Permanent Land Retirement - Analysis Report

Some interest groups have expressed a desire for the CALFED Bay-Delta Program to include a permanent land retirement program as a specific method for reducing Delta export quantities and thus reducing fishery entrainment impacts in the south Delta. It has been suggested that as much as 500,000 acres of irrigated land be taken out of production to achieve this goal. In order to have the desired reduction in entrainment impacts, the retired lands would have to be in export regions (along the westside of the San Joaquin Valley and the Tulare Basin). In order to better understand the implications of such a program, CALFED has analyzed the following attributes:

- where would 500,000 acres of permanent land retirement occur?
- what crops would most likely be taken out of production?
- how much water would be obtained through permanent land retirement?
- what would be the cost of retiring this land (including maintenance cost)?
- what would be the potential adverse impacts to local jobs, personal income, local tax revenue, or other resources?

Where?

For this analysis, it was assumed that land would be retired throughout several of the export areas within the San Joaquin Valley. Lands outside of the San Joaquin Valley were not included. An allocation of 500,000 acres of land to be retired was made among four geographic areas as shown in Table 1. Total irrigated agricultural acreage in these areas is approximately 3.6 million acres, the majority of which is in the Kern County and Tulare Lake bed areas:

Table 1 - Allocation of Land to be Retired

Area	Allocation	Resulting Acres
Delta Mendota Service Area	34%	170,000
Westlands Water District	24%	120,000
Tulare Lake Bed	28%	140,000
Kern County	14%	70,000
	Total	500,000

This allocation was made based on information in the September 1990 report, *A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside of the San Joaquin Valley* (referred to as the "Rainbow Report"). The CALFED analysis focused on drainage impacted acreage identified in the earlier analysis since retirement of these lands may serve a dual purpose,

gaining both water supply and drainage reduction benefits. Within the Rainbow Report, information is presented regarding the extent of drainage impacted lands for each of the above regions. Using the ratio of drainage impacted acreage for each region in the Rainbow Report to total drainage impacted acreage, a percent allocation was estimated for each region. This allocation, shown above, was used to distribute the 500,000 acres of proposed retirement among the various export regions included.

What Crops?

To understand the potential impacts and to estimate the water saving potential from a land retirement program, it is necessary to try to predict what types of crop land would come out of production (i.e., what reduction in historic cropping patterns would need to occur?). To accomplish this, the Central Valley Production Model (CVPM) was used. This model is an agricultural economics model that is capable of predicting changes in cropping patterns as a result of various factors, including: commodity prices, water price and availability, product supply and demand, available irrigable acreage, as well as numerous others. The CVPM was most recently updated for use in analysis conducted for the Central Valley Project Improvement Act Programmatic Environmental Impact Statement.

For purposes of this exercise, land retirement was modeled by reducing the number of irrigable acres in a CVPM region (CVPM is subdivided into several regions, including the four shown previously). A 1995 Existing Conditions set of criteria was used as a starting point. These criteria included water deliveries based on a 1995 level of demand for crop production, the Biological Opinion for Winter Run Chinook Salmon, and the 1994 Bay-Delta Accord requirements. Other economic and water supply conditions, including groundwater pumping and water prices, were held unchanged. This allowed for a prediction of the likely mix of crops that would be retired for the designated retirement acreage. The table below shows the results of this prediction.

Table 2 - Expected Irrigated Acreage Reduction by Crop Type (1,000 acres)

	Rice	Cotton	Alfalfa Hay	Field Crop	Vegetable Crop	Tree & Vine	Total
Delta Mendota service area	-2	-52	-45	-46	-7	-1	-153
Westlands	0	-78	-9	-32	-10	0	-129
Tulare Lake	0	-56	-34	-51	0	-1	-142
Kern County	0	-43	-14	-17	0	-1	-75
Total	-2	-228	-103	-146	-17	-3	-500

Source: CVPM simulation results

How Much Water?

In addition to simulating what crop mix may be retired, the CVPM also estimated the reduction in applied water (based on irrigation efficiencies and historic data included in the model) and the associated reduction in evapotranspiration (ET) of the crops. The crop mix reduction (shown in the Table 2) results in the estimated water reductions shown in the following table.

Table 3 - Estimated Applied Water Reduction and Associated ET Reduction

	Applied Water Reduction [1] (1,000 acre-feet)	ET of Applied Water Reduction (1,000 acre-feet)
Delta Mendota service area	-534	-401
Westlands	-411	-308
Tulare Lake	-460	-345
Kern County	-263	-197
Total	-1,668	-1,251

Source: CVPM simulation results

1. Because some of the losses associated with applied water provide a supply to existing beneficial uses, not all applied water can be assumed available to 'transfer' as a result of land retirement

Though the results show applied water is reduced by over 1.6 million acre-feet, the actual water savings from a land retirement program would likely be somewhat less because some excess applied water is currently reused or is available for reuse. Water applied to a field ends up in one of three primary destinations: 1) crop evapotranspiration, 2) surface runoff to adjacent surface waters, or 3) deep percolation below the root zone. In some instances, the latter two destinations are 'salt sinks', such as surface evaporation ponds or shallow degraded groundwater. When water flows to salt sinks, it is considered irrecoverable, or not suitable (without expensive treatment) for use by most water users. However, in many other instances, water flowing to surface waters or via deep percolation to groundwater, can and does provide a reusable supply available to other water users, including the ecosystem.

We do not know what portion of losses associated with surface runoff or deep percolation provide additional water supply benefits. For this analysis, we assumed that half the losses (the difference between the applied water and the ET) would be irrecoverable. The other half is assumed to currently provide benefits to other existing water supply users and is not available. Therefore, approximately 1,400,000 acre-feet is assumed to become available as 'saved' water as a result of a 500,000 acre land retirement program.

What is the Cost?

The landowner compensation aspects of a land retirement program could be structured in many

ways. For simplicity, it is assumed that the program would purchase private lands outright and convert them to state or federal ownership, paying the landowner for the land. This process would result in several cost factors: land acquisition, legal fees, permitting, conversion of land to suitable habitat (assumed to not need any water), and annual maintenance.

Land acquisition is the greatest of these expenses. To estimate the total cost of acquiring 500,000 acres of land, it is assumed that a land retirement program would be established by a state or federal agency and solicitations for various land parcels would be made (or offers to sell accepted). Due to the significant acreage to be purchased and retired, it is assumed that acquisition would take several years. Because of lengthy acquisition time and other forces that can influence land and water prices (including water transfer markets), it can not be assumed that the cost paid for the first acre of land will be the same as that paid for the last acre. For purposes of this analysis, three price categories were used for land acquisition. Initial land prices used are comparable with land prices seen today along the west side of the San Joaquin Valley when land is being sold *with water*. It is important to note that the acquisition of water with land being purchased is the primary factor in determining the land value. Barren land with no water may only be worth a few hundred dollars an acre. With water, the value of the land is a few thousand dollars per acre. Table 4 provides a cost estimate for a land retirement program with a goal of 500,000 acres.

Table 4 - Estimated Cost of a 500,000 Acre Land Retirement Program

		Unit Cost ($/acre)	Total Cost ($ millions)
Land Acquisition (incl. water)			
	first 100,000 acres	2,000	200
	next 200,000 acres	3,500	700
	final 200,000 acres	5,000	1,000
	legal fees, etc.	50	25
		subtotal =	1,925
Conversion of land to suitable habitat			
	planting to desired species	500	250
	minor earthwork	100	50
		subtotal =	300
Annual Maintenance Activities			
	yearly program	50	25/year
Total Cost			$2,225 million
			$25/year for maintenance

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As shown in Table 4, a 500,000 acre land retirement program could cost over $2.2 billion with an additional $25 million per year for maintenance activities.

For comparison to other water acquisition programs, the cost of a land retirement program and the associated water savings can be viewed in terms of the annual cost per acre-foot of water. If a retirement program were started within the next few years, the cost per acre-foot to acquire the initial increments of land and water would be between $60 and $120 per acre-foot annually (a translation of the capital cost). As a transfer market matures and competition for water increases, the annual cost per acre-foot will increase dependent on the level of competition and other market forces. Ultimately, to acquire the last increments of land and water through a permanent land retirement program, the annual cost may rise 2 to 4 times this amount ($200 to $300 per acre-foot per year). In addition to the annual cost per acre-foot necessary to acquire the land and water, there will also be a maintenance cost associated with the property upkeep and/or habitat development. Such activities might add $50 per acre per year. If an average water supply of 2.5 acre-feet per acre is assumed, then another $20 per acre-foot annually should be included in the cost. If the annual cost per acre-foot were to be averaged for an entire land retirement program, it is estimated that each acre-foot might cost $150 annually (including maintenance costs).

Adverse Impacts of Land Retirement

The retirement of agricultural land currently producing economic activity will have adverse impacts to landowners, laborers, the local economy and the state. To estimate the potential economic impact from retiring 500,000 acres of land, CVPM results were used. In addition to estimating crop mix changes and water supply impacts, CVPM also provides economic information on a regional basis regarding the value of production lost as a result of land retirement. This CVPM output was used in a regional economic impact model, called IMPLAN, to estimate the associated losses in regional income and employment. A version of IMPLAN used during CVPIA analysis was used to make these estimates.

This analysis assumes that the property owner is not economically affected since compensation for land retirement has been provided (the land is purchased). However, other people in the community were dependent on that land being in production, either directly as a source of employment or indirectly through landowner expenditures (e.g., payments to fertilizer company, local stores, equipment dealers, professional service providers, etc.). The removal of this land from production can result in fewer jobs and less money available in the local economy. The results of the IMPLAN analysis are shown in Table 5 below.

Net job loss indicated is the difference between jobs lost as a result of land retirement and jobs created as a result of local spending of revenue generated by the retirement. The analysis indicated a loss of nearly 22,000 jobs with just over 15,000 new jobs created by local spending of payments made to landowners. (It is unclear the result permanent retirement of specific parcels will have on local spending and new job creation within the local community compared with if the same amount

of land was fallowed, but not necessarily removed from production. Permanent land retirement may result in more spending outside of the region and less local generation of new jobs. For example, landowners may take their proceeds and leave the region, not creating any local spending.)

Table 5 - Annual Estimated Adverse Impacts from Land Retirement Program

	Local Personal Income Lost ($ millions)	State and Local Tax Revenue Lost [1] ($ millions)	Local Number of Jobs Lost (net jobs)
Delta Mendota service area	62	6.2	2,467
Westlands	51	5.1	2,034
Tulare Lake	32	3.2	1,297
Kern County	15	1.5	599
Total	$160 million/year	$16 million/year	6,397

Source: CVPM and IMPLAN simulation results

1. Values for state and local tax revenue impacts are derived using factors from the Sate of California, Department of Finance. For this estimate, the factor used assumes 10 percent of personal income provides state and local tax revenue.

A land retirement program targeting 500,000 acres would have a significant economic impact to local communities both in the form of lost jobs and lost personal income. Additionally, both the local county and the state could be seriously affected with the loss of $16 million per year in tax revenue.

Additional adverse impacts to the availability of goods and services within the community are not reflected in this analysis but could also occur. Large scale land retirement could reduce agricultural production enough to threaten the viability of local businesses that support agriculture. If some local businesses close, remaining growers might find that they have to travel much further to visit implement dealers, banks, or other service providers.

The impact to the commodity markets as a result of significant land retirement is not known. For example, if 100,000 acres of alfalfa hay are taken out of production in the San Joaquin Valley, how would the market respond? Would new sources be developed in other regions of the Central Valley because of reduced supply and better prices? These issues are very difficult to understand or to analyze, but could be significant additional adverse impacts from a land retirement program targeting 500,000 acres.