The Brattle Group

Economic Analyses Conducted on the Bay Delta Conservation Plan

Presented by:
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Outline

Background

Economic Analyses Conducted

Results

Public Comments

Background

Thomas J. Graff Chair in Natural Resource Economics at UC Berkeley

- Founder, Berkeley Water Center
- NSF Research Center on Urban Water Systems

Principal, The Brattle Group

- National Leader, Environment and Natural Resources Practice
- Clients: MWD, SFPUC, USDOJ, corporations, utilities, states
- Currently involved in two interstate water disputes before the U.S. Supreme Court

Economic Analyses

Comprehensive set of 6 analyses

Economic Benefits of the BDCP (April 2013)

- Foundation is work on shortage losses done for ACWA, CUWA, SWC and MWD
- Analysis compares aggregate benefits to costs to determine the economic feasibility of the Proposed Action

Analysis of Take Alternatives (June 2013)

- Compare economic benefits and costs of alternative configurations of the BDCP
- Goal is to assess "practicability" of the alternatives

Statewide Economic Impacts (August 2013)

- Consider the economic impacts to various interests in the State
- Focus on a large number of Delta issues

Direct Economic Benefits of BDCP

Categories of Benefits

Urban Water Supply Reliability

Agricultural Water Supply Reliability

Water Quality Impacts

Reduction in Seismic Risk

Benefits Analysis Assumptions

BDCP construction is assumed to begin in 2015

BDCP operations are assumed to begin in 2025 and continue to 2075

Impacts are calculated relative to two Existing Conveyance scenarios (High and Low Outflow)

All present value impacts are in 2012 $ (millions), and are discounted using 3% real discount rate

Present Value Benefits and Costs ($ millions)

Alternative Description			Total Benefits and Costs[a, b]		
Alternative	**Facility Size (cfs)**	**Deliveries (MAF)**	**Total Benefits[c]**	**Total Costs[d]**	**Net Benefits**
BDCP Proposed Action High-Outflow	9,000	4.705	$18,011	$13,328	$4,684
BDCP Proposed Action Low-Outflow [e]	9,000	5.591	$18,795	$13,343	$5,452
A: W Canal 15,000 cfs	15,000	5.009	$23,820	$10,789	$13,030
B: Tunnels 6,000 cfs	6,000	4.487	$14,967	$12,123	$2,844
C: Tunnels 15,000 cfs	15,000	5.009	$23,820	$15,381	$8,438
D: Tunnels: 3,000 cfs	3,000	4.188	$8,918	$10,039	-$1,121
E: Isolated 15,000 cfs	15,000	3.399	-$7,531	$15,436	-$22,967
F: Through Delta	N/A	4.172	$9,301	$4,887	$4,415
G: Less Tidal Restoration	9,000	4.705	$18,011	$13,146	$4,865
H: More Restoration	9,000	4.705	$18,011	$13,219	$4,792
I: More Spring Outflow	9,000	4.338	$13,508	$13,182	$326

Notes:

[a] Construction is assumed to begin in 2015. BDCP operations are assumed to begin in 2025.

[b] All values are in 2012 $ (millions), and are discounted to present value using 3% real discount rate.

[c] Benefits are calculated out to year 2075.

[d] Costs are calculated out to year 2075.

[e] Benefits for the BDCP Proposed Action Low-Outflow Scenario are calculated relative to the Existing Conveyance Low-Outflow Scenario, which assumes Scenario 6 operations, no Fall X2, no north Delta diversions.

cfs = cubic feet per second; MAF = million acre-feet

Urban Water Supplies

Analysis Background

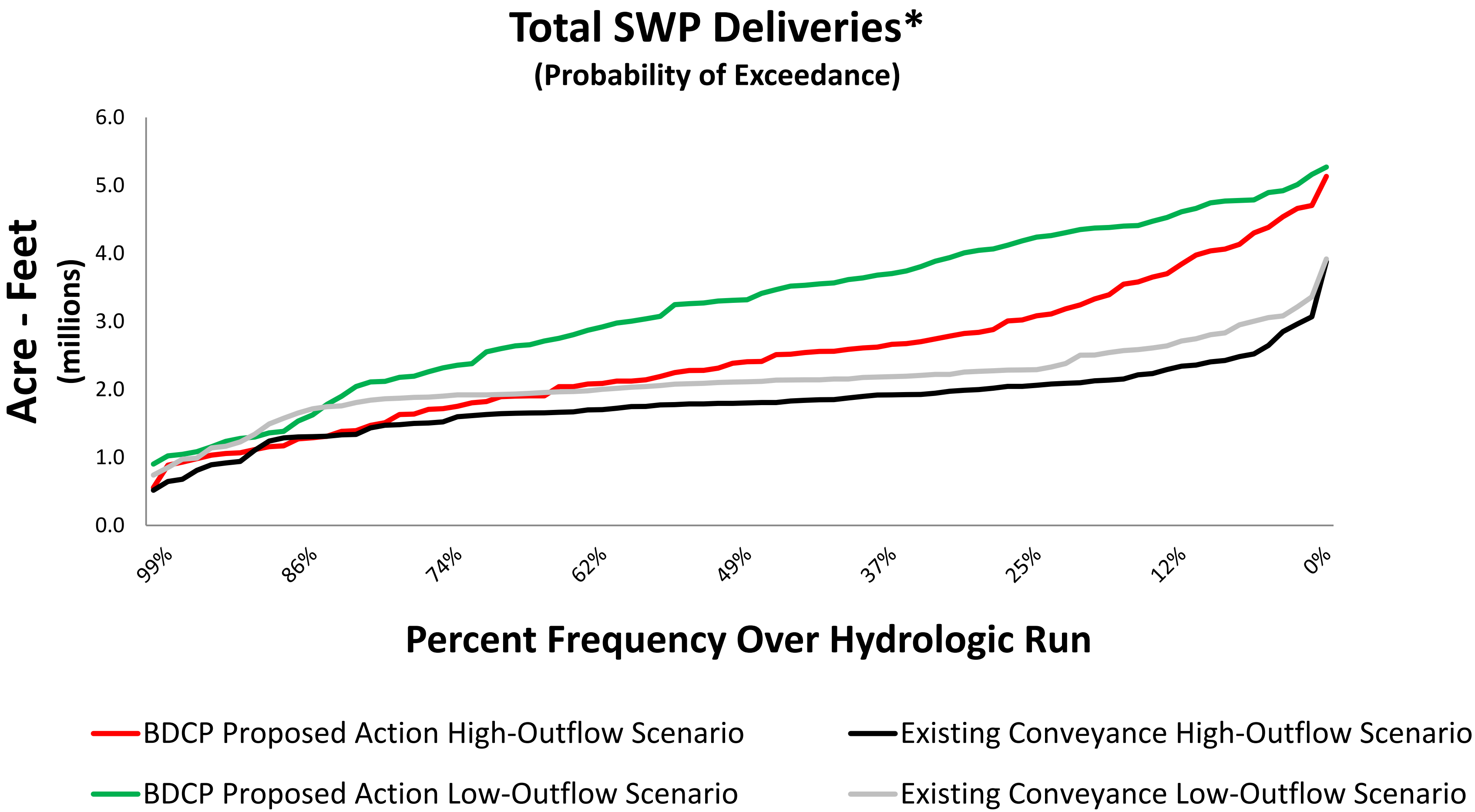
BDCP benefits to urban agencies are the value of avoiding future shortages and investments in alternative water supplies

We evaluate losses at the agency level for 36 urban water utilities receiving SWP supplies

- All MWD member agencies
- 10 other CA water agencies

Impact model considers a range of factors, including demand growth, water supply alternatives and operation of storage facilities

Total SWP Deliveries



Note: Total SWP deliveries in this graph only include Table A, Article 21, and Carryover.

Implied Cost of BDCP ($ per AF)

BDCP Proposed Action High-Outflow increases mean SWP deliveries by 1.2 MAF relative to Existing Conveyance High-Outflow

BDCP Proposed Action Low-Outflow increases mean SWP deliveries by 1.7 MAF relative to Existing Conveyance Low-Outflow

➔With a cost of $13.3 billion, the implicit water supply cost of the BDCP ranges from $302 to $408 per acre-foot.

Cost of Recycling Projects ($ per AF)

Project Title	Project Location	Estimated Cost per Acre-Foot
Groundwater Replenishment System [a]	Orange County Water District	$955
Regional Recycle Water Program, Northwest Area Project [b]	Inland Empire Utilities Agency	$1,467
Southeast Water Reliability Project Phase 1 [c]	Central Basin Municipal Water District	$1,672
Widomar Recycle Water System [b]	Elsinore Valley Municipal Water District	$1,312

Notes:

[a] Orange County Water District groundwater replenishment calculations are before subsidies and have a 5% annual escalation of operating costs from 2009 to 2012 (Groundwater Replenishment Systems 2010)

[b] Bureau of Reclamation 2012

[c] Central Basin Municipal Water District 2012 Southeast Water Reliability Project description

Cost of Desalination Projects ($ per AF)

Project Title	Project Location	Estimated Cost per Acre-Foot
Carlsbad Desalination Project[a]	Carlsbad, San Diego County, CA	$2,014–$2,257
Huntington Beach Seawater Desalination Project[b]	Huntington Beach, Orange County, CA	$1,768–$1,812
West Basin Municipal Water District Desalination Project[c]	El Segundo and Redondo Beach, Los Angeles County, CA	$1,273 for brackish $1,700 for seawater
Camp Pendleton Seawater Desalination Project[d]	Camp Pendleton, San Diego County, CA	$1,900–$2,340
Oxnard GREAT Program[e]	Oxnard, Ventura County, CA	$1,680 first phase $1,191 second phase

Notes:

[a] Poseidon Resources, LP and San Diego County Water Authority 2012

[b] Municipal Water District of Orange County and Poseidon Resources, LP 2013. Range includes total costs before any subsidies and includes conveyance costs

[c] University of Arizona Water Resources Center 2011

[d] RBF Consulting 2009; Pacific Institute 2012

[e] Wenner 2012

Cost of Conservation ($ per AF)

Addressing excess demand through conservation, case example of year 2035:

- BDCP Proposed Action High-Outflow Scenario: $1,414 per acre-foot
- BDCP Proposed Action Low-Outflow Scenario: $1,204 per acre-foot

Agricultural Water Supplies

CVP and SWP Agricultural Water Supply Benefits

Benefits are estimated using the Statewide Agricultural Production (SWAP) model

- Simulates the profit-maximizing decisions of agricultural producers given inputs:
  - Availability and cost of water
  - Land
  - Labor
  - Other
- Accounts for SWP & CVP water, other local supplies, and groundwater

Water Supply Benefits Summary

Expected Present Value Benefits of Water Supply Reliability ($ millions)

Take Alternative[a]	Facility Size (cfs)	Deliveries (MAF)	Total Water Supply Benefits[b, c]
BDCP Proposed Action High-Outflow Scenario	9,000	4.705	$15,722
BDCP Proposed Action Low-Outflow Scenario[d]	9,000	5.591	$16,642
A: W Canal 15,000 cfs	15,000	5.009	$21,305
B: Tunnels 6,000 cfs	6,000	4.487	$13,130
C: Tunnels 15,000 cfs	15,000	5.009	$21,305
D: Tunnels: 3,000 cfs	3,000	4.188	$7,799
E: Isolated 15,000 cfs	15,000	3.399	-$11,937
F: Through Delta	N/A	4.172	$9,363
G: Less Tidal Restoration	9,000	4.705	$15,722
H: More Restoration	9,000	4.705	$15,722
I: More Spring Outflow	9,000	4.338	$11,128

Notes:

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[d] Benefits for BDCP Proposed Action Low-Outflow Scenario are calculated relative to the Existing Conveyance Low-Outflow Scenario, which assumes Scenario 6 operations, no Fall X2, no north Delta diversions.

cfs = cubic feet per second; MAF = million acre-feet

Water Quality Impacts

Water Quality Impacts

Two models used to estimate salinity - related benefits

- Lower Colorado River Basin Water Quality Model
- South Bay Water Quality Model

Main variables

- Total dissolved solids (TDS) concentration
- Water deliveries
- Costs to users
- Demographic characteristics

Evaluates reduced salinity impacts on

- Useful life of appliances
- Specific crop yields
- Cost to industrial and commercial customers
- Amount of irrigation water needed

Value of Water Quality Impacts ($ millions)

Take Alternative[a]	Facility Size (cfs)	Deliveries (MAF)	Total Water Quality Benefits[b, c]
BDCP Proposed Action High-Outflow Scenario	9,000	4.705	$1,819
BDCP Proposed Action Low-Outflow Scenario[d]	9,000	5.591	$1,789
A: W Canal 15,000 cfs	15,000	5.009	$1,952
B: Tunnels 6,000 cfs	6,000	4.487	$1,524
C: Tunnels 15,000 cfs	15,000	5.009	$1,952
D: Tunnels: 3,000 cfs	3,000	4.188	$1,063
E: Isolated 15,000 cfs	15,000	3.399	$3,741
F: Through Delta	N/A	4.172	$0
G: Less Tidal Restoration	9,000	4.705	$1,819
H: More Restoration	9,000	4.705	$1,819
I: More Spring Outflow	9,000	4.338	$1,910

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Seismic Risk

Estimating Benefits of Seismic Risk Reduction

Calculate seismic risk benefits based on a one year outage reference case

Assume 2% probability of occurrence each year

Marginal values taken from the SDBSIM and SWAP

- Only considering direct benefits to water consumers in the affected agencies
- Indirect analysis considers changes in statewide output and employment

Post-earthquake water supplies provided by MWD

Present Value Benefits of Seismic Risk Reduction ($ millions)

Take Alternative[a]	Facility Size (cfs)	Deliveries (MAF)	Earthquake Supply (MAF)	Total Seismic Benefits[b, c]
BDCP Proposed Action High-Outflow Scenario	9,000	4.705	3.800	$470
BDCP Proposed Action Low-Outflow Scenario[d]	9,000	5.591	3.800	$364
A: W Canal 15,000 cfs	15,000	5.009	4.500	$563
B: Tunnels 6,000 cfs	6,000	4.487	2.900	$313
C: Tunnels 15,000 cfs	15,000	5.009	4.500	$563
D: Tunnels: 3,000 cfs	3,000	4.188	1.600	$55
E: Isolated 15,000 cfs	15,000	3.399	3.399	$665
F: Through Delta	N/A	4.172	1.000	-$62
G: Less Tidal Restoration	9,000	4.705	3.800	$470
H: More Restoration	9,000	4.705	3.800	$470
I: More Spring Outflow	9,000	4.338	3.800	$470

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Key Public Comments

The new financing plan not only assumes the 2014 water bond passes, but that the state will pass another subsequent water bond to fund the BDCP

BDCP's own economic analysis does not show that the benefits to agricultural contractors exceed the proportional costs allocated to agricultural contractors. Financial feasibility requires benefits to exceed costs for all contractors.

In the past year, the cost estimate for the tunnels has increased from $12.8 billion to $14.5 billion even though the water delivery capacity of the tunnels was decreased by 40 percent.

Key Public Comments

The new BDCP economic analysis demonstrates that the Governor and other BDCP proponents have exaggerated the economic risk of a Delta earthquake on water supplies.

BDCP shows that the cumulative economic benefits of seismic risk reduction from the tunnels only sum to $400 million over 50 years which is only 2 percent of the economic benefits of the tunnels to the water contractors.

Statewide Economic Impacts Study

Released on August 5, 2013

Addresses several categories of economic impacts

- Construction, restoration, O&M stimulus effects
- Changes in the Delta
  - Recreation
  - Traffic congestion
  - Air quality
  - GHG emissions
  - Delta agriculture
  - Commercial fishing
  - Etc.
- Impacts of improved water supply reliability