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Managing Water in the West

San Diego Basin Study Public Meeting

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August 2, 2017

U.S. Department of the Interior
Bureau of Reclamation

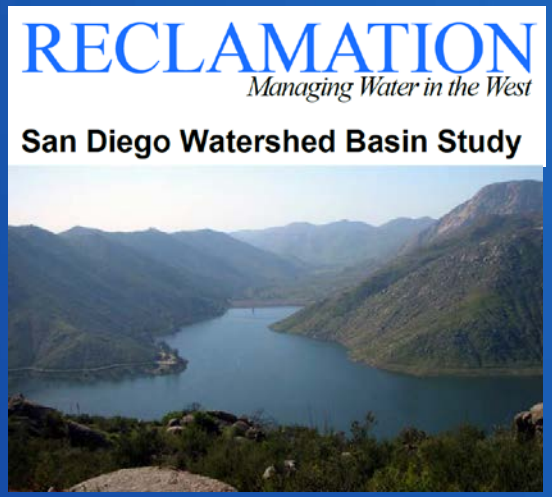
Agenda

1. Welcome & Introductions
2. Overview of the Basin Study and its current status
    1. Present baseline impacts identified in Task 2.3
    2. Overview of Task 2.4 Portfolios to be used in the study
3. Overview Trade-Off Analysis for Task 2.5
4. Discussion: Evaluation Objectives for Trade-Off Analysis
5. Next steps and study schedule
6. Closing remarks & public comment

What is the San Diego Basin Study?

Purpose:

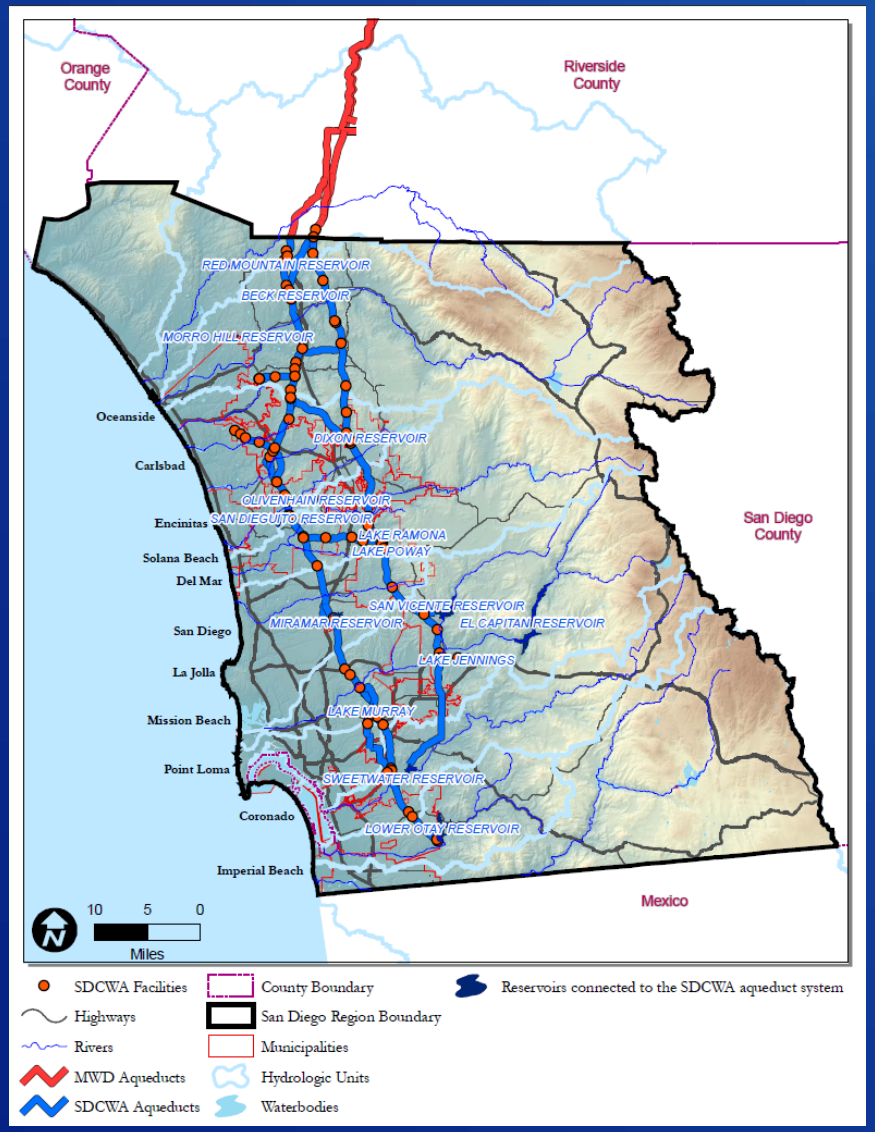
- Identify approaches to bridge current and future water supply gaps
- Complement existing planning efforts



Objectives:

- Evaluate water supply and demand conditions under future demands and climate change conditions
- Identify potential changes to existing facilities or operations or development of new facilities that can alleviate the impacts of increasing demands and climate change. Develop portfolios of concepts.

What is the San Diego Basin Study



Study area =
the SD IRWM planning region.

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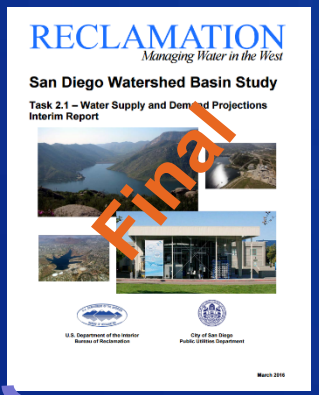
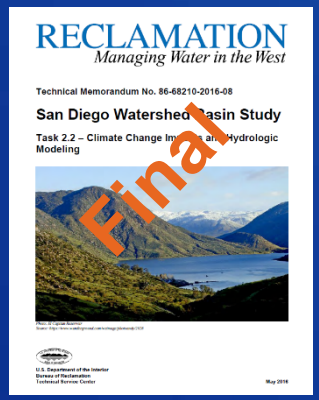
San Diego Basin Study Tasks & Status

Water Supply and Water Demand Projections (Task 2.1)



Downscaled Climate Change and Hydrologic Modeling (Task 2.2)



Existing Structural Response and Operations Guidelines Analysis (Task 2.3)

Structural and Operations Concepts (Task 2.4)

Task 2.4

Winter 2017

Trade-Off Analysis and Recommendations (Task 2.5)

Task 2.5

Winter 2017

Summary Report (Task 2.6)

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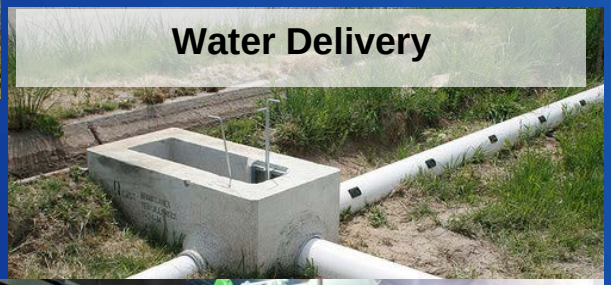
Impacts examined in the San Diego Basin Study

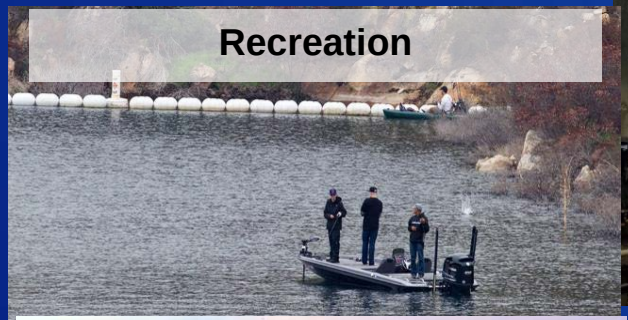
Flood Control

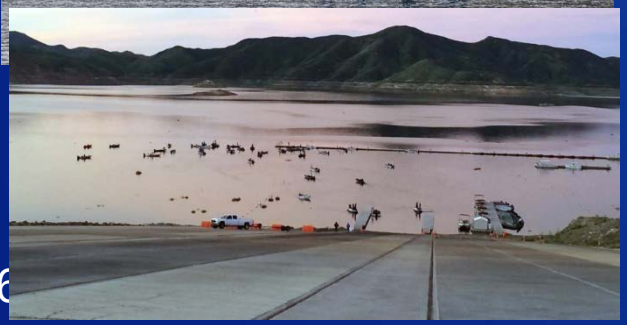
Water Delivery



Energy

Recreation





Environmental

- Habitat
- Endangered Species
- Water Quality
- Ecological Resiliency

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Baseline Impacts Identified Task 2.3

- **Water Supply/Demand/Delivery:**
  - Baseline water deliveries increase to meet demands
  - Reliance on imported water increases while other sources remain constant
  - Shortages occur more often and are larger with future demands. Climate change exacerbates shortages.
  - Conveyance system limitations may contribute to shortages
- **Recreation:** Boat ramps typically remain accessible but may sometimes be inaccessible at some reservoirs
- **Energy:** Net energy consumption increases with increased deliveries despite moderate generation increases
- **Flood:** Number and volume of spills (not for water supply) decreases
- **Environmental:** Impact area not modeled in 2.3

Task 2.4 Portfolios: Adaptation Concepts and Associated Projects

Goal of Task 2.4

Develop Portfolios

- Identify and analyze structural and non-structural (e.g. operational) concepts that can alleviate the impacts of increasing demands and climate change. Develop portfolios of concepts.

Approach for Task 2.4

1. **Develop portfolios** that can alleviate the impacts of increasing demands and climate change

2. **Incorporate:** Determine how each portfolio will be incorporated into the CWASim model

3. **Run the CWASim model** with the portfolios for a range of climate and demand scenarios

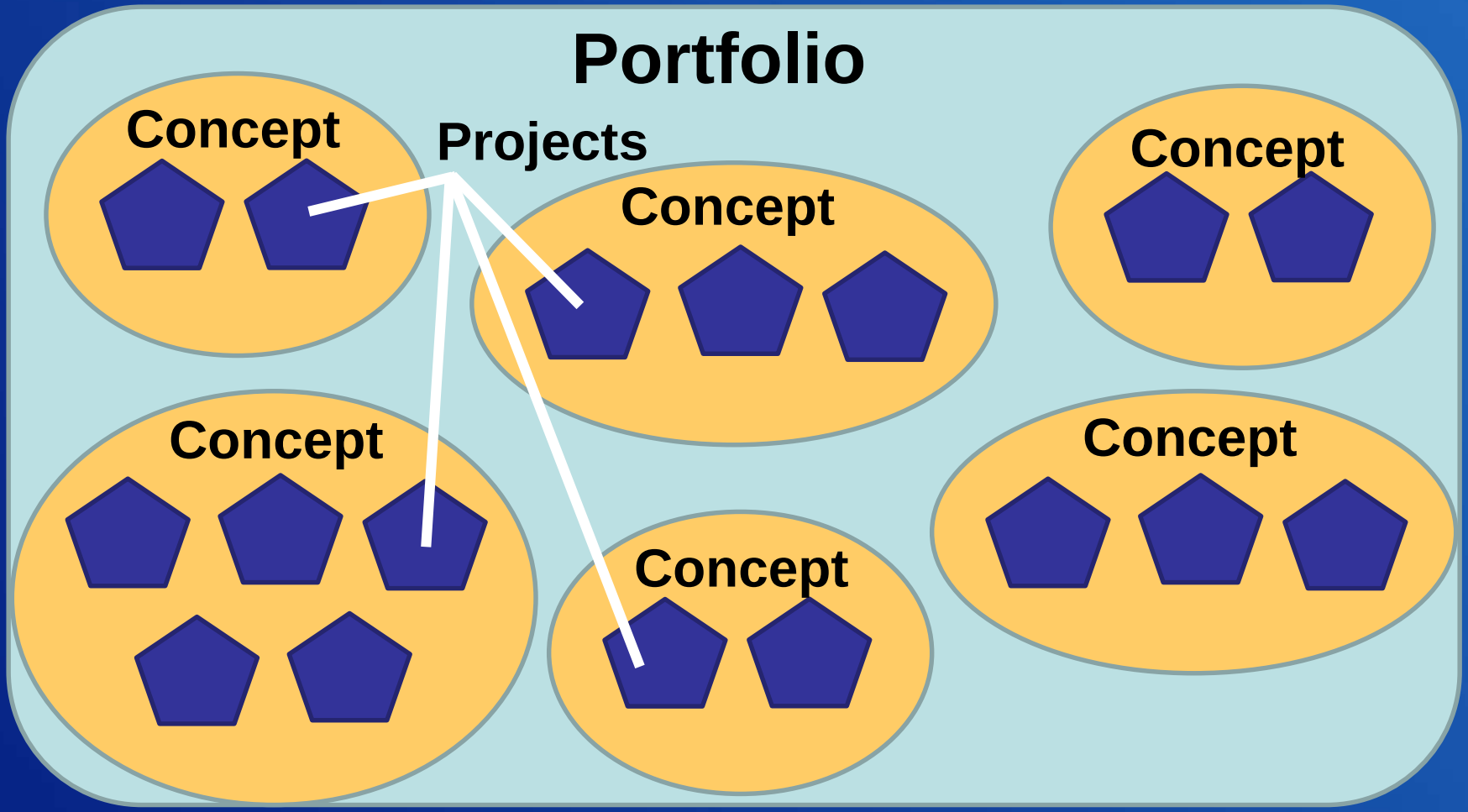
4. **Analyze the performance** of each portfolio for climate change scenarios

Final Study Portfolios

Baseline	**Adaptation projects and concepts accepted as verifiable for the 2015 UWMP**
Baseline +	**Adaptation projects considered verifiable since Baseline began or have begun to be implemented since Baseline**
Increase Supplies	**Not designated as verifiable projects yet, but close.**
Optimize Existing Infrastructure	**Projects that focus on increasing regional water supplies.**
Demand Management/ Enhanced Conservation	**Projects that seek to reduce demand management through enhanced conservation.**
Environmental/Healthy Watersheds	**Projects that restore or create habitat.**

Conceptual

What are Adaptation Concepts and why organize them into Portfolios?



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Portfolios Structure

Portfolios

(Baseline, Baseline +, Conceptual – Increase Supplies, Optimize Existing Infrastructure, Demand Management/Enhanced Conservation, Environmental)

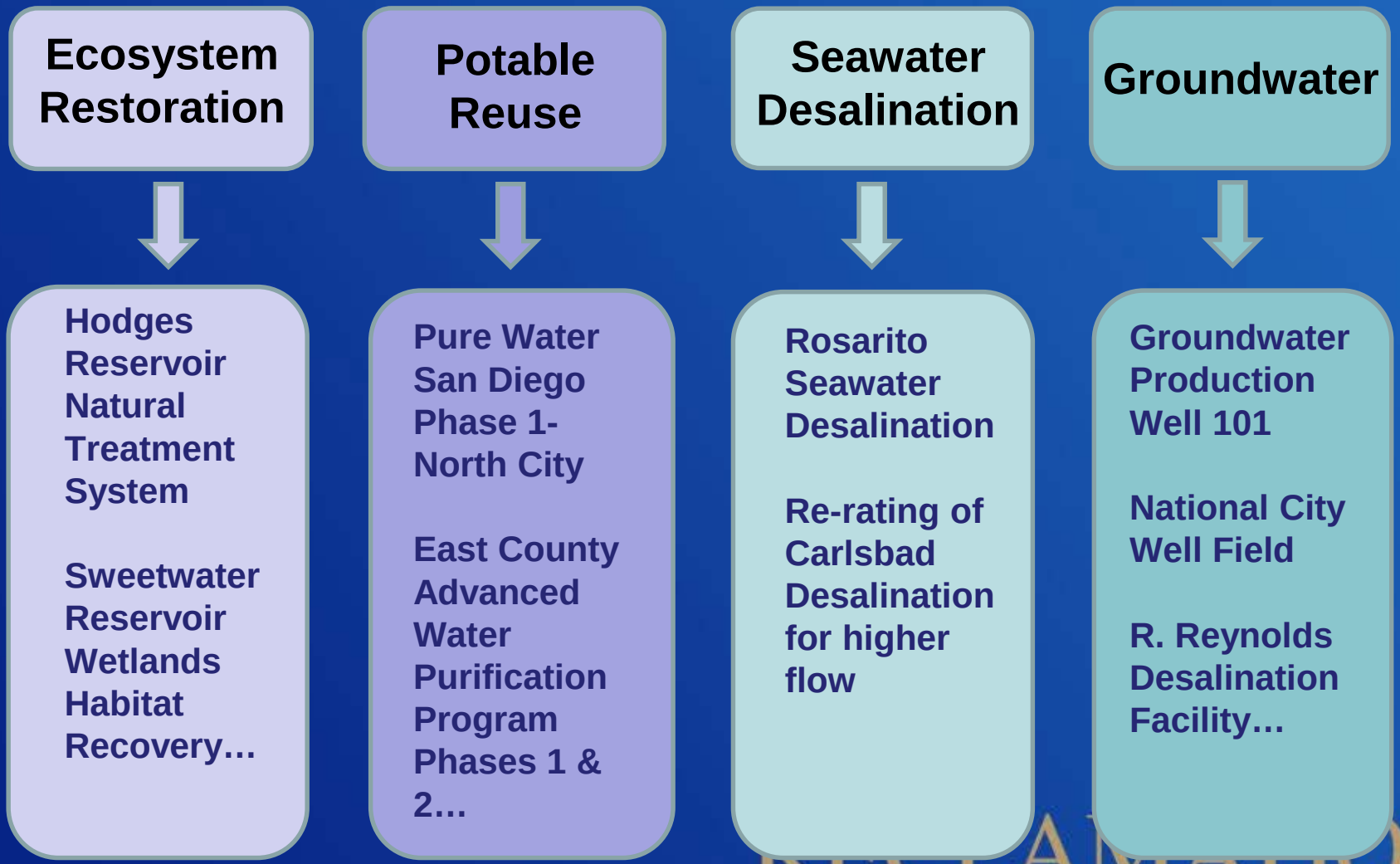
Adaptation Concepts

Groundwater, Potable Reuse, Recycled Water, Gray Water Use, Stormwater Capture, Desalination, Ecosystem Restoration, Imported Water Purchases, etc.

Specific Projects

(Pure Water San Diego, San Luis Rey WRF - Short/Long-Term Expansion, etc.)

Example of Projects Associated with Adaptation Concepts?



Example Projects

(see supplementary materials)

Baseline

- Carlsbad Desalination Plant
- Connection #1-North City Water Reclamation Plant
- Conservation from 2015 UWMP

Baseline +

- Pure Water Phase I
- Nutrient Management in Santa Margarita River Watershed
- Sweetwater Reservoir Wetlands Habitat Recovery
- Regional Drought Resilience Program

Increase Supplies

- Re-rating of Carlsbad Desalination for higher flow
- Rosarito Beach Desalination
- Pure Water Phase 2

Optimize Existing Infrastructure

- Otay to Alvarado Conveyance
- SD County Reservoir Intertie

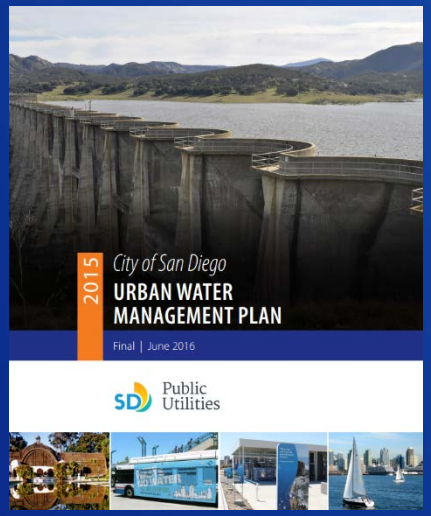
Demand Management/ Enhanced Conservation

- Conservation above Baseline.

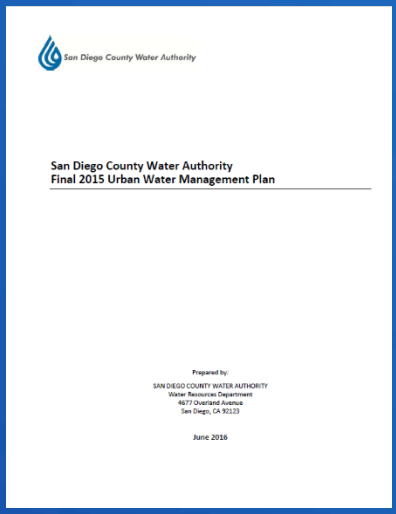
Environmental/Healthy Watersheds

- Low Impact Development Urban Runoff Control Projects for the Tijuana Estuary
- Safari Park Storm Water Capture and Reuse Project

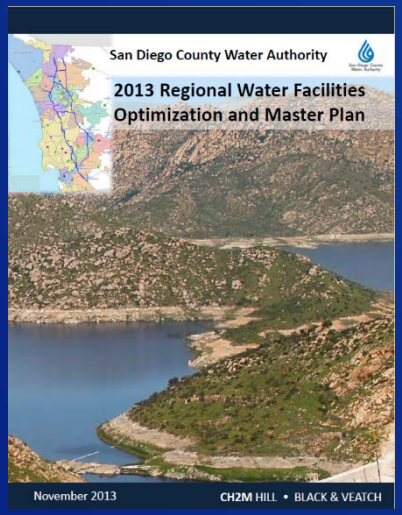
Recent Planning Documents Used



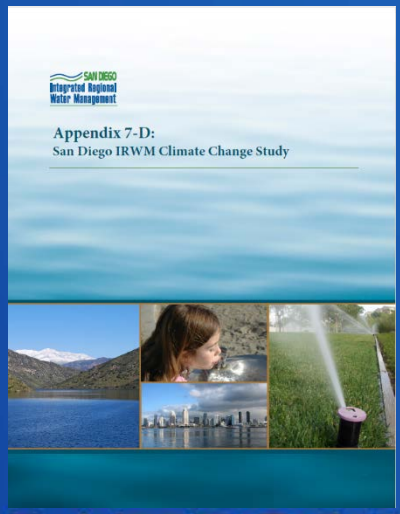
2015 City of San Diego Urban Water Management Plan



2015 SDCWA Urban Water Management Plan



2013 SDCWA Regional Water Facilities Optimization and Master Plan



2013 San Diego Integrated Regional Water Management Plan

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Task 2.5 Trade-Off Analysis

Goal of Task 2.5

Evaluate the trade-offs between the portfolios developed in Task 2.4.

- **Includes a well-defined no action alternative**
  - **Accounts for costs of any actions/programs/unmet demands that reasonably would be expected.**
  - **No action alternative serves as the baseline for estimating benefits, costs, and regional impacts.**

Approach for Task 2.5

1. **Analyze the portfolios** developed during Task 2.4.

2. **Conduct Trade-Off Analysis** of the Portfolios, using the Evaluation Objectives.

3. **Interpret results** of Trade-Off Analysis to compare Portfolios.

Evaluation Process for Trade-Off Analysis

***Need public stakeholder feedback** on the trade-off analysis utilized for the study (Task 2.5)*

- **What Evaluation Objectives should be used?**
  - **To do: Review list of Evaluation Objectives and associated Performance Measures.**

Draft Evaluation Objectives

(See supplementary materials)

- **Provide Reliability & Robustness**
- **Manage Cost and Provide Affordability**
- **Provide for Scalability of Implementation**
- **Optimize Local Control/Independence**
- **Protect Quality of Life**
- **Regional Economic Impact**
- **Protect Habitats, Wildlife & Ecosystem Services**
- **Reduce Carbon Footprint**

****Evaluation Objectives have associated Performance Measures that are used in the Portfolio evaluation process.**

Trade-Off Analysis

Quantitative and qualitative benefits

- **There are alternatives/portfolios/projects that generate benefits and provide outputs that cannot be easily quantified (e.g. habitat improvement or quality of life).**
- **These non-quantifiable benefits need to be combined with traditional economic analysis to evaluate multiple benefits for several alternatives.**
- **Trade-off analysis can accommodate both quantifiable and non-quantifiable benefits and costs.**

Trade-Off Analysis

- **Simple definition of a trade-off is giving up one thing to get another**
  - **– (ex. Flood control vs. hydropower; water withdrawals for supply vs. in-stream biota)**
- **Value trade-offs**
  - **– Comparing alternatives requires decision makers to place values/weights on the output associated with different alternatives. Derivation of these values/weights must be transparent.**
- **Need for trade-off analysis**
  - **– Need to account for benefits and costs that can and cannot be monetized/quantified.**
  - **– Trade-off analysis can accommodate both.**

Trade-Off Analysis

- Need to have explicit objectives/quantifiable characteristics – Topic of Discussion Today
- Need clear definition of alternatives to be considered and outputs of alternatives – Defined "no action" alternative
- Need formulation of criteria by which to evaluate the alternatives
- Need relative importance of criteria (weighting) for comparing alternatives

Trade-off Analysis Example

- Four hypothetical alternatives (or portfolios)
- Three hypothetical rating criteria (or objectives)

Portfolio	Objective 1: Water Supply Benefits	Objective 2: Project Costs	Objective 3: Wetland Acres
1	$500,000	$16.0 million	+400
2	$200,000	$19.5 million	+350
3	$250,000	$13.5 million	+300
4	$300,000	$17.0 million	+600

Trade-off example - Continued

- **Compare portfolios with normalized values**
  - **Method: normalize according to the maximum value for beneficial objectives and the minimum value for negative effects**
  - **Note: Units of measure cancel out so results are a unit-less comparison of effects on objectives**

Portfolio	Objective 1: Water Supply Benefits	Objective 2: Project Costs	Objective 3: Wetland Acres
1	($500,000 ÷ $500,000)	($13.5 ÷ $16.0)	(400 ac ÷ 600 ac)
2	($200,000 ÷ $500,000)	($13.5 ÷ $19.5)	(350 ac ÷ 600 ac)
3	($250,000 ÷ $500,000)	($13.5 ÷ $13.5)	(300 ac ÷ 600 ac)
4	($300,000 ÷ $500,000)	($13.5 ÷ $17.0)	(600 ac ÷ 600 ac)

Trade-off example - Continued

- **The normalized values can be used to compare portfolios by individual objectives.**
  - **e.g. Portfolio 1 is twice as good as portfolio 3 in providing the objective of water supply benefits**

Portfolio	Objective 1. Water Supply Benefits	Objective 2. Project Costs	Objective 3. Wetland Acres
1	1.00	0.84	0.67
2	0.40	0.69	0.58
3	0.50	1.00	0.50
4	0.60	0.79	1.00

- **Next Step: Develop method to compare portfolios considering all objectives**

Trade-off example - Continued

Are all the objectives equally important?

- **Yes → If it is assumed that all objectives are equally important, can simply calculate the average of all objectives for each portfolio.**
  - **For example, for portfolio 1 the overall normalized score would be (1 + 0.84 + 0.67) ÷ 3 = .837**

- **No → It is unlikely that each objective is equally important.**
  - **Comparisons may be made by developing a single score to compare Portfolios in their ability to achieve multiple Objectives.**
  - **Need to establish the relative importance of objectives. This should reflect preferences of the affected population.**

Trade-off example - Continued

- **Establishing the relative importance of objectives**
  - **Possible sources of information for estimating preferences**
    - **Previous studies**
    - **Surveying the affected population**
    - **Asking representatives of affected groups**
    - **Other**
- **An index for the relative importance of objectives or "weighted scores"**
  - **Can ask for importance of individual objectives based on a scale (e.g. 1 to 10)**

Trade-off example - Continued

- **Develop weights of importance (scale of 1 to 10) for the different objectives:**
  - **Water Supply Benefits = 10**
  - **Project Costs = 4**
  - **Wetland Acres = 6**

Portfolio	Objective 1. Water Supply Benefits	Objective 2. Project Costs	Objective 3. Wetland Acres
1	1.00	0.84	0.67
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4	0.60	0.79	1.00

- **Combining Criteria and Weights**
  - **Portfolio 1 = (1*10) + (0.84*4) + (0.67*6) = 17.38**
  - **Portfolio 2 = (0.4*10) + (0.69*4) + (0.58*6) = 10.24**
  - **Portfolio 3 = (0.5*10) + (1*4) + (0.5*6) = 12.00**
  - **Portfolio 4 = (0.6*10) + (0.79*4) + (1*6) = 15.16**

Today's Topic of Discussion:

Review Evaluation Process for Trade-Off Analysis

Evaluation Objectives & Performance Measures

Evaluation Process Steps

Summary:

1. **Develop Evaluation Objectives (today)**
2. **Develop weighted scores/rank for objectives (future)**
3. **Complete Trade-Off Analysis (Task 2.5)**

Discussion Goal:
Develop Evaluation Criteria

Summary:

- **What Evaluation Objectives should be used as criteria to evaluate Portfolios?**

- **What Performance Measures are relevant for each Objective?**

- ***To Do:** Review list of Evaluation Objectives and associated Performance Measures*

Discussion:
Develop Evaluation Criteria

Discussion Questions:

1. **Is the current list of Objectives comprehensive? Anything missing?**
2. **Is the current list of performance measures comprehensive? What performance measures should be considered? Should any performance measures be pulled out as objectives?**

Outcome: ***Revised list of Objectives and associated Performance Measures***

Resources: ***Supplementary Materials***

Evaluation Objectives

(See supplementary materials)

- **Provide Reliability & Robustness**
- **Manage Cost and Provide Affordability**
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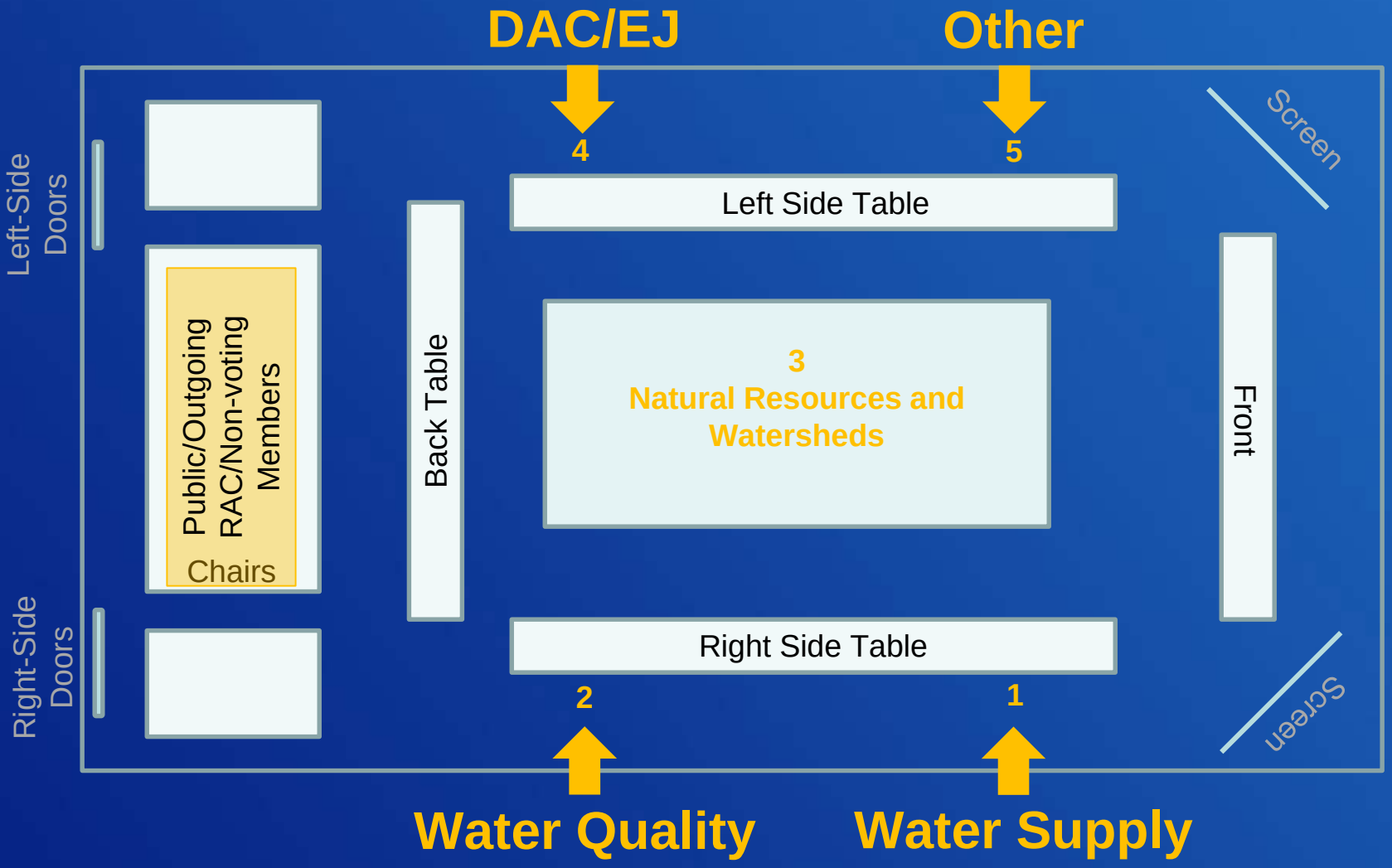
RAC Caucus Breakout



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Develop Evaluation Criteria

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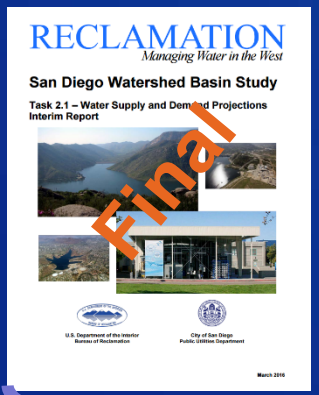
Outcome: ***Revised list of Objectives and associated Performance Measures***

Resources: ***Supplementary Materials***

Wrap-up and Next Steps

San Diego Basin Study Tasks & Status

Water Supply and Water Demand Projections (Task 2.1)



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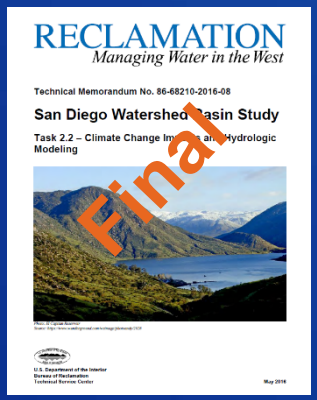

Existing Structural Response and Operations Guidelines Analysis (Task 2.3)

Structural and Operations Concepts (Task 2.4)

Task 2.4

Winter 2017

Trade-Off Analysis and Recommendations (Task 2.5)

Task 2.5

Winter 2017

Summary Report (Task 2.6)

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Next Steps

- Task 2.3 Interim Report Finalized – August 2017
- Basin Study Public Meeting – August 2, 2017
- Technical Team work on Task 2.4 – Summer 2017
- Presentation of Task 2.4 Results – Fall 2017
- Technical Team work on Task 2.5 – Fall 2017
- Presentation of Task 2.5 Results – Winter 2017
- Summary Report – April 2018

Questions?

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