ISSUE BRIEF

Delta Tunnels Aren't the "Fix" California Needs

SAN FRANCISCO BAYKEEPER®

The Sacramento-San Joaquin River Delta is in crisis. It is not alarmist to state that the Delta-wide ecosystem—and, by extension, San Francisco Bay—is in collapse and that its damaged condition may spell doom for many important species and habitats. Scientific evidence has shown that the Delta is starving for freshwater, with repercussions for the entire estuary. While there are no quick or easy solutions to increase freshwater flows, what is clear is that the Governor's current proposal, known as WaterFix, would authorize further water diversions from this already crippled system without first establishing a path to recovery and sustainability. WaterFix proposes to build large tunnels to take more freshwater from the Delta without substantially addressing the urgent environmental issues facing these river systems. The tunnels would harm the rivers, harm the Delta, and harm San Francisco Bay.

Defining the Bay-Delta

The San Francisco Bay Estuary, frequently referred to as the Bay-Delta, consists of San Francisco Bay, including its northern sub-embayments, San Pablo and Suisun Bays, and the Sacramento-San Joaquin Delta. As one might guess, these adjoining water bodies do not operate independently of one another. They form an estuary, where salt water from the Pacific Ocean and San Francisco Bay mix with freshwater from the Sacramento and San Joaquin Rivers. Both rivers originate in the Sierra Nevada and flow westward, where they intersect east of San Francisco Bay and form the Sacramento-San Joaquin Delta. The Delta is the heart of California's watershed and a crucial habitat for hundreds of species of plants and animals. In addition to supporting fisheries and serving as a critical juncture for migrating birds along the Pacific Flyway, Delta waters currently provide 25 million people with drinking water and support a $54 billion agricultural industry that grows produce for much of the United States.

Figure 1: The Bay-Delta (USGS)

Why does the Bay-Delta need fixing?

One of the few issues farmers, regulators, environmentalists, and fishermen can all agree on is that something is wrong with the health of the Delta. As a result, there are negative consequences for recreation, tourism, ecology, farming, and the availability of water exports. The combination of historic wetland destruction to support farming and cities, on-going urban and agricultural pollution, and heavily diverted water resources

have created conditions that have seriously degraded the ecosystems of the Delta and northern San Francisco Bay (i.e. Suisun Bay), especially over the last three decades.

The health of the upper Bay-Delta is now in poor condition, a conclusion supported by the overwhelming majority of scientists in publications such as the 2015 State of the Estuary report.[i] The indicators that have raised concern include:

- **Delta smelt:** Recent surveys for the Delta smelt suggest the species is at or near extinction. Throughout the 2016 fall surveys for Delta smelt, only 8 individuals were found, while in 2014 and 2015, only 9 and 7 individual smelt, respectively, were caught during fall season surveys.
- **Other fish**: All other monitored fish species – both native and non-native, including the economically important sport fish, striped bass – were near or at historic lows in recent years.[ii]
- **Native species:** Native fish populations in Suisun Bay have dropped by 64%. In the Central and North Delta, native fish abundance has dropped by 87% over the same time span.[iii]
- Native species can no longer be found in some areas of the Delta. In Suisun Bay, 59% of fish are non-native. A healthy ecosystem should contain a diverse fish population dominated by native species, as demonstrated by those areas of the Bay, like the Central Bay, which is heavily influenced by ocean conditions. The upper Bay-Delta does not display these characteristics, and available evidence shows the problem is getting worse.[iv]
- **Phytoplankton:** In the Delta, production of phytoplankton—which form the bottom of the food web—s ranked in the lowest 15% of the world's estuaries due to a number of factors, including insufficient habitat and low freshwater flows.[v]
- **Algal blooms:** Drought and low-flow conditions have caused never-before seen blooms of toxic blue-green algae, or cyanobacteria, known to be harmful both to wildlife and humans.[vi]
- **Unimpaired flows:** In recent years, spring Bay inflows have averaged only 44% of unimpaired flows.[vii] Criteria adopted by the State Water Resources Control Board explain that in order to protect resources in the Delta and preserve a naturally variable system to which native fish species are adapted, winter and spring flows through the Delta and into the Bay should be at least 75% of natural, unimpaired flows.[viii]
- **Floodplain flows:** Since the early 1990s, flood flow conditions have been poor 68% of the time. This means that flows do not reach floodplains needed for primary productivity and fish rearing.[ix]
- **Stagnant water:** Freshwater wetlands have been reduced by 98%, while open-water area has increased by 63%, creating more lagoon-like conditions in the Delta. These stagnant conditions are conducive to harmful algal blooms, propagation of invasive species, and the concentration of harmful pollutants.[x]

Many of these problems began 160 years earlier with the diking and filling of Delta wetlands to develop agricultural lands, coupled with the more recent hydrologic changes associated with water diversions to supply farms and cities.

Since 1850, Delta farmers have controlled flows to protect their crops from drowning during wet years and from perishing during drought years due to dry conditions and saltwater intrusion from the Bay. Beginning in 1935, the federal Bureau of Reclamation built a series of dams and levees to formally control flows, which was collectively known as the Central Valley Project. In 1960, construction of dams and aqueducts began through a separate project, known as the State Water Project, to provide more water to southern California. The

functionality of these two projects relied on complicated conveyance infrastructure that dramatically altered the San Francisco Bay-Delta ecosystem.

Scientists began observing declining fish populations soon after completion of the Central Valley and State Water projects, and over the past decade those populations have reached a crisis point as several species are nearing extinction. The downward trends are directly linked to water diversions out of the Delta and to the resulting habitat loss. For instance, pumping facilities in the South Delta exert an immense force that reverses natural Delta flows. These altered flows, coupled with stagnant conditions and multiple pollution sources, harm both fish and farmers. Reverse flows also prevent fish from completing their migrations, and many of the historic channels in the Delta have been altered so severely that riparian habitat has all but disappeared. As a result, there is little opportunity for flows and fish to reach floodplains, where essential nutrients and sources of food are found.

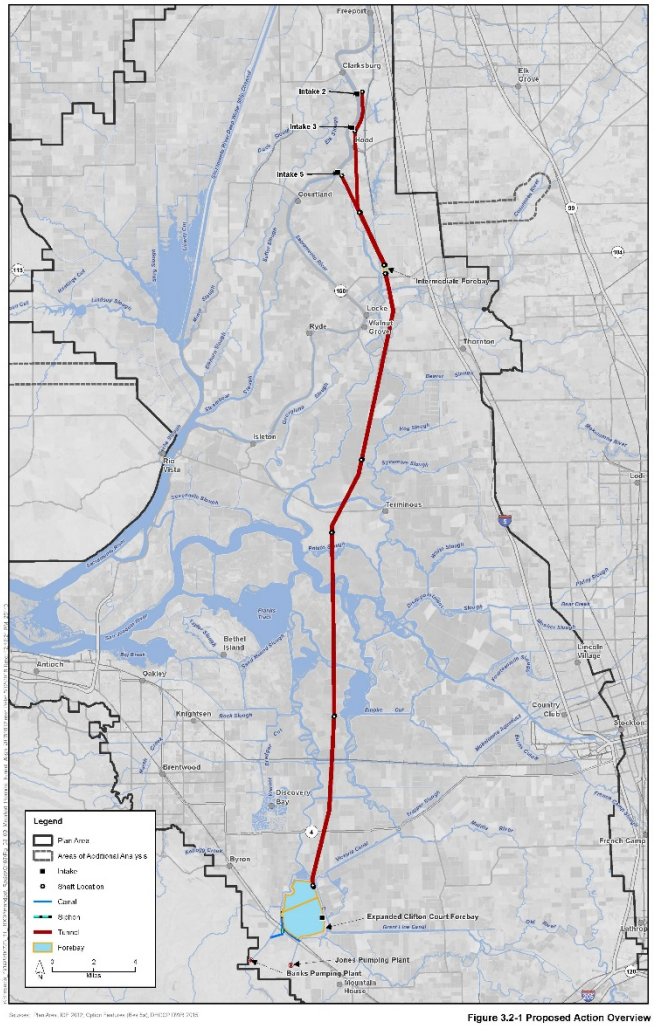

Figure 3.2-1 Proposed Action Overview

Figure 2: Proposed WaterFix action overview

What is the California WaterFix?

WaterFix is the latest iteration of California's obsession with an engineered solution to balance the abundance of water in the northern part of the state and the lack of water in the south. Beginning in the 1940s and 50s, the State became consumed with developing water diversion projects in and around the Delta. In the 1980s California voters defeated a proposal for a peripheral canal. The latest iteration of this quest is the twin tunnels proposed under Governor Jerry Brown's WaterFix.

WaterFix is estimated to cost $15-17 billion, not including financing costs, which could drive the price tag up to as much as $67 billion.[xi] For this huge expenditure, the California Department of Water Resources proposes to build three new water intakes on the Sacramento River between Courtland and Clarksburg. At the core of the WaterFix plan are two giant tunnels to carry Sacramento River water from the new intakes to the existing State Water Project and Central Valley Project facilities at Clifton Court Forebay, where the Jones and Banks Pumping Plants are located (see Figures 2 and 3).[xii] The proposed twin tunnels would be 30 feet long and 40 feet in diameter, and as deep as 150 feet below ground. To accommodate the tunnels, a great many associated facilities would have to be built as well, including the expansion of some existing facilities and a permanent gate to help control cross Delta reverse flows.

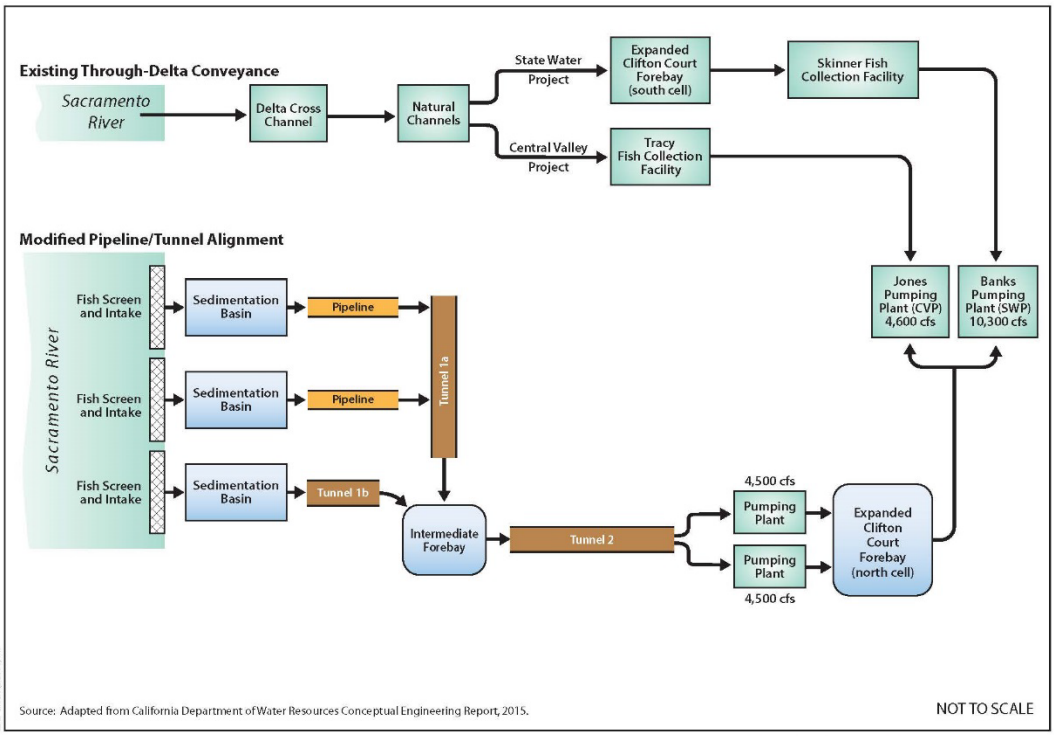

Figure 3: WaterFix conveyance

The 2009 Delta Reform Act requires the people who will use the diverted Delta water to pay all of the costs of the tunnels.[xiii] In this instance, the end-users are entities like the Metropolitan Water District of Southern California, which supplies water to cities throughout Southern California, and Westlands Water District, the largest agricultural water district in the United States. However, it has become increasingly evident that substantial taxpayer funds will be necessary to complete the project.[xiv] Dr. Jeffrey Michaels with the University of the Pacific's Center for Business & Policy Research puts the cost-benefit analysis for his optimistic scenario at about 39 cents for every dollar invested. The base, non-optimistic estimate is 23 cents for every dollar invested.[xv] Without a higher return on investment, water users are unlikely to agree to foot the bill for WaterFix entirely by themselves.

What does WaterFix hope to achieve?

There are two primary objectives of WaterFix, as stated in the environmental documents for the project:

1. To restore and protect the ability of state projects to deliver full water contract amounts, consistent with the requirements of state and federal law.
2. To reduce impacts to state and federally listed species from pumping plants in the southern Delta and other conveyance facilities in the Delta and Sacramento River watershed.

Secondary objectives as stated in the project's environmental documents include:

1. Minimize harm to listed species and, if possible, enhance habitat conditions.
2. Adapt the Delta water conveyance system to sea level rise and other climate change effects.
3. Minimize the threat to pumping capacity associated with earthquake-induced levee breaches.
4. Stabilize regulatory frameworks by implementing projects that improve ecosystem health.

5. Reliably and cost-effectively route water through new conveyance facilities to existing pumps.[xvi]

To meet these stated goals, the State proposed several alternatives in the environmental impact documents for the project. However, all of the options involved essentially the same concept: extract water directly from the Sacramento River, a couple of miles south of the City of Sacramento, and direct that water through two tunnels capable of sending 9,000 cubic feet of water per second to existing pumps, about 45 miles south.

What's wrong with WaterFix?

Proponents of the twin tunnel concept, led by San Joaquin Valley irrigators and Metropolitan Water District of Southern California, have indicated that diverting water out of the system further north and routing it directly to the existing South Delta pumps would help avoid time-consuming and expensive obligations to comply with endangered species protections. They also claim that a northern diversion point would reduce the number of fish sucked into the powerful pumps, a process known as entrainment.

If viewed through a narrow, shortsighted lens, these claims about the tunnels might sound plausible. The tunnels could fast track endangered species evaluations in determining the amount of water that can be pumped and could reduce the number of fish entrained by Delta pumps.

But these alleged benefits are highly speculative. While WaterFix proposes to reduce current entrainment, there are no operational actions included with the tunnels proposal that would guarantee less fish entrainment. Furthermore, the proposal would introduce another opportunity for fish entrainment at the mouths of the new tunnels, and doubts remain about the effectiveness of the advanced, but very long, fish screens that have been proposed.[xvii] That means that in reality WaterFix could result in *increased* fish entrainment. Moreover, the U.S. Fish and Wildlife Service's Draft Biological Opinions for WaterFix note several other negative impacts for fish species, including elimination of critical Delta smelt habitat and increased salmon mortality. These projected impacts indicate that WaterFix is overall bad for fish because it simply maintains the existing inadequate levels of outflow.[xviii]

Furthermore, the long-term ecologically harmful consequences arising from any project to re-plumb the Delta would likely outweigh these purported benefits. The consequences of removing flows from the Sacramento River include ecosystem-scale effects, such as increased salinity intrusion throughout the Bay-Delta, reduced flows available to help juvenile salmon reach the ocean fast enough to avoid predation, and unknown consequences to the Bay-Delta when high quality Sacramento River water is replaced by low quality South Delta and San Joaquin River water.

Additionally, downstream impacts are likely to affect portions of San Francisco Bay by:

- Increasing Bay concentrations of selenium, which is already present in the upper San Francisco Bay at levels toxic to sturgeon and diving ducks during drought conditions[xix]
- Reducing sediment transport into the Bay-Delta, limiting the ability of shoreline beaches and wetlands to replenish themselves or combat sea level rise, and
- Increasing the likelihood and magnitude of toxic algal blooms such as microcystin, which although is a freshwater toxin has already been documented in the upper San Francisco Bay in recent years.[xx]

By taking high quality Sacramento River water from a new northern point of diversion before it reaches the Delta, less clean freshwater will be available to flush out and dilute harmful pollutants, such as selenium and pesticides, in the upper San Francisco Bay and Delta. Reductions in flows through the Bay-Delta will also make it harder for juvenile salmon to reach the ocean. In addition, freshwater reductions will create more stagnant

conditions conducive to the proliferation of harmful algal blooms and invasive species. So relative to the highly speculative outcome that salmon and smelt entrainment will be reduced, WaterFix will likely commit California to degrading the Bay-Delta ecosystem further, and also harm the economy that depends on it.

California commercial fisheries accounted for $267.8 million in 2013 and $252.5 million in 2014, and that economic production depends in part on a healthy Bay-Delta ecosystem.[xxi] There is no backup plan for how California will cope with a further degraded Delta ecosystem, and fewer fish. Many Californians are rightfully concerned about the unmitigated economic, health, environmental, and aesthetic consequences projected to result from further degradation.

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The State has released very few details about the implementation and potential impact of the WaterFix plan. It remains unclear how much water will be taken from the Sacramento River under various conditions, what will happen should ecological conditions worsen, whether and when habitat restoration will occur, who will pay for the WaterFix, and why the effects of climate change and sea level rise were only considered up to a 2030 time horizon, which comes before the anticipated completion date of the project. Due to all of this uncertainty, Baykeeper and numerous other groups are opposed to Governor Brown's WaterFix.

WaterFix is not the solution, yet the Bay-Delta still needs a fix

Support for WaterFix is eroding among the water contractors who have long backed the project, indicating the need for a new plan. This diminishing support is due to uncertainty regarding the allocation of costs among agricultural and urban water users and the near certainty that the twin tunnels will not increase water exports significantly, let alone to fully contracted amounts. Regulatory uncertainty is also a problem because the habitat restoration elements originally planned to accompany the twin tunnels – and which would have provided regulatory assurances -- have now been separated out into a project called "EcoRestore." This means that WaterFix offers its funders neither the assurances of increased water supply nor the certainty of acquiring regulatory approvals seen as a benefit under the previous version of the project, the Bay Delta Conservation Plan.

As water contractors in the San Joaquin Valley and Southern California weigh the merits of WaterFix, Baykeeper will advocate for a wider range of alternatives to be considered in any future iteration of a Delta "fix." Had a wider range of alternatives been considered in the current round of environmental documents, a pivot toward a more sustainable option might now have been possible. Unfortunately, all of the alternatives assessed in the current environmental documents center around the two large tunnels to meet a significant proportion of California's agricultural and urban needs. This means a meaningful fix for the Delta ecosystem is likely years away.

Some would prefer a return to pristine habitat conditions by means of fully unimpaired flows through the San Francisco Estuary from the Sacramento and San Joaquin River watersheds. Realistically, however, it is highly

unlikely the Bay-Delta would ever return to its natural state. Southern California water users rely on water diversions. And while cities like San Diego are aggressively exploring local water supply options and objecting to WaterFix, and reduced reliance on the Delta generally is a top priority mandated by statute, Delta water diversions are likely to remain a necessary part of California's water future. The Bay-Delta is one of the most heavily managed ecosystems in the world, and water exports from the region are too vital to California's economy and cultural vibrancy to reasonably suggest we can turn off the faucet to agriculture and cities.

However, it is equally unlikely that self-sustaining salmon and smelt populations will return without a concerted effort to restore habitat in combination with a science-based flow regime. In other words, fresh water diversions must be balanced with ecosystem priorities such as species survival, flood protection, and water quality.

Alternatives to WaterFix

The current heavy-handed management style is not the solution. With a portfolio of science-based actions we can stabilize the Delta ecosystem to prevent fish extinctions while permitting sustainable water exports. Signs of hope and solutions include:

- *Development of flow standards for the San Joaquin and Sacramento River watersheds.* Flow standards for the San Joaquin River that could enhance habitat conditions for hundreds of miles of rivers and streams are currently under consideration. Flow standards for the Sacramento River are the next step and should build off of the San Joaquin standards.
- *Large-scale habitat restoration.* California has shovel-ready plans to restore floodplain access and habitat quality in the Yolo Bypass, and scientists are advancing plans to restore habitat along a contiguous arc from Suisun Bay to Yolo Bypass, known as the North Delta Habitat Arc. The science is mostly in place; in many cases, all that is needed is funding.
- *Modernization and funding of levee maintenance programs*. Many of the Delta's islands are fortified by dikes and levees and are thus susceptible to failure and flooding. Momentum is building toward a levee maintenance regime based on economic and environmental risk analysis with an eye toward eventual ecosystem stability.
- *Enhanced groundwater storage.* California approved $2.7 billion for water storage that Proposition 1 and the Sustainable Groundwater Management Act say must prioritize groundwater management and groundwater storage. California should prioritize groundwater storage over dams for both economic *and* environmental reasons.
- *Conservation and enhanced urban water supplies.* Urban areas reliant on the Delta are investigating ways to maximize water conservation and prioritize the development and enhancement of local supplies, including stormwater capture, groundwater storage, and water recycling. These efforts should be supported and expanded.
- *Reduction in tunnel scope to a single smaller tunnel.* Several groups, including the Natural Resources Defense Council and the Public Policy Institute of California, have suggested that a single tunnel could help achieve the reliability and resiliency sought by water contractors while maintaining an engineered limit to diversions that would be less susceptible to over-extraction and abuse.

San Francisco Bay and the Sacramento-San Joaquin River Delta are inextricably linked. Changes to one water body will inevitably affect the other. In the near term, there are promising signs for implementation of habitat restoration plans under EcoRestore and improved flows in the San Joaquin River through increased flow standards. These are critical steps toward restoring the Delta. Yet no one solution will result in a magical fix for the Delta's complex issues. Many in the water world, including San Francisco Baykeeper and its partners, eye WaterFix and its purported benefits with great skepticism. There are better, more responsible options on the table to help us improve California's water future.

Center for Lakes and Reservoirs

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[iii] See endnote 1.

[iv] See endnote 1.

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[xi] Jacques Leslie, *The delta tunnels — a project only engineers can love*, Op Ed, Los Angeles Times (Nov. 20, 2016) (referencing Mercury News reports from December, 2013), available at http://www.latimes.com/opinion/op-ed/la-oe-leslie-costs-and-benefits-delta-tunnel-20161120-story.html.

[xii] Bureau of Reclamation, Biological Assessment for the California WaterFix, § 3.2 (July 2016).

[xiii] Cal. Water Code § 85089.

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[xv] Dr. Jeffrey Michael, *Benefit-Cost Analysis of The California WaterFix*, Center for Business and Policy Research (August 2016), available at http://www.pacific.edu/Documents/school-business/BFC/WaterFix%20benefit%20cost.pdf.

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