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DRAFT - *For Discussion Only*

CALFED

DRAFT TECHNICAL REPORT
MUNICIPAL AND INDUSTRIAL WATER SUPPLY ECONOMICS
ENVIRONMENTAL IMPACTS

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MUNICIPAL AND INDUSTRIAL WATER SUPPLY ECONOMICS

1.0 Introduction

The intent of the CALFED Bay-Delta Program (Program) is to develop long-run solutions to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary in Northern California. Overall, the effect of the Program is expected to be beneficial. However, specific Program components may have potentially adverse impacts.

The purpose of this technical report is to document, in a programmatic manner, the potential impacts of the program on municipal and industrial (M&I) water supply economics. The objective is to describe and analyze effects on M&I water supply economics that could result from the No Action Alternative or implementing any of the three Program alternatives. This report discusses potential impacts that may occur in the five regions within the study area: the Delta Region, Bay Region, Sacramento River Region, San Joaquin River Region, and the Other SWP Service Areas. The report also contains a brief description of potential mitigation strategies designed to reduce adverse Program impacts to a less-than-significant level. The summary contained in this technical report, in conjunction with other information, data, and modeling developed during pre-feasibility analysis will be used to prepare the environmental impacts section of the Programmatic Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

2.0 Summary

A partial analysis of M&I water supply economics is provided, and results from an even more limited analysis of water quality economics are shown. Qualitative analysis is provided for CALFED programs, especially water quality and urban water conservation. Table 1 provides a summary of findings.

Impacts on water supply are analyzed using preliminary DWRSIM results and a model of M&I water supply economics. Based on the size of water supply increases from DWRSIM results, and assumptions concerning the allocation of these supplies, Alternatives 1C, 2B, 2E, 3B, and 3D through 3I are likely to have a significant beneficial impact on water supply for Central Valley Project (CVP) and State Water Project (SWP) M&I water providers. The significance of impacts on individual providers depends on the share of these water supplies as part of their entire water supply mix.

Potential benefits of the alternatives listed above, in terms of water supply costs avoided, are about $150 to $175 million annually under 2020 development conditions; additional gross benefits in year during the critical period are roughly $180 million to $280 million under 2020 development conditions. Most of the benefits are obtained in the SWP service areas south of the Tehachapis ~~Kern County~~, where gross benefits in an average hydrologic year are $135 to $160 million and, during the critical period, $150 to $235 million annually~~. Benefits to all other regions in a critical period are roughly $30 to $55 million annually.~~ These benefits would be less if water transfers from the Central

Valley were included as an alternative supply in the No Action and Action Alternatives, and they might be less if additional local water supply options were considered.

Costs of the CALFED storage and conveyance options are currently not available. Therefore, these costs have not been considered in terms of their effects on net benefits, nor have they been considered in terms of their effects on retail water prices or demand.

Cost information is important in evaluating environmental consequences because potential impacts on population, economic growth, and employment depend on the net benefit, not the gross benefit, of the alternatives. If the costs of CALFED supplies were substantially less than other supply options, the CALFED alternatives could have small positive effects on economic growth. If the costs of CALFED supplies were much more than other options, increased retail water costs could have small negative effects on economic growth and employment. Currently, it is believed that the costs of CALFED options will be similar to the costs of other supplies avoided. Therefore, no significant effects on economic growth, population, or employment, and no significant effects on the related natural and physical environment are anticipated.

Impacts on water quality are analyzed only for salinity measured as total dissolved solids (TDS). There is no ~~accepted~~ available method to use for economic analysis of other water quality constituents at this time. In this draft, salinity costs are analyzed for Alternatives 1A, 1B, 1C, 2A, 2B, 2D, 2E, 3A, 3B, and 3E. The analysis covers all M&I providers that use Delta water except for providers served by the North Bay Aqueduct. The salinity analysis results in a single dollar value for each alternative but, because of uncertainties in the economic and hydrologic methods a range of values is provided below.

The analysis accounts only for differences in the quality of Delta source water caused by differences in Delta intake and conveyance configurations. The economic analysis accounts for blending of Delta water deliveries with other water supplies. Differences in quality of source water caused by differences in export and storage amounts and in timing are not considered.

Results suggest that source water quality for Contra Costa Water District (CCWD) will be improved by all variations of Alternative 2. Annual benefits are on the order of $10 million to $15 million. Salinity is increased in Alternatives 3A and 3B but the increase in 3A is probably not significant. Net annual cost of the increased salinity in Alternative 3B is $7 million to $10 million annually. Potential mitigation strategies include relocation of intake facilities, water treatment, or re-operations.

Results in the Bay Region show economic costs from increased salinity in Alternative 1C. The average annual cost relative to No Action is not substantial, about $2 million annually. Annual benefits from reduced salinity in Alternative 2 could range from $10 to $15 million annually. Annual benefits in Alternative 3 range from about $10 million in Alternative 3A to $20 million in Alternative 3E.

Results for other SWP service areas suggest that source water quality will be substantially improved by all variations of Alternatives 2 and 3 and especially by Alternative 3E. ~~The~~ This region ~~South Coast Region~~ obtains improved water quality for end users because of significantly reduced TDS in export water, and because of increased Delta water supplies in Alternative 1C, 2B, 2E, and in all of Alternative 3 except for Alternative 3A. Annual economic benefits to the other SWP service areas range from a small net cost of $8 to $12 million in Alternative 1C to a range of ~~$100 to $150~~ $90 million to $140 million in Alternative 2. Benefits in Alternative 3 range from around $100 million in Alternative 3A up to $200 million in Alternative 3E.

~~Based on the limited information available at this time, the impacts of all five programs — water use efficiency, water quality, levee system integrity, ecosystem restoration and water transfers related to economics are not believed to be significant for any alternative. No adverse environmental effects have yet been identified, so no mitigation is required.~~

Region	Alternatives												
	No Action	Alt 1			Alt 2				Alt 3				
		1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
Delta (CCWD)				Supply (33)	Salinity	Supply (33) and salinity	Supply (17) and salinity	Supply (33) and salinity	Supply (10) ~~salinity reduced~~	Supply (54) salinity reduced	Supply (54)	Supply (54)	Supply (54)
Bay				Supply (10) ~~salinity reduced~~	Salinity	Supply (10) and salinity	Salinity	Supply (10) and salinity	Salinity	Supply (33) and salinity	Supply (33) and salinity	Supply (33)	Supply (33)
Sacramento River				Supply (23)		Supply (23)		Supply (23)		Supply (46)	Supply (46)	Supply (46)	Supply (46)
San Joaquin River				Supply (12) ~~salinity reduced~~	Salinity	Supply (12) and salinity	Salinity	Supply (12) and salinity	Salinity	Supply (20) and salinity	Supply (20) and salinity	Supply (20)	Supply (20)
Other SWP Service Areas				Supply (15) ~~salinity reduced~~	Salinity	Supply (15) and salinity	Salinity	Supply (15) and salinity	Salinity	Supply (24) and salinity	Supply (24) and salinity	Supply (24)	Supply (24)

NOTES:

Any entry means that a significant effect has been identified. Supply = Water supply benefit, Cost = Water supply cost, Salinity = Water salinity benefit. The numeric entry after supply is the percent reduction in total drought costs. Salinity data are not available for alternatives 3H and 3I. The ~~lack of a symbol does not mean that the alternative will not have any impacts. Rather, it means that no decision has been reached, or information is not available.~~

Table 1. Significant Impacts by Region and Source, M&I Water Supply - DRAFT *For Discussion Only*

3.0 Assessment Methods

M&I water supply economics assessment variables include:

- Water supply benefits and costs,
- Water quality benefits, and
- Conservation benefits and costs.

3.1 Water Supply

The M&I water supply economics assessment uses preliminary results from DWRSIM and a model of M&I water supply economics to calculate the gross benefits of new CALFED water supplies. No information on costs of CALFED alternatives is developed or used in the analysis; therefore, no judgment can be made about the potential benefit-cost relations of the alternatives.

Water supply benefits are any cost savings on water supplies acquired to meet future demands and make-up supplies acquired for use during drought. If total end-user deliveries are reduced during drought, shortage occurs. Net revenue losses, shortage management costs, and end-user shortage costs are also considered as costs avoided by having new supplies during drought. The analysis includes average condition and critical condition water deliveries and economics; therefore, the benefits in the average hydrologic condition are only water supply costs avoided, but avoided costs in the critical condition also include the end-user shortage costs.

The M&I water supply economics model is operated in a limited way because no information on costs of the CALFED water supply options is currently available. Normally, the average-condition model operates to pass on costs and cost savings of water supply options to consumers in the form of water prices, and water prices affect demand. If CALFED alternatives were to provide water at a lower cost than other options, water price would be reduced and demand would increase. In this analysis, retail water prices are fixed at No Action levels so that the level of demand does not vary as a result of CALFED alternatives, and the measure of benefit is the cost savings from avoided costs only.

In the critical condition, economic costs involve supply cost savings and shortage costs. The analysis requires mandatory drought conservation up to a maximum before new supplies can be purchased in the critical condition. End-user shortage costs are calculated from economic demand functions tailored to each group of providers in the analysis. If mandatory conservation is not sufficient to accommodate the supply deficit, make-up supplies must be developed. Make-up supplies developed for use during the critical condition are generally more expensive than supplies for use in the average condition.

The analysis uses functions that describe the yields and costs of supplies replaced by the CALFED water supplies. The critical period yield of these supplies is assumed to be 50 percent of their average condition yield. Therefore, CALFED supplies in the critical period must provide more than 50 percent of their average yield to result in a net critical period supply increase.

Several other important assumptions of the M&I economic analysis are:

- No water transfers from the central valley are included as alternative supplies.
- Some water supply options that do not have NEPA compliance are not included in terms of their alternative cost.

- Water demands are based on DWR's Bulletin 160-93 2020 levels.

The first two ~~se three~~ factors tend to increase the value of new water significantly relative to existing and actual future conditions because (1) water transfers have recently been, and should continue to be, a low-cost source of supplies; and (2) some other water supplies will become feasible and cost-effective, and some may be developed between now and 2020~~; and (3) more water demands increase the marginal (incremental) cost of supplies used~~.

For this preliminary impact assessment, the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (PEIS) Alternative 1 hydrology is used to represent the CALFED No Action Alternative. The PEIS Alternative 1 includes restoration payments, 800,000 acre-feet (AF) of CVP yield dedicated for fish and wildlife, ~~B2~~ Section 3406(b)(2) water management, and the Shasta temperature control device. All of these actions are also included in the CALFED No Action Alternative.

The PEIS Alternative 1 has some differences, however, from the CALFED No Action Alternative. First, PEIS Alternative 1 includes Level 2 refuge water supplies, while the CALFED No Action Alternative requires more water to meet Level 4 supplies. Second, The PEIS Alternative 1 includes Trinity River fisheries restoration actions that reduce diversions from the Trinity basin; therefore, PEIS Alternative 1 supplies are reduced relative to the CALFED No Action Alternative. Third, the PEIS Alternative 1 includes retirement of 30,000 acres of San Joaquin Basin lands that is not included in the CALFED No Action Alternative. Some water is therefore available in the PEIS Alternative 1 that is not available in the CALFED No Action Alternative. All else equal, the PEIS Alternative 1 should be roughly representative of the CALFED No Action Alternative, but with slightly more water available.

In the M&I analysis, PEIS Alternative 1 M&I deliveries are the baseline; increases in deliveries caused by the CALFED alternatives as estimated by DWRSIM are added to the baseline levels. The DWRSIM preliminary runs used in the analysis, the corresponding alternatives, and the increase in critical and average M&I deliveries are shown below.

DWRSIM Run No.	CALFED Alternatives	TAF/Yr Increase in M&I Deliveries	
		Average	Critical
472	No Action, 1A, 1B	0	0
472B	2A	60	26
475	3A	90	69
498	2D	107	122
510	1C, 2B, 2E	185	235
500	3B, 3E through 3I	220	353

These M&I deliveries are equal to one-third of the total increase in deliveries. The other two-thirds were allocated to agricultural and environmental uses. This allocation of water is strictly hypothetical, and it should not be inferred that benefits should be assigned or costs allocated in relation to this yield allocation.

The total increase in M&I deliveries was allocated to all CVP and SWP M&I users in the analysis according to their share of total contract or entitlement. The contract or entitlement amounts and shares are shown below.

M&I Provider Group	TAF Contract or Entitlement	Share of CALFED Water (%)
CVP Shasta	37	1
CVP Sacramento	76	2
CCWD	167	5
CVP San Felipe	128	4
SWP North Bay	67	2
SWP South Bay	188	6
CVP San Joaquin	29	1
SWP San Joaquin	143	4
SWP Coastal Aqueduct	50	2
SWP South of Tehachapis ~~Kern County~~	2,468	74

3.2 Water Quality

Water quality constituents that are important to M&I water users include salinity and related by-products, organic carbon and related by-products, turbidity, and microbes. Water quality of M&I supplies may be affected by the quality of source waters, but changes in quantities of supplies are also important when a provider uses numerous supplies that vary in their quality. Some providers intentionally mix supplies of various qualities to obtain water quality goals.

~~Because water quality is affected by the actions of all water users, M&I water users are affected by water quality actions targeted to non-M&I water users. M&I water users also may pay some of the costs of water quality actions even if the actions are targeted to non-M&I water users, and M&I water users may pay water quality costs for actions that do not improve M&I water~~

~~quality in an economically meaningful way~~. The exact scope of water quality actions and the financing of the actions in terms of cost shares have not yet been determined; therefore, a comprehensive analysis of costs and benefits is not possible.

Water quality of Delta water exports is strongly affected by the configuration of Delta conveyance and export facilities. Also, the salinity in some provider's service areas can be improved with more Delta water supplies because Delta water is blended with other, more saline supplies.

This technical report includes an economic analysis of salinity damages in delta export water users' service areas for some CALFED alternatives. The scope of this analysis ~~will~~ includes service areas in which salinity of delta export water could have economically important effects.

It is expected that economic analysis of changes in THM precursors and bromides under Calfed alternatives will be available in the future.

Limited estimates of concentrations of these substances under Calfed alternatives are provided below. The estimates were provided for Alternatives 1A, 1C, 2B, 2D, 2E and 3E for five intake locations used by M&I providers; Contra Costa Canal, North Bay Aqueduct, Tracy Pumping Plant, Clifton Court, and Los Vaqueros Intake (Woodard, 1997). Estimates for bromide were provided as an average for dry years 1985 and 1987, and as an average over 1985 through 1987 which include the wet year 1986. For DOC, estimates were provided for the 1985-1987 period only. Some observers expect that economic benefits from reduction of THM precursors and bromides will exceed the benefits from salinity reductions.

The ~~water quality~~ economic analysis of salinity must consider quality and quantity. DWRSIM Run 472 and information from the CVPIA programmatic environmental impact statement provide estimated deliveries for the CALFED No Action condition. To obtain deliveries for the other alternatives, the differences in total average delivery between Run 472 and the alternatives runs were calculated, and these differences were split into thirds. The hypothetical M&I third was allocated to water users according to their share of CVP contracts plus SWP entitlements. For example, SWP entitlement holders south of the Tehachapis ~~South Coast Region~~ receives ~~60~~ 74 percent of any incremental M&I water yield, or about ~~20~~ 25 percent of all CALFED yield, that results from the CALFED alternatives. This yield increment is added to the No Action ~~South Coast Region~~ delivery from DWRSIM Run 472. ~~Results for the South Coast Region are provided in Table 2 below.~~

DWR provided estimates of end-of-month salinity at Clifton Court Forebay and Rock Slough for the water years 1976 to 1991 for Alternatives 1A, 1C, 2B, 2D, 2E, 3A, 3B, and 3E. Alternative 1A salinity is believed to be representative for Alternative 1B, and Alternative 2B salinity is believed to be representative for Alternative 2A. All of these results are based on DWRSIM Run 472B hydrology, so monthly data on SWP exports under Run 472B hydrology at Banks Pumping Plant were obtained. Monthly salinities at Clifton Court were multiplied by monthly exports, and the products were summed and divided by total delivery over the period to obtain flow-weighted salinity. Salinity data from Rock Slough are used for CCWD. These annual salinity estimate in this case is the simple average of the

monthly average salinities. Results are provided in Table 2 below.

In total, analysis is possible for Alternatives 1A, 1B, 1C, 2A, 2B, 2D, 2E, 3A, 3B, and 3E. Because deliveries and salinities for Alternatives 1A and 1B are identical, nine analyses are possible.

The salinity data account only for differences in salinity caused by the different geometry of Delta conveyance and intake configurations. Since the salinity data are all estimated from Run 472B hydrology, they do not account for any differences caused by different export amounts or storage configurations, or the timing of exports or storage releases. Therefore, economic results account for only part of the impacts of the alternatives on salinity and salinity damages. Unfortunately, it is not known whether salinity damages would be more or less if storage and export amounts and timing were accounted for.

Water quality costs of these changes in water supply and its salinity were estimated using an economic model of salinity costs. The model is based on an earlier model of salinity damages for the entire lower Colorado River basin as discussed in *Estimating Economic Impacts of Salinity of the Colorado River* (Milliken Chapman Research Group, 1998).

The revised model, obtained from Metropolitan Water District of Southern California, ~~did not~~ included all ~~much~~ of the data required to run the model for the South Coast region and none of the data needed for the other regions included in the analysis. ~~Therefore,~~ Data for the other regions were obtained from other sources. Bulletin 160-93 data were used to develop some data on demands and quantity of other (non-delta) supplies. A survey of potentially affected providers was conducted, and responses provided useful information on demands, supplies and salinity.

The model was configured to accept data for ~~six~~ five other potentially affected regions: ~~the South Coast~~, the South Lahontan, Contra Costa Water District, the South Bay, the San Joaquin Valley, and the Central Coast. The model obtained from Metropolitan with data for the south coast region was altered to consider the Calfed alternatives in terms of quantity and salinity of SWP supplies.

3.3 Water Conservation

M&I providers are affected by the water conservation actions of others. They may finance other's water conservation actions, and others may participate in M&I water conservation in many ways. The CALFED Bay-Delta Program Water Use Efficiency Input Report 5-1 provides general and specific state-wide assumptions, estimates of urban water use, and preliminary estimates of existing and future urban water conservation ~~efforts~~ savings with and without the

Alternative	DWRSIM Run #	~~SCR~~ ~~Delivery~~	Clifton Court TDS[a]	Rock Slough TDS
No Action	472	~~1,597~~	269.02	300
1A, 1B	472	~~1,597~~	269.02	300
1C	510	~~1,707~~	281.43	294
2A	472B	~~1,632~~	180.55	166
2B	510	~~1,707~~	180.55	166
2D	498	~~1,661~~	181.86	168
2E	510	~~1,707~~	177.75	161
3A	475	~~1,650~~	192.86	317
3B	500	~~1,727~~	185.57	376
3E	500	~~1,727~~	125.95	294
3~~F~~H through 3I	500	~~1,727~~	None available	None available

NOTE:

SCR = the South Coast Region

[a] All TDS estimates assume DWRSIM Run 472B hydrology.

Table 2 ~~South Coast Region Water Delivery, and~~ Salinity Estimates Used for Salinity ~~Damages~~ Benefits Analysis

CALFED water use efficiency program~~ on a regional basis. Costs of these measures are forthcoming~~. In practice, each urban water provider would select conservation measures that are most economically feasible as part of their water supply and demand solutions.

Water conservation benefits are primarily water cost savings that depend on supply levels, and economic savings may also include end-user energy cost and wastewater treatment cost savings. Conservation costs include program costs and end-user costs. Utilities pay the program costs of conservation programs. End-users pay some additional costs for compliance with mandatory and voluntary provisions (e.g., costs of water-saving devices, time, and inconvenience).

The assessment of M&I water conservation economics is qualitative because quantitative information on the costs of water conservation is not available. Future impact analysis will consider quantitative information on these variables. Costs will be provided, and techniques will be developed to estimate benefits associated with water conservation.

3.4 Relationships with M&I Land Use

This technical report is not concerned with M&I land use as it may be directly affected by the alternatives (e.g., if habitat restoration

were to involve urban land acquisition). The land use impact analysis identifies some potential direct M&I land use changes that may affect M&I water demands and economics, but the specific locations of land use changes cannot be identified until Phase III of the CALFED process.

4.0 Significance Criteria

The California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) define slightly different roles for economics. Under CEQA, economic changes are categorically not subject to significance calls. However, economic impacts may be used to determine that a physical change is significant, and if economic changes result in physical or environmental effects, these physical effects may be judged to be significant (Bass et al., 1996). Therefore, economic effects must be considered only if they may have an environmental effect, and they may be considered as a measure by which physical effects can be judged.

NEPA and CEQA do not require significance determination for economic impacts, in and of themselves. However, as discussed below, a number of variables are used to assess the magnitude and intensity of impacts. This analysis uses economics to judge the significance of physical changes in water quality and supply for M&I providers.

A list of economic and demographic factors that have been considered in environmental documentation has been compiled by CALFED (1996) for use in this effort. Particular economic and demographic considerations of potential relevance to M&I water supply economics include:

- Changes in population or population inducement by a water supply project,
- Changes in housing,
- Impacts to employment income or loss of full-time equivalent jobs, and
- Costs of options displaced and expected economic losses.

The economic analysis does not measure any of these variables; consequently, none of them are used in the impact analysis. Water supply does not induce growth in the economic model. Rather, water supply replaces other supplies and cost savings affect price, which affects conservation by existing users. Also, water supplies affect the magnitude and cost of end-user shortage during drought. If price and drought shortage is substantially affected, potential impacts on economic growth, population, and housing must be assessed qualitatively.

NEPA requires a discussion of economic effects, and some CALFED actions will have both economic benefits and costs. An economic impact might be considered adverse if its costs are expected to be larger than its benefits, and an impact might be considered beneficial if its benefits exceed its costs. Because information on the costs of CALFED alternatives is not currently available, an indication of whether a net impact is adverse or beneficial (based on the relative size of costs and benefits) is not possible at this time. Deeming an impact beneficial and significant based on water supply means that the water supply is beneficial in terms of the costs of other supplies and shortage costs avoided. It does not imply that the net benefit is positive (i.e., that benefits exceed costs).

The use of significance criteria requires that significance thresholds be defined. The water supply benefit threshold used here is: the supply must not increase average water year costs, and total drought cost must be reduced by more than 10 percent. ~~For water quality, and absent and economic analysis, a change in tds of delta export water by 30 percent or more is considered significant if tds is normally an economic problem in the service area of the recipient.~~

5.0 Environmental Impacts

5.1 Description of No Action Resource Conditions

The No Action Alternative is the baseline against which alternatives are compared for purposes of evaluating significance. The No Action Alternative displays the state of water supply economics under a 2020 level of development. The 2020 level of development is especially important to M&I water supply economics because of the increase in population and urban water use over time. Economic growth, and increasing population and municipal water demands, are part of the No Action and Action Alternatives. Population and economic growth increase the use of local supplies, contracts, and entitlements, leaving less water available for other users and for use in following years. If growth causes M&I water demand to exceed available supplies, more conservation or new supplies are required. Increased demand in the future would mean that shortages during drought will be more frequent and severe compared to existing conditions. All else equal, larger percent cutbacks in deliveries must be imposed early, or larger shortages as a percent of use must occur later in the drought.

The No Action Alternative includes a number of projects that will reduce Delta export constraints, as discussed under each region below. Under existing conditions, there are times when Delta conveyance or pumping capacity limits exports. At other times, water is available in the Delta and excess pumping capacity is available, but no immediate demand or storage space is available to utilize the water. New south-of-Delta storage and conveyance projects increase the frequency and duration of time in which Delta export constraints are the limiting factor, and the potential yield and value from Delta improvements to reduce export constraints increases with additional storage and conveyance south of the Delta.

Improvements that reduce Delta constraints increase the feasibility and reduce the costs of water transfers from willing sellers, and additional conveyance and storage south-of-Delta increase the importance of Delta constraints as the factor that limits transfers. Increased availability of transfers from specific places in specific times will reduce average transfer costs, increase the use of transfers, and reduce the use of other more expensive supplies. This analysis does not include a quantitative assessment of CALFED alternatives in relation to water transfers.

Table 3 shows characteristics of M&I provider groups for the existing condition and the No Action Alternative.

5.1.1 Delta Region

More details on the Delta Region are provided in the Affected Environment Technical Report. For purposes of preliminary impact analysis of water supply

Condition Variable	Delta Region (CCWD)[a]	Sacramento River Region	Bay Region (not CCWD)	San Joaquin Region	Other SWP Service Areas
Existing Condition					
TAF average demand	150	566	707	337	3,784
TAF dry year demand	150	613	767	344	3,916
Typical retail cost, $/AF[b]	$700	$100-300	$500-650	$250-350	$450-1,350
Typical retail price, $/AF	$450	$0-300	$350-500	$100-150	$350-1,250
Percent industrial and commercial	31%	41%	31%	48%	26%
No Action Alternative					
TAF average demand	175	925	864	701	5,817
TAF dry year demand	178	1,003	960	710	6,032
Typical retail cost, $/AF[b]	$806	$125-325	$575-700	$275-350	$500-1,450
Typical retail price, $/AF	$502	$0-250	$400-600	$125-175	$420-1,350
Percent industrial and commercial	31%	41%	31%	48%	26%
Average cost of supplies[c]	$523	$115	$152	$207	$702
TAF shortage during drought	28	12	251	47	1,511
Mandatory conservation during drought	10	12	54	33	571
Average loss per AF from mandatory conservation[d]	$549	$192	$451	$195	$523
TAF supplies developed during drought	18	0	195	14	940
Average cost of drought supplies, $/AF	$876		$904	$140	$729

[a] Includes major industrial direct diversions of 10,000 AF/yr.

[b] Average cost for residential customers including service charges. Costs and prices for providers with only CVP water are typically higher.

[c] Average cost of supplies avoided or saved (Bay Area) to achieve supply/demand balance in No Action.

[d] Net revenue loss plus consumer surplus loss.

Table 3. Characteristics of M&I Provider Regions for Existing Condition and No Action Alternative

changes, economic impacts in CCWD are used to represent economic impacts of the alternatives in the Delta Region. The major reason for this assumption is that other M&I water supplies for most other providers in the Delta, for providers in Sacramento and Stockton, and for numerous small providers will not be affected by the alternatives in ways that can be measured at this time. In the following discussion, the term "Delta providers" is reserved for any and all providers actually located within the statutory Delta.

Table 3 shows some characteristics of CCWD in the existing and No Action conditions. Current demand is about 150,000 AF, which includes 10,000 AF of direct diversions by industrial customers. Retail cost to residential customers is currently about $700 per AF; and price, which does not include service charges, is about $450. About one-third of demands are commercial and industrial. Demand is expected to rise to 175,000 AF by 2020, with slightly higher demands in dry years due to less recharge of urban landscapes.

The No Action Alternative retail cost and price are higher than existing conditions because of conservation, CVPIA costs, and costs of new supplies. The average cost of new supplies from the M&I analysis needed to bring supply up to demand in the average condition is $523 per AF delivered. The average condition supply deficit is about 4,600 AF.

During the critical period, 2020 demand exceeds supply by 28,000 AF on average. Mandatory conservation is used to eliminate 10,000 AF of shortage, and supplies are acquired to eliminate the remaining 18,000 AF. Mandatory conservation costs $569 per AF in conservation program costs, lost net revenue and consumer surplus, and the make-up supplies cost $876 per AF delivered. Water transfers, which would reduce supply costs, are not available as a supply option in the average or critical year.

No Action projects that may reduce M&I supplies or increase costs relative to existing conditions include:

CVPIA: The CALFED No Action Alternative includes dedication of 800,000 AF of water for fish and wildlife, Level IV refuge water, restoration payments, and operation of the Shasta temperature control device. The dedicated water and Level IV refuge supplies will reduce CCWD water supplies relative to existing conditions. The CVPIA also will affect other providers located within the statutory Delta, including the City of Tracy, and potentially parts of Stockton and Sacramento.

No Action Alternative projects that are expected to increase supplies or reduce future costs, once completed, include:

Los Vaqueros Reservoir Project: This project will improve the quality and reliability of CCWD M&I supplies.

Other Delta providers (not CCWD) are generally provided by larger water wholesalers, small districts, or individual wells. No specific actions have been identified that will affect them. However, these small providers may have plans and programs in place that will affect their future water supplies.

5.1.2 Bay Region

Table 3 shows some characteristics of the Bay Region in the existing and No Action conditions. Current demand is about 707,000 AF. Retail cost to residential

customers is currently about $500 to $650 per AF; and price, which does not include service charges, is $350 to $500 per AF. About one-third of demands are commercial and industrial.

Demand is expected to rise to 864,000 AF by 2020, with slightly higher demands in dry years due to less recharge of urban landscapes. The No Action Alternative cost and price are higher than for existing conditions because of conservation, CVPIA costs, and costs of new supplies. The region has an overall supply surplus in the average condition, and the average cost avoided by not needing these supplies is $152 per AF delivered.

During the critical period, 2020 demand exceeds supply by 251,000 AF on average. Mandatory conservation is used to eliminate 54,000 AF of shortage, and supplies are acquired to eliminate the remaining 195,000 AF. Mandatory conservation costs $471 per AF in conservation program costs, lost net revenue and consumer surplus, and the additional supplies cost $904 per AF. Water transfers are not available as a supply option in the average or critical year.

This region is affected by any actions that affect the SWP or the CVP. No Action projects that may reduce M&I supplies or increase costs relative to existing conditions include:

The CVPIA may reduce CVP supplies and increase costs, for reasons described above.

No Action Alternative projects that are expected to increase supplies or reduce future costs, once completed, include:

The CVPIA may increase SWP supplies, depending on the amount of dedicated water that can be exported from the Delta.

5.1.3 Sacramento River Region

Table 3 shows some characteristics of the Sacramento River Region in the existing and No Action conditions. Current demand is about 566,000 AF. Retail cost to residential customers is currently about $100 to $300 per AF; and price, which does not include service charges, is $0 to $300 per AF. Price is zero in some areas because some use is not metered or priced. About 40 percent of demands are commercial and industrial.

Demand is expected to rise to 925,000 AF by 2020, with higher demands in dry years due to less recharge of urban landscapes. The No Action Alternative cost and price are higher than for existing conditions because of conservation and CVPIA costs. The marginal cost of supplies is $115 per AF delivered. During the critical period, 2020 demand exceeds supply by 12,000 AF, on average. Mandatory conservation can be used to eliminate the entire shortage, and mandatory conservation costs $212 per AF in conservation program costs lost net revenue and consumer surplus.

No Action projects that may reduce M&I supplies or increase costs relative to existing conditions include:

The CVPIA may reduce CVP supplies and increase costs, for reasons described above.

Interim re-operation of Folsom Reservoir: This project could reduce M&I water supplies in the Sacramento area by dedicating more storage space to flood control.

Table 3 shows some characteristics of the San Joaquin River Region group in the existing and No Action conditions. Current demand is about 337,000 AF. Retail cost to residential customers is currently about $250 to $350 per AF; and price, which does not include service charges, is $100 to $150 per AF. About half the demands are commercial and industrial.

Demand is expected to double to 701,000 AF by 2020, with higher demands in dry years due to less recharge of urban landscapes. The No Action Alternative cost and price are higher than for existing conditions because of conservation and CVPIA costs. The marginal cost of supplies is $207 per AF delivered. During the critical period, 2020 demand exceeds supply by 47,000 AF on average. Mandatory conservation can be used to eliminate 33,000 AF of shortage, and mandatory conservation costs $215 per AF in conservation program costs, lost net revenue and consumer surplus. More groundwater is extracted to eliminate the remaining shortage at a cost of $140 per AF delivered.

No Action projects that may reduce M&I supplies or increase costs relative to existing conditions include:

The CVPIA may reduce CVP supplies and increase costs, for reasons described above.

No Action projects that are expected to increase supplies or reduce future costs, once completed, include:

Monterey Agreement: This project revises the formula used to allocate SWP water, retires 45,000 AF of agricultural entitlement, transfers 130,000 AF of entitlement from agriculture to M&I, allows sale of the Kern Fan element of the Kern Water Bank to agricultural contractors, and changes allowable operations at Castaic Lake and Lake Perris.

The CVPIA may increase SWP supplies, for reasons described above.

New Melones Conveyance Project: This project conveys water to Stockton East Water District and Central San Joaquin Water Conservation District for use near and within Stockton.

5.1.5 Other SWP Service Areas

Table 3 shows some characteristics of the Other SWP Service Areas in the existing and No Action conditions. Current demand is about 3,784,000 AF in average years. Retail cost to residential customers is currently about $450 to $1,350 per AF. The higher price is representative of the Central Coast area only. Price, which does not include service charges, is about $350 to $1,250 per AF. About one-quarter of the demands are commercial and industrial.

Demand would rise to 6,025,000 AF by 2020, but the costs of new supplies required to meet 2020 demand increases water price, and 2020 demand is reduced to 5,817,000 in average years. Demands are higher in dry years due to less recharge of urban landscapes. The No Action Alternative cost and price are higher than for existing conditions because of conservation and costs of new supplies. The average cost of new supplies needed to eliminate a 2020 supply deficit of over 1 million AF (MAF) is about $702 per AF, but the marginal (incremental) cost is more than $1,000 per AF because of the large amount of water involved. Water transfers from the Central Valley are not allowed as a means of meeting this demand.

During the critical period, 2020 demand exceeds supply by 1,511,000 AF, on average. Mandatory conservation is used to eliminate 571,000 AF of shortage, and supplies are acquired to eliminate the remaining 940,000 AF. Mandatory conservation costs $543 per AF in conservation program costs, lost net revenue and consumer surplus, and the additional supplies cost $729 per AF. Additional water transfers are not available as a supply option in the critical year.

No Action projects that are expected to increase supplies or reduce future costs, once completed, include:

The CVPIA may increase SWP supplies ~~depending on the amount of dedicated water that can be exported out of the delta for reasons described above~~.

Coastal Aqueduct: This project will provide SWP water for M&I use in San Luis Obispo and Santa Barbara counties.

The Monterey Agreement will change SWP water allocations for M&I use, for the reasons described above.

~~Kern Water Bank: Only those aspects currently completed and operated are included in this analysis. The Kern Water Bank will develop storage capacity to augment the SWP's dependable supply~~.

The Metropolitan Water District's ~~South Coast Region's~~ Eastside Reservoir Project: This project will provide emergency storage following earthquake, supplies during drought, and supplies to meet peak summer demands.

Semitropic Water Storage District (WSD) Groundwater Banking Project: This project allows ~~certain~~ SWP ~~entitlement holders the South Coast Region~~ to recharge and extract SWP water in the Semitropic WSD, and will reduce overdraft and increase operational flexibility.

5.2 Description of Alternative Resource Conditions

5.2.1 Delta Region

Table 4 provides a summary of the impact analysis for the Delta Region. CCWD is used as a proxy for water supply and quality analysis. It should be kept in mind that not all of CCWD is in the statutory Delta, and some M&I providers in the Delta are not served by CCWD. Water supply and water quality analysis are applied only to CCWD; but other comments, especially those with respect to the CALFED programs, apply to all Delta providers.

Alternative 1

This alternative would utilize the existing system of through-Delta conveyance with some small physical modifications. Three variations of this alternative all include the CALFED programs. Environmental water would be acquired from willing sellers, habitat restoration would be located in the northern and western Delta, and relocation of water supply intakes for water quality purposes would be evaluated. Precise locations for many actions are not currently known, and names of locations are provided below for example purposes only.

Ecosystem Restoration Program

Ecosystem restoration actions include habitat restoration, changes in environmental water flows, development of floodways and meander zones, fish passage and fish screen improvements, undesirable species management, and water quality improvements. These actions are expected to

have small or no effects on M&I water supplies and costs unless environmental flows reduce M&I supplies or M&I providers pay some of the costs of restoration. Water flows for fish and wildlife could increase M&I water supply if the water can be reused as M&I water exports or if the flows contribute to Delta water quality standards. Prices of water transfers may be increased by transfers for environmental purposes.

Some restoration actions may have beneficial effects on water quality in the Delta. Water quality improvements may occur through dilution caused by increased Delta inflow for restoration purposes,

Economic Parameter	Existing Conditions	No Action[c]	Alternative 1[c]			Alternative 2[c]				Alternative 3[c]				
			1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
CALFED water supply costs[d]	0	0	No costs available											
Other water supply costs[d]	0	1.3	1.3	1.3	-3.2	0	-3.2	-1.4	-3.2	0	-3.9	-3.9	-3.9	-3.9
~~Water quality~~: Salinity reduction benefits[f]	-	0	0	0	0.6	13.4	13.4	13.2	13.9	-1.9	-8.4	0.6		
Total average costs[d]														
Drought conservation costs[e]	5	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Drought make-up supply costs[e]	0	15.4	15.4	15.4	8.4	15.4	8.4	11.9	8.4	13.2	4.1	4.1	4.1	4.1
Total drought cost[e].	5	21.1	21.1	21.1	14.1	21.1	14.1	17.6	14.1	18.9	9.8	9.8	9.8	9.8
Water conservation costs														

NOTE:

CCWD impacts are used for water cost and water quality analysis. ~~Providers in the statutory delta who obtain water from Tracy or Banks pumping plants are included in San Joaquin Valley results.~~

[a] The lack of an entry ~~means that data is not available does not mean that the impact is less than significant.~~

[b] Negative dollars in average years are cost savings from not needing available supplies.

[c] Under the 2020 development condition. Costs are additional costs to develop supplies or cost savings (-) from not needing available supplies.

[d] During a year of average delivery.

[e] During a year of the critical period (1928-1934). Assumes supplies are allocated evenly over the period. Drought conservation costs include net revenue loss, consumer surplus loss and conservation program costs.

[f] See text. Economic benefit relative to No Action condition.

Table 4. Summary of Impact Analysis for Delta Region

through reduced pollution loads caused by development and restoration of marsh and riparian habitats, and by increased immobilization of pollutants in these habitat types. Other water quality effects may be negative; for example, habitat restoration may increase organic carbon loads in delta water which would increase DBP levels in treated waters.

Restoration may reduce the uncertainty of M&I water supplies by enhancing recovery of special- status species. Because M&I providers acquire water supplies to protect against uncertainty, water supply costs could be reduced.

Water Quality Program

The Water Quality Program includes source control, treatment, management, and other actions to reduce releases and costs of pollutants in the Bay-Delta system. The Water Quality Program would utilize six programmatic actions to improve water quality in the Bay-Delta system. These actions are explained in more detail in the Water Quality Impacts Technical Report. The six actions are:

- Action 1. Reduce heavy metal emissions by source control and treatment of mine drainage.

  The principal mines are the Penn and Newton mines in the Mokelumne River watershed, and other sources are located in the Cosumnes River and Yolo Bypass watersheds. Costs would be incurred for sealing mines, removing and capping tailings piles, diverting streams, and removing contaminated stream bed sediments. It is expected that metals emissions will be reduced by 25 to 30 percent.

- Action 2. Reduce emissions of contaminants in urban and industrial runoff by enforcement of existing regulations and provision of incentives.

  This action would create economic costs through more vigorous enforcement of stormwater management plans. Costs include enforcement and compliance costs. The Water Quality Impacts Technical Report assumes that mass emissions from already built urban and industrial areas could be reduced by 5 percent, and emissions from future developed areas by 20 percent for a rough average of 10 percent. This action could affect all M&I providers in the Delta, including areas served by CCWD, Tracy, and parts of Stockton and Sacramento. Costs are not expected to be significant.

- Action 3. Reduce emissions of contaminants from wastewater treatment plant discharges by enforcement of existing regulations and provision of incentives.

  This action would require costs for more vigorous enforcement of existing regulation involving wastewater discharge, especially effluent limits and pretreatment requirements, and provision of incentives to encourage reductions in pollutant discharge. This action could affect all M&I providers in the Delta, including areas served by CCWD, Tracy, and parts of Stockton and Sacramento. Costs are not expected to be significant.

- Action 4. Reduce emissions of contaminants in agricultural surface runoff.

  This action would affect agricultural economics and land use; therefore, it is not discussed here.

- Action 5. Reduce emissions of contaminants in agricultural subsurface drainage.

  This action would affect agricultural economics and land use; therefore, it is not discussed here.

- Action 6. Relocate diversions to improve water supply quality.

  It is currently unclear how this action would be applied to M&I diverters.

These six actions would have ~~minor~~ benefits for M&I providers and their water customers with some offsetting costs. M&I costs are the M&I cost shares of the water quality measures. M&I providers or their customers would pay some of the costs of source control, stormwater and wastewater management, pretreatment measures, provisions of incentives, and relocation of diversions. Presently, the amount of these costs and the cost shares are unclear.

Most benefits of the Water Quality Program will be in the form of avoided treatment and regulatory costs, and avoided end-user costs. Water treatment costs, or costs of mixing Delta water with other supplies, might be reduced. The amount of cost savings will depend substantially on state and federal drinking water standards, especially with respect to metals, disinfec-tion by-products and microbes, and the changing costs and technology of water treatment. Lower salinity will reduce infra-structure damage costs, and net benefits (benefits minus costs) of conjunctive use and water reuse will be increased. End-users might avoid costs of purchased drinking water, tap water treatment, reduced life and value of water-using appliances, and adverse health effects. Currently, no monetary values have been estimated.

Water Use Efficiency

The Water Use Efficiency Program includes policies covering five areas: agricultural water use efficiency, urban water conservation, efficient use of environmental diversions, water recycling, and water transfers. Generally, the Water Use Efficiency Program is intended to help local agencies make informed decisions selecting the next least-costly increment of balancing supply and demand. Most actions in the Water Use Efficiency Program would be implemented by local agencies rather than CALFED. For M&I providers, the pace of implementation of urban conservation Best Management Practices (BMPs) would accelerate, and new practices would be added. Water reclamation (reuse) would be used to provide a larger share of supply, and policy measures to facilitate transfers would be developed. Overall effects of the Water Use Efficiency Program are considered to be small.

In general, M&I providers would pay the costs of M&I actions; however, only cost-effective measures would be implemented, implying that benefits would be commensurate with costs. Some actions such as tiered water pricing might result in lower costs for some users.

Conservation benefits may include more efficient water use. Additional benefits include the ability to receive any new water made available by CALFED or the ability to participate in a water transfer that requires approval of a CALFED agency. No general statement about net benefits is possible without consideration of overall supply levels and other factors unique to each provider and alternative.

CALFED Water Use Efficiency Input Report describes water conservation baseline levels and goals. Potential savings are described by region, but the Delta Region is not provided as a separate region. The costs and benefits of any conservation attributable to Calfed actions have not been counted in this analysis.

Levee System Integrity

System integrity actions will have minor effects on Delta hydraulics and water quality. Very small effects on water supply and quality and associated costs are expected in normal conditions. In flood conditions or following earthquake, improved levee integrity could affect M&I water quality through the effects of flooding on export operations and water quality. Benefits per event are probably most significant following earthquake, because water quality is less of a concern, on average, during flood events. On average, flood control benefits are limited by the small probability of levee failure event, and

this probability will be affected by the Levee System Integrity Program.

Conveyance

Because Alternative 1A would include no additional storage or conveyance, no water supply benefits are expected. The potential impacts of relocating Delta intake structures include minor water quality improvements and cost effects. Preliminary DWRSIM study results suggest using No Action Alternative deliveries for Alternative 1A as well. There may be a small water supply increase from Alternative 1A, but it has not yet been measured. Preliminary water quality results are also the same as those provided for the No Action condition.

Alternative 1B would include South Delta modifications to allow export pumps to operate at their physical capacity. Preliminary DWRSIM study results suggest using No Action Alternative deliveries for Alternative 1B as well, so there is no measured effect on water supply. Preliminary water quality results are also the same as those provided for the No Action condition.

Storage

Alternative 1C would build on Alternative 1B by enlarging Delta channels and by adding new water storage facilities. Up to 5 MAF of storage would be added.

The amount and pattern of impacts from Alternative 1C will depend on how the new facilities are managed and operated, and how costs are allocated. New storage facilities may facilitate water transfers. Overall, Alternative 1C should have little effect on water supplies for most Delta M&I providers because most providers do not receive CVP or SWP supplies. Conveyance and storage impacts on Delta M&I providers involve construction and displacement effects, as well as water supply and water quality.

Preliminary DWRSIM modeling studies and assumptions involving the allocation of increased yield imply that CCWD would gain about 9,200 AF in average years and 11,700 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 5 percent and 6.5 percent of demand in average and dry years, respectively. The average year supplies are worth $4.5 million, and the additional supplies in dry years are worth an additional $7.1 million relative to the cost of other supplies.

~~Water Quality Salinity~~ Changes Caused by Changes in Conveyance

DWR has provided preliminary analysis of TDS for Alternative 1C (DWR, 1997). The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. The average of 12 monthly 1976 to 1991 average TDS levels is 294 parts per million (ppm), not significantly different from the 300 ppm for the baseline condition.

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Alternatives 1A and 1B have water supplies and salinity identical to No Action levels, so there is no impact. In Alternative 1C, the annual economic benefit is not significant, estimated to be $0.6 million annually.

Limited information on bromide and organic carbon concentrations are available. For estimates "at CCC intake" and "at Los Vaqueros Intake" Alternative 1C shows slightly lower concentrations of bromide and nearly identical concentrations of DOC in comparison to Alternative 1A. Alternative 1A should be similar to No Action. Based on this limited information, changes in DBP precursors in 1A and 1C should not be economically significant.

Alternative 2

Alternative 2 would utilize a modified system of through-Delta conveyance. Five

variations of this configuration are considered that are made up of four conveyance and three storage options. All variations include the Programs, slightly modified to complement Alternative 2. Precise locations for many actions are not currently known, and names of locations are provided for example purposes only.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 2A would include the South Delta and CVP/SWP conveyance improvements as proposed for Alternative 1C. These measures would increase the diversion capacity of the existing export pumps to full capacity and provide additional operational flexibility. No new storage is included.

Preliminary DWRSIM modeling studies and assumptions involving yield allocation imply that CCWD would gain about 2,500 AF in average years and 1,300 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.4 percent and 0.7 percent of demand in average and dry years, respectively, The average year supplies are worth $1.3 million. The additional supplies in dry years are worth little relative to the cost of other supplies because they are almost 50 percent (1,300/2,500) reliable .

DWR has provided preliminary analysis of TDS for Alternative 2A. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. The average of 12 monthly 1976 to 1991 average TDS levels is 166 ppm, almost half of the 300 ppm for the baseline condition.

Storage

Alternative 2B would add up to 5.5 MAF of surface storage and 1 MAF of groundwater storage to Alternative 2A. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C. Preliminary water quality benefits are the same as those discussed for Alternative 2A.

Alternative 2D would use a screened intake in the Sacramento River and a new channel for conveyance. Habitat improvements might be used to provide conveyance and habitat, South Delta modifications might provide new habitat and increase export capacity, and CVP/SWP improvements would improve operating flexibility. Up to 2.0 MAF of storage south of the Delta would be provided.

Preliminary DWRSIM modeling studies and yield allocation assumptions imply that CCWD would gain about 5,300 AF in average years and 6,100 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 3.0 and 3.4 percent of demand in average and dry years, respectively. The average year supplies are worth $2.7 million. The additional supplies in dry years are worth an additional $3.5 million relative to the cost of other supplies.

DWR has provided preliminary analysis of TDS for Alternative 2D. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives.

Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. The average of 12 monthly 1976 to 1991 average TDS levels is 168 ppm, almost half of the 300 ppm for the baseline condition.

Alternative 2E might develop Tyler Island aquatic habitat and the McCormack Williamson Tract for conveyance. Mokelumne River floodway and East Delta habitat improvements on the South Fork Mokelumne would provide conveyance and habitat, South Delta modifications would provide new habitat and increase export capacity, and CVP/SWP improvements would improve operating flexibility. Up to 5.5 MAF of surface storage and 1 MAF of groundwater storage would be provided. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

~~Water Quality~~ ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in CCWD salinity caused by changes in delta conveyance configuration was conducted. Alternatives 2A through 2E show salinity levels of 161 to 168 ppm as compared to the No Action condition of 300 ppm. Annual economic benefits are $13.2 to $13.9 million.

Limited information on bromide and organic carbon concentrations are available. For estimates "at CCC intake" and "at Los Vaqueros Intake" Alternatives 2B, 2D and 2E show substantially lower concentrations of bromide than 1A. DOC concentrations, however, are slightly higher in Alternatives 2B and 2D and slightly lower in 2E. Alternative 1A should be similar to No Action. Based on this limited information, reductions in bromides in Alternative 2 are significant, but the economic consequences of this benefit cannot be estimated at this time.

Alternative 3

This configuration would utilize through-Delta modifications and an isolated system for through-Delta conveyance for exported supplies. Combinations of seven potential conveyance configurations and two new storage configurations result in nine variations. Precise locations for many actions are not currently known, and names of locations are provided for example purposes only.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 3A would modify Alternative 2A by adding a 5,000-cubic-foot-per-second (cfs) isolated open facility, and Delta islands would not be flooded and used for conveyance as in Alternative 2A.

Preliminary DWRSIM modeling studies and yield allocation assumptions imply that CCWD would gain about 2,500 AF in average years and 3,500 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.4 percent and 2.0 percent of demand in average and dry years, respectively. The average year supplies are worth $1.3 million. The additional supplies in dry years are worth an additional $2.3 million relative to the cost of other supplies.

DWR has provided preliminary analysis of TDS for Alternative 3A. Only differences in salinity due to different conveyance and intake configurations are modelled using DWR run 472B hydrology. The average of 12 monthly

1976 to 1991 average TDS levels is 317, more than the No Action level of 300.

Storage

Alternative 3B would add 5.7 MAF of surface water storage and 1 MAF of groundwater storage to Alternative 3A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that CCWD would gain about 10,800 AF in average years and 17,600 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 6.2 percent and 9.9 percent of demand in average and dry years, respectively. The average year supplies are worth $5.3 million. The additional supplies in dry years are worth $11.4 million relative to the cost of other supplies.

DWR has provided preliminary analysis of TDS for Alternative 3B. Only differences in salinity due to different conveyance and intake configurations are modelled using DWR run 472B hydrology. The average of 12 monthly 1976 to 1991 average TDS levels is 376, substantially more than the No Action level of 300.

Alternative 3E would replace the 5,000-cfs isolated open conveyance facility of Alternative 3B with a 15,000-cfs facility, and the enlargement and barrier at the head of the Old River would be removed. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

DWR has provided preliminary analysis of TDS for Alternative 3E. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. The average of 12 monthly 1976 to 1991 average TDS levels is 294 ppm, not significantly different from the 300 ppm for the baseline condition.

Alternative 3H would modify Alternative 3B by adding habitat on the present Tyler Island, changing the location of other habitat, and reducing in-Delta storage by 200 TAF for a total of 5.5 MAF of storage. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3I would modify Alternative 2C by adding an additional isolated intake (the northern 15,000-cfs isolated Sacramento River intake) and other new storage up to 6.5 MAF. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Salinity in Alternative 3A is similar to, but slightly more than No Action levels. Net economic costs are $1.9 million annually. In 3B, salinity is increased from 300 to 376 ppm for a net economic cost of $8.4 million annually. In Alternative 3E, salinity is nearly identical to No Action levels for a small net benefit of $0.6 million.

The increase in salinity in Alternative 3B is considered a significant adverse effect. Potential mitigation strategies include relocation of water supply intakes, re-operation, or new conveyance from better-quality sources.

Limited information on bromide and organic carbon concentrations are available. For estimates "at CCC intake" and "at Los Vaqueros Intake" Alternative 3E shows somewhat lower concentrations of bromide than 1A, but DOC concentrations are somewhat higher than in Alternative 1A. Alternative 1A should be similar to No Action. Based on this limited information, bromide concentrations would be reduced somewhat, but DOC concentrations increased somewhat. No economic benefit or cost estimates are possible at this time.

5.2.2 Bay Region

Alternative 1

Table 5 provides a summary of the impact analysis for the Bay region. The general description of Alternative 1 and the features of the each sub-alternative provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Any water quality improvements would affect the Bay Region through SWP and CVP exports.

Water Quality Program

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Water quality actions include only two actions:

- Action 2. Reduce emissions of contaminants in urban and industrial runoff by enforcement of existing regulations and provision of incentives.
- Action 3. Reduce emissions of contaminants from wastewater treatment plant discharges by enforcement of existing regulations and provision of incentives.

Water quality in the Bay Region could be affected by the quality of SWP and CVP exports as discussed below.

Water Use Efficiency

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Because the Bay Region generally has a high level of conservation, additional costs of conservation per unit of water saved may be higher than average. Efficiency Input Report describes preliminary water conservation baseline levels and goals. Potential real water savings from M&I uses due to CALFED Water Use Efficiency Actions for UR-4 (the San

Economic Parameter	Level by Alternative (millions of dollars per year)													
	Existing Conditions	No Action	Alternative 1			Alternative 2				Alternative 3				
			1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
CALFED water supply costs	0	0	No costs available											
Other water supply costs	-14.0	-8.4	-8.4	-8.4	-15.0	-10.6	-15.0	-12.3	-15.0	-11.7	-16.1	-16.1	-16.1	-16.1
~~Water quality~~ Salinity reduction benefits		0	0	0	-2.1	11.5	11.7	11.4	12.1	9.9	11	19.4	-	-
Total average costs														
Drought conservation costs	42.6	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Drought make-up supply costs	0	176.6	176.6	176.6	156.9	177.1	156.9	166.9	156.9	173.1	143.5	143.5	143.5	143.5
Total drought costs	42.6	202.9	202.9	202.9	183.2	203.4	183.2	193.2	183.2	199.4	169.8	169.8	169.8	169.8
Water conservation costs														

NOTE:

See notes from Table 4.

Table 5. Summary of Impact Analysis for the Bay Region (CCWD not included)

Francisco Bay Area) are estimated to be 135,000 to 150,000 AF. The costs and benefits of this conservation have not been counted.

Levee System Integrity

The nature and pattern of impacts are as described for Delta Region, Alternative 1. There is little potential impact except as levee failure might affect Delta export operations.

Conveyance

Because Alternative 1A would include no additional storage or conveyance, no substantial water supply benefits are expected. Alternative 1B would include South Delta modifications to allow export pumps to operate at their physical capacity. For Alternatives 1A and 1B, preliminary DWRSIM results suggest there will be no substantial change in water supply and water supply economics, and preliminary water quality analysis is the same as for the No Action condition.

Storage

Alternative 1C would build on Alternative 1B by enlarging Delta channels and by adding new water storage facilities. Up to 5 MAF of storage would be added. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Bay Region would gain about 21,000 AF in average years and 26,900 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 2.4 percent and 2.8 percent of demand in average and dry years, respectively. The average year supplies are worth $6.6 million annually in comparison to the costs of other supplies, and the additional supplies in dry years are worth an additional $19.8 million annually relative to the cost of other supplies.

DWR has provided preliminary analysis of TDS for Alternative 1C. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. Results, in terms of average salinity of exports from Clifton Court, are provided in Table 2.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Alternatives 1A and 1B have water supplies and salinity identical to No Action levels, so there is no impact. In Alternative 1C, the average tds of delivered water is increased slightly from 240 to 244 ppm for an annual economic cost of $2.1 million.

Limited information on bromide and organic carbon concentrations are available. The South Bay obtains water from SWP and CVP south delta exports. For estimates "at Clifton Ct" and "at Tracy PP" Alternative 1C shows slightly lower concentrations of bromide but slightly higher concentrations of DOC than 1A. Alternative 1A should be similar to No Action.

At the North Bay Aqueduct "at NBA intake," concentrations of bromides and DOC are about the same in Alternatice 1C as compared to 1A.

Based on this limited information, changes in DBP precursors in 1A and 1C should not be economically significant.

Alternative 2

The general description of Alternative 2 provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 2A would include the South Delta and CVP/SWP conveyance improvements as proposed for Alterna-tive 1C. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Bay Region would gain about 6,800 AF in average years and 3,000 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 0.8 percent of demand in average and 0.3 percent in dry years. The average year supplies are worth $2.2 million annually, but the additional CALFED supplies in dry years are worth little ($0.5 million) relative to the supplies they replace.

DWR has provided preliminary analysis of TDS for Alternative 2A. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology.

Results, in terms of average salinity of exports from Clifton Court, are summarized in Table 2. There is a difference in the TDS of exports between Alterna-tive 2A and No Action.

Storage

Alternative 2B would add up to 5.5 MAF of surface storage and 1 MAF of groundwater storage to Alternative 2A. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C. Preliminary water quality benefits are the same as those discussed for Allternative 2A.

Alternative 2D would use a screened intake at Hood to divert water from the Sacramento River, a new channel for conveyance, and about 2 MAF of new storage south of the Delta. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Bay Region would gain about 12,100 AF in average years and 13,900 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.4 percent of demand in average and dry years. The average year supplies are worth $3.9 million annually, and the additional supplies in dry years are worth an additional $9.7 million relative to the cost of other supplies. Preliminary water quality analysis of water exported from Clifton Court is summarized in Table 2.

Alternative 2E would develop new conveyance, and up to 5.5 MAF of surface storage and 1 MAF of groundwater storage would be provided. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C. Preliminary water quality analysis of water exported from Clifton Court is summarized in Table 2.

~~Water Quality Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in Bay Region salinity caused by changes in delta conveyance configuration was conducted. Alternatives 2A through 2E show salinity levels of 212 to 213 ppm as compared to the No Action condition of 240 ppm. Annual economic benefits are $11.5 to $12.1 million.

Limited information on bromide and organic carbon concentrations are available. The South Bay obtains water from CVP and SWP diversions in the south delta. For estimates "at Tracy PP" and "at Clifton Ct" Alternatives 2B, 2D and 2E show slightly lower concentrations of bromide and DOC than 1A. DOC estimates are slightly higher or the same. Alternative 1A should be

similar to No Action. Based on this limited information, reductions or increases in DBP precursors in Alternative 2 do not appear to be economically significant.

At the North Bay Aqueduct "at NBA intake," concentrations of bromides and DOC are both substantially increased in Alternative 2. This may be a significant effect, but no economic analysis is available.

Alternative 3

The general description of Alternative 3 provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 3A would modify Alternative 2A by adding a 5,000-cfs isolated open facility, and Delta islands would not be flooded and used for conveyance as in Alternative 2A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Bay Region would gain about 10,200 AF in average years and 7,900 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1 percent of demand in average and dry years. The average year supplies are worth $3.3 million annually, and the additional supplies in dry years are worth an additional $3.5 million relative to the cost of other supplies.

Storage

Alternative 3B would add 5.7 MAF of surface water storage and 1 MAF of groundwater storage to Alternative 3A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Bay Region would gain about 24,900 AF in average years and 40,300 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 2.9 percent and 4.2 percent of demand in average and dry years, respectively. The average year supplies are worth $7.7 million annually, and the additional supplies in dry years are worth an additional $33.1 million relative to the cost of other supplies.

Alternative 3E would replace the 5,000-cfs isolated open conveyance facility of Alternative 3B with a 15,000-cfs facility, and the enlargement and barrier at the head of the Old River would be removed. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B. Preliminary water quality analysis of water exported from Clifton Court is summarized in Table 2. The concentration of TDS in water exported from Clifton Court would be reduced by over one-half relative to the No Action Alternative.

Alternative 3H would modify Alternative 3B by changing the amount and location of habitat and reducing in-Delta storage by 200 TAF, for a total of 5.5 MAF of storage. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3I would modify Alternative 2C by adding an additional isolated intake and other new storage up to 6.5 MAF. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Water Quality Salinity Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Salinity of Alternative 3A water deliveries is less saline (217 ppm) than No Action (240 ppm). Net economic benefits are $9.9 million annually. In 3B, salinity is reduced to 214 ppm for a net economic benefit of $11.0 million annually. In Alternative 3E, salinity is reduced to 195 ppm for a net benefit of $19.4 million in comparison to No Action.

Limited information on bromide and organic carbon concentrations are available. The South Bay obtains water from CVP and SWP diversions in the south delta. For estimates "at Tracy PP" and "at Clifton Ct" Alternative 3E show much lower concentrations of bromide and substantially lower concentrations of DOC than 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in DBP precursors in the South Bay region in Alternative 3 appear to be economically significant.

At the North Bay Aqueduct "at NBA intake," concentrations of bromides and DOC are both substantially increased in Alternative 3. This could be a significant adverse effect, but no economic analysis is available.

5.2.3 Sacramento River Region

The impact analysis for the Sacramento River region is summarized in Table 6.

Alternative 1

The general description of Alternative 1 and the features of the each sub-alternative provided for the Delta Region is valid for the Sacramento River Region as well.

Ecosystem Restoration Program

The Ecosystem Restoration Program would have no effect on the Sacramento River Region, except as CVP water service contract supply amounts may be affected.

Water Quality Program

The Water Quality Program is the same as described for the Delta Region, Alternative 1, except that Actions 5,6, and 7 are not included. Major mines in the Sacramento River Basin include Iron Mountain Mine, Afterthought Mine, Cherokee Mine, and Manzanita Mine. The Water Quality Program would have no effect on the Sacramento River Region, except as CVP water service contract supply amounts may be affected.

Water Use Efficiency

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Because the Sacramento River Region generally has a low level of conservation in the existing condition, additional costs of conservation per unit of water saved may be lower than average. CALFED Water Use Efficiency Input Report describes preliminary water conservation baseline levels and goals. Potential real water savings from M&I uses due to CALFED Water Use Efficiency Actions for UR-1, the Sacramento River Area, are estimated to be 5,000 to 10,000 AF.

Levee System Integrity

The Levee System Integrity Program would have no effect on M&I water supplies in the Sacramento River Region.

Conveyance

Because Alternative 1A would include no additional storage or conveyance, no substantial water supply benefits are expected. Alterna-tive 1B would include South Delta modifications to allow export pumps to operate at their physical capacity. For Alternatives 1A and 1B, preliminary DWRSIM results suggest there will be no substantial change in water supply and water supply economics.

Storage

Alternative 1C would build on Alternative 1B by enlarging Delta channels and by adding new water storage facilities. Up to 5 MAF of storage would be added. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Sacramento River Region would gain about 11,100 AF in average years and 7,900 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.2 percent of demand in average and 0.8 percent of demand in dry years. The average year supplies are worth $1.3 million annually, and the additional supplies in dry years are worth an additional $0.6 million annually relative to the cost of other supplies.

Alternative 2

The general description of Alternative 2 provided for the Delta Region is valid for the Sacramento River Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 2A would include the South Delta and CVP/SWP conveyance improvements as proposed for Alternative 1C. Preliminary DWRSIM modeling studies and yield allocation assumptions

Economic Parameter	Level by Alternative (millions of dollars per year)													
	Existing Conditions	No Action	Alternative 1			Alternative 2				Alternative 3				
			1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
CALFED water supply costs	0	0	No costs available											
Other water supply costs	0	0.1	0.1	0.1	-1.2	0	-1.2	-0.9	-1.2	0	-1.4	-1.4	-1.4	-1.4
Total average costs														
Drought conservation costs	0	2.6	2.6	2.6	2.0	2.6	2.0	2.5	2.0	2.3	1.4	1.4	1.4	1.4
Drought make-up supply costs	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0
Total drought costs	1.9	2.6	2.6	2.6	2.0	2.6	2.0	2.5	2.0	2.3	1.4	1.4	1.4	1.4
Water quality costs														
Water conservation costs														

Note:
See notes from Table 4.

Table 6. Summary of Impact Analysis for the Sacramento River Region

imply that the Sacramento River Region would gain about 500 AF in average years and 900 AF in dry years. From the M&I water supply economic analysis, these gains would provide for less than 0.1 percent of demand in average and dry years. The additional supplies are worth little ($100,000 annually) relative to the cost of other supplies.

Storage

Alternative 2B would add up to 5.5 MAF of surface storage and 1 MAF of groundwater storage to Alternative 2A. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

Alternative 2D would use a screened intake at Hood to divert water from the Sacramento River, a new channel for conveyance, and about 2 MAF of new storage south of the Delta. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Sacramento River Region would gain about 8,500 AF in average years and 4,100 AF in dry years. From the M&I water supply economic analysis, these gains would provide for less than 0.1 percent of demand in average and dry years. The average year supplies are worth $1.0 million annually, and the additional supplies in dry years are worth an additional $0.2 million relative to the cost of other supplies.

Alternative 2E would develop new conveyance, and up to 5.5 MAF of surface storage and 1 MAF of groundwater storage would be provided. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

Alternative 3

The general description of Alternative 3 provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 3A would modify Alternative 2A by adding a 5,000-cfs isolated open facility, and Delta islands would not be flooded and used for conveyance as in Alternative 2A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Sacramento River Region would gain about 500 AF in average years and 2,300 AF in dry years. From the M&I water supply economic analysis, these gains would provide for less than 0.5 percent of demands. The average year supplies are worth $0.1 million annually, and the additional supplies in dry years are worth an additional $0.3 million relative to the cost of other supplies.

Storage

Alternative 3B would add 5.7 MAF of surface water storage and 1 MAF of groundwater storage to Alternative 3A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Sacramento River Region would gain about 12,300 AF in average years and 11,900 AF in dry years. These gains would provide for about 1.3 and 1.2 percent of demand in average and dry years, respectively. The average year supplies are worth $1.4 million annually, and the

additional supplies in dry years are worth an additional $1.2 million relative to the cost of other supplies.

Alternative 3E would replace the 5,000-cfs isolated open conveyance facility of Alternative 3B with a 15,000-cfs facility, and the enlargement and barrier at the head of the Old River would be removed. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3H would modify Alternative 3B by changing the amount and location of habitat and reducing in-Delta storage by 200 TAF, for a total of 5.5 MAF of storage. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3I would modify Alternative 2C by adding an additional isolated intake and other new storage up to 6.5 MAF. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

5.2.4 San Joaquin River Region

Table 7 provides a summary of the impact assessment for the San Joaquin River Region.

Alternative 1

The general description of Alternative 1 and the features of the each sub-alternative provided for the Delta Region is valid for the San Joaquin River Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Any water quality improvements would affect the San Joaquin River Region through SWP and CVP exports.

Water Quality Program

The nature and pattern of impacts are as described for the Delta Region, Alternative 1, except that water quality actions do not include Actions 4 and 6. The principal mine is the New Idria Mine in San Benito County.

Any water quality improvements would affect the San Joaquin River Region through SWP and CVP exports.

Water Use Efficiency

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Because the San Joaquin River Region generally has a lower than average level of conservation in the existing condition, additional costs of conservation per unit of water saved may be lower than average. CALFED Water Use Efficiency Input Report describes preliminary water conservation baseline

Economic Parameter	Existing Conditions	No Action	Alternative 1			Alternative 2				Alternative 3				
			1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
CALFED water supply costs	0	0	No costs available											
Other water supply costs	0	-1.7	-1.7	-1.7	-3.4	-2.2	-3.4	-2.6	-3.4	-2.5	-3.7	-3.7	-3.7	-3.7
~~Water quality~~ Salinity reduction benefits		0	0	0	-.02	1.3	1.4	1.3	1.4	1.8	2.1	3.3		
Total average costs														
Drought conservation costs	0	7.0	7.0	7.0	6.6	7.0	6.6	6.8	6.6	7.0	6.4	6.4	6.4	6.4
Drought make-up supply costs	8.5	2.1	2.1	2.1	1.4	2.1	1.4	1.7	1.4	1.9	1.0	1.0	1.0	1.0
Total drought costs	8.5	9.1	9.1	9.1	8.0	9.1	8.0	8.5	8.0	8.9	7.4	7.4	7.4	7.4
Water conservation costs														

Level by Alternative (millions of dollars per year)

NOTE:

See notes from Table 4.

Table 7. Summary of Impact Analysis for the San Joaquin River Region

levels and goals. Potential real water savings from M&I uses due to CALFED Water Use Efficiency Actions for UR-2 (the Eastside San Joaquin River) and UR-3 (the Tulare Lake Region) are estimated to be 40,000 to 50,000 AF annually. No economic analysis of benefits or costs associated with this conservation is available.

Levee System Integrity

The nature and pattern of impacts are as described for Delta Region, Alternative 1. There is little potential impact, except as levee failure might affect Delta export operations.

Conveyance

Because Alternative 1A would include no additional storage or conveyance, no substantial water supply benefits are expected. Alternative 1B would include South Delta modifications to allow export pumps to operate at their physical capacity. For Alternatives 1A and 1B, preliminary DWRSIM results suggest that there will be no substantial change in water supply.

Storage

Alternative 1C would build on Alternative 1B by enlarging Delta channels and by adding new water storage facilities. Up to 5 MAF of storage would be added. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the San Joaquin River Region would gain about 9,400 AF in average years and 12,100 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.3 percent of demand in average years, and 1.7 percent of demand in dry years. The average year supplies are worth $1.7 million in comparison to the costs of other supplies, and the additional supplies in dry years are worth an additional $1.0 million annually relative to the cost of other supplies. Preliminary water quality analysis results are reported in Table 2.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Alternatives 1A and 1B have water supplies and salinity identical to No Action levels, so there is no impact. In Alternative 1C, the average tds of delivered water is increased from 315 to 325 for an annual economic cost of $0.2 million.

Limited information on bromide and organic carbon concentrations are available. For estimates "at Tracy PP" Alternative 1C shows slightly lower or the same concentrations of bromide and slightly higher concentrations of DOC than 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in DBP precursors in 1A and 1C should not be economically significant.

Alternative 2

The general description of Alternative 2 provided for the Delta Region is valid for the San Joaquin River Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 2A would include the South Delta and CVP/SWP conveyance improvements as proposed for Alternative 1C. Preliminary DWRSIM modeling studies

and yield allocation assumptions imply that the San Joaquin River Region would gain about 3,000 AF in average years and 1,400 AF in dry years. From the M&I water supply economic analysis, these gains would provide for less than 0.5 percent of demand in average and dry years. The average year supplies are worth $0.6 million in comparison to the cost of other supplies, but the additional supplies in dry years have little additional value because the dry-year yield of the supplies replaced is about the same as the new CALFED supplies.

Storage

Alternative 2B would add up to 5.5 MAF of surface storage and 1 MAF of groundwater storage to Alternative 2A. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

Alternative 2D would use a screened intake at Hood to divert water from the San Joaquin River, a new channel for conveyance, and about 2 MAF of new storage south of the Delta. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the San Joaquin River Region would gain about 5,400 AF in average years and 6,300 AF in dry years. These gains would provide for about 0.8 percent of demand in average years, and 0.9 percent of demand in dry years. The average year supplies are worth $1.0 million in comparison to the cost of other supplies. These supplies would have more value if they can be managed to meet demands in dry years. The additional supplies in dry years are worth an additional $0.5 million annually relative to the cost of other supplies.

Alternative 2E would develop new conveyance, and up to 5.5 MAF of surface storage and 1 MAF of groundwater storage would be provided. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in San Joaquin Region salinity caused by changes in delta conveyance configuration was conducted. Alternatives 2A through 2E show salinity levels of 237 to 240 ppm as compared to the No Action condition of 315 ppm. Annual economic benefits are $1.3 to $1.4 million.

~~Limited information on bromide and organic carbon concentrations are available. For estimates "at Tracy PP", Alternatives 2B, 2D and 2E show somewhat lower concentrations of bromide, but slightly higher levels of DOC than 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in DBP precursors in Alternative 2 should not be economically significant.~~

Alternative 3

The general description of Alternative 3 provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 3A would modify Alternative 2A by adding a 5,000-cfs

isolated open facility, and Delta islands would not be flooded and used for conveyance as in Alternative 2A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the San Joaquin River Region would gain about 4,600 AF in average years and 3,600 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 0.5 percent of demand in average years, and 0.7 percent in dry years. The average year supplies are worth $0.8 million in comparison to the cost of other supplies. The additional supplies in dry years are worth an additional $0.2 million annually relative to the cost of other supplies.

Storage

Alternative 3B would add 5.7 MAF of surface water storage and 1 MAF of groundwater storage to Alternative 3A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the San Joaquin River Region would gain about 11,200 AF in average years and 18,100 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.6 and 3.8 percent of demands in average and dry years, respectively. The average year supplies are worth $2.0 million, and the additional supplies in dry years are worth an additional $1.8 million annually relative to the cost of other supplies.

Alternative 3E would replace the 5,000-cfs isolated open conveyance facility of Alternative 3B with a 15,000-cfs facility, and the enlargement and barrier at the head of the Old River would be removed. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3H would modify Alternative 3B by changing the amount and location of habitat and reducing in-Delta storage by 200 TAF, for a total of 5.5 MAF of storage. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Alternative 3I would modify Alternative 2C by adding an additional isolated intake and other new storage up to 6.5 MAF. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Salinity of Alternative 3A water deliveries is less (250 ppm) than in No Action (315 ppm). Net economic benefits are $1.8 million annually. In Alternative 3B, salinity is reduced to 243 ppm for a net economic benefit of $2.1 million annually. In Alternative 3E, salinity is reduced to 193 ppm for a net benefit of $3.3 million annually in comparison to No Action.

Limited information on bromide and organic carbon concentrations are available. For estimates "at Tracy PP" Alternative 3E shows much lower concentrations of bromide and substantially lower concentrations of DOC than 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in DBP precursors in Alternative 3E should be economically significant.

5.2.5 Other SWP Service Areas

Table 8 provides a summary of the impact analysis for the Other SWP Service Areas.

Alternative 1

The general description of Alternative 1 and the features of the each sub-alternative provided for the Delta Region is valid for the Other SWP Service Areas as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Any water quality improvements or

other benefits would affect the Other SWP Service Areas through Delta exports only. Costs and cost shares are currently unknown.

Water Quality Program

There is no water quality program targeted to ~~this~~ these regions because the region's watersheds do not drain to the Bay or Delta. However, water quality improvements in the Delta would affect the Other SWP Service Areas through SWP exports. Costs and cost shares are currently unknown.

Economic Parameter	Existing Conditions	No Action	Alternative 1			Alternative 2				Alternative 3				
			1a	1b	1c	2a	2b	2d	2e	3a	3b	3e	3h	3i
	Level by Alternative (millions of dollars per year)													
CALFED water supply costs	0	0	No costs available											
Other water supply costs	-91	601	601	601	466	556	466	521	466	534	442	442	442	442
~~Water quality benefits~~		~~0~~	~~0~~	~~0~~	~~-10.6~~	~~104.6~~	~~113.3~~	~~105.9~~	~~116~~	~~96.6~~	~~107.8~~	~~186.1~~		
~~Salinity reduction benefits~~		~~0~~	~~0~~	~~0~~	~~8.5~~	~~112.1~~	~~118.8~~	~~113.3~~	~~122~~	~~100.4~~	~~115.0~~	~~180.3~~		
Total average costs														
Drought conservation costs	63	310	310	310	310	310	310	310	310	310	310	310	310	310
Drought make-up supply costs	0	685	685	685	535	680	535	608	535	650	451	451	451	451
Total drought costs	63	995	995	995	845	990	845	918	845	960	761	761	761	761
Water conservation costs														

NOTE:

See notes from Table 4.

Table 8. Summary of Impact Analysis for Other SWP Service Areas

Water Use Efficiency

The nature and pattern of impacts are as described for the Delta Region, Alternative 1. Because the Other SWP Service Areas generally has a higher than average existing level of conservation, additional costs of conservation per unit of water saved may be higher than average. CALFED Water Use Efficiency Input Report describes preliminary water conservation baseline levels and goals. Potential real water savings from M&I uses due to CALFED Water Use Efficiency Actions for UR-5 (the Central Coast), UR-6 (Southern California), and UR-7 (the Colorado River Region) are estimated to be 525,000 to 575,000 AF annually. The economic benefits or costs of this conservation have not been considered in this analysis.

Levee System Integrity

The nature and pattern of impacts are as described for Delta Region, Alternative 1. There is little potential impact, except as levee failure might affect Delta export operations. The economic cost of Delta export disruptions is inversely related to the amount of south-of-Delta storage, but this effect is judged too small to warrant a comparison across alternatives.

Conveyance

Because Alternative 1A would include no additional storage or conveyance, no ~~water~~ substantial water supply benefits are expected. Alternative 1B would include South Delta modifications to allow export pumps to operate at their physical capacity. For Alternatives 1A and 1B, preliminary DWRSIM results suggest that there will be no substantial change in water supply and water supply economics. Preliminary water quality results also suggest no quantifiable difference from No Action conditions.

Storage

Alternative 1C would build on Alternative 1B by enlarging Delta channels and by adding new water storage facilities. Up to 5 MAF of storage would be added. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Other SWP Service Areas would gain about 138,100 AF in average years and 176,700 AF in dry years. These gains would provide for about 2.4 percent of demand in average years and 4.5 percent of demand in dry years. The average year supplies are worth $135.4 million in comparison to the cost of other supplies. These supplies would have even more value if they can be managed to meet demands in dry years. The additional supplies in dry years are worth an additional $150.6 million annually relative to the cost of other supplies. These supply values would be less if water transfers from the Central Valley were allowed as a supply option.

DWR has provided preliminary analysis of TDS of export water for Alternative 1C. The salinity analysis does not consider differences in the amount of storage and in the amount and timing of exports between alternatives. Rather, only differences in conveyance and intake configurations are modeled using DWR Run 472B hydrology. Results, in terms of average salinity of exports from Clifton Court, are summarized in Table 2.

Water Quality ~~Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Alternatives 1A and 1B have water supplies and salinity identical to No Action levels, so there is no impact. In Alternative 1C, the average tds of delivered water is increased from 1 to 2 percent, depending on subregion, for an annual economic cost of ~~$10.6~~ $8.5 million.

Limited information on bromide and organic carbon concentrations are available. For estimates at Clifton Ct., Alternative 1C shows slightly lower concentrations of bromide but slightly higher DOC than in 1A. Alternative 1A should be similar to No

Action. Based on this limited information, any change in DBP precursors in 1A and 1C should not be economically significant.

Alternative 2

The general description of Alternative 2 provided for the Delta Region is valid for the Other SWP Service Areas as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 2A would include the South Delta and CVP/SWP conveyance improvements as proposed for Alterna-tive 1C. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Other SWP Service Areas would gain about 44,600 AF in average years and 19,800 AF in dry years. These gains would provide for about 0.8 percent of demand in average years, and 0.3 percent in dry years. The average year supplies are worth $45.3 million in comparison to the cost of other supplies. These supplies would have more value if they can be managed to meet demands in dry years. The additional supplies in dry years have little additional value ($5.4 million) because the dry-year yield of the supplies replaced is about the same as the new CALFED supplies.

DWR has provided preliminary analysis of TDS of exports for Alternative 2A. Results, in terms of average salinity of exports from Clifton Court, are summarized in Table 2.

Storage

Alternative 2B would add up to 5.5 MAF of surface storage and 1 MAF of groundwater storage to Alternative 2A. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alterna-tive 1C.

Alternative 2D would use a screened intake at Hood to divert water from the Other SWP Service Areas, a new channel for conveyance, and about 2 MAF of new storage south of the Delta. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Other SWP Service Areas would gain about 79,300 AF in average years and 91,700 AF in dry years. From the M&I water supply economic analysis, these gains would provide for about 1.4 percent of demand in average years and 1.5 percent of demand in dry years. The average year supplies are worth $79.5 million, and the additional supplies in dry years are worth an additional $77.3 million annually relative to the cost of other supplies.

DWR has provided preliminary analysis of TDS of exports for Alternative 2D. Results, in terms of average salinity of exports from Clifton Court, are summarized in Table 2.

Alternative 2E would develop new conveyance, and up to 5.5 MAF of surface storage and 1 MAF of groundwater storage would be provided. Preliminary DWRSIM results and water supply benefits are the same as those discussed for Alternative 1C.

DWR has provided preliminary analysis of TDS of exports for Alternative 2E. Results, in terms of average salinity of exports from Clifton Court, are summarized in Table 2.

Water Quality Salinity Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in Other SWP Service Area salinity caused by changes in

delta conveyance configuration was conducted. Alternatives 2A through 2E show salinity levels reduced by 9 to 25 percent as compared to the No Action condition, depending on sub-region. Annual economic benefits are ~~$104.6 to $116.0~~ $112.1 to $121.9 million.

Limited information on bromide and organic carbon concentrations are available. For estimates "at Clifton Ct." Alternatives 2B, 2D and 2E show somewhat lower concentrations of bromide and slightly higher concentrations of DOC than 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in bromides in Alternative 2 may be economically significant, but increases in DOC are probably not significant. No economic analysis is available.

Alternative 3

The general description of Alternative 3 provided for the Delta Region is valid for the Bay Region as well.

Ecosystem Restoration Program

The nature and pattern of impacts are as described for Alternative 1.

Water Quality Program

The nature and pattern of impacts are as described for Alternative 1.

Water Use Efficiency

The nature and pattern of impacts are as described for Alternative 1.

Levee System Integrity

The nature and pattern of impacts are as described for Alternative 1.

Conveyance

Alternative 3A would modify Alternative 2A by adding a 5,000-cfs isolated open facility, and Delta islands would not be flooded and used for conveyance as in Alternative 2A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Other SWP Service Areas would gain about 66,900 AF in average years and 52,100 AF in dry years. These gains would provide for about 1.2 percent of demand in average years, and 0.9 percent in dry years. The average year supplies are worth $67.4 million, and the additional supplies in dry years are worth an additional $35.3 million annually relative to the cost of other supplies.

Storage

Alternative 3B would add 5.7 MAF of surface water storage, and 1 MAF of groundwater storage to Alternative 3A. Preliminary DWRSIM modeling studies and yield allocation assumptions imply that the Other SWP Service Areas Region would gain about 163,600 AF in average years and 265,200 AF in dry years. These gains would provide for about 2.8 percent of demand in average years, and 4.4 percent in dry years. The Other SWP Service Areas Region in the 2020 average condition would require new water to meet demands, so the average year supplies are worth $158.8 million, and the additional supplies in dry years are worth an additional $234.6 million annually relative to the cost of other supplies.

Alternative 3E would replace the 5,000-cfs isolated open conveyance facility of Alternative 3B with a 15,000-cfs facility, and the enlargement and barrier at the head of the Old River are removed. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

DWR has provided preliminary analysis of TDS of exports for Alternative 3E. Results, in terms of average salinity of exports from Clifton Court, were summarized in Table 2.

Alternative 3H would modify Alternative 3B by changing the amount and location of habitat and reducing in-Delta storage by 200 TAF for a total of 5.5 MAF of storage. No additional effects on M&I

water use and costs are expected in comparison to Alternative 3B.

Alternative 3I would modify Alternative 2C by adding an additional isolated intake and other new storage up to 6.5 MAF. No additional effects on M&I water use and costs are expected in comparison to Alternative 3B.

~~Water Quality Salinity~~ Changes Caused by Changes in Delta Conveyance

Economic analysis of changes in salinity caused by changes in delta conveyance configuration was conducted. Salinity of Alternative 3A water deliveries is reduced by 7 to 21 percent, depending on sub-region, in comparison to No Action. Net economic benefits are ~~$90.6~~ $100.4 million annually. In 3B, salinity is reduced by 8 to 24 percent for a net economic benefit of ~~$107.8~~ $115.0 million annually. In Alternative 3C, salinity is reduced by 14 to 41 percent for a net benefit of ~~$186.1~~ $180.3 million annually in comparison to No Action.

Limited information on bromide and organic carbon concentrations are available. For estimates at Clifton Ct. Alternative 3E shows much lower concentrations of bromide and substantially lower concentrations of DOC than Alternative 1A. Alternative 1A should be similar to No Action. Based on this limited information, reductions in DBP precursors in Alternative 3E should be economically significant.

5.3 Summary of Comparisons by Region

Economic impacts of the Ecosystem Restoration, Water Quality, Water Use Efficiency, Water Transfers and Levee System Integrity Programs have not been quantified, primarily for lack of information on the magnitude of physical impacts and cost sharing.

Impacts of water storage and water conveyance components are summarized by region in Tables 9 through ~~16~~ 18. All of the analysis on which these tables are based is preliminary and subject to change.

However, some trends are readily apparent. Based on reductions in drought water supply costs, Alternatives 1C 2B, 2E, and 3B through 3I all have a significant influence on water supply for all regions. CCWD is entirely dependent on Delta export water for its supplies, so Alternatives 2D and 3A are also significant in the Delta region.

For water users who take export watre from Clifton Court, Alternative 1C increases salinity and increases salinity costs. All M&I water users considered benefit from Alternative 2. Total annual benefits range from $100 to $150 million annually. Benefits in alternative 3 range from $100 in 3A to $208 million in 3C.. Salinity for CCWD is increased in Alternative 3B.

6.0 References Cited

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Alternative	CALFED Water Storage Costs	Other Water Supply Costs	Water Quality Costs	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Increasing importance of stored water for water quality control.	Increasing.
No Action Alternative	None	Includes CVPIA and Los Vaqueros. Increased demand requires new supplies or more use of existing supplies, increasing costs.	Delta water quality deteriorates relative to existing conditions.	Small increase in real water costs and water prices, and conservation initiatives result in some water savings.
Alternative 1	Unknown	Alternative 1C reduces other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 2	Unknown	Alternatives 2B and 2E reduce other water supply costs with 5 MAF of new storage. 2D also significant.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 3	Unknown	All variations include more storage, which reduces other water supply costs.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.

Table 9. Generalized Impacts of Alternatives on M&I Water Costs for the Delta Region—Water Storage

Alternative	CALFED Water Conveyance Costs	Other Water Supply Costs	Water Quality Costs[a]	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Conveyance capacity limits ability to move water when quality is better.	Increasing.
No Action Alternative	None	Increased demand may require more capacity, increasing costs.	Less excess capacity in 2020 means less ability to move water when quality is better.	Conservation may help relieve capacity constraints.
Alternative 1	Unknown	No substantial changes to conveyance and no quantifiable effect on supplies.	Alternative 1C reduces ~~water quality~~ salinity costs by less than $1 million annually.	Without supply increase, no interaction between conveyance and conservation.
Alternative 2	Unknown	Changes to conveyance have little quantifiable effect on water supplies.	~~Water quality~~ Salinity reduction benefit of $10 million to $15 million annually.	Without supply increase, no interaction between conveyance and conservation.
Alternative 3	Unknown	Isolated facility increases water supply, but effect not considered significant.	Alternatives 3A and 3B ~~impair water quality at costs of~~ increase salinity costs by $1.8 and $8.4 million, respectively. ~~Alternative 3E increases DOC concentrations~~	Without significant supply increase, no interaction between conveyance and conservation.

[a] Water quality analysis considered effects of different intake and conveyance configurations without analysis of interactions with storage or export amounts, or timing.

Table 10. Generalized Impacts of Alternatives on M&I Water Costs for the Delta Region—Water Conveyance

Alternative	CALFED Water Storage Costs	Other Water Supply Costs	Water Quality Costs	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Increasing importance of stored water for water quality control.	Increasing.
No Action Alternative	None	Includes CVPIA. Increased demand requires new supplies or more use of existing supplies, increasing costs.	Delta water quality deteriorates relative to existing conditions.	Small increase in real water costs and water prices, and conservation initiatives result in some water savings.
Alternative 1	Unknown	Alternative 1C reduces other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 2	Unknown	Alternatives 2B and 2E reduce other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 3	Unknown	All variations (except for Alternative 3A) include more storage, which reduces other water supply costs.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.

Table 11. Generalized Impacts of Alternatives on M&I Water Costs for the Bay Region—Water Storage

Alternative	CALFED Water Conveyance Costs	Other Water Supply Costs	Water Quality Costs[a]	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Conveyance capacity limits ability to move water when quality is better.	Increasing.
No Action Alternative	None	Increased demand may strain conveyance capacity into the region.	Less excess capacity in 2020 means less ability to move water when quality is better.	Additional conservation may reduce capacity pressures.
Alternative 1	Unknown	No substantial changes to conveyance and no quantifiable effect on supplies.	Alternative 1C increases ~~water quality~~ salinity costs by $2.1 million annually.	Without supply increase, no interaction between conveyance and conservation.
Alternative 2	Unknown	Changes to conveyance have little quantifiable effect on water supplies.	Annual benefit from ~~improved water quality~~ reduced salinity is $10 to $15 million annually. DBP precursors increased for North Bay	Without supply increase, no interaction between conveyance and conservation.
Alternative 3	Unknown	Isolated facility increases water supply, but effect not considered significant.	Annual benefit from ~~improved water quality~~ reduced salinity ranges from $10 million in Alternative 3A to $20 million in Alternative 3B. In Alternative 3E, bromide and DOC decreased in South Bay but increased in North Bay.	Without significant supply increase, no interaction between conveyance and conservation.

[a] Water quality analysis considered effects of different intake and conveyance configurations without analysis of interactions with storage or export amounts, or timing.

Table 12. Generalized Impacts of Alternatives on M&I Water Costs for the Bay Region—Water Conveyance

Alternative	CALFED Water Storage Costs	Other Water Supply Costs	Water Quality Costs	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Water quality generally not a problem.	Increasing, assume Level 1.
No Action Alternative	None	Includes CVPIA. Increased demand requires new supplies or more use of existing supplies, increasing costs.	Some deterioration of water quality relative to existing conditions.	Small increase in real water costs and water prices, and conservation initiatives result in some water savings.
Alternative 1	Unknown	Alternative 1C reduces other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 2	Unknown	Alternatives 2B and 2E reduce other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 3	Unknown	All variations (except for Alternative 3A) include more storage which reduces other water supply costs.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.

Table 13. Generalized Impacts of Alternatives on M&I Water Costs for the Sacramento River Region—Water Storage

Alternative	CALFED Water Conveyance Costs	Other Water Supply Costs	Water Quality Costs[a]	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Water quality generally not a problem, not related to Delta conveyance.	Increasing.
No Action Alternative	None	Increased demand increases peak deliveries, but not through Delta.	Water quality deteriorated, but still not a big problem.	Little interaction between conservation and Delta conveyance.
Alternative 1	Unknown	No substantial changes to conveyance and no quantifiable effect on supplies.	No quantifiable effect on water quality.	Without supply increase, no interaction between conveyance and conservation.
Alternative 2	Unknown	Changes to conveyance have little quantifiable effect on water supplies.	No quantifiable effect on water quality.	Without supply increase, no interaction between conveyance and conservation.
Alternative 3	Unknown	Isolated facility increases water supply, but effect not considered significant.	No quantifiable effect on water quality.	Without significant supply increase, no interaction between conveyance and conservation.

[a] Water quality analysis considered effects of different intake and conveyance configurations without analysis of interactions with storage or export amounts, or timing.

Table 14. Generalized Impacts of Alternatives on M&I Water Costs for the Sacramento River Region—Water Conveyance

Alternative	CALFED Water Storage Costs	Other Water Supply Costs	Water Quality Costs	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Increasing importance of stored surface water.	Increasing.
No Action Alternative	None	Includes CVPIA. Increased demand requires new supplies or more use of existing supplies, increasing costs.	Delta water quality declines relative to current conditions, more use of surface water to substitute for degraded groundwater.	Small increase in supplies, real water costs and water prices, and conservation initiatives result in some water savings.
Alternative 1	Unknown	Alternative 1C reduces other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 2	Unknown	Alternatives 2B and 2E reduce other water supply costs with 5 MAF of new storage.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.
Alternative 3	Unknown	All variations (except for Alternative 3A) include more storage which reduces other water supply costs.	Effects of storage on water quality cannot be judged with existing results.	Increased storage may discourage conservation if water prices are reduced.

Table 15. Generalized Impacts of Alternatives on M&I Water Costs for the San Joaquin River Region—Water Storage

Alternative	CALFED Water Conveyance Costs	Other Water Supply Costs	Water Quality Costs[a]	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Conveyance capacity limits ability to move water when quality is better.	Increasing.
No Action Alternative	None	Increased demand increases peak deliveries.	Less excess capacity in 2020 means less ability to move water when quality is better.	Little interaction between conservation and conveyance.
Alternative 1	Unknown	No substantial changes to conveyance and no quantifiable effect on supplies.	Alternative 1C increases ~~water quality~~ salinity costs, but not substantially ~~by $.02 million annually.~~	Without supply increase, no interaction between conveyance and conservation.
Alternative 2	Unknown	Changes to conveyance have little quantifiable effect on water supplies.	Annual benefit from ~~improved water quality~~ reduced salinity is $1.0 to $1.5 million.	Without supply increase, no interaction between conveyance and conservation.
Alternative 3	Unknown	Isolated facility increases water supply, but effect not considered significant.	Annual benefit from ~~improved water quality~~ reduced salinity ranges from $1.2 million in Alternative 3A to $2.2 million in Alternative 3E. Alternative 3E reduces DBP precursors.	Without significant supply increase, no interaction between conveyance and conservation.

[a] Water quality analysis considered effects of different intake and conveyance configurations without analysis of interactions with storage or export amounts, or timing.

Table 16. Generalized Impacts of Alternatives on M&I Water Costs for the San Joaquin River Region—Water Conveyance

Alternative	CALFED Water Storage Costs	Other Water Supply Costs	Water Quality Costs	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Increasing importance of stored water for water quality control.	Increasing.
No Action Alternative	None	Increased demand requires new supplies or more use of existing supplies, increasing costs.	Delta water quality deteriorates relative to existing conditions.	Moderate increase in supplies, real water costs and water prices, and conservation initiatives result in water savings.
Alternative 1	Unknown	Alternative 1C reduces other water supply costs with 5 MAF of new storage.	Effects of storage on quality cannot be judged with existing results; increased delivery from Alternative 1C ~~should~~ reduces salinity ~~water quality~~ costs.	Increased storage may discourage conservation if water prices are reduced.
Alternative 2	Unknown	Alternatives 2B and 2E reduce other water supply costs with 5 MAF of new storage.	Effects of storage on quality cannot be judged with existing results. Increased delivery from Alternatives 2B and 2E ~~should~~ contributes to significantly reduced ~~water quality~~ salinity costs.	Increased storage may discourage conservation if water prices are reduced.
Alternative 3	Unknown	All variations (except for Alternative 3A) include more storage, which reduces other water supply costs.	Effects of storage on water quality cannot be judged with existing results. Increased delivery from Alternative 3E ~~should~~ contributes to significantly reduced salinity ~~water quality~~ costs.	Increased storage may discourage conservation if water prices are reduced.

Table 17. Generalized Impacts of Alternatives on M&I Water Costs for Other SWP Service Areas—Water Storage

Alternative	CALFED Water Conveyance Costs	Other Water Supply Costs	Water Quality Costs[a]	Water Conservation Costs
Existing Conditions	None	Many sunk costs, some excess capacity.	Conveyance capacity limits ability to move water when quality is better.	Increasing, assume Level 1.
No Action Alternative	None	Less excess capacity, especially from Colorado River system.	Less excess capacity in 2020 means less ability to move water when quality is better.	Little interaction between conservation and conveyance.
Alternative 1	Unknown	No substantial changes to conveyance and no quantifiable effect on supplies.	Alternative 1C increases ~~salinity water quality~~ costs by ~~$12.7~~ $8.5 million annually.	Without supply increase, no interaction between conveyance and conservation.
Alternative 2	Unknown	Changes to conveyance have little quantifiable effect on water supplies.	Annual benefit from ~~improved water quality~~ reduced salinity is ~~$100 to $150~~ $90 to $145 million.	Without supply increase, no interaction between conveyance and conservation.
Alternative 3	Unknown	Isolated facility increases water supply, but effect not considered significant.	Annual benefit from ~~improved water quality~~ reduced salinity ranges from ~~$90~~ $100 million in Alternative 3A to ~~$200~~ million in Alternative 3E. ~~Alternative 3E reduced DBP precursors.~~	Without significant supply increase, no interaction between conveyance and conservation.

[a] Water quality analysis considered effects of different intake and conveyance configurations without analysis of interactions with storage or export amounts, or timing.

Table 18. Generalized Impacts of Alternatives on M&I Water Costs for Other SWP Service Areas—Water Conveyance

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