

# Water Blueprint

## for the San Joaquin Valley

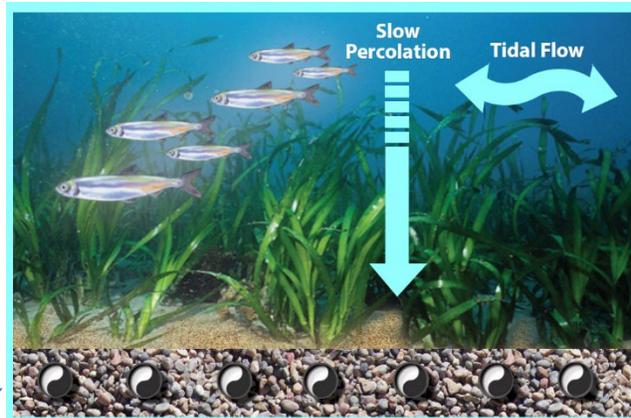
### Blueprint Paper<sup>1</sup> #21

## ENVIRONMENTALLY FRIENDLY WATER DIVERSIONS

### Frequently Asked Questions

1. *What is the Environmentally Friendly Water Diversion Project?*

The Environmentally Friendly Diversion (EFD) Project is a project to change the way water is diverted from the Delta at the Central Valley Project (CVP) and State Water Project (SWP) export facilities. It draws water from the bottom of the water column, instead of the side, and is far more protective of fish than conventional fish screens.



Perforated pipes divert water from gravel below the water column

2. *Why is the project needed?*

Endangered fish are entrained at water project pumping plants in the South Delta. Historically, these losses likely had population level impacts. The Biological Opinions in 2008 and 2019 instituted regulations to reduce the impact of water projects on fish. These regulations reduce – but do not eliminate - impacts on fish populations. However, these regulations have greatly reduced water supplies from the Delta. The project is needed both to provide additional protections for fish and to restore water supplies.

3. *Who will benefit from the project?*

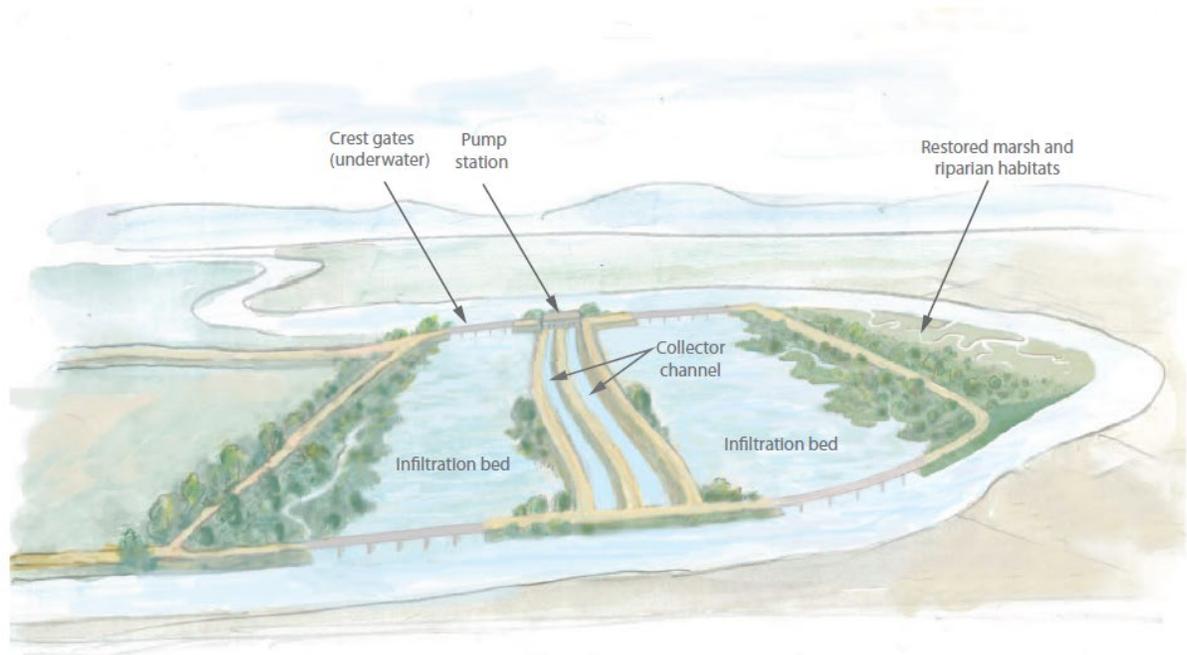
The primary beneficiaries of the project will be SWP and CVP water contractors, but so much water will be available during high-outflow periods in the Delta after San

<sup>1</sup>Blueprint Papers summarize topic-specific information – typically a potential component of a water solution for California. It is hoped that these papers stimulate discussion and lead to new ideas and better solutions. Correspondence and questions concerning this paper may be directed to Scott Hamilton, [Scott@ResourceEconomics.net](mailto:Scott@ResourceEconomics.net) (661) 303 1540.

Luis Reservoir fills that water surplus to the needs of the SWP and CVP contractors can be delivered to areas in the San Joaquin Valley that do not have a surface supply or are otherwise short of water.

4. *How is the project more protective of fish than existing operations?*

While existing fish facilities were designed to salvage fish and return them to the Delta, many fish are eaten before reaching the salvage facilities. Additionally, the efficiency of the existing facilities varies with the species and size of the fish, as well as the velocity of water flowing towards the screens. For delta smelt it has been estimated that for every 1 fish salvaged, 30 are lost. Fish Friendly Diversions eliminate the need to salvage fish and eliminate predation areas.



**Figure 1.** *Project concept. Infiltration beds, large areas with buried perforated pipe, would be constructed on subsided Delta islands. As pumps operate, water flows from the infiltration beds into collector channels, through a main pump station and into conveyance facilities for delivery. The infiltration galleries could be constructed in pairs to allow one gallery to be closed for maintenance while the other one continues to operate. Tidal and river flows would pass over the infiltration galleries so there is no “dead-end” that could harbor predators. The facility would appear like any other Delta channel.*

5. *What infiltration rates are protective for fish?*

Dr. Chuck Hanson, a fish biologist and an expert in Delta issues, conducted laboratory studies on fish of various ages and species over a period of two years. The most sensitive were newly hatched delta smelt. Dr. Hanson estimated that downward velocities of one inch per minute had no adverse effects on larval delta smelt.

6. *How much land is needed?*

Environmentally Friendly Diversions, with a capacity sufficient to meet the existing pumping capacities, require around 200 acres. However, due to other constraints, the need to build in flexibility, and settling ponds to manage sediment loading, this acreage might be larger and spread over multiple locations.

7. *Why can't DWR just fix or replace the existing screens?*

Relacing the existing screens to eliminate entrainment requires approach velocities that would still result in a dramatic reduction of project yield. The surface area of the infiltration gallery is hundreds of times larger than existing screens, allowing for much slower velocities while still protecting project yield. Simply repairing the project screens would not prevent the predation that currently occurs in Clifton Court Forebay: a dead-end trap for fish. By comparison, the infiltration galleries for fish friendly diversions have openings at both ends – dead-ends are eliminated by design.

8. *Will the diversions block up with sediment?*

No; in field experiments using Delta water, Carollo Engineers tested a variety of materials covering the perforated pipes and concluded that a coarse gravel would not lead to blockages from sediment.

9. *Has this concept been implemented elsewhere?*

Yes; subsurface diversions have been implemented in United States's rivers since the 1930s and are currently utilized on at least four rivers in California: the Russian, Eel, Mad, and Tuolumne and have been considered for desalination plants in Southern California to protect marine life. The diversions most similar to those proposed for the Delta were constructed on the Tuolumne River (right).



10. *What is the projected increase in water supply due to the project and will it be enough?*

Water supply increases from the Delta with Fish Friendly Diversions are estimated to be around 1.5 million acre feet (maf) per year. The water shortage in the San Joaquin Valley is currently estimated to be around 2.4 maf. Increased utilization of local

supplies will make up some, but not most, of the difference.

11. *What will the project cost?*

The cost of the project will vary depending on the site chosen. Initial estimates put the cost at \$1.5 billion, but new cost estimates will be developed once the pilot project is complete. In round figures, water from fish friendly diversions will cost about \$100/af if averaged over the total quantity of water passing through them.

12. *Who will pay for the project?*

For planning purposes, it is assumed that the water used for private use will be paid for by the water user and water for public benefits will receive government funding.

13. *Will the project allow too much water to be pumped from the Delta?*

No; the amount of water that can be exported from the Delta is limited by several regulations, including State Water Resource Control Board Decision D-1641, which limits export pumping to 35% of inflows from February through June. Capacities of pumping plants and canals also place a physical limit on the quantity of water that can be exported. These two sets of constraints together mean that no more than 15% of the surplus delta water can be pumped on average, equating to 8.5 million acre feet of water per year, not needed for any other purpose, that will continue to flow out to the Pacific Ocean.

14. *Will the EFD affect the health of the Delta ecosystem?*

No; because the additional water to be pumped will only occur during periods of high outflow, no adverse effects on the Delta ecosystem are anticipated.

15. *How will the EFDs be cleaned if needed?*

Cleaning of the Environmentally Friendly Diversion facilities is not anticipated to be a frequent event as most of the sediment will simply pass through the facilities. A number of methods for cleaning the facilities will be explored in the pilot project including water pulses, air pulses, and physical removal.

16. *Will the peat soils in the Delta affect the water quality from the project?*

No; the project design calls for an impermeable membrane between the infiltration gallery and the native underlying soils preventing any degradation of water quality from the peat soils.

17. *How will sea level rise affect the EFDs?*

As sea levels continue to rise, the yield of the SWP and CVP will decline as more freshwater will be needed to maintain salinity standards in the Delta, particularly during low-outflow periods. During high-outflow periods, when the Environmentally Friendly Diversions are most valuable, sea level rise will have little impact on project

yield. Environmentally Friendly Diversions will be constructed with sea-level rise in mind, meaning that project levees will be higher than those currently in the Delta.

18. *Where will the EFDs be located?*

Locations for Environmentally Friendly Diversions have not yet been determined and a final decision will not be made until after CEQA is complete and local concerns are identified and addressed. However, the facilities will most likely be located in 2 or 3 different locations.

19. *How will water levels and velocities in the south Delta with EFDs compare to existing water levels?*

Preliminary hydraulic studies show no significant difference in water levels or velocities in the south Delta between EFD project operations and existing conditions. However, further studies will be required as part of the CEQA process because hydraulic impacts are likely to vary between sites.

20. *Is the EFD a replacement for the existing Delta tunnel project?*

No; the Cal Water Fix (the Delta tunnel project) provides benefits that Fish Friendly Diversions do not. The Cal Water Fix provides better water quality and increased water supply reliability in the event of a disaster in the Delta. Environmentally Friendly Diversions are not intended to replace the Cal Water Fix but rather to work in conjunction with it to protect fish and enhance water supplies.

21. *What will happen to project operations if there is a major failure of Delta levees due to floods or an earthquake?*

The primary purpose of the Fish Friendly Diversions is to build up groundwater supplies and groundwater-bank accounts in the San Joaquin Valley. An earthquake or flood in the Delta, leading to a failure of Delta levees, would cause an intrusion of saltwater, interrupting water exports. Thus, a Delta failure would cause exports from Environmentally Friendly Diversions (and existing facilities) to stop until the damage could be repaired and salinity standards restored. During this time, water exporters would need to rely on groundwater and banked supplies.

22. *Will the project require existing Delta levees to be maintained and channels to be dredged?*

Yes; there is a fear that with the Cal Water Fix there will be less incentive to maintain Delta levees and flow capacity in Delta channels, but the Environmentally Friendly Diversion project has the opposite effect. Levees and channel capacities need to be maintained if Environmentally Friendly Diversions are to be successful.

23. *Are new water rights required to implement the project?*

No new water rights are needed for the project. The SWP and CVP have sufficient

water rights to operate their currently installed Delta pumping capacity. No component of this proposal calls for an expansion of that capacity.

24. *What happens if, despite the best planning and research, the project fails to perform as expected?*

In the event of a total project failure, the CVP and SWP would return to their existing methods of operation.

25. *Who will get to review the project plans and operations before construction?*

The Fish Friendly Diversion Project will undergo a full NEPA/CEQA process allowing for full public review.

26. *Why is a pilot project needed?*

The primary purpose of a pilot project is to ensure the current technology is adapted appropriately to a tidally dominated system and to reduce construction and operating costs of the project. It also provides an opportunity to conduct further biological studies, particularly on young salmon.

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*Updated 12/17/22*