Cost-Benefit Analysis of the California WaterFix

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At $16 billion, the California WaterFix is the most expensive water infrastructure project ever proposed in California. However, the sponsoring agencies have not, as of yet, produced a feasibility study or benefit-cost analysis of the project. This is important not just because of the projects' large cost, but because of the operational constraints that may need to be placed on the project in order for it to receive various regulatory approvals. In addition, the policy change from building the tunnels as part of a habitat conservation plan, the BDCP, seeking a section 10 Endangered Species Act permit to the tunnels-only WaterFix seeking a section 7 ESA permit has implications for the projects' economics that are not well understood.

This paper applies standard benefit-cost methodology to the WaterFix using data from the RDEIR/RDEIS, draft biological assessment, and other official documents describing the project. It includes an optimistic scenario which uses values are derived from earlier BDCP reports, and a base scenario where benefit values are derived from other analysis from the Department of Water Resources and Bureau of Reclamation. The analysis uses a 3.5% discount rate recently recommended by the California Water Commission and calculates benefits for 100 years of operations following an estimated 15 year construction period. Preliminary results are in the table below.

	base	optimistic
Benefits		
Export Water Supply	$1,319,521,208	$2,822,409,124
Export Water Quality	$1,626,802,827	$1,626,802,827
Seismic Risk to Exports	$0	$435,796,554
Total Benefits	$2,946,324,035	$4,885,008,504
Costs		
Ecosystem	$700,616,872	$0
In-Delta Municipal	$100,000,000	$30,000,000
In-Delta Agriculture	$411,087,481	$164,610,904
Construction Costs	$11,676,474,531	$11,676,474,531
O&M Costs	$591,658,075	$591,658,075
Total Costs	$13,479,836,959	$12,462,743,510
Net Benefit	($10,533,512,924)	($7,577,735,006)
Benefit/Cost ratio	0.22	0.39

Policymakers need to be mindful of these benefit-cost relationships as they consider environmental constraints and conditions to approving the project or risk increasing future environmental-economic conflict in the Delta.

Keywords: economics, Delta Tunnels, WaterFix, benefit, cost
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Adapting Information Management to Improve Natural Resource Adaptive Management

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Recent years have witnessed increased attention not just on landscape restoration in the Delta, but also on ways to optimize transparent decision-making by reconceptualizing the relationship between restoration projects and the landscape that they affect. The Sacramento-San Joaquin Delta Conservancy (Conservancy) and partners, including SFEI-ASC, have made collective strides in recent years to bring together landscape restoration projects, legacy and current water quality information, data visualization technologies, and performance measures through several US EPA-funded projects. By working closely with agency partners, researchers, and other stakeholders, the Conservancy has sought to address critical data gaps and information redundancies, advancing innovations, that have otherwise impeded effective adaptive management.

Starting in 2013, the Conservancy convened a workgroup to evaluate and perform the merger of several disparate landscape restoration and conservation databases into a unified whole. Coming together were representatives from key partner agencies to develop Project Tracker, a tool that has significantly improved the management of project-related information. Following from this effort, the Conservancy tackled the challenge of discovering, collecting, and formatting data -- both legacy and active -- that could address questions of nutrient enrichment and toxic contaminants in the Delta. This project, called DEDUCE, helped to expand the current Bay Area Regional Data Center to serve additional CEDEN-compatible data. To make visual sense of these data, the Conservancy launched a visualization project to bring additional detailed water quality information into EcoAtlas. Finally, the Conservancy has focused on restoration project performance metrics with a new project, conducted in collaboration with the Delta Stewardship Council.

These projects may be individually recognized as offering incremental progress toward greater information access, transparency, and visualization. However, the whole is greater than the sum of the parts, with each project filling gaps to build a framework that can, in effect, establish a strong basis for adaptive management.

Keywords: adaptive management, performance measures, water quality, data visualization, landscape restoration
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Lessons learned as Chair of the Science Advisory Team for the Marine Life Protection Act Initiative

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I was the non-scientist Chair of the Science Advisory Team for the Marine Life Protection Act Initiative. I was also a member of the Leadership Team. I would like to share the lessons I learned from that experience.

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Assessing Extinction I: Extinction as a Process

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When considering long-term values of restoration projects in places such as Suisun Marsh, the potential for extinction of native species should be assessed. But while extinction is often at the forefront of conservation concerns, the primary focus has been on prevention, not assessment. In this talk we discuss general aspects of extinction, followed by a talk relating this discussion to native fishes of the San Francisco Estuary, including delta smelt. Extinction is usually regarded as a yes/no state, but its determination can be quite complicated. Using previous and novel approaches, we propose six extinction categories (mitigated, regional, native range, wild, visual, and global) which reflect increasing conservation-reliance and/or decreasing habitat availability. We explain how dependence on artificial selection is tantamount to mitigated extinction and introduce a waiting period (visual extinction) based on generation time rather than a fixed number of years to prevent premature declaration of extinction. Guidelines are then outlined to ensure a practical assessment of extinction and maximize the conservation effectiveness of these categories. Using imperiled fishes in California as a model, we demonstrate how a number of currently endangered species are already conservation-reliant, reaching the initial levels of extinction proposed. With a number of fishes in the Delta and Suisun Marsh approaching extinction (e.g., delta and longfin smelt), our guidelines and categories should be useful for assessing the status of these lineages and developing more comprehensive management strategies.

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Assessing Extinction II: Delta Fishes

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Here we apply our general discussion of extinction in the previous talk to Suisun Marsh and Delta fishes. The thicktail chub is a classic example of global extinction, while the Sacramento perch is regionally extinct. Winter-run Chinook salmon are completely conservation-reliant and subject mainly to artificial selection, thus are an example of mitigated extinction. Delta smelt and spring-run Chinook salmon, despite intensive management, still maintain populations 'in the wild' subject to natural selection and so do not yet fit our extinction categories but are likely to qualify for mitigated extinction in the near future. Fall-run Chinook salmon are also arguably an example of mitigated extinction because of their nearly complete reliance on hatcheries, although there is the potential to reverse that status with an intensive program of managing for naturally spawning populations. Delta smelt may face wild extinction in the very near future. The use of cultured fish to 'restore' the population has its pros and cons and merits intense discussion. If delta smelt are supported largely through the use of cultured fish, are they still delta smelt or are they a domesticated lineage rapidly diverging from the original? We favor considering such fish as 'real' delta smelt as long as artificial selection is kept to a minimum and the long-term goal is to develop a population that is once again subject mainly to natural selection, albeit in a novel ecosystem.

Keywords: delta smelt, thicktail chub, Chinook salmon, Sacramento perch, extinction
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