

North-of-the-Delta Offstream Storage Investigation

Preliminary Results of Economics Analysis

September 7, 2011

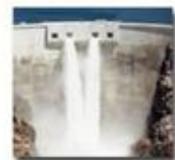


Preliminary – Subject to Change

Feasibility

Feasibility from a federal perspective includes:

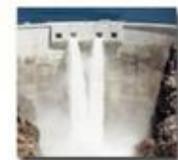
- Technical
- Environmental
- Economic
- Financial (the likelihood of repayment)



Planning Objectives

- Primary Planning Objectives:
 - Water Supply and Reliability Benefits
 - Water Quality Improvement
 - Fisheries Restoration and Ecosystem Enhancement
 - Hydropower Integrated with Renewable Energy
- Secondary Planning Objectives:
 - Flood Damage Reduction
 - Recreation

Benefits and Costs annualized 50- and 100-years



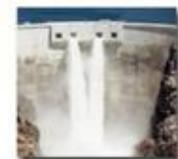
Economic Evaluation Requirements

Federal

- Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G; WRC, 1983); changes pending, but uncertain
- Bureau of Reclamation's Economics Guidebook

State

- Department of Water Resources' (DWR) Economics Guidebook
- 2009 Water Package Legislation, Public Benefits

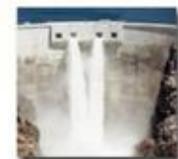


Economic and Environmental Principles & Guidelines for Water and Related Land Resources Studies (P&G)

Federal feasibility studies must address P&G's and display potential effects (benefits, costs) in specified accounts:

- National Economic Development (NED); required
- Regional Economic Development (RED); optional
- Environmental Quality (EQ); required
- Other Social Effects (OSE); optional
- Other methods and non-monetary effects may be considered

NODOS Feasibility Analyses include all four accounts



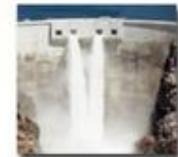
National Economic Development (NED)

- Evaluate the direct net benefits to the nation
- Consider both market (e.g., water for agricultural use) and non-market benefits (recreation)
- Include implementation costs (e.g., opportunity cost of capital for construction)
- Include uncompensated adverse costs to third parties
- Determine net NED benefits



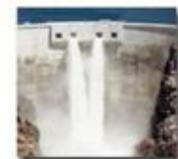
Regional Economic Development (RED)

- Focus on output, employment, and income effects
- Examine regions of primary economic activity
- Consider the indirect effects of project-related spending
- RED and NED benefits are not additive



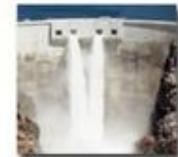
Environmental Quality (EQ)

- Include beneficial and adverse effects on ecological, aesthetic, and cultural resources
- Exclude EQ effects monetized and included in NED
- Assess other EQ effects in physical or qualitative terms
- Describe in terms of frequency, duration, location, etc.



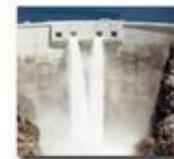
Other Social Effects (OSE)

- Urban and community (employment, income distribution, fiscal, and quality of life)
- Life, health, and safety (flood risk, potential damage from structural failure, air quality impact)
- Displacement
- Long-term productivity
- Energy requirement and conservation



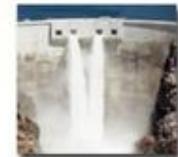
Potential Ag and M&I Water Supply Benefits

	Alternative A	Alternative B	Alternative C
<ul style="list-style-type: none"> Storage Intake/Release at Delevan 	<ul style="list-style-type: none"> 1.2 MAF Both 	<ul style="list-style-type: none"> 1.8 MAF Release Only 	<ul style="list-style-type: none"> 1.8 MAF Both
	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>
<ul style="list-style-type: none"> Ag Supply (TAF) Ag Benefit (\$M) 	<ul style="list-style-type: none"> 62 : 106 \$12 : \$23 	<ul style="list-style-type: none"> 35 : 71 \$7 : \$16 	<ul style="list-style-type: none"> 57 : 100 \$11 : \$23
<ul style="list-style-type: none"> M&I Supply (TAF) M&I Benefit (\$M) 	<ul style="list-style-type: none"> 93 : 207 \$143 : \$323 	<ul style="list-style-type: none"> 97 : 191 \$147 : \$278 	<ul style="list-style-type: none"> 102 : 229 \$152 : \$366



Potential Refuge Benefits

	Alt A	Alt B	Alt C
	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>
• Refuge Supply (TAF)	• 44 : 21	• 71 : 37	• 74 : 36
• Refuge Benefit (\$M)	• \$12 : \$8	• \$19 : \$14	• \$19 : \$14



Potential Water Quality Benefits

	Alt A	Alt B	Alt C
	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>
• Water Quality Supply – AG (TAF)	• 3 : 2	• 3 : 2	• 4 : 3
• Water Quality Supply – AG Benefit (\$M)	• \$1 : \$2	• \$1 : \$3	• \$2 : \$3
• Water Quality Supply – M&I (TAF)	• 128 : 117	• 136 : 119	• 165 : 169
• Water Quality Supply – M&I Benefit (\$M)	• \$17 : \$20	• \$18 : \$22	• \$22 : \$26

Agriculture

Irrigation water savings

M&I

Reduced Water Treatment



Preliminary – Subject to Change

Potential Ecosystem Enhancement Benefits

	Alt A	Alt B	Alt C
	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>	<u>Avg : Dry Yr</u>
• Ecosystem Enhancement Flows (TAF)	• 84 : 91	• 80 : 98	• 77 : 86
• Ecosystem Enhancement Flows Benefit (\$M)	• \$17 : \$20	• \$16 : \$22	• \$16 : \$18

Estimated benefits based on flows for ecosystem enhancement purposes



Potential Alternative Approaches to Ecosystem Enhancement Benefits

Estimated Average Year Annual Ecosystem Enhancement Water Benefits Based on Coldwater Pool and Delta Outflow

Alternative	Increase End of May Storage	June-Sept Increase Delta Outflow
A	\$25 M	\$26 M
B	\$29 M	\$28 M
C	\$29 M	\$31 M



Preliminary – Subject to Change

Power

Hydropower operations reduce facility operating costs, but have a net pumping energy requirement

Alternative	Annual Generation (GWh)	Annual Usage (GWh)
A	184-301	-367
B	143-336	-366
C	169-353	-412

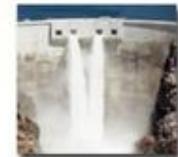
Renewable energy source and peaking power plant not estimated yet, but expected to increase benefits



Flood Damage Reduction

Reduced flooding risk for 4,600 acres in Stone Corral and Funks Creek watersheds and 4,025 acres in the Colusa Basin (100-year flood)

- Estimated average flood damage: \$1,000/acre
- Estimated annual flood damage reduction **for all alternatives**: \$86,250



Recreation Benefits

- 25% projected as net “new” recreation benefit
75% relocated from other regional recreational facilities
- Projected 100,000 annual net new recreation user days.
- Adjustment for low surface water elevations

Alternative	Average Year	Dry/Critical Year
A	\$4 M	\$3 M
B	\$4 M	\$3 M
C	\$4 M	\$4 M



Preliminary Benefits Summary

Beneficiary	Alternative A	Alternative B	Alternative C
Water Supply	(\$M)	(\$M)	(\$M)
<i>Agricultural</i>	\$11.7	\$6.6	\$10.7
<i>Urban</i>	\$143.4	\$146.6	\$152.4
<i>Refuges</i>	\$11.6	\$18.9	\$19.5
<i>Total</i>	\$166.7	\$172.0	\$182.6
Water Quality			
<i>Agricultural</i>	\$1.2	\$1.3	\$1.6
<i>Urban</i>	\$16.8	\$18.3	\$22.2
<i>Total</i>	\$17.9	\$19.6	\$23.8
Ecosystem Enhancement Account	\$16.8	\$16.4	\$15.6
Hydropower (system)	(\$5.4)	(\$9.6)	(\$5.7)
Recreation	\$4.4	\$4.3	\$4.5
Flood Damage Reduction	\$0.1	\$0.1	\$0.0
Total	\$200.4	\$202.8	\$220.9



Preliminary – Subject to Change

Preliminary Benefit Cost Ratio

	Alt A (\$M)	Alt B (\$M)	Alt C (\$M)
Total Project Costs	\$3,579	\$3,384	\$3,887
Interest During Construction	\$1,028	\$972	\$1,117
<i>Annual Costs:</i>			
Interest/Amortization	\$185.8	\$175.7	\$201.8
Operations & Maintenance	\$17.8	\$14.3	\$19.6
Total Annual Costs	\$203.6	\$189.9	\$221.4
Total Benefits	\$200.4	\$202.8	\$220.9
Net Benefits	(\$3.2)	\$12.9	(\$0.5)
<i>Benefit Cost Ratio</i>	<i>0.98</i>	<i>1.07</i>	<i>0.99</i>



Preliminary – Subject to Change

Preliminary Financial Analysis

- Tied to results of pending preliminary cost allocation
- Beneficiaries Pay (CALFED, Delta Plan, State & Federal Legislation)
- Must Assess Ability to Pay for Shared Costs
- Primary Repayment Options for Agricultural and M&I Water Supply and Power (Federal costs)
- Results Presented in Draft and Final Feasibility Report
- Consider 2009 Water Package Requirements (State)



Next Steps – Define and Address Public Benefits Per State Requirements



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