impacts does not have long-term adverse nor beneficial regional impacts.

- Urban conservation measures are unlikely to significantly affect air quality. To the extent that energy savings occur from reduced water and wastewater treatment associated with urban use, then air quality impacts associated with the production of energy may be reduced. In addition, it is feasible that less lawn area would exist if new, lower water using landscapes are installed. This would reduce the amount of lawn requiring mowing and thus reduce the associated impact from lawnmower exhaust. Short-term construction related impacts from urban conservation or reclamation programs could be adverse.

- Figure 5-1 - Both the water quality and water use efficiency programs have the potential for land conversion. The water quality program is considering land retirement as a tool to reduce drainage inflow to the San Joaquin River. The water use efficiency program may include land conversion (temporary or permanent) as a result of water transfer markets.

- Section 5.2.1.2, p. 12 - Water use efficiency will result in construction of tail water ponds, regulating reservoirs, new irrigation systems, land leveling or other land maintenance activities and many other agricultural as well as urban projects. Urban areas may construct local or regional recycling plants and distribution systems. All of these activities will have construction related impacts. Long-term impacts, whether beneficial or adverse, will not solely be the result of the economics of water. Other factors will influence conservation measures. Furthermore, water use efficiency actions are anticipated throughout the Central Valley, the Bay Area and the service areas outside the Central Valley. Impacts would thus occur in all air basins in the solution area.

**5. Land Use Economics**

- Section 5.2.1, p. 8-9, 15, 17, 19, - Water use efficiency measures are designed to work in coordination with other components to help meet the overall objectives of the Program. It is wrong to assume (end of paragraph on p.9) that efficient use will preclude the need for storage and conveyance options and thus have less impact on agricultural land use.

- Changes in land use may occur as a result of improvements in water use efficiency. In some instances, land may be removed from production because of increased costs and decreased profitability that may result from required efficiency improvements or increased district water charges (i.e., as part of tiered water pricing). If not profitable, land will typically not be used to produce agricultural commodities. On the other hand, improved efficiency may allow the continued viability of agriculture in some areas. This will tend to maintain the existing uses of agricultural lands and reduce the amount that may go out of production or being urbanized (in comparison to No Action or existing conditions).

  Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown. For instance, Westlands

Water District has seen a 300% increase during the past two decades in the acreage of vegetable crops grown and an 80% decrease in wheat and barley. This is partly because of improved irrigation performance. Also, areas of the Sacramento Valley are converting from open row crops and rice to permanent crops, such as orchards, partly because of increased water supply costs.

- In the urban sector, changes in land use may occur as a result of implementation of conservation measures but these will be limited to changes in urban landscapes. While this practice does not change the size of landscaped areas it may change the percentage of the land that might be under grass, Mediterranean, or xeriscape landscaping.

## 6. Municipal and Industrial Water Supply Economics

- 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.

- Section 5.1 - Reference is made in each regional discussion to the cost of mandatory conservation to lost revenue and consumer surplus. It is not clear if the cost of implementing conservation is reflected in this dollar value. If it is not, it may be useful to include a conditioning statement making this exclusion more clear.

- Section 5.2 - For the CALFED alternative impact discussion, it may be useful to state that the water use efficiency program may result in lower and higher residential and commercial/industrial water bills depending on how the cost of conservation measures is past on to customers. Tiered pricing, for example, may result in lower water bills for some users who are efficient, but higher bills for those who are not. (This may not be an issue of M&I Water Supply Economics, though).

- Section 5.2 - Reference to the *Water Use Efficiency Input Report* needs to drop the "5.1" designation. In addition, values for urban real water savings need to be modified to reflect the latest values in the Input Report (e.g., San Francisco Bay Region has potential for around 350,000 acre-feet versus the 10,000 acre-feet value shown on p. 25).

- p. 28 - The Sacramento Section is not assumed to have a low level of conservation planned to occur under CALFED. Is this reference intended to mean "existing level of conservation"? As it is written, this is unclear. CALFED does plan equivalent levels of conservation in all regions in the solution area. The way it is stated here makes it seem like CALFED is planning to "go easy" on the Sacramento area.

- p. 31 - The same comment as above applies to the San Joaquin Region.

- Table 4, 5, 6, 7, 8 - What is the difference between drought conservation cost and water conservation cost? It may be useful for the reader who is skimming the document if this is clarified in each table with a footnote.

- Table 9, 11, 13, 15, 17, p. 47-49 - We need to be cautious in stating that increased storage will discourage conservation. While that may seem inherently true, the CALFED Program is intended to use all components together to meet the stated objectives of improving water quality, ecosystem health, levee stability and water supply reliability. Storage is not planned as a trade-off for conservation because storage is intended to have many other benefits toward the stated objectives. At the same time, water use efficiency is a common program and is anticipated to be implemented at equivalent levels in all alternatives.

**7. Agricultural Economics**

- Section 5.2 - The document should note the potential for improved water supply reliability as a result of efficiency improvements and that such gains in reliability may aid in securing annual financing necessary for most agricultural production.

- Section 5.2 - The document should also mention the potential adverse impact to water district budgets as a result of less delivered water or as a result of more irrigators switching to groundwater. This can impact the ability of the district to recapture fixed costs. Switching to groundwater is already occurring in areas of the Sacramento Valley because of, among other things, the increased cost of CVP water with the addition of the CVPIA restoration fund. A shift in cropping from row crop to trees is also adding to this phenomenon.

- Section 5.2 - should more reference to potential impacts of water transfers be included? It is feasible that the CALFED water use efficiency program may result in more water transfers occurring. This can create revenue sources for local users and districts that could be used to help fund more water conservation measures. If land fallowing is used to generate water for transfers could there be additional agricultural economic impacts?

**8. Public Health and Environmental Hazards**

- In general, water use efficiency improvements can result in the following impacts (text is from the draft *Water Use Efficiency Input Report*)

  Water use efficiency improvements may beneficially impact some aspects of public health. For instance, to the extent that efficiency improvements decrease residual wetland or seepage areas along delivery facilities or on farm fields, mosquito breeding and other vector habitat will be reduced. However, where this type of habitat currently exists is usually well displaced from human population areas. Therefore, further improvements may not be necessary.

  Because many efficiency improvements, both agricultural and urban, will include construction activities, the risk of contamination from hazardous materials, such as lubricants, fuels, and other elements, may increase. In the agricultural sector, long-term operation of pumping equipment included as part of some efficiency for reservoirs to produced power at hydroelectric facilities. Also, in the last bullet under water use efficiency actions, we should refer to switching from 'gravity fed irrigation systems to pressurized systems'. This sounds better and is more accurate than 'switching from flood to sprinkler'.

- Section 5.3.1.1.5, p. 25 - is this supposed to cover different impacts than presented under the common programs? For energy use at groundwater pumping plants, increased agricultural efficiency may result in more groundwater pumping and more pressurization of irrigation systems (regardless of the source of the water).

  For energy use at treatment plants, urban conservation can reduce the amount of energy needed to treat and distribute water to urban customers. However, water recycling plants will require more energy to treat and distribute water.

- The above comments need to be incorporated into the discussion for the remaining alternative configurations.

## 16. Fish, Wildlife and Recreational Economics

- Section 5.1.1, p. 5 - No action conditions in the Sacramento Valley may also be influenced by continued trends in agricultural water use efficiency. Existing trends seem to indicate a continued conversion of waterfowl and wildlife conducive crops, such as rice, to other crop types less wildlife friendly. Some of this change is a result of changes in water prices that is resulting in changes in irrigation types and crops grown. The same is true to an extent in the Delta region where many new vineyards are replacing alfalfa fields and pasture land.

- Section 5.1.2, p. 15, 18 - Sacramento Valley and San Joaquin Valley - To the extent efficiency improvements reduce wetlands or riparian areas that survive off irrigation losses, and to the extent that changes in irrigation pricing act to induce crop changes or act as a disincentive to after harvest field flooding, waterfowl habitat may be decreased. This decrease could have adverse impacts on the availability of lands for recreational hunting or for bird watching. It is not anticipated, though, that any of these would be significant.

  At the same time, efficiency improvements may lead to reduced diversions, leaving more water for instream benefits. Instream benefits may include increased flow through a particular reach of stream for a particular year, changes in the timing of reservoir releases, and decreased diversion impacts on aquatic species. All of these may have a combined beneficial impact on recreational and commercial fishing, and other recreational activities such as boating (both instream and on reservoirs).

- Section 5.1.2, p. 21 - SWP/CVP service area - The water use efficiency program will not "increase yields of water deliveries". It may, however, result in reoperation of reservoirs that has the same effect. What is more likely is that conservation measures will act to stretch existing supplies to meet a greater future demand. This actually may create more fluctuation in reservoir levels and have an adverse impact on reservoir recreation in this region. For instance, assume that a full reservoir in spring is kept as high as possible through the summer and drawn down in fall. When more demand exists, this delayed drawdown may not be feasible resulting in lower reservoir levels earlier in the summer, during peak recreational times. It is doubtful, though, that this would cause significant adverse impacts.

**17. Fisheries and Aquatic Resources**

This document does not include specific descriptions of impacts anticipated to occur from any of the common program (except the ERPP). The following text is taken from the draft *Water Use Efficiency Input Report* and presents the many, potential significant, benefits that could accrue to fisheries and aquatic resources as a result of the water use efficiency common program.

Efficiency improvements can provide some direct benefits to fisheries and aquatic ecosystems. These include reduced diversion impacts, improved water quality (see the comments on the *Water Quality Impact Report* under #3 above), potential to modify diversion timing, and potential to modify flow releases from reservoirs. (Note: please see water quality benefits, they are very important.)

To the extent that the anticipated 1 million acre-feet of applied water reductions can actually reduce surface water diversions, there may be inherent reductions in entrainment and impingement impacts to fisheries and aquatic species. However, there is not a one-to-one correlation between applied water reductions and potential benefits. For instance, many agricultural diversions begin in mid-spring, peak in July and August, and are no longer necessary after September or October. This creates a general bell-shaped diversion pattern. Reductions in applied water would primarily be consistently spread throughout the diversion season. Entrainment impacts, however, may be most problematic during certain months or flow periods. Therefore, only a fraction of the 1 million acre-foot applied water reduction will result in entrainment reduction benefits. In general, however, any reduction in diversion will generate positive impacts to fisheries and aquatic species existing in the source stream, river, drain, or reservoir.

Efficiency improvements in some areas of the Central Valley may also allow for slight modifications in the timing of local diversions. These modifications may not be more than a delay of a few days or a week for a planned diversion such that maybe a pulse flow could be routed downstream to help fish species out-migrate. For instance, assume a small tributary with several minor (<2 cfs) diverters. The diverters collectively decide to allow a pulse flow to move downstream to help flush juvenile salmon to a larger river. Each diverter successively delays irrigation diversions until the pulse flow has passed their diversion location. This may cause a delay in irrigation of a few days or a week, but, if properly coordinated, could be possible. Such an action has successfully been implemented on Shasta River. Delays in diversions on larger rivers or of larger diversions become increasingly less possible because of more complex instream flow regimes. The potential to modify diversion timing would have to be analyzed on a case-by-case use.

Water transfers that involve land fallowing will have similar impacts to groundwater recharge as conservation measures have. If irrigation is not applied to a field, then deep percolation is reduced, possibly impacting the underlying groundwater levels that previously were dependent on such recharge.

- Section 4.2, pp. 16, 17 - see the above comments.

- Section 4.2.4, p. 19 - This section should also include the discussion on p. 16-17 as well as incorporate the comments stated above.

- A few related thoughts (text is from the draft *Water Use Efficiency Input Report*):

Improved on-farm and district efficiency will result in decreased deep percolation of applied water. Though this savings can have other benefits, the deep percolation plays a vital role in recharging underlying aquifers in many areas. Many of the farms in the Sacramento Valley and San Joaquin Valley serve as vast, effective, economical groundwater recharge basins. Given the potential of greater groundwater pumping, decreases in recharge could further adversely impact groundwater levels and aquifer capacities. Many water districts, especially along the eastside of the San Joaquin Valley, depend on their delivery canals as recharge basins. During wet years, these canals are purposefully filled with water during the winter months to recharge the underlying aquifer. This operation acts as a method of water storage for use later in the season or during drier years. Canal lining could adversely impact their ability to conjunctively use groundwater and surface water supplies.

Decreased recharge from on-farm irrigation may result in lowering groundwater tables. Where groundwater and surface water are in balance, decreasing groundwater levels will lead to increasing recharge of surface water back into aquifers. In such cases, instream flows will be decreased, resulting in the need to release more water from upstream sources to account for river losses.

## 15. Power Production Economics

- Section 5.3.1.1.8, p. 26 - re: water recycling - Water recycling projects will increase energy requirements since most plants are at the 'low-end' of the municipal system and reuse locations are typically upslope or some distance away. This can require significant pumping. The treatment process necessary to meet standards for water recycling also will require significant energy inputs.

Re: agricultural water use - it is feasible that improve efficiency in the agricultural sector will allow for a shifting in the timing of reservoir releases such that what previously was released on an ag demand schedule may be released on a slightly modified schedule, possibly to benefit instream flow needs. This may benefit or adversely impact the ability