Agricultural Economics and Production
Preliminary Assessment of Potential Impacts of CALFED Alternatives
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Note to reader:

At this stage of the analysis, potential impacts are discussed qualitatively for the alternatives. Each configuration (e.g., 1A, 1B, etc.) is treated as an alternative. An overall summary of impacts is provided for each alternative, with a discussion of each of the key assessment variables that have been identified. Some indication is provided of the likely impact regions. Ultimately a separate impact assessment will be provided for each impact region, but to reduce repetition and choppiness in this preliminary draft, impacts are summarized for all regions in each alternative.

The potential impacts described below have not been specified as relative to No Action versus Existing Conditions. In general the same direction of impact would occur regardless of the basis for comparison, only the magnitude of impact would change. Because magnitudes are difficult to assess at this stage, no differentiation was attempted.

The outline numbering below is consistent with the preliminary outline developed for the Economics Impact Assessment Workgroup, and may not be consistent with other workgroups' outline.

ENVIRONMENTAL CONSEQUENCES

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4.3.3 Alternative 1

4.3.3A Alternative 1A

Alternative 1A implements only the common programs developed by the CALFED Bay-Delta Program. These are grouped as Ecosystem Restoration, Water Quality, Water Use Efficiency, and Levee System Integrity.

Potential impacts of the Ecosystem Restoration Program on agriculture include:

- Purchase and conversion of existing agricultural land to wildlife habitat. Potential impact regions are the Delta, Sacramento River, and San Joaquin Regions.
- Development of new water or purchase of water from existing users (primarily

agricultural users) to improve flow conditions in the Delta and tributary streams. Alternative 1A includes no new water development, so water would have to be purchased. Lands purchased for habitat could also provide a portion of the water for flow prescriptions. Potential impact regions are the Delta and regions served by streams tributary to the Delta. If water delivered by the SWP or CVP is purchased, areas outside the Central Valley could also be affected.

- Installation or replacement of fish screens and fish ladders. Primary impact mechanism could be cost. Targeted impact areas are the Delta and tributary streams.
- Purchase and conversion of existing agricultural land for floodways along the San Joaquin and Cosumnes Rivers. Impact area is the Delta.
- Crops removed from production due to Program implementation could shift to other areas within the Central Valley or the State. The demand for these crops would provide an incentive for other areas to increase production. Because no new water is provided in Alternative 1A, these new lands would most likely use groundwater. All impact regions could be affected.

Potential impacts of the Water Quality Program on agriculture include:

- BMPs regulating quantity or quality of discharged drainage from agricultural lands. BMPs may target salinity, selenium and other trace elements, and pesticides. Impacts will vary depending on structure of control program (e.g., whether BMPs are required versus advisory, or whether financial incentives such as cost-sharing and technical assistance are provided). Potential impact regions are Delta, Sacramento River, and San Joaquin Regions.
- Effective reduction in salinity of water delivered to agriculture is a potential benefit. Potential impact (benefit) regions are primarily the Delta Region and all areas receiving water exported from the Delta.

Potential impacts of the Water Use Efficiency Program on agriculture are difficult to assess because they depend on the details of Program implementation, which will largely occur at the local level. The Program does not impose mandatory measures and targets, but rather relies on incentives and technical assistance. The Program includes policies on agricultural water use efficiency and water transfers. All impact regions are potentially affected.

- Achieving higher agricultural water use efficiency requires costs at both the farm and district levels. Greater capital investment and energy use is generally required to deliver and apply water more precisely and on demand. Some evidence exists that yields can improve with more careful and efficient water management. Costs for water and other production inputs can also change.
- Reducing recoverable losses from irrigation can affect downstream users of return flow and groundwater users that benefit from percolation recharge.
- Shifting to pressurized irrigation can induce greater groundwater use because it is available on demand and is free of silt and debris that can clog emitters.
- Water transfers are generally beneficial to the direct parties involved, but other agricultural users may potentially be affected. If land is fallowed in an area selling

water, agricultural jobs and related supply and processing industries may be affected. Conversely, agricultural water supply can increase through a purchase of water, thereby increasing production and jobs. If groundwater is pumped to replace surface water sold, long-term impacts on groundwater levels and quality can be significant. If pumping occurs in hydraulic connection with a surface stream, streamflow can be reduced. Both of these impacts can affect other agricultural users.

Potential impacts of the Levee System Integrity Program on agriculture include:

- Improvement in the reliability of protection from a levee provides a reduced risk of flooding to agricultural areas protected. Potential impact area is the Delta.
- Setback levees would largely require the purchase of existing agricultural land. Crop production would decline. Potential impact area is the Delta.
- Salinity intrusion that might result from key levee failures could cause extended shutdown of Delta water diversions. Reduced risk of levee failure in the Delta would provide benefit to areas receiving water exported from the Delta. Impact areas include the Delta, San Joaquin Region, Bay Region, and SWP and CVP areas outside the Central Valley.

4.3.3A.1 Summary of Alternative 1A Effects

Irrigated Acres

The common program recommends a total of approximately 150,000 to 200,000 acres of land converted to habitat and ecosystem restoration, levee setbacks, and floodways. The great majority of this land is likely to be used currently for agricultural purposes. Most (120,000 to 150,000 acres) of this land is in the Delta Region. The current mix of crops grown in the Delta is shown in Table ___. The remainder of the converted agricultural land is distributed through the Sacramento River and San Joaquin Regions, primarily along streams. In the Sacramento River Region, typical crops grown include rice, pasture, hay, orchards, and tomatoes. In the San Joaquin Region, cotton and other row crops, orchards, vineyards, pasture, and hay are all potentially affected. According to analysis done for the CVPIA PEIS, overall acreage of orchards, vineyards, and vegetable crops are less affected by water or land purchase. Pasture, hay, rice, cotton, and other field crops are more likely to be affected.

Some shifting of crops to other regions in the Central Valley, California, or other states is likely if large amounts of land are fallowed for habitat restoration and water purchase.

Agricultural Water Use

Agricultural water use would be most affected by the agricultural land use changes described above. Average unit applied water estimates by crop for the three Central Valley regions are shown in Table ___. Regions increasing acreage as a result of production shifts would show higher water use. Because surface water is generally fully allocated, additional groundwater pumping would likely supply the additional acreage.

The impact of the Water Use Efficiency Program is uncertain, and could range from little or no measurable effect to significant reductions in applied water. Realistic reductions in applied water could range from 5 percent to 15 percent, depending on the area and the existing conditions. In many areas, most of this savings is a reduction in recoverable loss, so the basin-wide impact would be substantially smaller, probably less than 3 percent of total water use.

Growers or districts with more than one source of water will attempt to conserve the high cost source. In many cases this is groundwater. However, groundwater is a preferred water source for pressurized irrigation systems likely to be encouraged by the Water Use Efficiency Program. Groundwater is available on demand and at frequencies and durations appropriate to pressurized irrigation. It does not have silt and debris which can clog emitters. Overall, the impact of the Water Use Efficiency Program on the mix of water sources used for irrigation is uncertain, and likely to vary by region and district.

The Water Quality Program could have some impact on agricultural water use. BMPs for drainage water quality control may include reductions in tailwater and/or percolation, which would reduce overall applied water. Areas currently relying on drainage from upslope lands may find the supply reduced and may increase diversion of fresh water. Improvements in salinity of water diverted for agriculture could also reduce the leaching fraction required for salt management, although this effect is likely to be small.

Costs of Production

Costs of agricultural production would disappear on land converted to other uses, but generally would not disappear on land fallowed due to water sales. Some costs remain to manage the land for weed and pest control, dust, road and fence maintenance, etc.

The Water Use Efficiency Program could result in significant increases in irrigation system and management costs. However, the voluntary nature of the program suggests that only measures judged to be cost-effective would be implemented. Based on irrigation cost estimates prepared for the CVPIA PEIS, the cost to raise irrigation efficiency to 85 percent can range from $___ to $___ per acre per year, depending on the region.

Tailwater reuse, percolation and subsurface drainage reduction, recycling, treatment, and controlled discharge are all potential mechanisms to implement the Water Quality Program. All of these could, depending on financial arrangements, increase agricultural production costs.

Cost allocation and recovery for all components of the common programs will directly affect costs of agricultural production. Water charges and other assessments are possible ways to help finance any Program whose costs are partly allocated to agriculture. Substantial increases in surface water charges can induce some growers to increase groundwater pumping. Any significant increase in water charges or land assessments may make some crops on some lands unprofitable to farm.

Agricultural Income

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Income from crop production would decline in response to land conversion and water sales. County Agricultural Commissioner prices, yields, and gross revenues for major crops are shown in Table ___. Because these programs are based on willing sellers of land and water, the sale would not occur unless the net income from sales would be at least as great as the net income from farming. Estimates made for the CVPIA PEIS, shown in Table ___, indicate potentially large increases in net income to individuals or districts selling water, especially in regions where large amounts of water are targeted for purchase. In general, as more water is purchased within a restricted geographic area, more valuable land must be idled, thus raising the market price of water for all sellers.

Net revenue from crop production may be affected by costs of water use efficiency measures, water quality control measures, and water charges or assessments imposed to recover costs of CALFED programs. These costs could be significant.

Risk and Uncertainty

CALFED may affect economic costs to agricultural water users through effects on the variability of water supplies. Variable surface water supplies can be a substantial economic problem in irrigated agriculture. Farmers often must make important investment, planting, and marketing decisions before knowing their water supply. Water supply variability adds to other risks imposed by crop price, yield, and production cost variability. Agricultural lending decisions are also affected by banks' judgments about variability and risk. This section identifies some ways in which CALFED programs might affect variability, risk, and uncertainty.

Variability simply means that water supplies are not the same in every year. **Risk** means that not only do supplies vary, but that they cannot be predicted with certainty. Risk refers to future variable events (in this case water supply) that have a probability distribution that can be estimated. Typically, the probability of different water supplies being available is based on a historical record of supplies. **Uncertainty** describes a situation in which future water supplies are unknown and cannot be well predicted. This usually occurs either when no reliable historical record exists or when the conditions have changed so much that the historical record is no longer useful to predict future supplies. The uncertainty created by new laws, changing technology, or climatic change are examples.

Agriculture has faced an extended period of long-term uncertainty associated with water allocations as a result of ESA actions, water quality concerns, and CVPIA. To the extent that the common programs in Alternative 1A can resolve many of the environmental concerns and reduce the threat of future regulatory action, long-term water supply uncertainty will be reduced.

Changes in monthly and seasonal water allocation rules can affect short-term uncertainty. Examples include delays in the announcement of water deliveries or revisions to water export plans in response to real-time monitoring. It is unclear whether CALFED implementation will affect such uncertainty.

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The concept of adaptive management implies that long-term or short-term export and delivery rules may change over time as new information is obtained. Changes can either increase or decrease total water deliveries, but the possibility of rule changes imposes uncertainty. It is possible that this uncertainty would be less than that faced by agricultural water users under existing conditions or No Action.

4.3.3B Alternative 1B

Alternative 1B includes all the common programs described under 1A, plus it adds an operational intertie between the SWP and CVP Delta pumping facilities to improve operational flexibility and potentially increase joint yield. Also added would be fish screens at Tracy or Banks pumping plants and a barrier at the head of Old River. The purpose of these improvements is to allow the pumping facilities to be operated at higher capacity. The potential agricultural impact of these additions would be to increase the delivery of water for irrigation south of Delta. The quantity and pattern of increase in delivery is unknown at this time.

4.3.3B.1 Summary of Alternative 1B Effects

In general, impacts of 1B would be the same or similar to 1A. The potential impacts described below focus on ways that 1B impacts might be different from 1A.

Irrigated Acres

Impacts would be as described under 1A, except that some increase in SWP and CVP water delivery south of Delta could increase acreage in these regions. Crops that have been fallowed in response to water supply limitations have generally been pasture, hay, cotton, and field crops, with the mix varying over time in response to crop market conditions.

Additional surface water delivery could reduce the potential groundwater mining described under 1A as a possible result of land conversion and crop shifting.

Agricultural Water Use

Additional surface water supply delivered south of Delta could replace some of the groundwater overdraft in these areas. Decisions to use additional surface water supply to replace groundwater versus increase acreage depend on the relative cost of groundwater and surface water and on crop market conditions.

Costs of Production

Potential impacts on costs of production will be similar to 1A. Additional costs of the south Delta facilities would also need to be recovered, at least in part, from agricultural users. These additional costs could be significant.

Agricultural Income

Changes in gross revenue from crop production would follow changes in irrigated acreage - additional land in production would correspondingly increase gross revenue. Impacts on net revenue will depend on the interaction between changes in gross revenue and changes in costs of production. Key determinants of the change will be the cost of increased Project water supplies, the change in the mix of surface and groundwater use, changes in gross revenue, and costs incurred from the common water quality and water use efficiency programs.

Revenues to willing sellers from land and water sales would be similar to Alternative 1A.

Risk and Uncertainty

Most impacts would be similar to those described in 1A. The south Delta improvements, especially the pumping facilities intertie, may increase the reliability of Project water supply.

4.3.3C Alternative 1C

Alternative 1C incorporates the common programs of 1A and the South Delta improvements of 1B, and adds Delta channel enlargement and potentially both surface and groundwater storage.

4.3.3C.1 Summary of Alternative 1C Effects

Impacts of Alternative 1C would be similar to those described in 1B. The potential impacts described below focus on ways that 1C impacts might be different from 1B. Water supply yields from new storage facilities are assumed for this analysis to be split evenly (one-third each) among agriculture, M&I, and environmental uses. Costs of storage facilities are also assumed to be split evenly.

Irrigated Acres

A major difference from 1B would be the lands directly affected by new storage and conveyance facilities. Offstream storage facilities are expected to be in foothill areas, where the major agricultural use is non-irrigated grazing. Small amounts of irrigated land may also be affected by the footprint of a storage reservoir. Conveyance facilities to offstream storage sites and widening of existing channels can displace existing agricultural lands.

An increase in SWP and CVP water delivery south of Delta could increase acreage in these regions. Crops that have been fallowed in response to water supply limitations have generally been pasture, hay, cotton, and field crops, with the mix varying over time in response to crop market conditions.

Additional surface water delivery could reduce the potential groundwater mining described under 1A as a possible result of land conversion and crop shifting.

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One-third of the yield from the storage facilities is assumed allocated for instream and Delta flow. This yield would reduce the quantity of purchased water described under Alternative 1A, and would potentially reduce the associated impacts described.

Agricultural Water Use

Water use impacts would be qualitatively similar to those described under Alternative 1B. If the additional storage and channel improvements increased SWP and CVP delivery to agriculture, the magnitude of the impacts described under 1B could be increased. In addition, some of the water purchased for instream flow in Alternative 1A could now be provided from the yield of the storage components.

Costs of Production

Impacts would be similar to Alternative 1B. The potentially large increases in storage could require large costs to be repaid by agricultural users benefitting from the new water supply. A range of cost and yield estimates are not yet available.

Agricultural Income

Impacts would be similar to Alternative 1B. Changes in gross revenue from crop production would follow changes in irrigated acreage - additional land in production would correspondingly increase gross revenue. Impacts on net revenue will depend on the interaction between changes in gross revenue and changes in costs of production. Key determinants of the change will be the cost of increased Project water supplies, the change in the mix of surface and groundwater use, changes in gross revenue, and costs incurred from the common water quality and water use efficiency programs.

Revenues to willing sellers from land and water sales would be similar to Alternative 1A, except that less water may be purchased because of water supplied from new storage.

Risk and Uncertainty

Additional storage and conveyance capacity is likely to increase the reliability of SWP and CVP water supply south of Delta.

4.3.4A Alternative 2A

Alternative 2A includes the common programs and south Delta improvements of Alternative 1C with the exception of the surface and groundwater storage components. In addition, north Delta improvements include a 10,000 cfs intake at Hood, channel widening, setback levees, and flooding of McCormick Island to provide greater through-Delta conveyance capacity.

4.3.4A.1 Summary of Alternative 2A Effects

Impacts of Alternative 2A would be similar to those described in 1B. The potential impacts described below focus on ways that 2A impacts might be different from 1B. In particular, improved through-Delta conveyance would require additional purchase and conversion of agricultural land, and would potentially increase delivery and improve reliability of water supply south of Delta.

Irrigated Acres

The major difference from 1B would be the lands directly affected by through-Delta conveyance facilities. Channel widening and island flooding will require the purchase of agricultural lands, with cropping pattern on purchased land similar to that described in the common ERPP in Alternative 1A.

An increase in SWP and CVP water delivery south of Delta could increase acreage in these regions. Crops that have been fallowed in response to water supply limitations have generally been pasture, hay, cotton, and field crops, with the mix varying over time in response to crop market conditions.

Additional surface water delivery could reduce the potential groundwater mining described under 1A as a possible result of land conversion and crop shifting.

Agricultural Water Use

Water use impacts would be qualitatively similar to those described under Alternative 1B. The through-Delta conveyance improvements would increase SWP and CVP delivery to agriculture, either replacing groundwater pumping or supporting increased irrigated acreage.

Costs of Production

Impacts would be similar to Alternative 1B. Some of the costs of through-Delta conveyance would be repaid by agricultural users benefitting from the new water supply. A range of cost and yield estimates are not yet available.

Agricultural Income

Impacts would be similar to Alternative 1B. Changes in gross revenue from crop production would follow changes in irrigated acreage - additional land in production would correspondingly increase gross revenue. Lands purchased and converted in the Delta region would result in lower gross revenue, although some of this production could shift to other regions. Impacts on net revenue will depend on the interaction between changes in gross revenue and changes in costs of production. Key determinants of the change will be the cost of increased Project water supplies, the change in the mix of surface and groundwater use, changes in gross revenue, and costs incurred from the common water quality and water use efficiency programs.

Revenues to willing sellers from land and water sales would be similar to Alternative 1A.

Risk and Uncertainty

Additional through-Delta conveyance capacity is likely to increase the reliability of SWP and CVP water supply south of Delta.

4.3.4B Alternative 2B

Alternative 2B includes the components of 2A plus additional surface and groundwater storage.

4.3.4B.1 Summary of Alternative 2B Effects

Impacts of Alternative 2B would be similar to those described in 2A. The potential impacts described below focus on ways that 2A impacts might be different from 1B. In particular, 2B provides for additional surface and groundwater storage. It is assumed that one-third of the yield from the storage facilities would be available to agriculture. Another one-third would be available for instream flow, thus reducing the quantity of water purchased from agriculture.

NOTE: All additional alternatives have impacts that are qualitatively similar to those already described. Differences are primarily a matter of scale. Differentiating the impacts further will require some reasonable estimate (or range) of the water supply and cost associated with the components.