
Alternative Narrowing Process

Chain of Lakes

Alternative 3F

Alternative 3F, "Chain-of-Lakes", utilizes a connected chain of up to eight lakes, created by flooding Delta islands, that would convey water via siphons beneath Delta channels to Clifton Court Forebay.

An enlarged Delta Cross Channel would include a new intake facility capable of diverting 10,000 cfs through "best feasible technology" fish screens. A low lift pump station would be required downstream of the screens to lift water into the remainder of the conveyance system which operates by gravity. All or a major portion of seven Delta islands would be converted to storage and conveyance facilities. Seven siphons would convey water under river and slough crossings to Clifton Court Forebay. Distributed pump stations with cylindrical fish screens would be added to facilitate filling of islands from adjacent channels and returning flow from storage along the conveyance route. North Delta Channel and South Delta Improvements are also included in this alternative.

Modification to Remove Technical Problems

The main intake to the facility is located in an enlarged Delta Cross Channel. Construction and operation of a "best available technology" screen at this location would be difficult. The strong tidal influence would dictate an extremely long bypass system to insure that the fish that successfully bypassed the screen would not be re-exposed to the screens (i.e. recirculated passed the screen). To avoid this problem, fish entering the bypass would have to be held, sorted, and transported by truck to other locations in the Delta system. Much like the system at the south Delta pumps now. Flow reverses in this area would also increase the fish exposure to the screens. This area is also will within the habitat for resident Delta fish species. Consultation with in-Delta and anadromous fish experts in the fish and wildlife agencies, suggested that given that the Cross Channel is will within the tidal zone, and would have periods of flow that are not conducive to moving fish passed the screens, and is also well within the Delta smelt habitat area that it would be preferable to locate any new screened intake on the Sacramento River upstream to at least as far as Hood.

The agency experts also recommended the small distributed screens which could have the effect removing the water and concentrating the resident Delta fish species in a dead end sink situation be consolidated into a larger "best available technology" screen located in a non Delta species habitat area.

To address these concerns the screened intake could be moved upstream from the Delta Cross Channel to Hood, the capacity increased to 15,000 cfs and the distributed intakes eliminated. This modification would increase the costs of the conveyance system for this alternative.

Compared to other alternatives this alternative requires the most extensive land use conversion of in-Delta agriculture land, ecosystem habitat, and future habitat restoration areas (totaling approximately 37,000 acres). Assuming an one to one mitigation acreage, this conveyance and storage option would require a substantial portion of Delta agriculture and habitat acreage (approximately 74,000 acres). Compared to the 15,000 cfs isolated open canal conveyance facility in alternative 3E which only requires a right-of-way of 5,330 acres, this alternative requires substantially more acreage to achieve the same conveyance objective.

Functionally Equivalent Conveyance

The principle advantage of the lakes are that it not only provide a isolated conveyance route, but also provide operational storage that is directly assessable to the export pumps. Although the total maximum storage of the islands is 835,200 Ac-ft, the actual active usable storage is approximately 174,000 Ac-ft. This storage provides operational flexibility for supply, quality, and environmental needs in that it allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduced environmental sensitivity. It could also reduce the frequency and duration of export curtailments, thus improving water supply reliability. An in-Delta storage option linked to the isolated open canal facility could provide the same benefit without requiring the large amounts of land. The 200,000 Ac-ft of in-Delta storage in alternative 3E could provide almost the same benefits with only effecting 13,398 acres.

Any conversion of Delta islands into storage reservoirs would incorporate substantial aquatic and terrestrial habitat improvements. The lakes could also serve as a major resting area for waterfowl. The substantial water surface area formed by the lakes would create increased evaporation losses over those created by current landuses. It is estimated that the addition evaporation loss from the lakes is 1 to 2 feet more than existing agricultural land and habitat. Using these general losses the chain-of-lakes option with its surface area of approximately 37,000 acres would lose about 18,000 to 36,000 Ac-ft per year over that in alternative 3E with in-Delta storage with its acreage of 18,000 acres.

There is no practical precedents for a large isolated facility using Delta flooded islands. Its uncertain whether the organic soils in the lakes will create TOC problems in the treatment of export drinking water. If needed, organic soils could be removed or sealed from the reservoirs to avoid release of carbon into stored water, adding substantial cost to the alternative. Alternative 3E would have the advantage of being able to utilize the isolated facility and/or the storage in the lakes which would provide operational flexibility benefits for water quality and fisheries.

Costs Comparison

Major cost factors for the chain-of-lakes conveyance/storage option include land acquisition cost, fortifying the lake levees to support varying water levels on both sides, large siphons, and mitigation.

The following table compares the capital cost of the chain-of-lakes conveyance/storage facility in alternative 3F to the conveyance and in-Delta storage in alternative 3E. The costs were derived from the references listed in the table and were adjusted to include the mitigation acreage. Each item in the table includes contingencies and engineering, legal, and project administration costs.

Although the table displays a single number for comparison purposes, the costs are preliminary and should be expressed as a range of -10% to +25%.

Conveyance (15,000 cfs)/In-Delta Storage Facilities (\$Millions)		
Cost Item	Alt 3F¹	Alt 3E²
Chain-of-Lakes Capital (includes cost to move intake to Hood)	\$1,997	
Chain-of-Lakes Mitigation	370	
Eastside Open Canal Isolated Facility Capital		\$1,140
Eastside Open Canal Isolated Facility Mitigation		53
In-Delta Storage Capital		385
In-Delta Storage Mitigation		134
Total Estimated Capital Cost:	\$2,367	\$1,712

1) CALFED Bay-Delta Program, "DRAFT - Facility Descriptions and Updated Cost Estimates for the Chain-of-Lakes Project", March 23, 1997

2) CALFED Bay-Delta Program, "DRAFT - Facility Descriptions and Updated Costs Estimates for Isolated Delta Conveyance Facility", March 28, 1997 and CALFED Bay-Delta Program, "DRAFT - Facility Descriptions and Updated Costs Estimates for the In-Delta Storage Project", June 24, 1997

3) Mitigation cost added on a 1:1 replacement ratio for the full right-of-way acreage

Even though the costs are preliminary the comparison shows that the chain-of-lakes option costs substantially more than the open canal conveyance with in-Delta storage.

Recommendation

Given that the chain-of-lakes conveyance/storage has the most extensive land use conversion of in-Delta agricultural land, ecosystem habitat, and future restoration areas and that options are available that achieve the same objectives at substantially reduced cost, it is recommended that alternative 3F be dropped from consideration.