DNCT Special Meeting with CVP/SWP Operators
on Flexible Operations
9/28/98

Basis Concept and Options for Operational Flexibility:

- Relaxing standards to allow increases in export for water supply at times so that greater restrictions to protect fish can be put in place at other times.
- Provide for predelivery of fish water (don't wait to repay later).
- Would provide two benefits: currency for water supply and currency for fish.
- Real-time adjustments balancing biology and operations.

Approach to Daily Simulation:

- Simulate operational flexibility with a daily modeling tool
- historic + Accord + Flex Oper
- Delta operations only: exports; E/I's; X2
- tool to try out rules and accounting to ease fears
- run model without triggers; then with; account for differences. Need a way to increment changes.
- modify exports and demands for now; add reservoirs to modify inflows and reoperate later.
- fish triggers based on density; as are benefits from cutting exports.
- delivery deficits = fish benefits

Potential Improvements to Concept:

- include system demands
- include upstream reservoir and system-wide operations (needed to take advantage of relaxations)
- need to define specifics of fish triggers
- MWD is looking at ways to shift demands for blend water using East Side Reservoir; which would allow keeping San Luis fuller through summer to provide more flexibility and reduce spring exports. This would shift the demands to other periods, but it could be a benefit to env and water supply.
- An increase in ground water or reservoir storage in south would help reduce demands on San Luis storage and provide for more operational flexibility.
- The basic premise of system operation is to fill San Luis as soon as possible - we can even change this.
- We should also include potential shifts in demand management.
- CVP and SWP sharing of San Luis could be built in to be more realistic.
- Include Bureau's winter run temp releases in model. Show how it affects system and how operators deal with it. Model should reflect reality.
- We need model of how two project operate on a real time basis for current conditions; then we bring in fish triggers and new operational flexibility to show affects.
- We should look at impacts to all species from changes in system operations.
- We should use model to show all possible means for flexibility and accounting.
- We should provide accounting for changes due to fish triggers.

Comments on Needed Improvements:

- Under Dry Year or Balanced conditions export reductions could be wasted because water may have to be released due to upstream release requirements. Under wet year similar problems but water released for similar and other reasons (flood control). Because of this problem **upstream operations should be included in simulation tool.** Minimum flows, spills, and demands would be relatively easy to include in our tool.
- Upstream operations have also changed in the last decade. We may also want to change upstream operations to provide water supply and fish protection.
- Upstream operations may also have a large affect on San Luis operations and thus our ability to manipulate Delta conditions.
- Reasonable to operate flexibly within and around basic system operation.
- Joint Point of Diversion when applied will take away some of flexibility; if used CVP users could be affected; but it could also provide more flexibility by filling San Luis earlier. Could be used for fish benefits. May also push fish water out of San Luis - need some accounting for balanced sharing.
- Need to make commitment to account for all of these features and water - develop rules.
- Should consider consumptive use.
- COA could be added with upstream reservoir component of model.

System Operations - Controlling or Limiting Factors

- E/I ratio and X2 are usually not a controlling factor in dry years; while storage is by causing shifts in demand management.
- Downstream storage is often a limiting factor in the model for dry year.
- East Side Reservoir could provide some storage.
- Demand is also important - it is hard to shift as it is responsive to crop needs; but urban demand could shift with other storage options

Modeling Approach

- model historic operations and add layers of new flexible options on top of base
- reoperate reservoirs such as Oroville to meet needs of new flexible operations (flex minimum flows, carryover storage, and demands on storage)
- account for new demands and any flexibility in demands (flexibility in demands can provide more leeway in San Luis and East Side reservoirs)

Example - 1990

- Accord would greatly change historical operation - greatly reduce Feb-June exports - reduce total exports by over 1 MAF. Adding more fish protections would cut exports another 260 TAF. San Luis would empty in summer.
- limiting factors include
  - 10,300 pumping capacity
  - outflow requirements
  - some E/I and X2
  - minimum 1500 pumping
- Changing E/I in summer would not help - not constraining, outflow is constraining.

- Since outflow is constraining much opportunity to export to refill San Luis water in summer if water could be made available (releases, transfers, purchase, etc).
- 15,000 pumping capacity would give us back 160 TAF of San Luis storage by taking advantage of small winter flow pulses (these pulses may not be obtainable in real-time).
- Relaxing E/I in Feb-Mar to 45% would provide an additional 45 TAF of restored San Luis water.
- San Joaquin requirement is included in example; but VAMP would be lessor requirement. Better simulation if we just show VAMP. Exports would be 2 kcfs rather than 4 kcfs.

Next Steps

- Simulate more years.
- Add features to model (e.g., upstream reservoirs, inflows, and associated components)
- Modify San Joaquin using VAMP limits.
- Add salinity component.
- Further develop triggers and apply them to see their effect; adjust as necessary. Triggers need not be fixed. They could be adjustable or vary with water supply commitments or other factor. (Something to consider in Phase 1 adaptive management.)
- Extent triggers beyond smelt to salmon and striped bass.
- Provide output in terms of fish salvage reductions from actions.
- Consider forcasting 1999 using various baselines and levels of demands derived from historical period or example years.
- Develop a realistic model to show benefits of flex operations - represent operations accurately.
- Determine what system modifications could improve performance - try to improve operations.
- Show system constraints (e.g., San Luis storage; pumping capacity, canal capacity, etc.)
- Build additional tools.
- Don't limit ourselves to CALFED process.
- Determine if this is realistic approach. Is the env side receptive?
- Have an objective of no net loss of water supply to guide process. AG/Urban's would like no less than provided by the Accord. Convince them that operational flex is the way to do it.
- Show impacts of ESA regulations.
- Show how existing take limits are too restrictive.
- Show how we would operate now under todays conditions.
- Develop a way to deal with increasing SWP demands. Adjusting historical demands is a reality check. Try to adjust as hydrology allows.
- Show the ripple effect of new measures on entire system operations. We have to use the model for this.
- Build in system maintenance shutdowns to be more realistic.
- Build in monthly and daily operational characteristics used by operators. Consider daily questions faced by operators to be more realistic. Account for water that may not be saved because operators just have lags and other considerations.
- Build operations layers, then fish layers.

- Build a pre-emptive attack type of system.
- Use model to show how system would benefit from specific new facilities (e.g., storage). Start with existing system and how much it can be flexed; then add the new facilities in sequence. Show existing and Stage 1. Show how new storage gives chips to both sides. Show how greater flexibility would have provided more water in 1997.
- Show the effects of new decisions such as b2. Do such decisions hurt flex?
- Show how each year is different in how flex would be applied and benefits derived.
- Develop rules to protect water supply as well as env.
- Look at what we tried in 97 and 98 in Ops Group. (e.g. how we made up water later; problems with this approach - payback rather than pre-emptive.)
- Build in realism such as buffers and carraige water; water for EC caused by tidal extremes - things that operators deal with all the time.
- Build in rules that minimize loss of water.
- Get trace of periods of balanced conditions - equate operations to requirements at that time.
- Build in other daily subtleties: carryover credits into next month; ways to deal with running average standards.
- Study and analyze history to see constraints and opportunities to save water and fish.
- Look for opportunities that we have seen in record.
- Look for better fish triggers but also better system operations.
- Build a tool that will help both sides to a willingness to take some risk in future under adaptive management. Show everyone where this approach will take us. Show benefits to both sides. Assurances?
- Develop measures for quick reaction and response in model that are realistic and potentially useable in future testing.
- Test ideas in real life in future so we learn and improve from experience.
- Get to point of daily forecasting model.
- Develop the env accounting method.
- Try out new rules, but make sure we include existing rules and daily operational criteria and system operations approaches first; and show how these already provide many benefits..

Finally discuss these topics with NoName, DEFT, and DNCT; and CALFED.
Jim Snow's team will start looking at some of these things. Russ will continue to show some of these features with his spreadsheet tool. Continue thinking about a daily operations model.

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