

# RECLAMATION

*Managing Water in the West*

## San Diego Basin Study Preview for IRWM RAC

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U.S. Department of the Interior  
Bureau of Reclamation

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## San Diego Basin Study Objectives

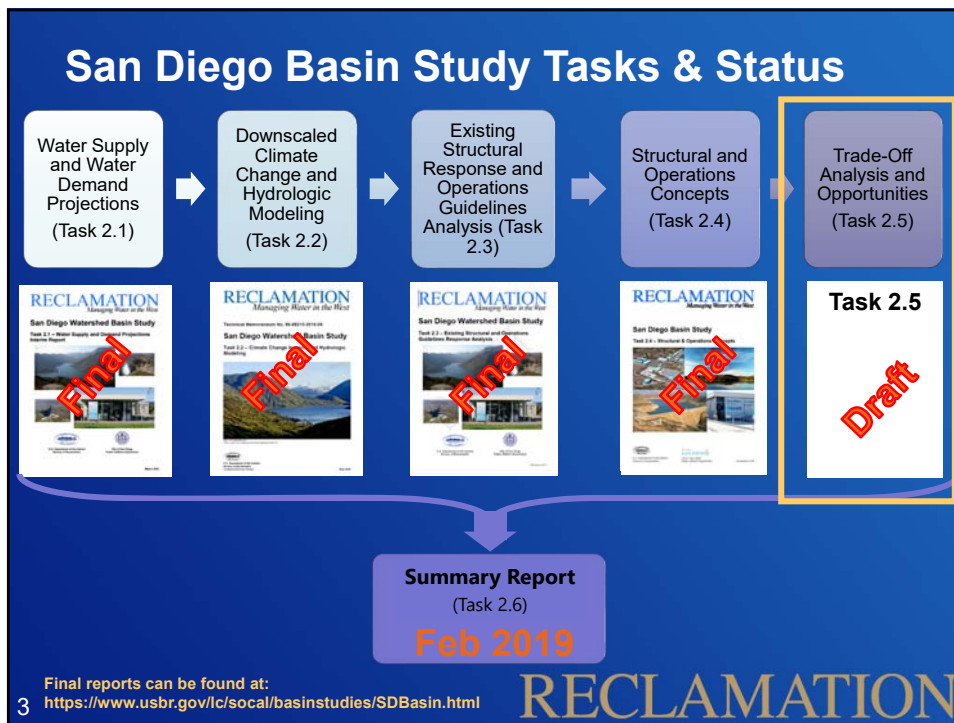
1. Determine how climate change will impact the water supply system
2. Develop structural and non-structural adaptation strategies to manage climate change impacts



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### Task 2.4 Purpose

The purpose of Task 2.4 of the San Diego Basin Study was to analyze and explore differences in water deliveries, flood control, recreation, and energy among a range of approaches to meet water demands and address the impacts of increasing demand and climate variation through the 2050s.

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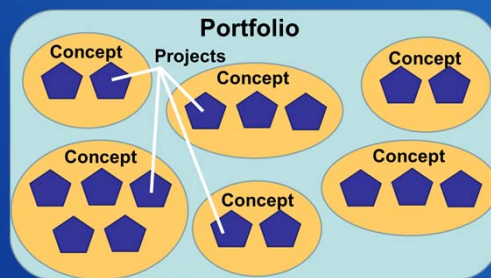
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## Task 2.4 Portfolios

### Portfolios

- Baseline (B)
- Baseline Plus (B+)
- Increase Supplies (IS)
- Enhanced Conservation (EC)
- Optimize Existing Facilities (OEF)
- Watershed Health and Ecosystem Restoration (WE)



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## Task 2.4: Impact Categories



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## Task 2.4: Key Findings

- **Water Delivery**
  - Demand projections increase due to population and climate
  - Sources of additional water deliveries to meet increasing demands vary by Portfolio
    - B: Increase in Imported Water Purchases
    - B+: Increase in Surface Water deliveries (Hodges and Sweetwater) & increase in Potable Reuse (Pure Phase 1)
    - EC: Demand reduction by conservation
    - IS: Increase in Potable Reuse (Pure Phase 2) & Desalination (Rosarito and Camp Pendleton)
    - OEF: Similar to B+
    - WE: Similar to B+
  - Shortages occurred in all Portfolios for some demand/climate scenarios
    - Largest shortages in B, Smallest in Enhanced Conservation
    - No shortages above shortage threshold in EC or IS

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## Task 2.4: Key Findings (cont.)

- **Energy**
  - Highest consumption in B, lowest in EC
- **Recreation**
  - Boat ramps generally available at Hodges and San Vicente
  - Boat ramps frequently inaccessible at El Capitan, except in OEF (Reservoir Intertie)
  - Boat ramp accessibility improved at Lower Otay for all Portfolios beyond B (Mission Trails Alternative 1)
- **Flood Control**
  - No flooding at San Vicente or Olivenhain
  - More days with flood outflows at El Capitan for IS (increase in local supply availability)
  - Days with flood outflows decreased at Hodges in B+ and beyond (Hodges Water Quality Improvement Program)

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## Task 2.5 Purpose

The purpose of Task 2.5 is to compare Concepts for meeting the San Diego region’s water demands and addressing the impacts of increasing demand and climate variation through the 2050s.

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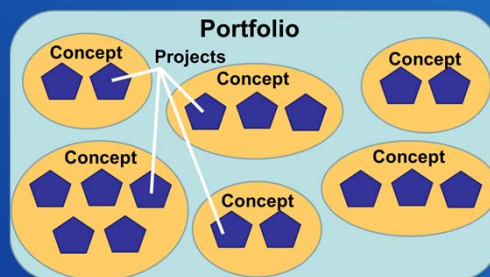
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## San Diego Basin Study Concepts

### Concepts

- Conveyance Improvements
- Drought Restriction/Allocation
- Firm Water Supply Agreements
- Gray Water Use
- Groundwater
- Imported Water Purchases
- Local Surface Water Reservoirs
- Potable Reuse
- Recycled Water
- Seawater Desalination
- Stormwater BMPs
- Stormwater Capture
- Urban & Ag. Water Use Efficiency
- Watershed and Ecosystem Management



Concepts represent a set of planned or conceptual projects that are being considered in the region for the purposes of improving operations of existing facilities and supplies, and/or developing new water supply sources.

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## Task 2.5: Trade-Off Analysis Steps

1. **Identify Evaluation Objectives**
2. **Determine the Relative Importance of Evaluation Objectives**
  - Based on evaluation objective rating survey results
3. **Place Values on Evaluation Objectives using Performance Measures**
  - Project- and Concept-level survey results
  - GIS analysis
  - Model metrics
  - Scoring criteria
4. **Evaluate and Combine Evaluation Objective Scores for Each Concept**
  - All scores are comparable unit-less values

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## Task 2.5 Evaluation Objectives

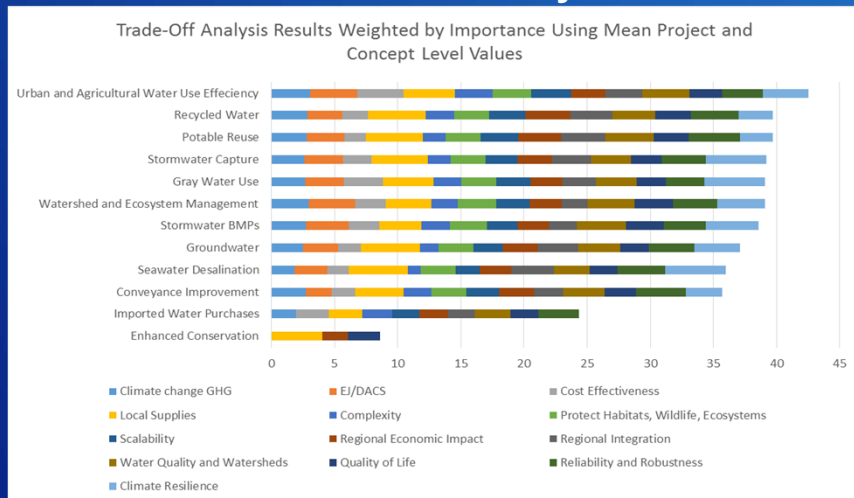
- Address Climate Change Through Greenhouse Gas Reduction
- Climate Resilience
- Cost Effectiveness
- Environmental Justice
- Optimize Local Supplies/Independence
- Project Complexity
- Protect Habitats, Wildlife, and Ecosystem Services
- Provide for Scalability of Implementation
- Provide Reliability and Robustness
- Quality of Life/Recreation
- Regional Economic Impact
- Regional Integration and Coordination
- Water Quality and Watersheds

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## Task 2.5: Overall Trade-off Analysis Results



\*Imported Water Purchases only has scores for 10 or the 13 Evaluation Objectives. It excludes the Climate Resilience, Environmental Justice/DACs, and Water Quality and Watersheds Evaluation Objective scores.

\*\* Enhanced Conservation only has scores for 3 of the 13 Evaluation Objectives. It includes only Local Supplies, Regional Economic Impact, and Quality of Life/Recreation, and Reliability and Robustness Evaluation Objective scores.

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## Task 2.5: Overall Trade-Off Analysis Results

Concept	Cumulative Points Weighted by Importance	Relative points on a 1 to 100 scale
Urban and Agricultural Water Use Efficiency	42.32	100.00
Potable Reuse	39.73	93.89
Recycled Water	39.72	93.87
Stormwater Capture	39.20	92.63
Gray Water Use	39.11	92.42
Watershed and Ecosystem Management	38.15	90.15
Stormwater BMPs	37.79	89.31
Groundwater	37.08	87.62
Seawater Desalination	35.97	85.01
Conveyance Improvement	35.68	84.31
Imported Water Purchases*	24.34	57.52
Enhanced Conservation**	8.61	20.36

\*Imported Water Purchases only has scores for 10 or the 13 Evaluation Objectives. It excludes the Climate Resilience, Environmental Justice/DACs, and Water Quality and Watersheds Evaluation Objective scores.

\*\* Enhanced Conservation only has scores for 3 of the 13 Evaluation Objectives. It includes only Local Supplies, Regional Economic Impact, and Quality of Life/Recreation, and Reliability and Robustness Evaluation Objective scores.

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### Task 2.5: Weighted results by Evaluation Objective

Concept	Climate change GHG	EJ / DACS	Cost Effective-ness	Local Supplies	Complexity	Protect Habitats, Wildlife, Ecosystems	Scalability	Regional Economic Impact	Regional Integ-ration	Water Quality and Watersheds	Quality of Life	Reliability and Robustness	Climate Resilience
Urban & Ag Water Use Efficiency	3.10	3.70	3.67	4.06	3.00	2.82	3.16	2.73	2.91	3.97	2.58	3.23	3.60
Stormwater Capture	2.61	3.05	2.27	4.49	1.80	2.76	2.53	2.73	3.06	3.33	2.40	3.52	4.80
Recycled Water	2.86	2.76	2.05	4.57	2.23	2.76	2.92	3.51	3.34	3.33	2.81	3.77	2.75
Potable Reuse	2.81	2.97	1.70	4.54	1.79	2.76	3.02	3.37	3.49	3.96	2.77	4.03	2.63
Watershed & Ecosystem Mgmt	2.97	3.63	2.47	3.62	2.07	2.13	2.65	2.52	2.02	3.77	3.04	3.51	3.80
Stormwater BMPs	2.75	3.36	2.44	3.31	2.27	2.17	2.44	2.46	2.23	3.90	2.99	3.33	4.18
Groundwater	2.48	2.77	1.82	4.67	1.47	2.79	2.33	2.74	3.21	3.39	2.23	3.64	3.57
Conveyance Improvement	2.75	2.03	1.86	3.81	2.23	2.76	2.61	2.76	2.32	3.39	2.47	3.97	2.84
Seawater Desalination	1.84	2.61	1.65	4.70	1.05	2.76	1.89	2.50	3.38	3.16	2.18	3.79	4.80
Gray Water Use	2.67	3.05	3.12	3.98	2.23	2.76	2.70	2.54	2.69	3.16	2.35	3.06	4.80
Imported Water Purchases	1.95	NA	2.62	2.64	2.38	2.76	2.13	2.28	2.14	3.16	2.23	3.23	NA
Enhanced Conservation	NA	NA	NA	4.03	NA	NA	NA	2.03	NA	NA	2.55	NA	NA

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### Task 2.5 Discussion and Opportunities

- The Concepts with highest combined point values consistently had higher Evaluation Objective scores for Water Quality and Watersheds, Local Supplies, and Environmental Justice/Disadvantaged Communities.
- None of the Concepts scored well for Project Complexity.
- Trade-off analysis highlights the benefits and challenges associated with concepts
- The Customized Trade-off Analysis Tool can be used to perform trade-off analysis with a subset of Evaluation Objectives, or with different weights or scores

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## Task 2.5 Customized Trade-Off Analysis Tool

Customizable Inputs		Type of Weigh		Evaluation Objectives	
: results outputted on Summary Tables tab		= editable cell		Include in calculation?	
<b>Evaluation Objective Weights (1-10 Scale)</b>	Used Value	Custom Values:	Stepped Ranking (1 = highest) Multiple objectives can have same ranking	Original Survey Weights (Provided for comparison to custom)	
Reliability and Robustness	10.00	10	1	10.0	Reliability and Robustness: yes
Optimize Local Supplies/Independence	9.40	9.4	2	9.4	Optimize Local Supplies/Ind: yes
Cost Effectiveness	8.50	8.5	3	8.5	Cost Effectiveness: Yes
Regional Integration and Coordination	8.50	8.5	4	8.5	Regional Integration and Co: yes
Provide for Scalability of Implementation	7.70	7.7	5	7.7	Provide for Scalability of Im: yes
Minimize Project Complexity	7.30	7.3	6	7.3	Minimize Project Complexi: yes
Promote High Quality of Life/Recreation	7.40	7.4	7	7.4	Promote High Quality of Li: yes
Promote Environmental Justice	6.70	6.7	8	6.7	Promote Environmental Ju: yes
Support Regional Economy	7.80	7.8	9	7.8	Support Regional Economy: yes
Enhance Climate Resilience	9.60	9.6	10	9.6	Enhance Climate Resilience: yes
Protect Habitats, Wildlife, and Ecosystem Services	9.20	9.2	11	9.2	Protect Habitats, Wildlife, an: yes
Protect Water Quality and Watersheds	10.00	10	12	10.0	Protect Water Quality and W: yes
Address Climate Change Through Greenhouse Gas Re	8.20	8.2	13	8.2	Address Climate Change Th: yes
			Stepped High Weight:	10	
			Stepped Low Weight:	5	
<b>Concepts</b>	Include in calculation?			<b>Survey Values Used</b>	Include in calculation?
Conveyance Improvement	Yes			Project Survey Values	Yes
Enhanced Conservation	Yes			Concept Survey Values	Yes
Grass Water Use	Yes				
Groundwater	Yes				
Imported Water Purchases	Yes				
Portable Reuse	Yes				
Recycled Water	Yes				
Seawater Desalination	Yes				
Stormwater BMP's	Yes				
Stormwater Capture	Yes				
Urban and Agricultural Water Use Efficiency	Yes				
Watershed and Ecosystem Management	Yes				

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## You're Invited!

### San Diego Basin Study Public Meeting

**When:** December 13, 2018 9am – noon

**Where:** City of San Diego MOC II Auditorium  
9192 Topaz Way,  
San Diego CA 92123

**What:** Task 2.4 Highlights  
Task 2.5 Methods, Results, Conclusions

**Why:** Hear about Basin Study findings  
Ask questions and share feedback

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# Questions?

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