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Gaming
Data Needs
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Here is a list of the basic operations information from Scenarios 1a and 1b, needed to present our work and finish our analysis. Many of these traces are automatically generated by the Daily Model already, so the list is not quite as daunting as it looks. Others will need to be generated using data from the games. In the next section, I will suggest a few ways in which to analyze this data. I make no suggestions about biological evaluations. That is for others.

	DWRSIM Run 2 (seq.)	DWRSIM Run 3 (seq)	DWRSIM Run 6 (seq)	DWRSIM Run 2 (yr)	DWRSIM Run 3 (yr)	DWRSIM Run 6 (yr)	DM from Run 3 (yr)	DM from Run 6 (yr)	DM final patterns from 1a	DM final patterns from 1b	Historical record
Exports	X	X	X	X	X	X	X	X	X	X	X
Deliveries (yr)	X	X	X	X	X	X					X
SLR storage	X	X	X	X	X	X	X	X	X	X	X
SLR lowpoint (yr)	X	X	X	X	X	X	X	X	X	X	X
Groundwater storage			X			X					
Shasta storage	X	X	X	X	X	X	X	X	X	X	X
Folsom storage	X	X	X	X	X	X	X	X	X	X	X
Upstream carryover storage (yr)	X	X	X	X	X	X	X	X	X	X	X
Delta storage, pumping in/out of Delta storage.								X		X	
Delta outflow.	X	X	X	X	X	X	X	X	X	X	X
Delta outflow (yr).	X	X	X	X	X	X	X	X	X	X	X
Releases at Keswick, Folsom, New Melones compared to AFRP.	X	X	X	X	X	X	X	X	X	X	X
Purchases (yr)								X		X	
Demand shifting (yr)								X		X	
Clifton Court salinity	X	X	X	X	X	X	X	X	X	X	X
Annual export salt loading	X	X	X	X	X	X	X	X	X	X	X
EWA water							X	X	X	X	
E/I relaxations							X	X	X	X	

Analysis of Supply Performance

Basic data on flows, diversion, and storage must be converted into more meaningful formats to be useful. Here are some preliminary suggestions on how we might present the results. Some of this information might be consolidated onto the same graphs.

Exports: Run 3 – Run 2 (seq) (yr). *Represents DWRSIM exports for scenario 1a before b(2), transfers, and demand shifting applied. Could manipulate these differences to show yearly data, average data, dry year data, etc.*

Exports. Run 6 – Run 2 (seq) (yr). *Same, but gives DWRSIM exports before Delta storage, b(2), demand shifting, transfers, etc.*

Exports. DM 1a exports – DM version of Run 3 + DWRSIM Run 3 (yr) – Run 2 (seq). *If I did the equation right, this should represent exports during the game relative to the Accord in the DWRSIM metric. Alternatively, we could simply present the exports in the DWRSIM metric and let people subtract for themselves. In that case, do not subtract Run 2 (seq).*

Exports. DM 1b exports – DM version of Run 6 + DWRSIM Run 6 (yr) – Run 2 (seq). *Same, but now for scenario 1b.*

Analysis of B(2) Use and Impacts

B(2) subtracted each year for WQCP (yr). *Maybe break this number into year type to see if there is any difference.*

B(2) from upstream AFRP (yr)/ applied/assessed/exported. *Include both applied and assessed to show that not all increased flows are a cost to b(2). Calculate how much extra water was pumped as a result of AFRP releases.*

B(2) discretionary remaining (yr) each year. Also note any unspent b(2) each year.

Overall reduction in exports each year as a result of upstream and in-Delta actions. *This should include both direct estimation of the impacts, based upon the results of the daily model and some estimate of the annual carryover effect, in which higher or lower storages cause impact or create gains in the next year. A comparison of the carryover storage in DWRSIM between the sequential runs (3 and 6) and the yearly runs (3 and 6) should provide some help here.*

Storage Carryover comparisons vs exports following year for Shasta, Oroville, SLR for Run 2(seq), Run 2(yr). *This gets at the same issue. Did changes in storage cause significant changes from the original baseline exports?*

Water Quality

I assume that Briggs can supply needed analysis.

Asset Analysis

We also need to look at the various assets to get some appreciation for how well they performed. This means more than just noting the use of an asset. It means trying to track what difference made in the game by the asset. For example:

- Dry year purchases were straightforward. They allowed us to deliver more water.
- Demand shifts may have allowed increased exports, but not necessarily. If San Luis didn't fill the next winter, then the demand shift actually dropped SLR storage the next year, so the benefits were canceled by the delivery loss the next year. We need to track whether this happened.

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- Delta storage. Filled easily during many years. However, filling Delta storage frequently meant that San Luis merely filled faster during the succeeding winter. This was a biological benefit, but not necessarily a water supply benefit (on the other hand, we might hypothesize that Delta storage in hand by February first can be used in allocating deliveries the next summer. This would help avoid the need to carryover Delta storage to a succeeding year.
- Banks pumping. What difference did it make to yield? To the ability to fill groundwater and SLR? To the ability to avoid low point problems? To water quality?
- Shasta storage. What new yield can we estimate was created by 290 kaf new storage?

Comments on Assets/ EWA linkage

Delta storage appears to provide major EWA benefits, while providing less significant user benefits. Moreover, control by users could lead to significant new bio damage. The reason is that DW fills most *easily in wet years. But in such years, the water may not be accessible until after the growing season.* If so, then it merely leads to an earlier fill of SLR – of no benefit to users, but of great value to EWA (and perhaps to water quality, since may reduce pumping february and march). Project is of greater value to both sides if a secure connection to Bacon.

Average EWA needs may not be great, but there may be significant needs in some years. Also, EWA is able to do lots of good just by borrowing (e.g., carrying out b(1) type actions, but including SWP). Both needs require *the existence of assets able to recoup major spring pumping reductions before* (and after) SLR low point. Thus, the highest priority EWA assets might be (keeping in mind that the greatest needs/ opportunities will be in wet years):

- Delta storage
- Groundwater storage
- A share of Banks (allows EWA water to shifted from upstream to pay back debts in the export areas)
- South of Delta purchase options.
- Wet year efficiency water.

Also, note that by building up EWA assets SOD and performing more export actions via the EWA, we are able to (1) focus b(2) more on upstream actions and (2) reduce the impacts of b(2) on the exporters.

High groundwater extraction rates remain crucial if this is to be a useful asset for borrowing. Note, however, that the pumping rate becomes less important if the EWA has other, more liquid, assets SOD. In that case, the EWA could pay out other assets, extending the length of time before the groundwater is needed.

Banks sharing formulas. Sharing still seems desirable. I still tend toward giving summer capacity to EWA and winter capacity to Projects. Why? In wet years, SLR will frequently fill early. This means that the EWA would have significant capability to shift pumping at Banks without cost – even without direct pumping rights. However, given the discussion above about the need for EWA to be able to compensate for spring pumping reductions, summer pumping rights appear very important. Thus, we might allocate new capacity 80% SWP and 20% EWA at Banks from September through February and 20% SWP and 80% EWA from March through August. This division also allows the EWA to protect March and the first 2 weeks of April (before VAMP) from increased pumping.

Similarly, efficiency purchases in the export areas that give the EWA increased operational control during wet periods appear very useful (though perhaps expensive).

South of Delta water purchases will need to take up whatever additional acquisition is needed. This is a fairly low cost solution, but is politically volatile. Therefore, I would consider it viable for now if wet year purchases are held below 200 kaf and dry year purchases below 100 kaf.

The expansion of

Notes

Add run 1 into matrix? Export patterns/ storage patterns could be interesting.

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