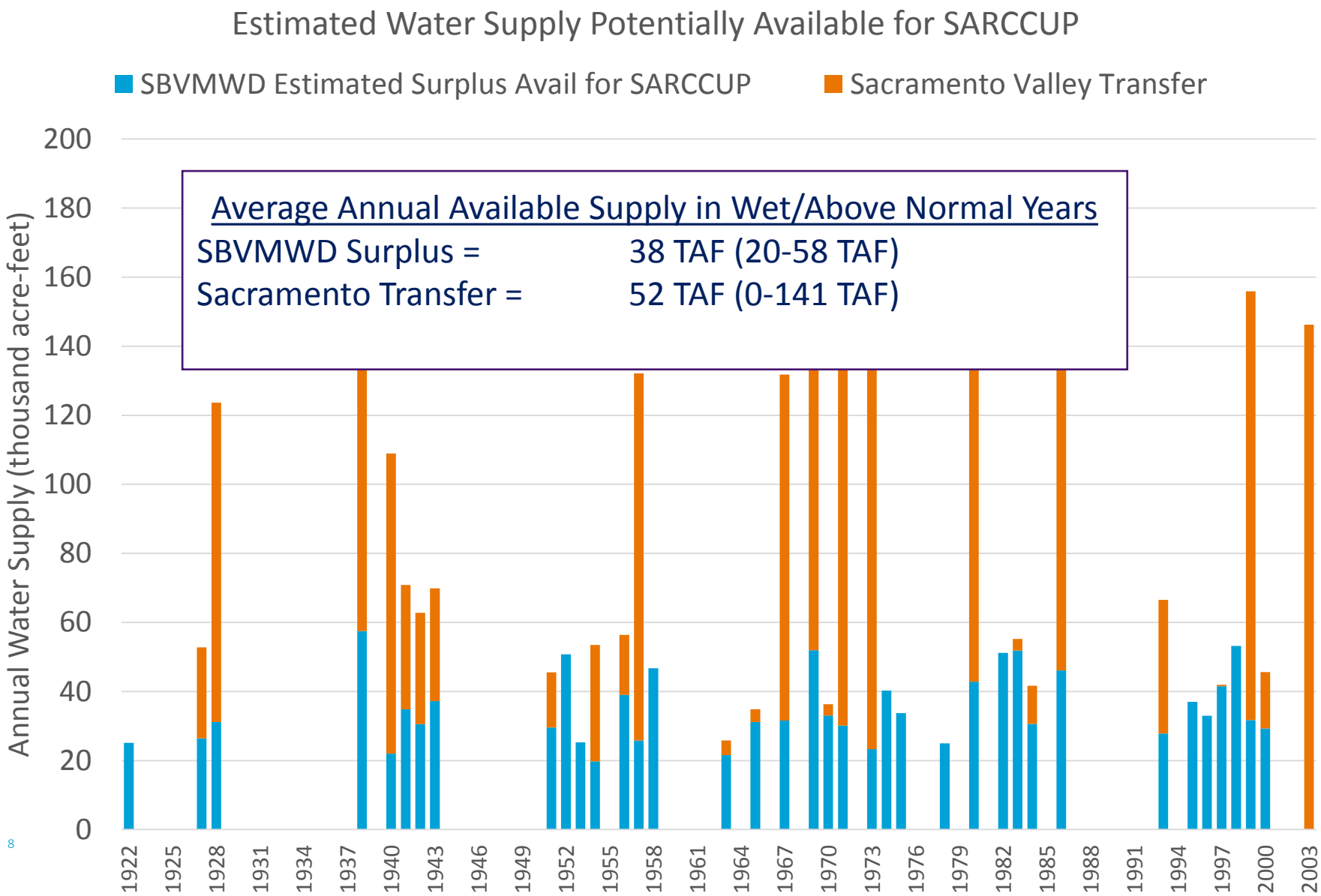
Surplus SBVMWD SWP Supply



- Delta and SWP transfer supply conveyance derived from the CALSIM II studies and an offline Delta transfer analysis tool
- Assumes no competing Wet and Above Normal year transfers

- SBVMWD demands for SWP water are assumed to be 30-40 TAF
- SWP allocation above this amount is potentially available for SARCCUP
- Hydrological-climatological conditions for water years 1922-2003 are assumed consistent with the CALSIM II simulation period

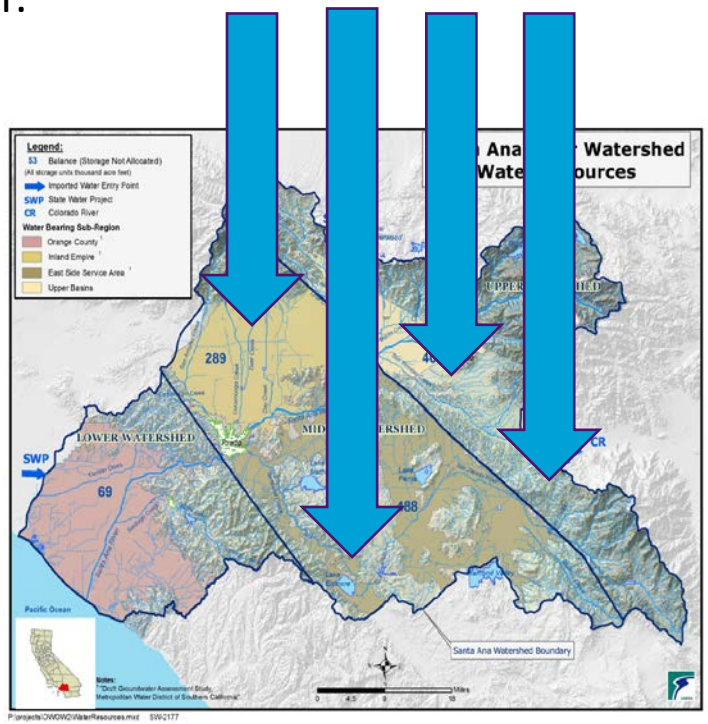
Estimated Water Supply Potentially Available for SARCCUP



SARCCUP Recharge

- Recharge of SARCCUP GW bank a function of:
  - Recharge capacity
  - Available GW bank storage
- Water conveyed to specific GW basin as a function of:
  - Recharge cost
  - Current storage in SARCCUP bank
- Recharge divided equally among 5 agencies in each GW basin
- “Basin management factor” estimated at 5% of recharge volume

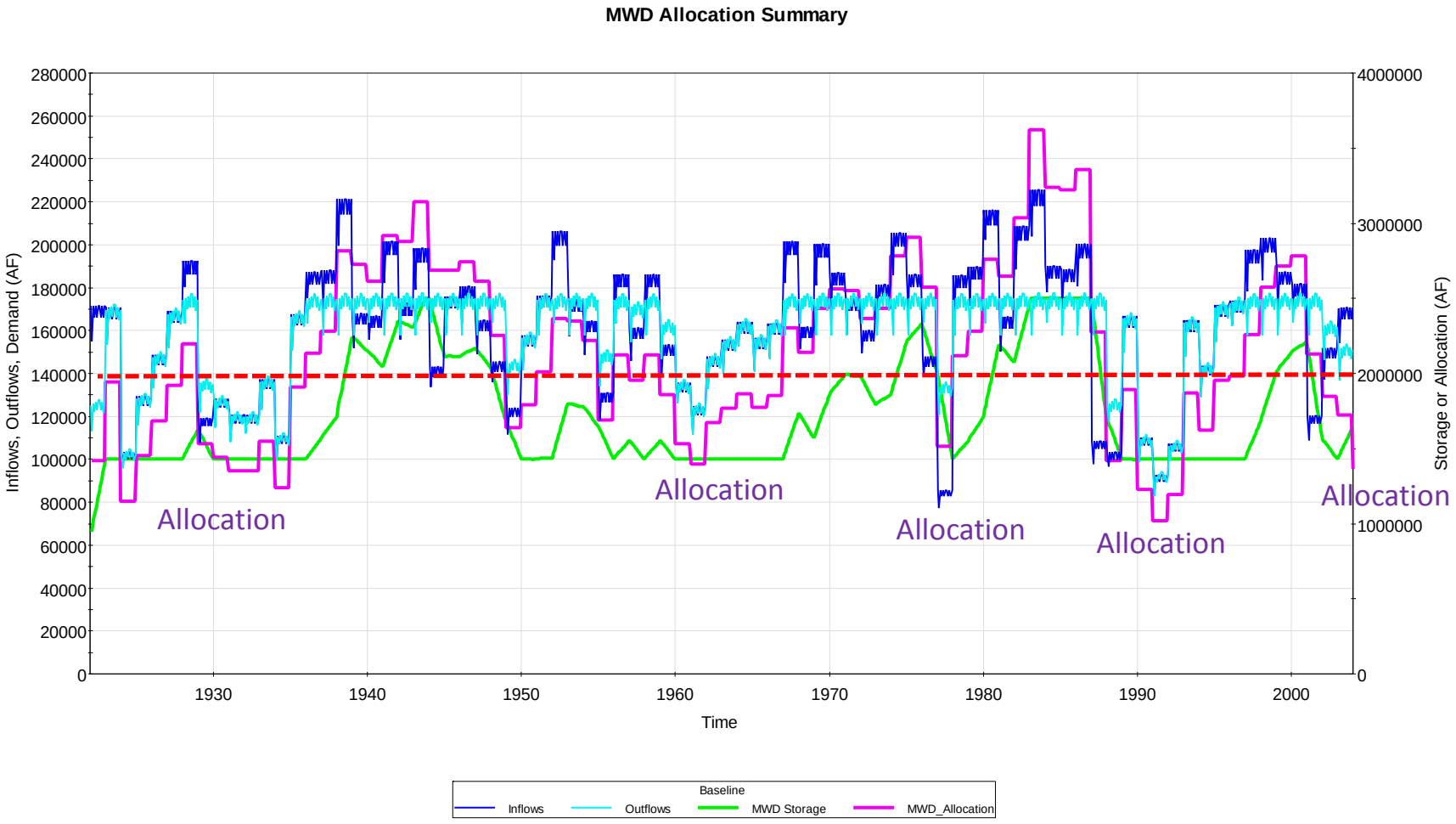
Imported Supply Available to SARCCUP



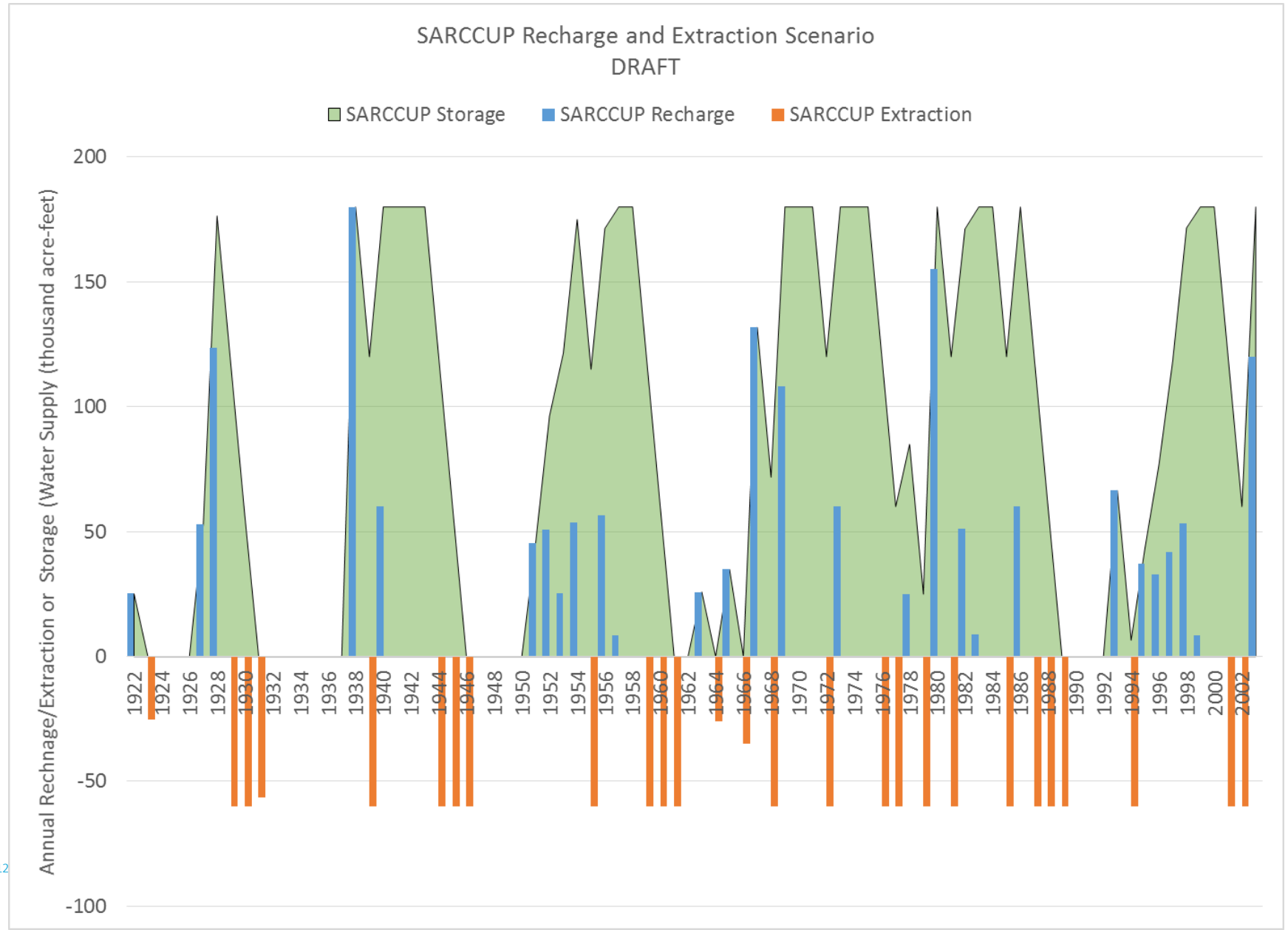
SARCCUP Extraction

- SARCCUP extraction designed to operate as a dry-year yield program
  - Extractions are linked to MWD Allocation years (consistent with MWD's extraordinary supply definition)
- Limited by extraction capacity in each specific basin
- Agency will use lowest cost source first
- Stored water exchanges will trigger to ensure agency is tapping the least cost source
- In-lieu exchanges of imported water triggered based on storage levels in specific basins and agency target

Example Scenario of Estimated MWD Allocation (REVISING FIGURE integrate with previous slide)



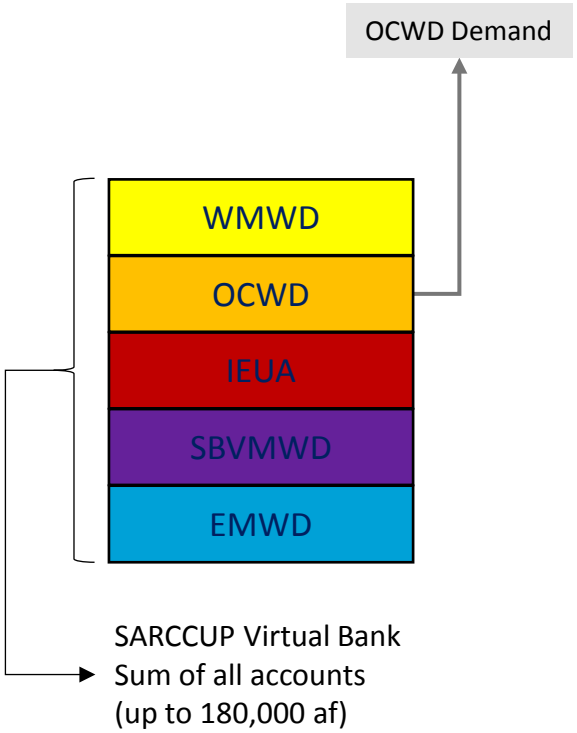
Example SARCCUP Recharge and Extraction Operation



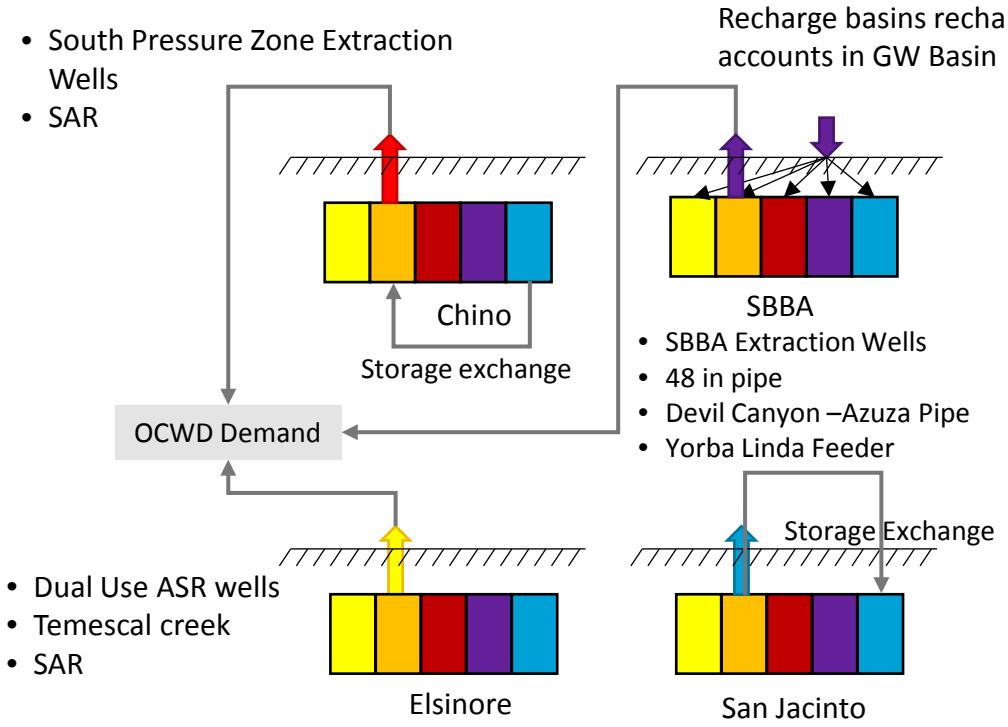
Groundwater Storage and Accounting

- Maximum SARCCUP storage capacity of 180,000 AF
- Both “Integrated” and “Basin Specific” SARCCUP accounts
- Each SARCCUP agency can track amount AND location of stored water

SARCCUP Integrated Account



SARCCUP Basin Specific Accounts

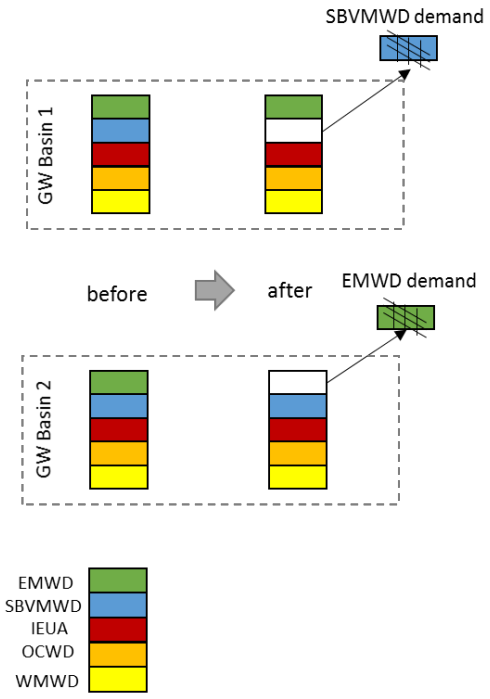


Explicit accounting and tracking of multiple SARCCUP banks and storages accounts. Need in lieu exchanges in order to deliver all SARCCUP supply.

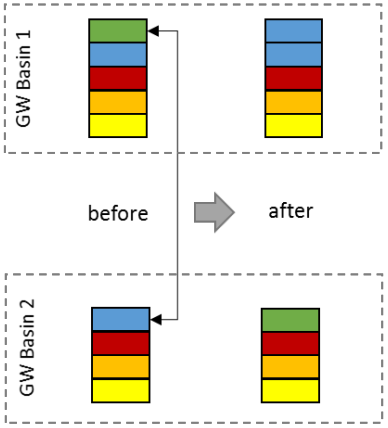
Delivery of SARCCUP Stored Water

- Three types of delivery mechanisms
  - ***Direct Delivery*** – Physical movement of water from basin to agency ($$$)
  - ***Storage Exchange*** – Simple exchange, or "re-coloring", of water in storage ($)
  - ***In-lieu Exchange*** – Exchange of non-SARCCUP supply from one agency to SARCCUP supply of another agency ($$)

a) Direct Delivery

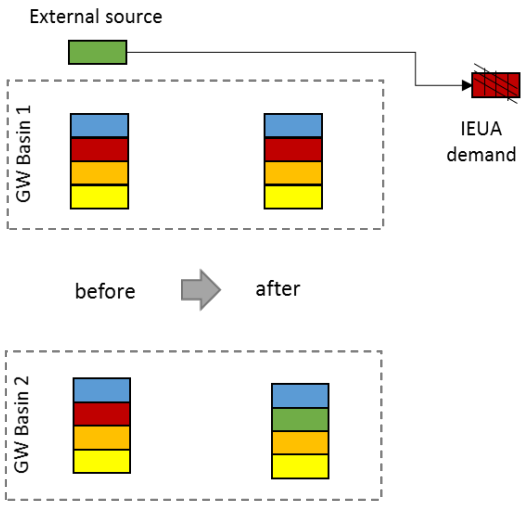


b) Storage Exchanges



Exchange between SBVMWD and EMWD
Case: EMWD doesn't have enough volume on GWBasin 2 but has on GW Basin 1. EMWD starts a transfer with SBVMWD to increase its volume on Basin 2. EMWD transfers its Basin 1 water to Basin 2 using SBVMWD water as exchange mechanism. Total volume can't change.

c) In-Lieu Exchanges



Exchange between IEUA and EMWD
Case: EMWD doesn't have enough volume on GWBasin 2 or any other storage. EMWD has access to some external source and can use that as an exchange to water that it will use from IEUA in the GW Basin 2. The external water source cannot go to SARCCUP storage because it would change the total SARCUPP volume stored.

Connections for Direct Delivery

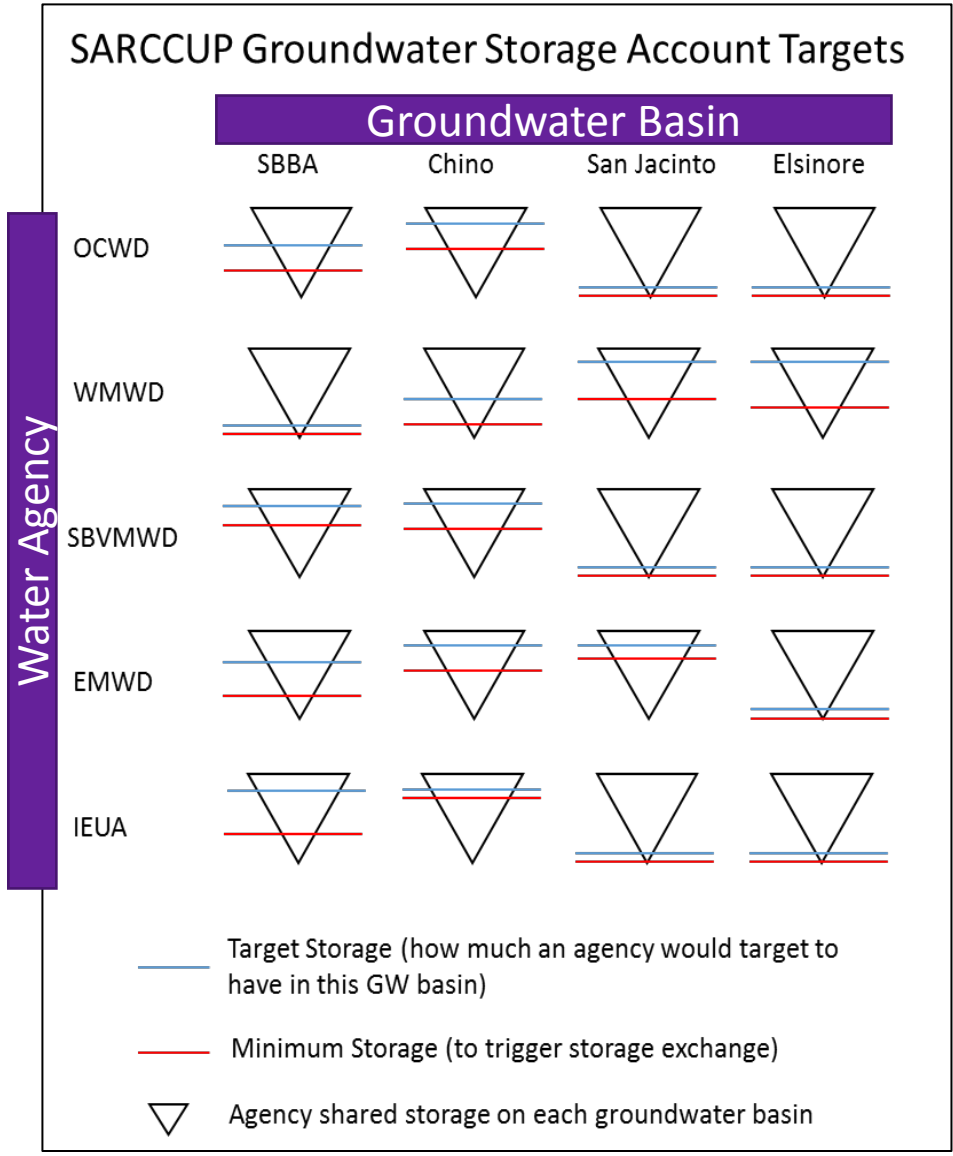
To SARCCUP Agency	From Agency System/GW Basin			
	Elsinore GW Basin	Chino GW Basin	SBBA GW Basin	San Jacinto GW Basin
OCWD	Dual use ASR wells to Temescal Creek to SAR	South Pressure Zone Extraction Wells to SAR	SBBA Extraction Wells 48 inch baseline feeder extension Devil Canyon –Azuza Pipe Yorba Linda Feeder or SAR	San Jacinto Extraction Wells CRA or San Jacinto creek
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

Groundwater Storage and Accounting

- Storage targets set for each agency in each basin based on cost optimization
- Storage exchanges will occur to attempt to achieve “optimal” storage balancing for each agency



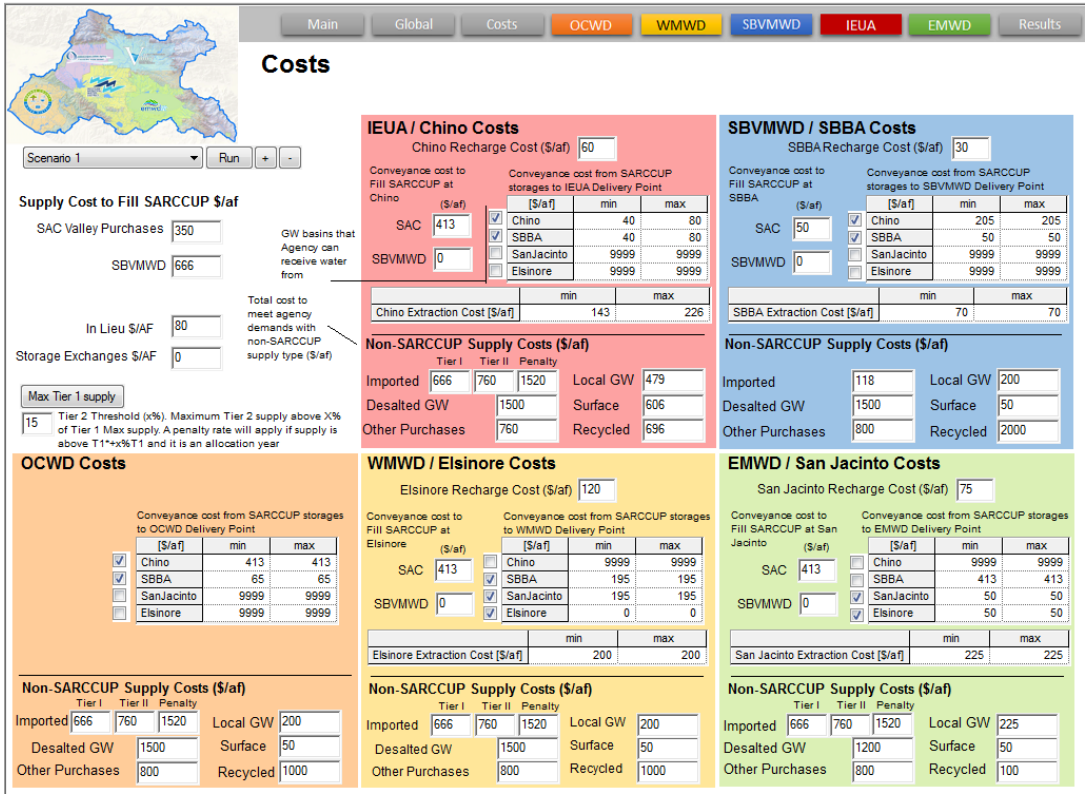
Optimizing Operations of SARCCUP

- Objective
  - Minimize net cost of delivery of SARCCUP supply to agencies
- SARCCUP Costs
  - Cost of Purchased Supply +
  - Cost of Recharge Conveyance +
  - Cost of Recharge +
  - Cost of Extraction +
  - Cost of Delivery Conveyance or Wheeling +
  - Cost of Exchanges

Total SARCCUP Cost /
Total SARCCUP Deliveries
=
SARCCUP Unit Cost
(or postage stamp rate)

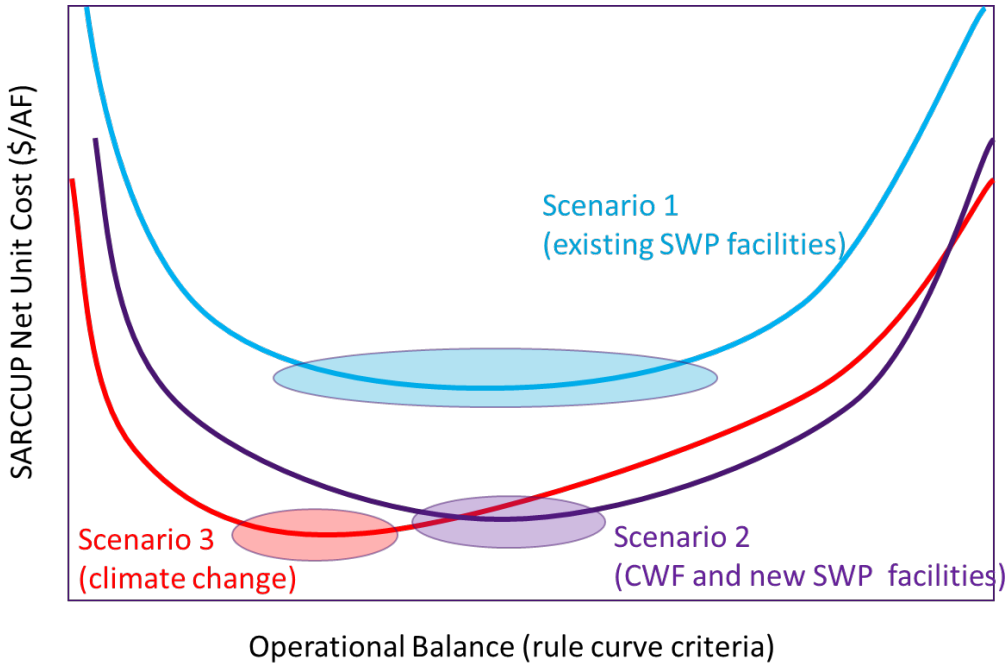
Cost Assumptions

- Supply Costs:
  - Sacramento Valley Water Purchases
    - To SBVMWD @ $400/AF
    - Through MWD wheeling rate $750/AF
  - SBVMWD Surplus @ MWD Tier 1 Rate, $666/AF
- Recharge Costs:
  - Varies by Basin, $30-120/AF
- Extraction Costs:
  - Varies by Basin, $70-225/AF
- Delivery Costs:
  - Varies by source/delivery point; $40-400/AF
- Exchange Costs:
  - Storage exchanges @ $0/AF
  - In-lieu @ $313/AF (treatment surcharge for WMWD)

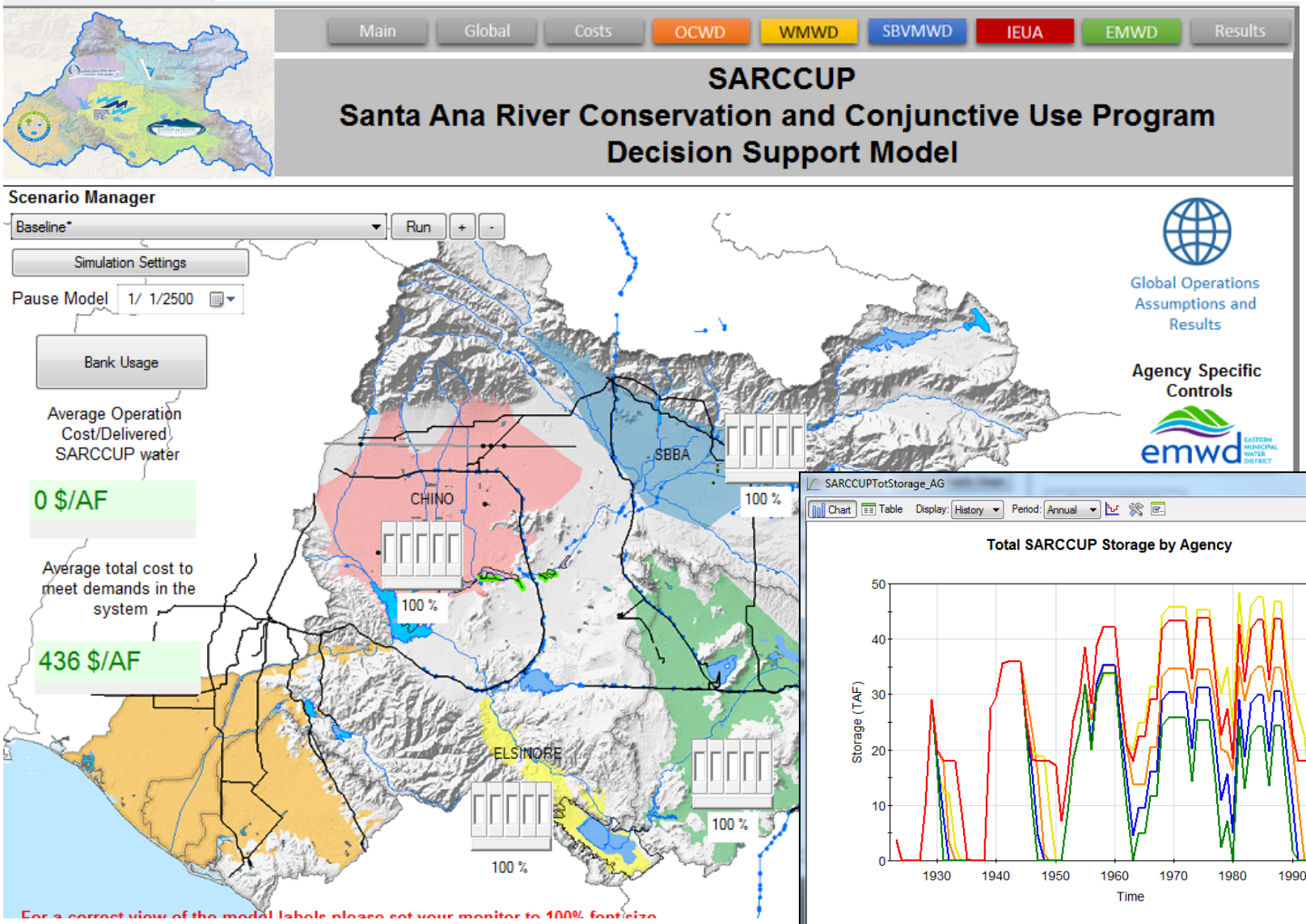


Optimization through Rule-Based Criteria

- Optimization through Rule-Based Criteria
  - Rules with variable criteria (target storage levels) are established … and optimized
  - Similar to development of “reservoir rule curves”
- Storage Rule Curves
  - Target SARCCUP bank storage distribution for each agency
  - Threshold bank volume that will trigger storage exchanges
  - Threshold bank volume that will limit storage exchanges
- GoldSim optimization methods to identify range of “optimal rule curves” to minimize SARCCUP unit cost



Model Dashboards – The User Interface



Modeling Scenarios Developed to Address Specific Questions

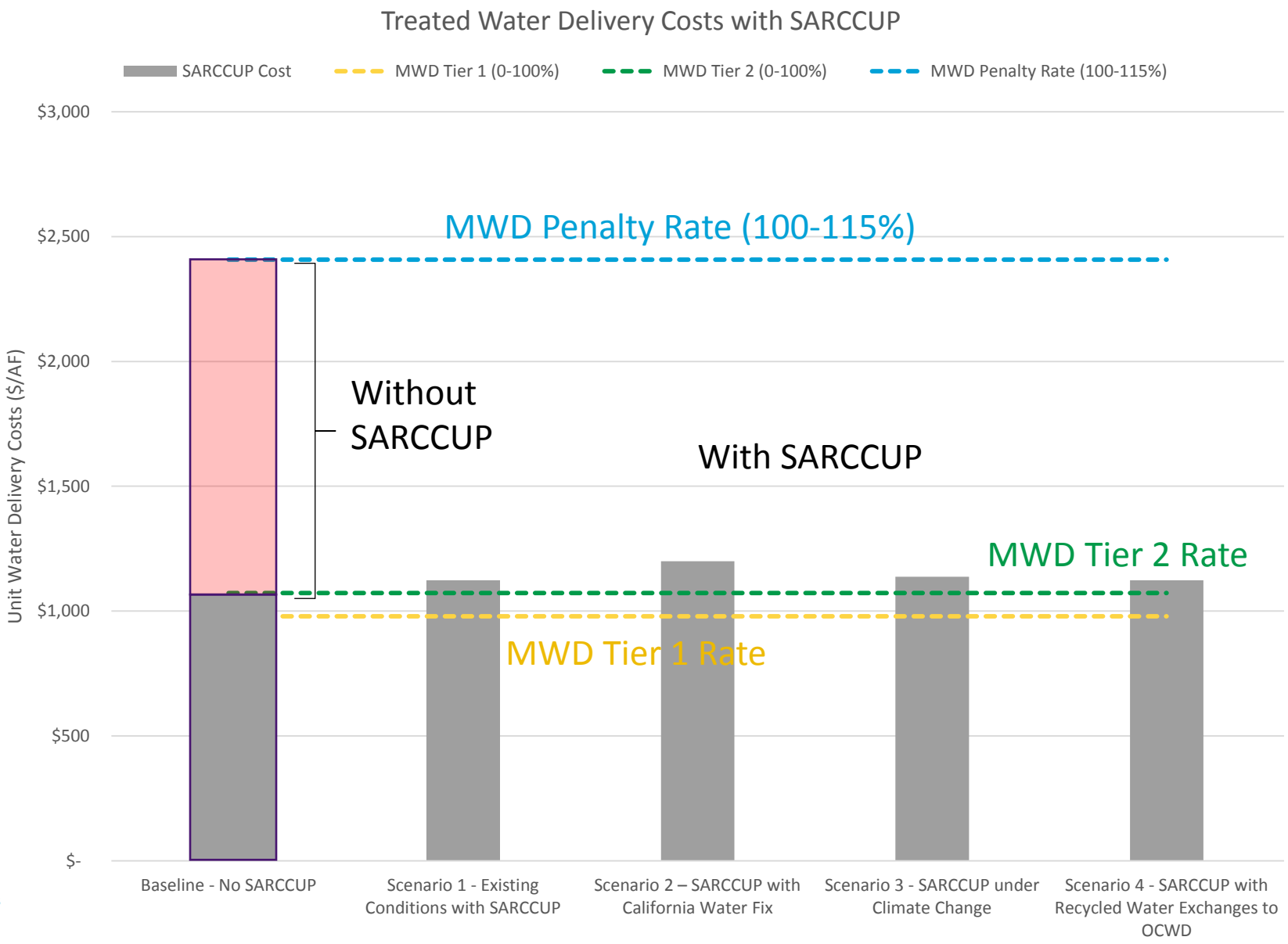
- What is the cost of SARCCUP water and how does it compare to the cost of water without SARCCUP?
- How does the California Water Fix impact SARCCUP?
- Where are the “bottlenecks” in SARCCUP, if any? What recharge/extraction facilities would be required to alleviate specific bottlenecks?
- Where in the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

Major Assumptions of SARCCUP Scenarios

- Baseline
  - No SARCCUP, existing imported supply reliability
- Scenario 1 – SARCCUP under Existing Conditions
  - SARCCUP operations, existing Delta infrastructure and regulations,
- Scenario 2 – SARCCUP with California Water Fix
  - SARCCUP operations, CWF infrastructure and regulations,
- Scenario 3 – SARCCUP with Climate Change
  - SARCCUP operations, future climate change around mid-century
- Scenario 4 – SARCCUP with recycled water exchanges to OCWD
  - SARCCUP operations, IEUA delivers recycled water to OCWD in exchanges for OCWD's SARCCUP groundwater supply in Chino

Preliminary SARCCUP Cost Results (Treated)

What is the cost of SARCCUP water and how does it compare to the cost of water without SARCCUP? How does the California Water Fix impact SARCCUP?



SARCCUP Facility Usage (in progress)

Where are the "bottlenecks" in SARCCUP, if any? What recharge/extraction facilities would be required to alleviate specific bottlenecks?
Where in the watershed does extra recharge or extraction capacity exist without new facilities?

- Recharge facility usage
  - Surplus recharge capacity exists in many basins, especially **SBBA and Chino**
  - Only **San Jacinto Basin** recharge approaches capacity limits
- Extraction facility usage
  - Surplus extraction capacity exists in **SBBA and Elsinore** basins
  - **Chino and San Jacinto** extraction capacities are fully utilized, but are sufficient to manage delivery under current sized SARCCUP bank
  - Extraction capacity will likely limit operation of a larger SARCCUP bank
- Conveyance facility usage
  - Regional conveyance does not appear to limit operations
  - Further evaluation of available capacity is warranted

Can SARCCUP Facilitate use of Reuse of Water Supplies in Upper Watershed

- In progress

Uncertainties and Future Work

- Uncertainties
  - Cost
    - Purchase cost of wet and above normal year Sacramento Valley transfer supply
    - Future of MWD penalty rate tiers and enforcement
  - Operations
    - MWD allocation timing and frequency based on simplified model
    - Some recharge, extraction, and conveyance capacities have not been confirmed
- Future Work
  - Refine scenarios and assumptions ??
  - Documentation
  - Support model for Master Plan