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Workshop 3

Analytical Tools

For evaluating water supply, hydrodynamic, and hydropower effects

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Summary of Recommendations

Impact analysis of potential WQCP amendments must:

- **use models that can incorporate**
  - **a *broad range of water management strategies* (including demand management and alternative supply sources)**
  - ***differing* assumptions re: *water users* contributing flows**
  - ***climate change* assumptions**
  - ***economic* analysis of alternative strategies**

- **include *daily* and *weekly* as well as *monthly* time steps, where possible**

- **compare *different %s of UIF* against changes in *specific flow needs* of fish, habitat, ecosystem**

Necessary Approach

- Models and analysis that exclude a broad range of water management strategies are not as useful in assessing impacts

- Potential supplies from alternative strategies are well documented, can be actually realized, and promote compliance with state policy to reduce Delta reliance

- At least 6.12 million acre-feet statewide by 2030 = more water than current average diversions from the Delta

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Necessary Approach: Alternative Water Supplies (1)

Alternative Water Supplies and Operations

- **Agricultural water use efficiency – multiple benefits include new water, increased productivity, improved water quality, reduced energy use, and greater control over timing of use. Estimated savings range from 0.9 to 5.7 million ac-ft annually (MAF/YR).**

- **Urban water use efficiency – continues to offer some of the most cost-effective means for generating significant demand reductions. Technical savings potential is up to 3.1 MAF/YR by 2030, not including any advances in water-saving technology.**

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Necessary Approach: Alternative Water Supplies (2)

Alternative Water Supplies and Operations

- **Capture and use or recharge wet period runoff in floodplains and groundwater (inc. urban stormwater capture and conjunctive management). Estimates range from 1.0 to 2.5 MAF/YR.**

- **Reservoir Reoperation - in conjunction with expanded floodways.**

- **Recycled water from municipal, agriculture, and industrial sources – Estimated potential just from municipal recycling ranges from 1.0 to 2.3 MAF/YR by 2030. Exploiting broader opportunities to reuse and reclaim would yield much greater supplies.**

Necessary Approach: Limitations of Models

- CALSIM is designed to evaluate Federal and State export capabilities in response to demand, and is not the optimal tool to assess potential water supply impacts in light of alternative water management (e.g. 2009 water transfers).

- Results from CALSIM runs in economic models should be used very cautiously.

Necessary Approach: Appropriate use of models (1)

- **Despite its shortcomings, CALSIM is the most detailed and widely-used model. CALSIM 3 should be evaluated as a replacement for the decade-old CALSIM 2.**

- **CALSIM modeling of BDCP Alternative 8 and CS5 shows that increased winter/spring outflow need not adversely affect upstream protections for salmonids. Board should build upon and refine these approaches to ensure upstream protections as well as adequate inflow and outflow.**

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Necessary Approach: Appropriate use of models (2)

- Other models, including optimization models such as UC Davis' CALVIN model, should also be used, since they can more readily evaluate the economic impact and response of water users to reduced diversions and other alternative management strategies throughout the Delta user service area.

- Models such as WEAP may be more suitable for evaluating alternative water management strategies and climate change than CALSIM for the entire watershed and user service area.

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Necessary Approach: Appropriate use of models (3)

Models should use % of UIF (or similar approach to mimic natural hydrologic patterns and volumes):

- **UIF is best conceptual approach to aggregate most flows based upon critical ecosystem needs into single objective or set of objectives (subject to refinement re implementation issues and augmented by additional objectives such as OMR flow criteria)**
- **UIF or similar approach is also better way manage adaptively, and to mitigate climate change effects as distribution of water year types changes with climate (more frequent dry water years).**
- **Modeling analysis needs to compare effects of different %'s of UIF against disaggregated, underlying flow needs to most accurately evaluate potential fish and wildlife beneficial use impacts.**

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Changes in Delta Outflow (1)

- **TBI's 1998 report "From the Sierra to the Sea: The Ecological History of the San Francisco Bay-Delta Watershed" (STS) analyzed historic trends in Delta outflow and calculated pre-development outflow. STS was funded by and included technical reviewers from MWD, CUWA, CALFED, and EPA.**

- **No new information offered by SWC/SLDMWA to challenge the STS findings that large dams and Delta export facilities significantly reduced the spring outflows compared to the pre-project period despite a significant increase in average runoff into the Central Valley and greater frequency of wet years since 1968.**

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Changes in Delta Outflow (2)

- **Water diversions and exports had even more significant impact than hydrology on outflow when comparing 1990s to 2000s. Average spring runoff decreased about 20% from one decade to the next; but average spring outflow decreased 43%. Comparing similar years of runoff from the two decades shows even greater decreases in outflow.**

- **Unimpaired Delta outflow not same as "natural" outflow because of significant land use alterations, but the unimpaired runoff is a satisfactory representation of the natural inflow conditions into the Central Valley.**

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Changes in Delta Outflow (3)

- **Both TBI and USGS analyses indicate pre-development or "natural" annual Delta outflow is, on average, about 50% greater than what has been modeled for actual Delta outflow for current conditions.**

- **The variation in the different estimates of natural outflow is primarily attributable to values assigned to estimated areal extent of different vegetation types and their transpiration rates, however the SWC/SLDMWA analysis has a number of questionable assumptions in its historical landscape reconstruction of vegetation types and transpiration rates.**

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Questions?