MEMO

To: Steve Ritchie, Dick Daniel
From: David Fullerton
Subject: Overlaps between EWA and ERP Flows
Date: February 2, 2002

This memo describes the ways in which the EWA as currently configured might interact with the flow enhancements in the ERPP. The information I have developed to date is primarily qualitative -- the pathways through which interactions can take place. However, I was able to get information from Russ Brown which allowed me to take a closer look at possible interactions during the 1991 and 1992 water years. These were not the best years we could have chosen for analysis and much work will be needed to get a reliable quantitative estimate for you. In fact, the best way to get a handle on possible interactions would be to make meeting ERPP flows an explicit part of future gaming.

The ERPP flows focus on instream flows upstream of the Delta. The ERPP flows are of two types: monthly averages and short term pulses. The short term pulses typically are targeted for the spring period -- March through May. The monthly average flows are more targeted at fall and winter but sometimes cover other months as well.

EWA assets analyzed so far lie primarily either in the Delta or in export areas and thus cannot be used directly to meet ERPP flow targets. However, there is one major exception -- water purchases upstream of the Delta. These purchases a major point of overlap. Other, less direct points of overlap also exist. In the gaming we have, to some extent, attempted to meet upstream water needs. However, for purposes of this memo, I will assume that the EWA (as currently configured) is focussed on the Delta and the ERP is focussed on upstream flows.

EWA/ ERPP OVERLAPS

The direct and indirect pathways through which the EWA and the ERPP flows may interact include the following (there may be others which I have missed):

- **Upstream releases to meet ERPP upstream targets might help increase EWA assets, decrease EWA expenditures, or meet EWA targets.**
- **Upstream releases to meet EWA in-Delta targets might help meet ERPP targets.**

This is the most obvious area of overlap between the two program. When the ERP releases

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water for upstream flow benefits, that same water might be of use to the EWA when it reaches the Delta, *provided that arrangements have been made to protect the ERP water from diversion in or above the Delta by water users through Section 1707 or other means.* The water could provide benefits in a number of ways to the EWA:

1. Enhance Delta outflow. The water might relieve the EWA from having to use its own water to enhance Delta outflow.
2. Accumulate upstream storage credits. The water might allow the Projects to reduce upstream deliveries to meet Delta outflow requirements or might create carryover X2 days which allow for reduced Project releases the next month. If so, then the EWA could gain credits in Project storage upstream. These credits could, in turn, be used to meet additional ERP flow targets on different tributaries or could used to meet ERP targets (outflow or ERP exports) or both.

3. Diversion into EWA accounts south of the Delta. If additional pumping is feasible when the ERPP flows reach the Delta, the water might be diverted for use by the EWA, or it might eventually be backed up into upstream reservoirs for meeting additional ERP targets.

Similarly, if the EWA controls water in upstream reservoirs, it may time the release of that water to coincide with instream ERPP flow targets (with possible recapture of benefits by the EWA downstream etc.)

- **Trade EWA storage south of the Delta for Project storage upstream. Use upstream EWA storage to meet ERPP targets upstream.**
- **Trade EWA storage south of the Delta for water purchased by export interests upstream of the Delta.**

This kind of an overlap is less indirect and assumes that the EWA is willing to trade some loss of benefits in the Delta in order to gain benefits upstream. The best way to assure this kind of benefit is to merge the EWA and ERP programs into a single program.

To understand how these trades might work, consider this scenario: a bank in New York wants to transfer gold bullion to London. Simultanously, a bank in London wants to move gold bullion to New York. They could each go to the expense of shipping the gold across the Atlantic. Or they could simply make a trade.

The point is that whenever two parties whish to move an identical asset in diametrically opposite directions, they may simply exchange assets at the two ends. Moreover, each side may gain reliability and reduce transportation charges. Indeed, this approach to generating upstream storage for the environment has distinct advantages, both to the environment and for water users.

In the games to date, we have only been able to back water up into storage from south of the Delta when (1) an export restriction required by the EWA coincided with (2) a period in which the Projects were making releases upstream above instream requirements for export south. The need for these two operations to overlap is very constraining. Moreover, it only allows us to back water up into state and federal reservoirs. Other reservoirs remain difficult to access. However, if we should be able to relax this criterion considerably. Whenever someone who controls water north of the Delta (whether the Projects or a water purchaser in the export area) expects to move water from upstream to south of the Delta, then the EWA should be able to make a trade for that upstream water using water it already controls south of the Delta. In this way, the EWA is able to convert low impact exports at a time of its choosing for valuable upstream storage rights. Moreover, it may be able to recapture the upstream water once it reaches the Delta, gaining significant net benefits at very low cost. Water purchasers also gain a benefit by avoiding having to move water through the Delta, a complicated and unreliable operation. Another benefit to this approach for the EWA is that it allows EWA access to any reservoir from which water is being purchased, including non Project reservoirs.

The main limitation on this approach will be in dry years, when the Projects may not be releasing any water specifically for export, but instead are simply making minimum releases from upstream reservoirs in order to meet environmental requirements. However, in such years, the water market is likely to be particularly active, thus increasing the opportunity for the EWA to make trades with water buyers in the export area. Another limitation is that water transfers are not always translateable into control over upstream storage.

Note that trading south of Delta water for upstream storage may involve allowing extra damage in the Delta in order to enhance upstream conditions. This kind of trade may be quite desirable, provided that it provides net fishery benefits. However, it is unlikely to occur unless the ERP and the EWA are operated by a single unit which is attempting to optimize overall conditions, not merely in-Delta or upstream conditions separately.

Indeed making the EWA responsible for meeting upstream flow targets may help to solve

an apparent paradox that has emerged in the gaming -- that the EWA actually accumulates assets in dry years, and expends them in wet years. The reason is that the EWA is focussed almost exclusively on export control and the greatest cost for export control is in wetter years. But upstream flow improvements may be most needed in dry years. If flow improvements upstream are highly leveraged (lots of benefit per acre-foot) in dry years, then the EWA should be making greater efforts to enhance them in drier years, even at the cost of allowing some additional exports during wetter years.

THE INCLUSION OF AFRP

The AFRP flows are very similar to both the ERPP and EWA targets. Significant net benefits are probably possible if the AFRP flows were allowed to be managed in real time in the same way we have the flexibility to vary the EWA and ERP flows. For example, the ERP targets include 10 days flow pulses for many tributaries sometime during the spring in all but the driest years. AFRP flows are also provided on these tributaries during the same general periods. It may be possible to shave a little off the AFRP flows and thereby generate enough water for the ERPP pulses. We would then need to balance off the damage caused by lowing the AFRP flows against the benefits generated by the pulses. Similarly, ERPP purchases and EWA activities could be used (as discussed above) to generate water to help generate water to help meet AFRP flow targets. Conversely, AFRP water might be diverted by the EWA in order to provide additional benefits.

THE DESIRABILITY OF COMBINING ENVIRONMENTAL FLOW DECISIONS UNDER ONE ROOF

As I examine these issues, it becomes clear that maximum efficiency (that is, the greatest benefits at the least cost) are possible only if the EWA and ERPP flow program are managed in concert with each other. Even greater gains in efficiency are possible if the b(2) water is included under the same umbrella.

THE BOTTOM LINE

I am not prepared to estimate the degree to which ERPP and EWA investments may provide overlapping benefits (and thereby reduce overall program cost). However, I believe that the potential for overlap is large enough that we should not assume that EWA and ERPP costs will be layered on top of each other. Rather, I believe that the total cost will be significantly less than the sum of the two programs in isolation. If we could include b(2) water under the same umbrella, then the savings could be even greater. I will

continue to investigate this issue. I will also recommend to the DNCT that we begin to include fulfillment of the ERP flow targets in future gaming excercises.