Water Operations: The Environmental Water Account
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Draft Phase II Section

CALFED Goals Related to Project Operations

CALFED intends during Stage 1 (among other things) to provide conditions that promote substantial recovery of threatened and endangered species while achieving continuous improvement in water supply reliability and water quality.

The Operations Problem

Water project operations have traditionally been affected by: (1) infrastructure; (2) regulations; and (3) demand management. Infrastructure defines how much water can physically be diverted and either stored or delivered for use, ignoring regulations and demand. Regulations define constraints on the use of infrastructure and are designed to protect the environment, water quality, or other beneficial uses. Demand management defines how much water will be requested and, if possible, delivered to water users.

A key problem facing CALFED is the potential conflict between (1) fishery agencies who seek to improve hydrological conditions for fish in the Delta by modification of operational patterns; and (2) water users, who seek significant increases in the amount of water diverted, compared to current conditions. These two goals have historically been in conflict. Indeed, there is a high level of concern that if only the traditional tools are available -- the combination of infrastructure, regulation, and demand management -- there may not be enough shared benefits as of the Record of Decision in late 1999 to generate broad stakeholder and agency support for the CALFED solution. Therefore, in addition to looking at infrastructure, regulations, and demand management, CALFED has begun to explore a new approach, called the Environmental Water Account (EWA), designed to provide greater environmental improvements through modifications to project operations with less effect on water supplies.

If CALFED can generate enough benefits for the environment and the water users through infrastructure improvements, regulatory shifts (including provision for the EWA), and demand management, then both sides can be satisfied and the "baseline argument" will become largely irrelevant. The key, then, is to generate both environmental benefits and water user benefits and to generate them quickly.

The Environmental Water Account (EWA)

The EWA is based upon the notion that active management of water operations is very likely to provide better environmental protection than passive management. Regulatory approaches to project operations are necessarily passive. Regulations require that, under "x" condition, the projects are limited to doing "y". In general, "x" could include hydrological, seasonal, and biological inputs. Thus, for example, the projects are limited to taking 35% of Delta inflow during February - June of most years.

The EWA approach is quite different. Instead of imposing constraints upon the operation of the existing water projects, the EWA would effectively create a new water agency, one that has the fish as its customers. The EWA would control a portfolio of assets. The EWA would control rights to water diversion facilities, aqueducts, and storage. It could buy and sell water. It could pump water to fill its storage facilities using those rights. It could secure water by paying for water efficiency or reclamation projects. It could allow variances in export standards in order to generate additional EWA water. Finally, it would have the funding needed to make use of these assets.

Using its portfolio of assets, the EWA would be able to modify project operations in real-time. For example, if fish were detected in the vicinity of the export pumps, the EWA might require reductions in export pumping to protect the fish. In return, the EWA would compensate the water projects out of its own supplies, if the reduced project pumping would otherwise result in water shortages to the state and federal water contractors.

As an example of how operations might be modified by EWA over the course of a year, assume that the EWA managers decided to extend the export reductions called for within VAMP for an extra month in order to protect salmon. The result for the state and federal projects would be reduced storage within San Luis Reservoir. The EWA would commit to filling up that hole in storage, if necessary, out of its water assets. If the state and federal projects were unable to move water out of storage north of the Delta to fill San Luis, then the EWA would probably be required to fill some or all of the hole in San Luis by the end of the growing season. It would do so using water it controlled -- a combination of surface and groundwater storage, production from conservation or reclamation projects, and market purchases. Or, if the EWA manager felt that relaxation of the E/I ratio would have minimal fisheries impacts, it might allow the project to pump water out of the Delta above the E/I ratio for some period. However, if the state and federal projects could replenish San Luis using upstream storage later in the summer, then the hole created by the export reduction would be moved upstream. If the next winter is wet and the upstream reservoirs spill, then the debt owed by the EWA to the users would be wiped clean. However, if the reservoirs do not spill, then the EWA would be required to fill in the upstream storage shortfall using its assets the following year. Of course, real operations would be much more complicated with the EWA manager spending assets to protect fish part of the year; diverting water to rebuild assets over other parts of the year; shifting water between surface storage and groundwater storage; and trying to project biological needs.

Clearly, the development of a high quality monitoring program through the CMARP program is a key prerequisite for the ultimate success of the EWA approach.

Note that the EWA is not a substitute for regulation, but is a supplement to regulation. It is a way to provide additional environmental benefits above some regulatory baseline with reduced impacts to the water users. A key issue yet to be worked out within CALFED is how to define the regulatory standards upon which the EWA will build.

The Advantages of the EWA

For a given quantity of environmental water dedicated to environmental protection, the EWA appropriately sized and constructed can be more protective than a classic standards approach for the following reasons:

1. Protect fish other than those targeted by standards- The operations decision making process, which is inherent in the EWA, can protect fish other than those for which standards would be set. The gaming analysis conducted to date has demonstrated that currently non-listed native species, such as splittail, could be protected from diversions effects under the EWA approach.

2. Protect species when entrainment is a problem despite favorable hydrological conditions- As an example, Delta smelt adults following a dry year are believed to be particularly vulnerable. Entrainment of such fish say in January or February could be a population level problem, despite hydrologic conditions which would suggest that no problems should be expected.

3. Focus on species that have the most risk-It is impossible to predict which species will be at greatest entrainment risk at a given time in the future. EWA operations decisions provide the ability to tailor operations to protect the species that is most at risk in a given time and situation.

4. Can apply the amount of water for circumstances at hand-Because of the wide range of hydrologic and environmental conditions that can be encountered in the Delta, it is impossible to craft a standard that protects efficiently under all circumstances. EWA operations will allow decisions to be tailored to the specific circumstances at hand, thus minimizing over- or under-protection.

5. Classic standards tend to be non-flexible-The traditional approach to standards setting is to set minimum requirements under specified conditions, e.g. full closure of the Delta Cross Channel for a block of months or a specific E/I ratio for a given month. The flexibility to provide the greatest level of protection at a time when the fish are actually most threatened maybe difficult to craft as a fixed standard. EWA operations are a much more protective and efficient tool for handling such situations.

6. Allows flexibility to add other methods of protection-EWA operations would allow the use of additional methods of protection as circumstances dictated. For example, tools such as additional flow, structure operations and pumping reductions could be used in conjunction or tandem to deal with a severe entrainment risk when it occurred. Crafting a standard to handle the range of possible situations would be exceedingly difficult.

7. Learn from previous operations-Standards are usually based on the science at the time the standard is adopted. Revising the standard is normally the only means of incorporating new information. In contrast, an EWA approach would allow translation of new understandings and insights into improved operations very quickly. The information provided by CMARP will be critical for the success of this adaptive approach.

8. Allows more easy experimental manipulations-The opportunities to conduct experimental manipulations would be far greater under an EWA approach because anticipated impacts on other objectives could be managed or mitigated by EWA resources. This principle of having immediately available resources and information from CMARP to deal with problems is one of the greatest strengths of the EWA approach.

9. Creates incentives to be more efficient for both water supplies and the environment-The incentive for getting maximum benefit from a given resource comes from having finite resources. Wasteful actions are not rationally consistent with a fixed budget.

10. Allows better coordination of maximum benefits-The classic standards approach does not provide opportunity to coordinate actions of others (ERP, CVPIA, etc). In contrast, an EWA operation decision could take into account diverse other events taking place at the same time, such as hatchery releases, large natural production of juveniles, unexpected toxicity events, etc.

11. Reduces conflict between the environment and water uses - The EWA and water users would no longer be in the position of seeking benefits by attacking the interest of the other side (win/lose), but would have a common interest in improving system infrastructure, system flexibility, biological monitoring, and scientific analysis (win/win).

Environmental Risks Associated with EWA

Even though EWA is likely to provide more environmental protection at a lower water cost than regulatory standards, it does carry some risks. In particular, how can environmental protection be assured when protective needs exceed the water available? Such a condition could come from either an overall shortage of water, an EWA with inadequate assets, or a year of exceptional fish sensitivity.

The adequacy of the EWA to deal with most environmental conditions that are expected to arise is a function of the strength of the assets controlled by the EWA and its operating and financial rules. Clearly, all else being equal, the greater the assets controlled by the EWA, the less frequently it will find itself strapped for the water and money needed to protect the environment. The EWA can also hedge against particularly stressful years by being more conservative in the use of its assets when conditions are favorable. Finally, the EWA could maintain a reserve fund or insurance policy to back it up during occasional periods when its normal resources are unequal to the task of environmental protection. Ultimately, however, there still may be periods when environmental protection is below that desired by the EWA. Periods of suboptimal protection must be balanced against the very substantial improvements in protection to be gained during normal years operation.

Often overlooked is the fact that any protective methods will fail under some conditions. During the recent simulations a number of actions were taken to protect fish that would have been lost under the proposed regulatory approach. Even when QWEST is positive and E/I ratios are low, fish are entrained at the facilities in varying numbers. The degree of confidence one has in the effectiveness of regulatory actions will determine whether such entrainment should be addressed by an EWA.

Initial Evaluation of an EWA

To gain insight into how and whether an EWA could provide adequate fish protection, water quality, and water supply benefits, a group including CALFED Agency staff and stakeholders walked through a simulation of EWA operations for water years 1984-1987. The simulation was conducted using a base operation study to serve as a default for SWP and CVP operations in the absence of an EWA. Changes in operations were simulated considering the assumed assets of the EWA and historic fish salvage records.

The EWA was assumed to have several hundred thousand acre-feet of assets, primarily in the export areas, consisting of surface and groundwater storage, water option contracts, production from an urban efficiency program, and the right to flex the E/I export standard to generate additional water. Moreover, it was allowed to use the Banks pumping plant at up to 8,500 cfs to generate additional water.

In the base run, the state and federal projects were granted an unlimited joint point of diversion (JPOD) and controlled an additional 200 kaf of groundwater storage beyond current conditions.

The four years simulated included a variable hydrologic sequence of alternating wet years and dry years. The simulation was conducted only once, without foresight as to hydrological or biological conditions. A longer simulation and additional experience would lead to more efficient operations and use of EWA assets.

The key outcome of the simulation was that the EWA could be used to provide significant amounts of environmental protection, with reduced water costs to the state and federal projects. However: (1) the fishery agencies did not feel that the amount of protection afforded the environment in the simulation was quite as high as they would like; and (2) water users felt that the water supplies generated in the simulation were not quite adequate to meet their baseline requirements.

Conclusions

Despite the fact that the four year simulation conducted to test out the EWA concept was not fully successful either for fish agencies or for water users, it came relatively close to meeting these objectives. As a result, agencies and stakeholders appear to agree that a Stage 1 program involving: (1) infrastructure improvements (e.g., south Delta improvements sufficient to allow increased use of pumping capacity in the south Delta); (2) regulatory shifts (e.g., JPOD and possibly some prescriptive environmental standards); and (3) an EWA, endowed at the appropriate level could provide enough fisheries protection and water supply benefits to win the support of all sides. The articulation of this approach will be taken over the next year.

The following insights and findings resulted from this excercise:

1. With the proper mix of assets, fisheries protection and water supply benefits can both be improved with implementation of an EWA.
2. Experience would allow more efficient use of EWA assets.
3. Monitoring data provided through CMARP would help gujide EWA decision-making. CMARP would have to be closely linked to operation of the EWA in order to operate the projects in a preventative manner.
4. Surface storage facilities controlled by the EWA would allow a great deal more flexibility than groundwater storage. Groundwater recharge rates limit opportunities to refill the account. In addition, groundwater extraction rates limited use of the account.
5. In-Delta storage would provide significant flexibility.
6. There are benefits to holding options on water north as well as south of the Delta, just as there are benefits to having access to storage north and south of the Delta. The EWA assets considered in this exercixse limited the ability to fill local storage deficits at key times both north and south of the Delta.
7. Additional optoin contracts with south oif Delta exporters would provide benefits.
8. A better mix of tools is needed to provide assurances.
9. Consideration must be given to how management of the EWA could affect attraction flows needed for upstream migrant salmon.
10. More water would be necessary to sonsistantly maintain some of the parameters (e.g., QWEST) believed by some to provide basic ecological benefits.
11. While flows and exports were managemed in this simulation to benefits fisheries, the exercise did not allow for directly evaluating potential biological benefits or impacts of actions taken in an attaempt to determine how well the EWA functioned to help fish.

Workplan for 1999

In order to bring the project operations portion of the CALFED Program to a successful conclusion before the ROD in 1999, the following plan of action will be followed.

1. Assume that the EWA will begin operation on October 1, 1999.
2. Determine which environmental protections will be provided through prescriptive standards and which will be provided through the EWA.
3. Determine how much (1) surface and groundwater storage; (2) water purchase contract water; and (3) efficiency water will be needed by EWA starting October 1, 1999. Acquire rights to control this portfolio of facilities and water.
4. Determine how the portfolio will shift and grow during Stage 1.
5. Determine initial water export improvements (e.g., South Delta improvements)
6. Determine Stage 1 water export improvements.
7. Determine and secure EWA rights to use existing and future facilities.
8. Develop accounting methodologies and baselines
9. Assure that water quality impacts of operational changes to protect fish are adequately dealt with within the CALFED water quality program.
10. Secure adequate, assured funding to support EWA operations at defined levels.
11. Allocate costs of this program using CALFED's cost allocation program.

12. Define institutional control of EWA, including governance, public participation, linkages to CMARP, and decisionmaking process.
13. Conduct a demonstration project during the 1999 water year, both to test out institutional concepts and to store water for use by the EWA in water year 2000.