

CALIFORNIA WATER FIX

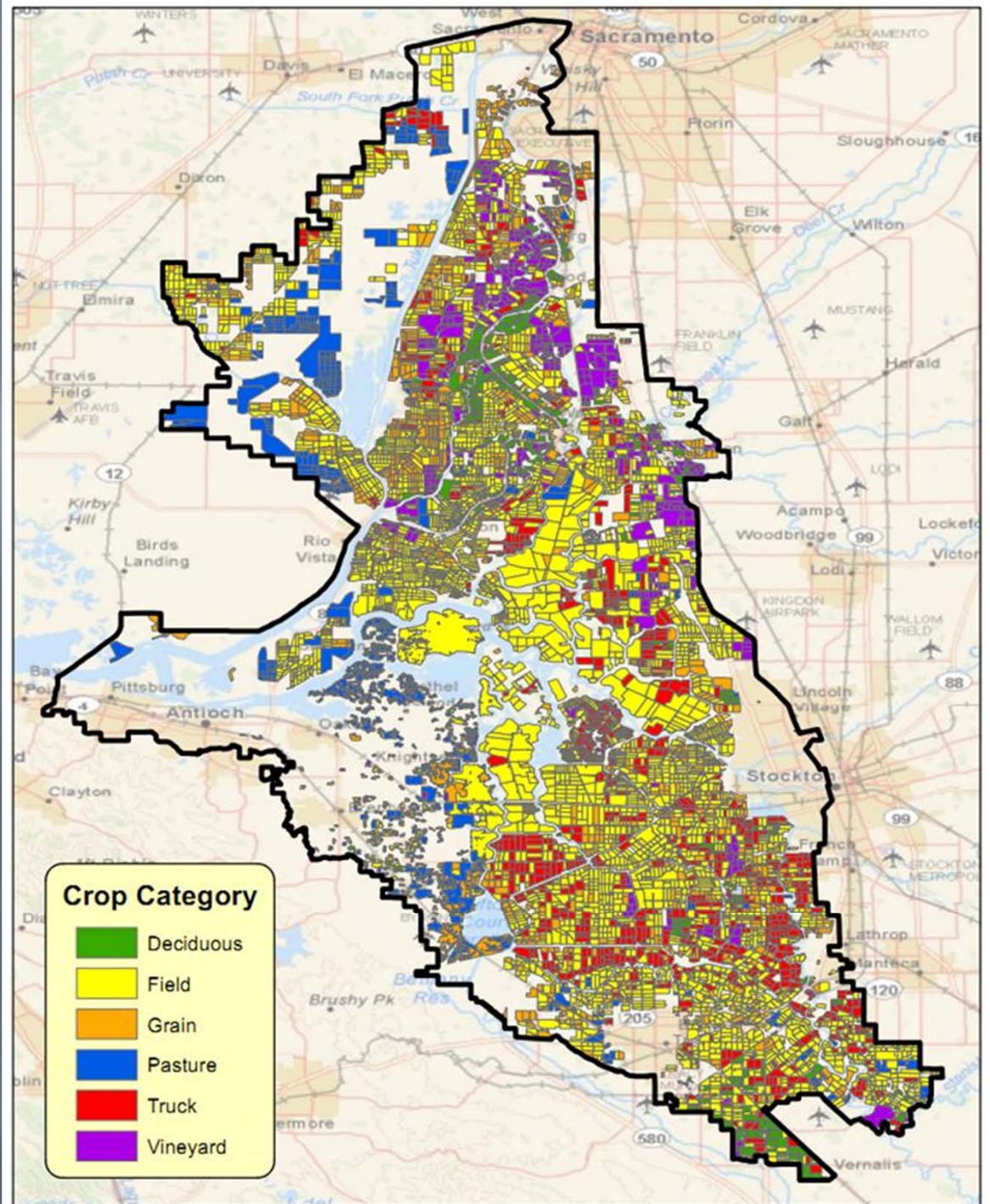
South Delta Water Agency Parties
Case-In-Chief Part 1b

TESTIMONY OF DR. JEFFREY
MICHAEL

OUTLINE

- ▣ Economic Harm To Delta Agriculture
 - Losses Are Likely Even With D-1641 Compliance
 - Spillover Effects to Surrounding Counties
- ▣ Other Drivers of Delta Economic Sustainability
 - Levees
 - Recreation and Tourism
 - Other Infrastructure Dependent Industries
- ▣ WaterFix Is Not Feasible
 - Petition Ignores Economic Feasibility
 - Strong Evidence That Proposed Operations Are Economically and Financially Infeasible

Agricultural Land Cover- 2010



Salinity Changes Can Decrease Delta Agricultural Revenue Even With D-1641 Compliance

- ▣ Model used in Delta Protection Commission Economic Sustainability Plan (ESP) and Draft BDCP Statewide Economic Impact Report produced for DWR.
- ▣ Positively reviewed by ISB peer review panel.
- ▣ Shows statistically significant salinity impacts during a period that has been described as high-compliance with D-1641.

Modeling Crop Choice in the Delta

- ▣ Multinomial Logit Model
- ▣ 6 Crop Groups
- ▣ 6,000 fields
- ▣ 8 Years: 2002-2004, 2006-2010
- ▣ Model Variables

Variable	Description	Units	Mean	Standard Deviation
ec	May-August Electroconductivity Average, 2001 - 2010	micro Siemens / cr	353.24	159.81
acres	Field Acreage	Acres	49.9	59.81
soil	Soil Storie Index	0-100 Point Scale	49.43	16.08
elev	Elevation	Feet	3.11	7.47
tmax	Avg. Annual Maximum Temp.	Degrees Celsius	23.4	0.22
slope	Slope	Decimal Degrees	0.14	0.59
year	Annual Fixed Effects			
conzone	Conservation Zone Fixed Effects			

Estimated Salinity Elasticities by Crop Categories

Deciduous	-0.5289 ***
	(0.1124)
Field	0.2034 ***
	(0.0226)
Grain	0.6744 ***
	(0.0510)
Pasture	0.8140 ***
	(0.1241)
Truck	-0.6150 ***
	(0.0381)
Vineyard	-0.6047 ***
	(0.1333)

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

DWR's BDCP Report Estimated Agricultural Losses Due to WaterFix

- ▣ BDCP Statewide Economic Impact Report finds a small change in salinity (+1.1% on average), would result in a \$1.8 million (2009\$) decrease to agricultural revenue over time.
- ▣ Scale of impact depends on amount of salinity change.
- ▣ Does not consider reduced yields, only shifts in crops.

Yield Reductions from Salinity For Important Delta Crops

Percentage Reduction in Yield For Leaching Fraction of 5%.

ECi	Ece	Bean	Corn	Alfalfa	Tomato	Almond	Grape
0.2	0.65	0.00	0.00	0.00	0.00	0.00	0.00
0.3	0.97	0.00	0.00	0.00	0.00	0.00	0.00
0.4	1.3	9.38	0.00	0.00	0.00	0.00	0.00
0.5	1.62	19.38	0.00	0.00	0.00	4.00	1.88
0.6	1.95	29.69	5.00	0.00	0.00	15.00	7.03
0.7	2.27	39.69	11.40	3.38	0.00	25.67	12.03
0.8	2.6	50.00	18.00	7.50	1.69	36.67	17.19
0.9	2.92	60.00	24.40	11.50	7.12	47.33	22.19
1	3.25	70.31	31.00	15.63	12.71	58.33	27.34

Illustrative Example Of Economic Impact From Yield Loss

Assumptions:

- ▣ 50% of SJ County Delta Area Has 5% LF
- ▣ Uniform distribution of baseline EC
- ▣ Uniform Increase of 0.1 EC, Likely To Maintain Compliance with D-1641

	0.4	0.5	0.6	Total
Almond	\$ 167,453	\$ 627,950	\$ 1,074,632	\$ 1,870,035
Corn/Alfalfa	\$ 0	\$ 445,838	\$ 1,319,679	\$ 1,765,517
Grape	\$ 100,577	\$ 376,093	\$ 643,585	\$ 1,120,255
Total	\$ 268,030	\$ 1,449,881	\$ 3,037,896	\$ 4,755,807

WaterFix Impacts Could Be More Negative Than Estimated

- ❑ Negative fluctuations over growing season (see Thomas Burke testimony)
- ❑ Proposed revision of D-1641 Standard From 0.7 EC to 1.0 EC
- ❑ Proposed WaterFix operations are not economically feasible

Decreased Agricultural Revenue Has Broad Economic Impacts on Delta Counties

- ▣ WaterFix construction is estimated to permanently eliminate about 4,000 acres from production
- ▣ Total revenue loss of about \$12 million for the WaterFix operated as proposed
- ▣ Delta Counties impact as proposed:
 - Decrease of 146 jobs & \$11.6 million in lost income.

WaterFix Impacts On Other Components of Delta Economic Sustainability

- ▣ Levees
 - “The levee system is the foundation on which the entire Delta economy is built.”
- ▣ Recreation and Tourism
- ▣ Infrastructure Services
 - Transportation
 - Energy
 - Water



Economic Sustainability Plan for the Sacramento-San Joaquin River Delta

Executive Summary

19 January 2012

**DELTA PROTECTION
COMMISSION**

WaterFix Increases Risk Of Delta Levee Failures

- ▣ Levees and isolated conveyance are substitutes (DRMS, PPIC, ESP, etc.)
- ▣ If Levee Assessment District is created – implementing WaterFix will result in decreased assessments paid by SWP/CVP
- ▣ DRMS estimated billions of dollars of In-Delta damage and hundreds of lost lives from large-scale levee failure
 - Even small increases in risk are important because the consequences of failure are so large.

Example: DRMS Phase 2

- ▣ DRMS Phase 1: tens of billions in economic losses from large Delta flood
 - 20% of from water export interruptions
 - 80% from In-Delta impacts (loss of transportation, property, ag production, repairs, etc.)
- ▣ Fall 2007 DRMS Phase 2 Draft: not released by DWR (obtained 4 years later for ESP)
 - Compared Seismic Levee Upgrade Strategy to Isolated Conveyance Strategy.
 - Seismic Improved Levees Scenario had both the lowest costs and the highest risk reduction benefits.

AB 1200 Report to the Legislature (January 2008)

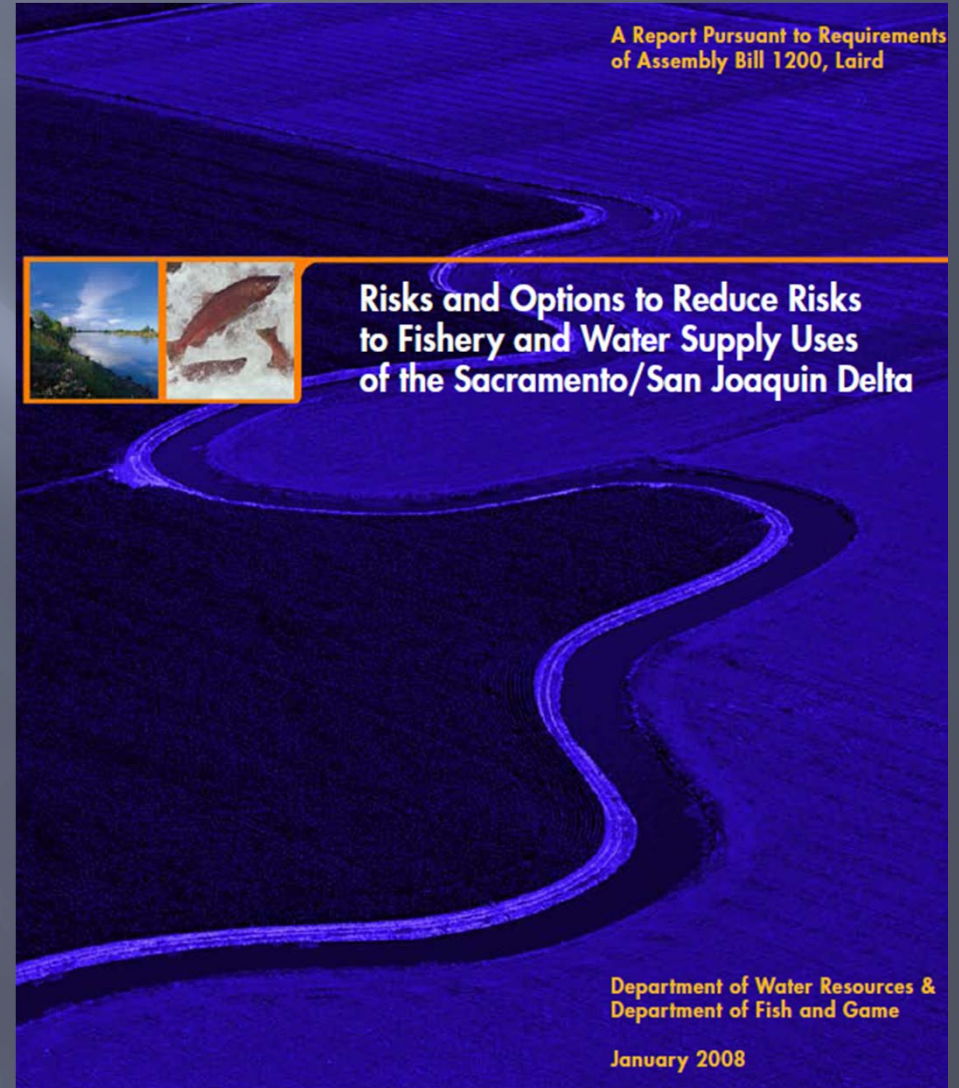
“DRMS is the primary process to provide technical information requested by AB 1200.”

http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/AB1200_Report_to_Legislature.pdf

“The (DRMS Phase 2) results suggest that three building blocks have the highest risk reduction potential...:

- **Armored Pathway Through Delta Conveyance.**
- **Seismically Improved Levees.** (included 100 miles of levees designed to withstand 300 year earthquake)
- **Isolated Conveyance Facility.”**

(Page 20)



AB 1200 Report to the Legislature (January 2008)

Page 24, Ranking of preliminary scenarios (emphasis added).

“The ranking of preliminary DRMS scenarios is shown in the following table. These rankings were developed by DWR and DFG staff based on DRMS analyses, **with adjustments based on the BDCP analyses.**”

TABLE 5. PRELIMINARY PERFORMANCE RANKING¹ FOR DRMS SCENARIOS

Goal ²	Existing: (Through Delta)	Scenario 1 (Improved Levees)	Scenario 2 (Armored Pathway)	Scenario 3 (Isolated Conveyance)
Prevent water supply disruption	●	● ●	● ● ●	● ● ● ●
Improve export water quality for drinking and agriculture (reduce salinity)	●	●	● ● ●	● ● ● ●
Maintain Delta water quality ³	● ● ●	● ● ●	● ● ●	● ● ●
Preserve lands and protect levees	●	● ● ● ●	● ● ●	● ●
Improve ecosystem	●	● ●	● ●	● ● ● ●
Overall risk reduction	●	● ●	● ● ●	● ● ● ●
Total long-term costs (including losses)	● ●	● ● ●	● ●	● ● ●

Notes: 1. Performance ranks are were prepared by DWR and DFG staff based on preliminary information from DRMS and BDCP:

Final DRMS Phase 2 Report

June 2011: Only results released by DWR

- ▣ Seismic levee improvements deleted
- ▣ Example of how BDCP/WaterFix results in reduced support for Delta levees & increased risk of devastating losses to Delta communities.

WaterFix Impacts On Recreation

- ▣ ESP found Delta Recreation/Tourism supports 3,000 jobs and \$329 million in economic output in Delta Counties
- ▣ Delta recreation businesses are poorly equipped to cope with disruption of waterways and roads during construction.
 - Small businesses.
 - Over a decade of construction.
 - Regulatory environment will severely constrain recovery investments.

WaterFix Operations Are Not Feasible

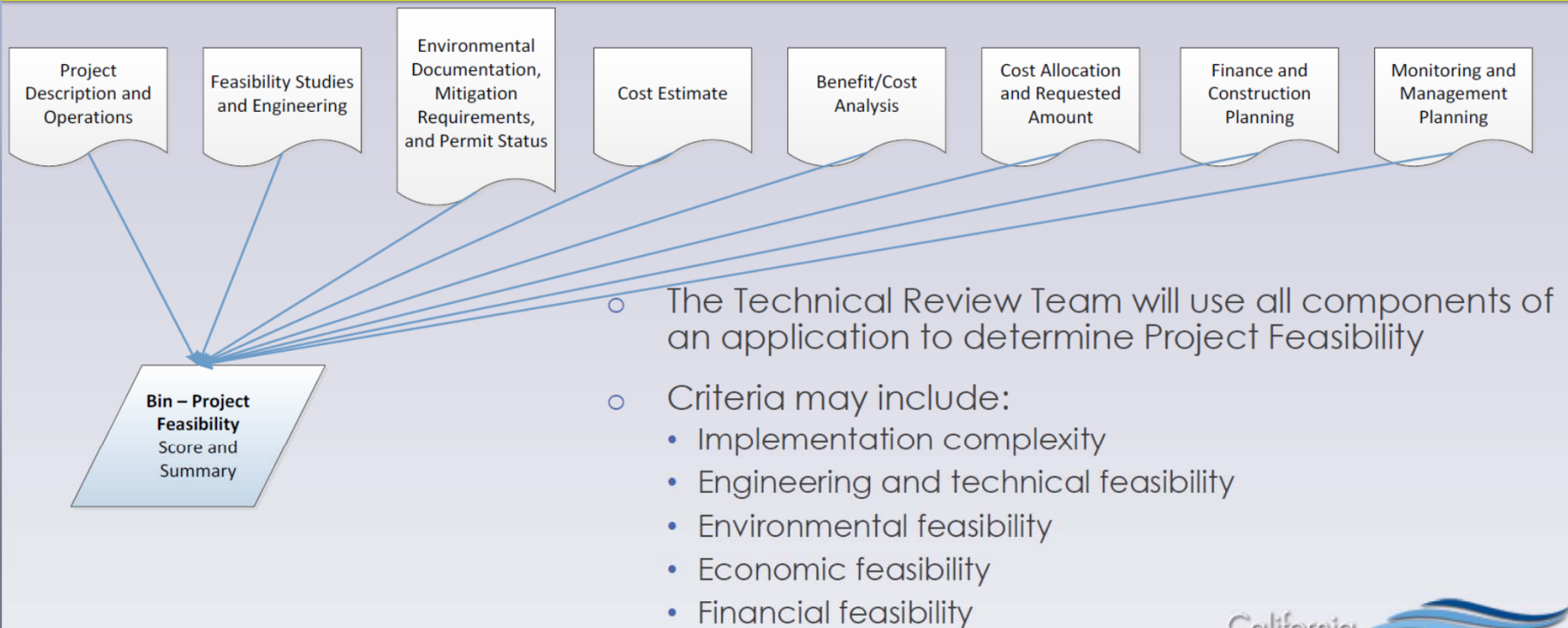
- ❑ Petitioners submitted no evidence regarding economic and financial feasibility
- ❑ March 4, 2016 SWRCB Ruling: “The petitioners should also show that there are feasible operations available to meet any performance standards.”
- ❑ Well-established standards and guidelines show economic and financial analysis is essential to feasibility assessment and must be integrated with engineering, operational and environmental feasibility.

CEQA Definition Of Feasibility

- ▣ Feasible shall mean capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.

California Water Commission Presentation: February 2016

What Informs Project Feasibility?



“Guidance For Development of State-Led Feasibility Study” (DWR 2014)

Identifies the three most important factors for feasibility on page 1.

- ▣ Financing
- ▣ Agency Alignment
- ▣ Value Assessment

Economic Analysis Guidebook (DWR, 2008)

- ▣ “The test of economic feasibility is passed if the total benefits that result from the project exceed those which would accrue without the project by an amount in excess of the project costs. It is important that the comparison be *with* and *without* rather than *before* and *after*...”
- ▣ “The objective of financial analysis is to determine financial feasibility (that is, whether someone is willing to pay for a project and has the capability to raise the necessary funds).”

Benefit-Cost Assessment of California WaterFix (UOP CBPR, August 2016)

- ▣ All Scenarios Use Biological Assessment As Source for Export Water Supply, and justification for Ecosystem Impacts.
- ▣ Costs and timeline from WaterFix DCE
- ▣ Discount rate 3.5% per CWC guidance.
- ▣ Base Scenario: Uses reputable state sources not created by BDCP/WaterFix to value benefits.
- ▣ Optimistic Scenario: Uses BDCP Statewide Economic Impact Report values for all benefits, and Delta ag and transportation impacts
- ▣ Does not consider the risk of cost escalation or quantify several areas of 3rd-party costs.

Present Value of Benefits and Costs of the California WaterFix

	Base scenario	Optimistic Scenario
Benefits		
Export Water Supply	\$1,319,521,208	\$2,822,409,124
Export Water Quality	\$1,677,361,307	\$1,677,361,307
Earthquake Risk Reduction	\$0	\$435,796,554
<i>Total Benefits</i>	<i>\$2,996,882,515</i>	<i>\$4,935,566,984</i>
Costs		
Construction and Mitigation	\$11,676,474,531	\$11,676,474,531
Operation and Maintenance	\$591,658,075	\$591,658,075
Ecosystem	\$0	\$0
In-Delta Municipal	\$111,279,332	\$37,093,107
In-Delta Agriculture	\$682,807,143	\$293,953,421
In-Delta Transportation	\$132,205,755	\$132,205,755
<i>Total Costs</i>	<i>\$13,194,424,836</i>	<i>\$12,731,384,889</i>
Net Benefit	(\$10,197,542,281)	(\$7,795,817,905)
Benefit/Cost ratio	0.23	0.39

How High Would Water Yield Need To Be For Economic Feasibility?

- ▣ Increase In Water Yield That Would Be Needed (without impacting ecosystem or various 3rd party costs)
 - Base Scenario: About 2 million acre feet of average annual yield.
 - Optimistic Scenario: About 1 million acre feet of average annual yield.
 - No operational scenarios in petition are economically feasible.

Cost per acre foot of WaterFix by Incremental Yield of Tunnels (source: Dr. Rod Smith, Stratecon)

Annual Yield (acre feet)	Risk Premium		
	0%	1%	2%
100,000	\$9,590	\$12,817	\$16,926
200,000	\$4,795	\$6,408	\$8,463
300,000	\$3,197	\$4,272	\$5,642
400,000	\$2,397	\$3,204	\$4,231
500,000	\$1,918	\$2,563	\$3,385
600,000	\$1,598	\$2,136	\$2,821
700,000	\$1,370	\$1,831	\$2,418
800,000	\$1,199	\$1,602	\$2,116
900,000	\$1,066	\$1,424	\$1,881
1,000,000	\$959	\$1,282	\$1,693
1,100,000	\$872	\$1,165	\$1,539
1,200,000	\$799	\$1,068	\$1,410
1,300,000	\$738	\$986	\$1,302
1,400,000	\$685	\$915	\$1,209
1,500,000	\$639	\$854	\$1,128
1,600,000	\$599	\$801	\$1,058
1,700,000	\$564	\$754	\$996
1,800,000	\$533	\$712	\$940
1,900,000	\$505	\$675	\$891
2,000,000	\$479	\$641	\$846

Clear Evidence That WaterFix Is Not Economically Feasible

- ▣ Cost per acre foot shows that even 2 million acre feet of yield would not be enough for agricultural feasibility.
- ▣ An urban-only financial plan would need over 1 million acre feet of yield for feasibility.
- ▣ All feasible operations are outside the scenarios presented in the Petition.
- ▣ If WaterFix is approved, there will be overwhelming financial pressure to change operations to the detriment of the environment and other legal users of water.