BENEFITS AND COSTS OF THE CALIFORNIA WATERFIX

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Outline

- Review of BDCP benefit-cost studies.
- Comments on Brattle Groups November 2015 draft WaterFix analysis, and Dr. Sunding’s October 27 presentation
- August 2015 UOP Benefit-Cost Analysis
  - Overview of statewide benefits and costs
  - Implications for water agencies and financing
Benefit-Cost Analysis of BDCP

- **UOP, Michael (July 2012)**
  - Evaluates tunnels independently
  - **Statewide** assessment based on BDCP costs and EIR/EIS.

- **BDCP chapter 9 appendix A (May 2013)**
  - Evaluates benefits and costs from **water agency perspective**
  - Changes from EIR/EIS baseline to assume tougher environmental regulations without WaterFix, but not with WaterFix. Justified by BDCP No-surprises Assurances under ESA Section 10.
  - Baseline change increases water yields and increase benefits.
### Difference in BDCP studies almost entirely due to water yield

<table>
<thead>
<tr>
<th></th>
<th>Michael (7/2012)</th>
<th>BDCP (5/2013)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Export Water Supply</strong></td>
<td>3,916</td>
<td>15,722 to 16,642</td>
<td>11,806 to 12,726</td>
</tr>
<tr>
<td><strong>Export Water Quality</strong></td>
<td>2,328</td>
<td>1,819 to 1,789</td>
<td>-509 to -539</td>
</tr>
<tr>
<td><strong>Earthquake Risk Reduction</strong></td>
<td>866</td>
<td>470 to 364</td>
<td>-396 to -502</td>
</tr>
<tr>
<td><strong>Environmental Benefits/Costs</strong></td>
<td>0</td>
<td>Not Estimated*</td>
<td>NA (0)</td>
</tr>
<tr>
<td><strong>Tunnel Costs (Capital, O&amp;M)</strong></td>
<td>-12,310</td>
<td>-13,328 to -13,343</td>
<td>1,018 to 1,033</td>
</tr>
<tr>
<td><strong>In-Delta and Upstream Impacts</strong></td>
<td>-1,173</td>
<td>Not Estimated*</td>
<td>NA (-1,173)</td>
</tr>
<tr>
<td><strong>Net Benefits ($ millions)</strong></td>
<td>-6,374</td>
<td>4,684 to 5,452</td>
<td>11,058 to 11,826</td>
</tr>
<tr>
<td><strong>Benefit-Cost Ratio</strong></td>
<td>0.53</td>
<td>1.35 to 1.41</td>
<td></td>
</tr>
</tbody>
</table>
Recent Sunding/Brattle Analysis

- November 2015 draft analysis from PRA request
  - Assumed taxpayers subsidize 30% of construction cost.
  - Found benefits $\leq$ allocated costs for agriculture even after subsidy.
  - But benefits $>$ costs after subsidy for all export water agencies due to high urban values.

- October 27, 2016 presentation to SDCWA
  - No subsidy: 30% of allocated costs “outside his scope”
  - Additional discussion of costs and benefits to water agencies.
Ignores 30% of project cost with no loss of benefits.

What are the benefits of 70% of a project?
Two Views of Cost versus Yield

Water Fix Incremental Cost Versus Yield

- Smith/Stratecon
- Sunding/Brattle

Yield (million acre feet)

$ per acre foot
Other Problems With Sunding/Brattle Assumptions

- Shifts no-tunnel baseline from EIR/EIS to boost project yield for water exporters.
  - Does not account for impact of baseline change on environmental values and 3rd party effects in-Delta and upstream. Invalid to differ from EIR/EIS without this.
- President-elect Trump
- Inflated Agricultural Water Value from land prices.
- Inflated Urban Scarcity Values
  - Aggressive population growth projection.
  - Ignores likely development of alternative water supplies and increased conservation.
Pacific Benefit-Cost Analysis of WaterFix


Released in August 2016
WaterFix Differences With BDCP Affect Benefit-Cost Analysis

- WaterFix is Not A Habitat Conservation Plan.
  - Water agencies lose “no surprise” regulatory assurances.
  - Tunnels no longer bundled with habitat restoration.
    - BDCP Section 10 permit: requires overall improvement in ES
    - WaterFix Section 7 permit: do not jeopardize existence of ES

- Water Yields Are Lower.

- Construction Costs Updated.

- Construction Time Estimate Increased from 10 years to 15 years.
Key Assumptions for WaterFix Benefit-Cost Analysis

- Export Water Yield: annual average of 225,432 acre feet per the January 2016 WaterFix Biological Assessment
- Timeline: Construction 2017-2031, Operation benefits valued from 2032 to 2131 (100 year useful life)
- Real Discount Rate: 3.5%
- Two Scenarios:
  - Optimistic: Values from 2013 BDCP/Sunding Analysis.
  - Base: Values from other state reports.
The Base Scenario Still Includes Some Pro-Tunnel Biases

- No Risk of Cost Escalation.
- Excludes some areas of potential social costs.
  - Delta recreation and upstream reservoirs
- Excludes some areas of environmental costs
  - Risk of algal blooms and construction impacts
- Assumes no technological improvements in alternative water supplies and conservation.
- Valued Delta Water exports 25% higher than current cost of alternatives.
- Long-time horizon and relatively low discount rate.
Agricultural Value:
- Difference in Rental Rate of Irrigated and Unirrigated Land Implies $124/af. Increase 25% to $150/af.

Urban Value:
- Cost of Alternatives DWR California Water Plan.
- Weighted average is $633/af, but increased 25% to $800/af – midpoint cost of recycled water.

<table>
<thead>
<tr>
<th></th>
<th>Low Cost ($/af)</th>
<th>High Cost ($/af)</th>
<th>Midpoint Cost ($/af)</th>
<th>Potential 2030 Supply (million/af)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brackish Groundwater Desalination</td>
<td>500</td>
<td>900</td>
<td>700</td>
<td>.1-.2</td>
</tr>
<tr>
<td>Ocean Desalination</td>
<td>1000</td>
<td>2500</td>
<td>1750</td>
<td>.1-.2</td>
</tr>
<tr>
<td>Municipal Recycled Water</td>
<td>300</td>
<td>1300</td>
<td>800</td>
<td>1.8-2.3</td>
</tr>
<tr>
<td>Surface Storage</td>
<td>300</td>
<td>1100</td>
<td>700</td>
<td>.1-1.1</td>
</tr>
<tr>
<td>Urban Water Use Efficiency</td>
<td>223</td>
<td>522</td>
<td>372.5</td>
<td>1.2-3.1</td>
</tr>
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</table>
Valuing Export Water Supply in Optimistic Scenario

Optimistic Scenario from BDCP analysis:

- Assumes very rapid urban population growth.
- Assumes no development of alternative water supplies or growth in conservation.
- Averages $785/af across urban and agriculture uses, compared to $367/af in base scenario.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Tunnels’ Annual Water Yield</th>
<th>Average Value of Water Supply</th>
<th>Annual Value</th>
<th>Present Value over 100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimistic</td>
<td>225,432 af</td>
<td>$785</td>
<td>$176.9 mil</td>
<td>$2,822.4 mil</td>
</tr>
<tr>
<td>Base</td>
<td>225,432 af</td>
<td>$367</td>
<td>$82.7 mil</td>
<td>$1,319.5 mil</td>
</tr>
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</table>
Seismic Risk Reduction Benefit

- "Optimistic" Scenario: avg. annual value $27.4 mil from BDCP report, present value $436 million. Why so low?
  - Low probability event
  - Tunnels only protect 50% of exports.
  - Worst case scenario is less than ¼ the loss of surface water in recent drought years

- Base Scenario: 0
  - Vast majority of economic damage is not water exports
  - Higher level of flood protection investment will occur without WaterFix
Benefit of WaterFix to Exporters

- Water Quality Improvement is the Biggest Benefit in the Base Scenario (value estimate from BDCP)
- Total Benefit is less than $5 billion in the most optimistic case

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<th>Base scenario</th>
<th>Optimistic Scenario</th>
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<tr>
<td>Export Water Supply</td>
<td>$1,319,521,208</td>
<td>$2,822,409,124</td>
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<td>Export Water Quality</td>
<td>$1,677,361,307</td>
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<tr>
<td>Earthquake Risk</td>
<td>$0</td>
<td>$435,796,554</td>
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<tr>
<td>Reduction</td>
<td>$2,996,882,515</td>
<td>$4,935,566,984</td>
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<td>Total Benefits</td>
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Cost of WaterFix to Exporters

- $15.7 billion construction/mitigation over 15 year period. O&M $25mil to $38mil annually.

- Present Value Cost is $12.3 billion

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<td>Construction and Mitigation</td>
<td>$11,676,474,531</td>
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<td>Operation and Maintenance</td>
<td>$591,658,075</td>
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- For exporters alone, costs exceed benefits by more than $7 billion.
In-Delta Costs

- **Agriculture**
  - Present value cost $294 million to $683 million.

- **In-Delta Transportation Impacts**
  - Present value cost of $132.2 million for state highways evaluated in BDCP EIR/EIS

- **Municipal Water Quality**
  - Mitigation cost present value $37 million to $111 million for Contra Costa WD alone.

- **Total In-Delta Costs could be near $1 billion**
  - Significant locally but not critical to statewide B-C ratio.
Environmental Costs/Benefits

- WaterFix EIR/EIS and biological assessment does not support any claim of environmental benefit.
  - Some species could be negatively impacted.
  - Section 7 permit is for No Jeopardy not Overall Improvement.
  - Other environmental risks.

- $0 Environmental Benefit/Cost seemed most consistent with EIR and BA
  - Using declining baseline scenario would create large environmental costs.
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<td>Ecosystem</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>In-Delta Municipal</td>
<td>$111,279,332</td>
<td>$37,093,107</td>
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<td>In-Delta Agriculture</td>
<td>$682,807,143</td>
<td>$293,953,421</td>
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<td>In-Delta Transportation</td>
<td>$132,205,755</td>
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<td>Total Costs</td>
<td>$13,194,424,836</td>
<td>$12,731,384,889</td>
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<td><strong>Net Benefit</strong></td>
<td>($10,197,542,281)</td>
<td>($7,795,817,905)</td>
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<td><strong>Benefit/Cost ratio</strong></td>
<td>0.23</td>
<td>0.39</td>
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Benefit-Cost Conclusions

- WaterFix is worse than the “status quo” as defined by its EIR/EIS.
  - Net Benefit is -$10 billion, and b-c ratio is 0.23 under base scenario.
  - No Pessimistic Scenario (no consideration of cost escalation or other potential problems)

- Implications for Project Financing
  - Many agricultural agencies are likely to opt-out.
  - Agencies that opt-out will not accept declining baseline.
  - Infeasible without enormous taxpayer subsidy of agricultural cost share.