

Water Supply Evaluation of EWA Games

Peter Louie, July 28, 1999

It has been suggested that since the SWP/CVP exports resulting from the EWA games in comparison to historic exports showed substantive increases, water supply objectives might have been satisfied.

Firstly, I believe the more proper comparison is between the "model base" and "model final" of the EWA games since all the modeling assumptions are the same except for the actions taken to manage the EWA. The Delta standards are common in all the games played thus far and applied to both the "model base" and "model final" results--Accord + all AFRP. The different games reflected the variable assets and applications by the EWA manager. Secondly, I will point out why it is not correct to use historic exports as the basis for comparison or to evaluate how well the games have been played to achieve the water supply objectives.

Observing Table 1 below containing the comparison of model base and model final export pumping:

- Average through the gaming years (1991 through 1995), the net annual impacts of the EWA operations were -129, -202 and -330 taf for games 2, 4 and 5, respectively. The largest annual impact was recorded for 1995 in Game 5-- 1181 taf. These figures included both increases and decreases in export pumping as the modeled results of the EWA actions during the games. However, they do not include the compensations made to the projects using the EWA assets. Therefore, these numbers are estimates of potential compensations that the EWA needs to offset project impacts (i.e., size of the account and assets).
- Looking into the monthly activities, it was also found that the largest single-month impact occurred in May of 1995 of Game 5--436 taf, followed by 409 taf occurred in June of 1995 in Game 2.
- Among the highest streak-of-months impacts took place in 1993 (Apr-Jun), totaling 902 taf and 1995 (Apr-Jun), totaling 972 taf in Game 5.
- The streak-of-months impacts may be good estimates for the EWA to acquire sufficient assets to maintain water supply reliability.
- This is a casual observation, Games 2 and 4 appeared to reduce export pumping in earlier months (Jan thru Mar); while Game 5 perturbed export pumping in later months (Mar thru Jun).

Additional comments on water supply objectives:

Even if the EWA were built with sufficient assets to deal with the streaks of impacts on the projects (i.e., compensating the projects back up to the model base pumping level), it would still be short of the water users' objectives. It is because the model base assumed Accord + all AFRP while the water supply objectives are seeking 200 to 400 taf from Accord + upstream AFRP.

Reasons why the historic export pumping should not be used as a basis for comparison:

- Historic exports were results of real-time operations of the projects that were based on a set of actual circumstances and conditions. Project contractors may have altered their water supply requests midstream into the year, summer weeds choking the pumping plants, system outages and scheduled maintenance, ESA incidental take curtailments on export pumping and a host of other operational nuances. Case in point, back in 1992 through 1994, there were pumping foregone and water supply impacts (see Table 2) due to ESA requirements of the following types: AFRP V/E ratio, Smelt-Take, Smelt-Flow, Winter Run-DCC, Winter Run-Take and Q-West.
- The model used in the EWA gaming exercises not only did it not capture all the operational nuances, it was not even designed to operate the system to meet the demands (as in the case of DWRSIM). It was designed primarily to work with the EWA by allowing adjustments to exports and storage operations to provide additional fish protections. Therefore, it merely estimated the potential pumping capability by checking against the Delta standards and a few other system constraints.
- If we were to adjust the historic pumping capability to account for the ESA impacts to properly compare to the potential pumping capability estimated by the model, we should at least add about 1 maf to the historic pumping in 1993 and 1.3 maf in 1994. We have not even accounted for other operational nuances like system outages, etc.

Table 2

ESA Impacts on SWP and CVP Exports

	Quantities in TAF	
	Forgone Pumping	Water Supply Impact
1992	255	255
1993	1,050	600*
1994	1,320	450*
1995	--	--
1996	345	345
1997	162	~0

* a DWR survey was conducted of the SWP and CVP contractors as to the quantities that could have been used or stored.

Table 1. Comparison of Export Pumping between Model Base and Model Final--
Effects of EWA

Actions. (Quantities in taf)

Game 2	Negative Impacts on Pumping		Positive and Negative Net Annual*
	Single-Highest Month	Streaks Month(s)	
1991 (d)	-26.5 Mar	-26.5 Mar	3.8
1992 (d)	-104 Feb	-104 Feb -27 Mar	31
1993 (w)	-381 Jan	-381 Jan -259 Feb	-90
1994 (d)	-175 Dec	-97 Mar -101 Apr	-180
1995 (w)	-409 Jun	-110 Dec -225 Jan	-410
Average:	-219		-129
Game 4			
1991 (d)	-136 Mar	-136 Mar -121 Apr	-245
1992 (d)	-168 Feb	-168 Feb -86 Mar -126 Apr	-300
1993 (w)	-255 Feb	-249 Jan -255 Feb	98
1994 (d)	-121 Dec	-121 Dec -65 Jan	-96
1995 (w)	-322 Jun	-63 Dec -144 Jan	-468
Average:	-200		-202
Game 5			
1991 (d)	-136 Mar	-136 Mar -33 Apr -32 May	-306
1992 (d)	-178 Feb	-178 Feb -76 Mar	55
1993 (w)	-363 May	-238 Jan -33 Feb -263 Apr -363 May -276 Jun	-416
1994 (d)	-177 May	-62 Mar -123 Apr -177 May	200
1995 (w)	-436 May	-64 Dec -145 Jan -214 Apr -436 May -322 Jun	-1181
Average:	-258		-330