

FOR REVIEW PRIOR TO 15 JUNE MEETING

"ALL CAPS" are comments/observations by Chadwick

"*** ALL CAPS ***" are comments/observations/responses by Buell

Technical Issues/Questions for Tech Team Evaluation by Category:

1. Fish and Flow

- 1.1. Winter export of small flow pulses in dry years (e.g., February 1991) – potential effect of moving X2 upstream and making delta smelt adults more vulnerable to export related impacts.
- 1.2. Importance of San Joaquin attraction flows – puts demands on SJ storage and is expensive. *** THIS IS TRUE, AND THERE IS SOME QUESTION WHETHER THE AMOUNT OF WATER USED UP BY VAMP IS WORTH IT. IT ALL DEPENDS ON WHAT IS DESIRED. FOR EXAMPLE, STEVE CRAMERS WORK INDICATES THAT A FEW "SHARP" FLOW PULSES ARE ACTUALLY SUPERIOR TO A CONTINUOUS RELEASE OF HIGHER FLOWS WHEN IT COMES TO "ENCOURAGING" SMOLTS TO MOVE OUT. AT THE VERY LEAST, THIS SHOULD BE PART OF THE "AM" PART OF "VAMP", AND IT COULD TURN OUT TO SAVE A GREAT DEAL OF WATER. ***
- 1.3. Importance of pulse flows for fish migration and habitat. *** SEE ABOVE FOR FISH MIGRATION (SALMON). THE SAME "MIGHT" BE TRUE FOR OTHER SPECIES (ANOTHER "AM" OUT OF VAMP). AS FOR "HABITAT", IT REALLY DEPENDS ON WHAT A PERSON MEANS (NOT TRYING TO BE "CLINTONESQUE" HERE) BY "HABITAT". IF A PERSON THINKS THAT Q-WEST IS "HABITAT", WE HAVE A BIG PROBLEM. IF PHYSICAL FEATURES ARE "HABITAT", ALONG WITH WATER VELOCITIES (INSTANTANEOUS) AND PATTERNS OF MIXING IN A TIDALLY DRIVEN ESTUARY, THEN HOW THESE PARAMETERS ARE INFLUENCED BY RIVER DISCHARGE BECOMES RELEVANT. ***
- 1.4. Are there any potential impacts of altering Sacramento River flow in August and September?
- 1.5. Would changes in Delta inflows and export rates affect upstream habitat conditions? *** PROBABLY INsofar AS UPSTREAM RELEASES ARE INFLUENCES ON UPRIVER AREAS AND TRIBUTARY STREAMS. EXPORTS WOULDN'T HAVE AN EFFECT, JUST RELEASES FOR "WHATEVER PURPOSE". ***
- 1.6. X2 standard is a seasonal standard – how do short term changes in flow and X2 potentially affect fish and fish habitat? *** THIS NEEDS TO BE DISCUSSED BY THE TECH. TEAM. I SUSPECT WE WILL GET INTO THE ISSUES OF CENTER OF DELTA SMELT POPULATIONS, WHETHER THE CROSS CHANNEL GATE IS OPEN, ETC. RECALL, HOWEVER, THAT FOR

REGULATORY PURPOSES, X2 IS *NOT* A SHORT TERM PHENOMENON, IT'S A MONTHLY AVERAGE! I'M NOT SURE WE CAN ANSWER THIS QUESTION THE WAY IT'S WORDED (?). MY POSITION CONTINUES TO BE THAT WE SHOULD APPEAL TO REAL-TIDE HYDRODYNAMICS. ***

- 1.7. AFRP action sets July exports as a function of June exports – if we adjust June exports, how will we deal with July exports to provide the same or more protection to the striped bass for which the AFRP action is directed?
- 1.8. Can fish be safely protected by managing X2, QWEST, and other Delta hydrodynamic parameters on a seasonal or monthly basis, or does it require daily management? Is recent hydrodynamic history important? Are other factors (e.g. local velocity fields, water residence time and local habitat conditions) important factors? *** MY POSITION CONTINUES TO BE THAT REAL-TIDE HYDRODYNAMICS AND IN-DELTA RESIDENCE TIME OF WATER ARE ABSOLUTELY KEY TO UNDERSTANDING AND MANAGING FISH RESOURCES IN THE DELTA...ALONG WITH WATER QUALITY, TO SOME EXTENT. Q-WEST IS NOT A USEFUL PARAMETER, IN MY JUDGEMENT, AND SERVES ONLY TO TAKE OUR EYE(S) OFF THE REAL ISSUES, WHICH REVOLVE AROUND LOCAL, REAL-TIDE HYDRODYNAMICS, PHYSICAL HABITAT FEATURES, HABITAT ASSOCIATIONS BY VARIOUS SPECIES, AND COMPETITION/PREDATOR/PREY RELATIONSHIPS. ***

2. Fish Population Effects and Factors that Affect Them

- 2.1. Effect of export losses on fish populations: At what salvage level is the potential risk to populations significant enough to warrant cutback in exports? *“The team differs on the potential degree of population effects of entrainment and salvage related losses. The team does not agree on the importance of export related effects (direct or in-direct) in reducing these losses on populations.”* *** THE ONLY WAY TO GET A HANDLE ON THIS VERY IMPORTANT ISSUE IS TO USE ADULT EQUIVALENCE ACCOUNTING. THERE IS NO SENSIBLE BIOLOGICALLY-BASED REASON TO SHY AWAY FROM THIS. THERE MAY BE OTHER REASONS, HOWEVER. ***
- 2.2. Effect on Sacramento salmon populations. *“The DEFT salmon team differs on the potential degree of recovery that may be achieved from the actions in the Common Program and the AFRP. The team agreed on a list of habitat actions for Stage 1 and on the priorities for the actions. The team agreed that Common Program and Upstream AFRP actions would probably lead to recovery of Sacramento salmon and steelhead populations.”* MY RECOLLECTION IS THAT THE TEAM AGREED THAT UPSTREAM ACTIONS WOULD PROVIDE UPSTREAM CONDITIONS SUFFICIENT TO SUPPORT RECOVERY, RATHER THAN AS STATED HERE WHICH IMPLIES THAT UPSTREAM ACTIONS ALONE WOULD BRING ABOUT RECOVERY. *** I AGREE WHOLEHEARTEDLY WITH CHADWICK'S STATEMENT, BUT WOULD TAKE IT FURTHER. IT IS *VERY* IMPORTANT TO TAKE ACCOUNT OF HARVEST (BOTH OFFSHORE AND INLAND),

ESPECIALLY IN LIGHT OF THE PERCENT OF TOTAL RETURNS THAT CONTINUE TO BE HAVESTED OFFSHORE, AND HATCHERY PRACTICES. WITH REGARD TO THE LATTER, NMFS IS VERY ANXIOUS FOR CDFG TO GET ON BOARD WITH BOTH DATA AND A SERIOUS REVIEW OF HISTORICAL AND PRESENT HATCHERY PRACTICES FOR THE SPECIFIC PURPOSE OF ASSESSING BOTH STOCK STATUS AND RECOVERY PROSPECTS. I ENDORSE NMFS' POSITION IN THIS MATTER. ***

- 2.3. Which populations are in greatest need of protection from project operations?
*** THE ONES CLOSEST TO THE PUMPS. THERE IS ALSO THE ISSUE OF SEQUENCING OF PROTECTIONS BOTH WITH REGARD TO THE STATE/FEDERAL WATER PROJECTS AND OTHER "PROJECTS" WHICH THREATEN FISH AND OTHER BIOLOGICAL RESOURCES. FOR EXAMPLE, IT MAKES NO SENSE WHATEVER TO "SEND" DELTA SMELT TO SUISUN/HONKER BAYS JUST TO HAVE THEM ENTRAINED IN PRODIGEOUS NUMBERS AT PITTSBURG AND CONTRA COSTA POWER PLANTS. CONTEXT COUNTS! ***
- 2.4. Is the percent reduction in salvage using the salvage model a real parameter for assessing impacts and benefits of simulations on the populations? *** YES! ESPECIALLY IN THE CONTEXT OF ADULT EQUIVALENCE ACCOUNTING. ***
- 2.5. Do impacts have to be observed or predicted (manifested) at the population level to be significant? *** RHETORICALLY, IF THERE IS NO POPULATION-LEVEL EFFECT, HOW COULD THE IMPACT ON THE FISH "RESOURCE" BE "SIGNIFICANT"?? ESPECIALLY IF WE ARE TALKING ABOUT ESA AND "POPULATION RECOVERY" FROM IMPACTS... THAT WOULD HAVE HAD TO BE AT THE POPULATION LEVEL TO GET THE POPULATION INTO TROUBLE IN THE FIRST PLACE. I DON'T KNOW WHY THIS IS AN "ISSUE"; IT'S A "NO-BRAINER" ***
- 2.6. Habitat: "*Salmon stocks can be greatly enhanced over existing conditions by improving habitat, food web, and predator/prey relationships within the interior Delta. We should do every thing possible to reduce movement of juvenile salmon into the interior Delta via the DCC, Georgiana Slough, and HOR.*" THE TWO SENTENCES DO NOT COMPLEMENT EACH OTHER. ALSO THE HOR WOULD NOT REDUCE MOVEMENT INTO THE INTERIOR DELTA. *** I AGREE WITH CHADWICK THAT THE ORIGINAL TWO SENTENCES ARE INCONSISTENT WITH EACH OTHER, UNLESS I'M MISSING SOMETHING. I THINK THE LOGICAL FOLLOW-ON TO THE FIRST SENTENCE IS "WE SHOULD GET WITH THE PROGRAM, STARTING YESTERDAY". I UNDERSTAND THE DESIRE OF SOME (WITH WHOM I AGREE TO ONLY A LIMITED DEGREE), TO KEEP JUVENILE SALMON OUT OF THE DELTA, BUT I BELIEVE THE SECOND ORIGINAL SENTENCE AS WRITTEN GREATLY OVERSTATES THE CASE. I SUSPECT THAT NON-NAIVE SALMON ENTERING THE DELTA DO VERY MUCH BETTER THAN "RELEASED" SALMON, WHICH WOULD BE VERY MUCH MORE VULNERABLE TO RAPID PREDATION IN

AREAS WITH HIGHER PREDATOR CONCENTRATIONS THAN MORE WILEY "NATURAL" OR UPSTREAM-RELEASED FISH...AND THE DATA SUPPORT THIS. I DISAGREE WITH CHADWICK (I THINK) WITH RESPECT TO HIS SECOND SENTENCE. I BELIEVE STRONGLY THAT THE HORB WILL GREATLY REDUCE THE PERCENT OF SJR SALMON SMOLTS WHICH WILL ENTER THE *SOUTHERN* DELTA, WHERE THEY WOULD BE MOST AT RISK FROM ENTRAINMENT. I SUSPECT THAT MOST FISH "FORCED" TO GO AROUND ALONG THE SJR MAIN STEM WOULD COME UNDER INFLUENCES OF TIDAL FLUX FROM THE CONFLUENCE AND WOULD BE MORE *LIKELY* TO FIND THEIR WAY OUT. DEFINITIVE EXPERIMENTS WITH ACCLIMATED FISH, TESTED BEFORE RELEASE FOR SALT WATER "TOLERANCE" (A STANDARD PROCEDURE AT MANY FACILITIES ELSEWHERE IN THE CONUTRY) HAVE NOT YET BEEN PERFORMED. ***

- 2.7. Ocean Conditions: *Recovery of salmon and other species may be dependent on ocean conditions. For example: the El Nino appears to affect ocean productivity and the distribution of predators and prey of salmon in coastal and open ocean feeding areas of salmon. The team differs on the potential role ocean conditions may be playing in the decline and recoveries of these fish species.* I SUSPECT WE CAN ALL AGREE THAT ANNUAL VARIATIONS IN OCEAN CONDITIONS CAUSE WIDE VARIATIONS IN ADULT ABUNDANCE AND SOMETIMES ARE A MAJOR REASON FOR LOW ADULT SPAWNING ESCAPEMENT. FOR RECOVERY TO "BE DEPENDENT ON OCEAN CONDITIONS", HOWEVER, REQUIRES OCEAN CONDITIONS EITHER TO FREQUENTLY BE SO BAD AS TO THREATEN SPECIES SURVIVAL OR TO BE TRENDING DOWNHILL. DOES ANYONE IN THE GROUP BELIEVE EITHER TO BE THE CASE? *** **YES** THERE IS INCREASING EVIDENCE THAT DISTRIBUTION OF SALMON STOCKS FROM THE CENTRAL VALLEY DO INDEED BECOME DISTRIBUTED FURTHER NORTH DURING EL NINO EVENTS, AND THAT THEY ARE SUBJECTED TO INCREASING FISHING AND OTHER PRESSURES. HARVEST OF CENTRAL VALLEY STOCKS HAS OCCURRED AS FAR NORTH AS THE N. END OF VANCOUVER IS. IN SUCH EVENTS. IN SEVERAL YEARS WHEN THERE HAS BEEN A SIGNIFICANT REBOUND IN ADULT POPULATIONS, HARVEST HAS BEEN PARTICULARLY INTENSE, MASKING POTENTIAL RECOVERY AND DOING MUCH TO PREVENT REBOUND/RECOVERY. THE DATA ARE THERE, AND ANALYSES HAVE BEEN PERFORMED. ***
- 2.8. Harvest/Hatcheries: *Recovery potential for salmon, steelhead, and striped bass may depend on activities outside the control of water projects such as harvest in the ocean or hatchery practices. The team differs in the potential role hatcheries and harvest play in the decline and recoveries of these species.* "The salmon team did not want to address hatchery issues when the topic was raised with the work group. CalFed really needs to take a separate look at the hatchery issues." *** **I REALLY THINK THIS TEAM SHOULD RE-ASSESS ITS POSITION ON**

*THIS ISSUE. IF WE REFUSE TO EVEN TAKE THIS INTO ACCOUNT, OUR WORK WILL BE OUT OF CONTEXT AND OF CONSTRAINED VALUE. ****

- 2.9. Exotics: *“The Bay/Delta is dominated by non-native species. Some introduced species have substantially altered the functioning of ecosystems they have invaded and the team has limited understanding of the new ecological relationships among species. New species will likely continue to arrive and disrupt the biological communities of the estuary in the future. All data and analyses, therefore, that rely on historical relationships may not accurately predict the future. The almost certain arrival of new species in the future may alter the ability of the estuary to support the three species described above. The team has not evaluated the potential role of exotic species in the potential for recovery of important fish populations. However, for many of the team members this is an important issue.” “We probably have a concensus that eliminating Potomocorbula from the estuary would be a good thing, but it can not be done.”*
I WONDER HOW FAR APART WE REALLY ARE. COULD WE APPROACH CONCENSUS ON SOMETHING LIKE THE FOLLOWING: NEW SPECIES INTRODUCED DURING THE PAST 30 YEARS HAVE ALTERED THE ABILITY OF THE ESTUARY TO SUPPORT SOME OF THE SPECIES ALREADY PRESENT, AND MAY BE MAKING IT MORE DIFFICULT TO RECOVER SOME OF THE TARGET FISH SPECIES. WHILE IT IS TECHNICALLY DIFFICULT TO DEFINE SUCH EFFECTS, ONE OF CMARP’S GOALS SHOULD BE TO DO SO. *** I AGREE WITH CHADWICK’S STATEMENT HERE, BUT I THINK THE LAST PART MAY BE JUST A BIT TOO TIMID (WITH APPOLOGIES). I BELIEVE WE CAN AT LEAST TRY TO MOVE IN A DIRECTION WITH OUR WORK WHICH WILL HOPEFULLY FAVOR NATIVE SPECIES OR “TIP THE SCALES” IN THE DIRECTION OF CO-EXISTENCE FOR SELF-SUSTAINING POPULATIONS OF NATIVE FISHES WITH INTRODUCED SPECIES. ***
- 2.10. Other Delta Diversions: *“The team has not evaluated or considered the relative role of other Delta diversions (primarily agricultural and steam electric generating stations) in the decline or recovery of important fish populations.”*
*** THE TEAM SHOULD CERTAINLY CONSIDER OTHER DIVERSIONS, ESPECIALLY WHERE THERE ARE DATA, SUCH AS AT THE PITTSBURG AND CONTRA COSTA POWER PLANTS. GIVEN THE LEVEL OF “TAKE” AT THESE FACILITIES, IS IT WISE TO “ENCOURAGE” DELTA SMELT TO GO TO SUISUN BAY??? ***
- 2.11. Predation: *“Striped Bass Predation on Salmon Smolts and Yearlings – This is not on the salmon teams list of issues but it should be. EBMUD Fisheries Biologists recently conducted an electrofishing survey in the lower Mokelumne River from Camanche downstream to the confluence with the Cosumnes River. The river was full of striped bass (live well of the electrofishing boat filled up in fifteen minutes) and they were preying on yearling fall-run chinook salmon FAR downstream of Woodbridge Dam. Jim Buell's scenario mentions predator removal in Clifton Court Forebay. The DEFT work group largely ignored Jim's proposal which may have a tremendous benefit in improving the survival of salmon smolts and yearlings.”* *** I STRONGLY AGREE WITH THE THRUST

OF THIS "ISSUE", AND ADVOCATE ITS INCLUSION ON THE LIST OF ISSUES. I ALSO ADVOCATED "STRATEGIC" PREDATOR (ESPECIALLY STRIPED BASS AND CRAPPIE) CONTROL IN AREAS OF KNOWN CONCENTRATION AND/OR PREDATION "ACTIVITY", SUCH AS BELOW WOODBRIDGE DAM. I STILL DO. ***

3. Fish and Exports

- 3.1. Importance of dry year exports on fish populations. Gaming did little to reduce exports in dry years. *** PERHAPS WE NEED TO RE-THINK OUR EWA STRATEGIES FOR WATER MANAGEMENT IN DRY YEARS. IN DRY YEARS, DEMAND PATTERN RE-ANALYSIS MIGHT GIVE MORE INSIGHTS INTO WHETHER MUCH EXPORT REDUCTION CAN BE EXPECTED IN DRY YEARS. IT OCCURS TO ME THAT THESE ARE THE TIMES WHEN FACILITY MANIPULATION THROUGH AN EWA WITH THE BEST REAL-TIME MONITORING (INCLUDING CMARP) WE CAN GET IS THE ONLY WAY TO GET AN ADVANTAGE OVER HISTORICAL OPERATIONS AND THEIR IMPACTS. ***
- 3.2. Are large gaming reductions in exports in wet years necessary to protect fish? Is the use of EWA assets in wet years to reduce exports the most effective use of resources? Does this maximize population benefits? *** I BELIEVE THE ONLY WAY TO GET A GOOD ANSWER TO THIS EXCELLENT QUESTION IS THROUG ADULT EQUIVALENCE ACCOUNTING. HOW ELSE CAN POPULATION LEVEL (RECOVERY) IMPACTS BE ASSESSED?? ***
- 3.3. Do exports significantly affect habitat, habitat quality, food availability, migration, and distribution of important fish species? *** I BELIEVE THE ANSWER TO THIS QUESTION IS "PROBABLY", BUT THE TEAM HAS DISAGREED ON THE *MECHANISMS* OF ACTION/EFFECT, AS WELL AS THE PROBABLE SEVERITY AND GEOGRAPHIC RANGE OF EFFECTS. THIS IS AN IMPORTANT SET OF ISSUES FOR THE TECHNICAL TEAM TO TACKLE. ***
- 3.4. **Migratory cues:** *"On this issue the controversy does not revolve around the fish using one cue versus the other; the issue for salmon is that during their migration they need to shift from a flow cue which is reliable in upstream areas, to a salinity cue that is reliable in tidally influenced areas. How long does this transition take, and how do the fish behave during the transition are important areas of uncertainty and disagreement. The team differs on the factors that guide or cue migrating fish on their movements through the Delta. Some believe net freshwater flow cues are important for downstream migrating juvenile fish such as smolt salmon. Others believe that tides and salinity gradients are potentially more important."* *"Out migrants key to flow or salt once in tidal zone and move with mean or tidal flows."* I THINK THIS GETS OFF WELL IN THE FIRST TWO SENTENCES, BUT THEN GETS OFF TRACK, PARTLY BY IGNORING THE ROLE OF THE EXPORT PUMPS. THERE SEEMS TO BE A GOOD CASE FOR A TRANSITION FROM FLOW BEING THE

DOMINANT CUE TO SALINITY OR SOME OTHER TIDAL COMPONENT BEING DOMINANT, WITH UNCERTAINTY ABOUT THE TRANSITION. PRESUMABLY THE LOCATION OF THE TRANSITION VARIES WITH THE MAGNITUDE OF FRESHWATER FLOW. THE TRANSITION QUESTION IS FURTHER CONFOUNDED BY THE LOCATION OF THE PUMPS AND VARIATIONS IN THE MAGNITUDE OF PUMPING. AT 8,000 CFS OF PUMPING, IT IS EASY TO BELIEVE THAT A SALMON IN OLD RIVER NEAR THE PUMPS IS QUEING ON FLOW CAUSED BY THE PUMPS. THAT EFFECT OBVIOUSLY DIMINISHES WITH DISTANCE, BUT AT AN UNCERTAIN RATE. THE SAME ISSUE PERTAINS TO OTHER SPECIES ALSO. *** THIS IS A BIG ISSUE THAT NEEDS TO BE ADDRESSED. I HAVE MADE A REVIEW OF THE SCIENCE ON THIS ISSUE AVAILABLE TO AT LEAST SOME MEMBERS OF THE TEAM IN THE PAST, AND CAN DO THIS AGAIN. THE *RELATIVE* ROLE OF THE EXPORT PUMPS IS PART OF THE ISSUE, AND WHERE THIS ROLE MAY BE "FELT" BY SALMON MIGRATING IN A TIDALLY DRIVEN ESTUARY. RESEARCH HAS IDENTIFIED WHEN THE PREFERENCE FOR SALT WATER IS ESTABLISHED, AND WHAT CONTROLS IT; THERE IS LITTLE SCIENTIFIC UNCERTAINTY HERE. THE "LOCATION OF THE TRANSITION" (BY THIS I GATHER THE LOCATION OF THE FISH WHEN THE "TRANSITION" OCCURS) IS DICTATED BY GENETICS MEDIATED BY THE TIME IT "GENERALLY" TAKES FOR A FISH TO "NATURALLY" EMMIGRATE FROM ITS REARING HABITAT TO THE SALT CHUCK, AS SHOWN BY RESEARCH CONDUCTED ON THE FRAISER RIVER. WHEN THIS TIMING IS INTERFERED WITH, FOR EXAMPLE BY TRUCKING SMOLTS (OR PRE-SMOLTS), ONE CAN EXPECT ANOMALOUS RESULTS. I DISAGREE WITH CHADWICK'S IMPLIED SIGNIFICANCE OF THE LOCATION/MAGNITUDE OF PROJECT PUMPING IN THAT FISH WOULD HAVE TO BE FAIRLY CLOSE TO THE FACILITIES TO "FEEL" THE DIFFERENCE ON A REAL-TIDE HYDRODYNAMICS BASIS... WHICH IS THE ONLY BASIS THAT AN ACTIVELY SWIMMING FISH COULD RESPOND TO. IN THE COMPLETE ABSENCE OF A SALINITY CUE, OR IN THE PRESENCE OF A "MISLEADING ONE" (A POSSIBILITY!) A "WRONG TURN" COULD RESULT. THUS, THE FINDINGS OF NEWMAN/RICE ARE THAT *BOTH* OUTFLOW *AND* SALINITY ARE IMPORTANT, ARE NOT INCONSISTENT, BUT REMARKABLY SUPPORTIVE OF THIS PHENOMENON. ONE OF MY MAIN POINTS IS THAT WHEN MIGRATING SMOLTS ENTER THE TIDAL AREA WITH SO MANY POTENTIALLY CONFUSING CHANNELS, THEY ARE MUCH BETTER OFF WITH A SALT CUE THAN WITHOUT ONE. SINCE Q-WEST DOES NOT EXIST IN REAL TIME, THE RELATIONSHIP BETWEEN TIDAL FLUX IN CHANNELS AND THE SALT FIELD SHOULD DRIVE OUR CONSIDERATION. I DO NOT DISAGREE WITH CHADWICK THAT A SALMON IN OLD RIVER "NEAR THE PUMPS" (HOW "NEAR" IS "NEAR"?) WOULD BE CUEING ON CHANNEL FLUX (LET'S THINK

ABOUT VELOCITIES HERE), ESPECIALLY IF THE DELTA IS EXTREMELY FRESH. CHADWICK IS CORRECT, I BELIEVE, THAT THE EFFECT WOULD DIMINISH WITH DISTANCE, *AS MEDIATED BY OTHER CUES*. THAT IS WHY I PUSHED FOR PARTICLE TRACKING AND REAL-TIME ANALYSIS LAST YEAR...BUT IT NEVER HAPPENED. OH, WELL. I STILL BELIEVE WE CAN MAKE REASONABLE INFERENCES WITH WHAT WE HAVE. WE MUST BE CAREFUL ABOUT THE EXTENT OF OUR EXTRAPOLATION, HOWEVER. ***

- 3.5. Do exports pull fish from the San Joaquin into the South Delta that would otherwise continue down San Joaquin to Central and Western Delta? Do they pull fish from the Sacramento River into the Central and South Delta that would otherwise move to the Bay? *** I BELIEVE THAT FLOW SPLITS CAN GIVE US A REASONABLE APPROXIMATION, MEDIATED BY REAL DATA. ***
- 3.6. What are risks to fish from expanded Banks high export rates? *** THIS DEPENDS ON ANY IMPROVEMENTS IN SALVAGE AND HANDLING WHICH *SHOULD* ATTEND ANY CAPACITY EXPANSION. ***
- 3.7. Are export losses of salmon confined to hatchery produced salmon? *** NO. I DO NOT UNDERSTAND WHY THIS IS AN ISSUE. ***
- 3.8. Are export losses more serious when populations are low? *** THE BEST WAY TO ANSWER THIS VERY IMPORTANT QUESTION IS WITH ADULT EQUIVALENCE ACCOUNTING. ***
- 3.9. Are effects greater at intake locations in dead-end channels? *** YES, IF FISH ENTER THEM (AND THEY OFTEN DO). ***
- 3.10. Could increased export rate cause an increase in fish density at the export pumps? *** IT IS POSSIBLE, AS IN OUR ASSUMPTIONS REGARDING THE SHIFTING OF THE CENTER OF POPULATION DENSITY FOR DELTA SMELT WITH A RELOCATON OF X2. HOWEVER, I FEEL RATHER STRONGLY THAT, WITH RESPECT TO THE PUMPS, THE INCREASE IS PROBABLY *LOOSELY* COUPLED, AND THE INCREASE IN DENSITY MAY BE A BIT SMALLER THAN WE HAVE BEEN ASSUMING...A FINE POINT. I DO NOT BELIEVE "AVERAGE FLOW" HAS ANYTHING TO DO WITH FISH DENSITIES UNLESS THIS DRIVES SOME *OTHER* PARAMETER WHICH CAUSE TO FISH TO VOLUNTARILY *SELECT* ANOTHER LOCATION (LIKE SALINITY, TEMPERATURE, D.O., ETC.). ***
- 3.11. What is the risk to Sacramento salmon from exports? *** DO AN ADULT EQUIVALENCE ANALYSIS AND FIND OUT! ***
- 3.12. With new screens and VAMP plus HOR barrier, is there adequate protection for SJ salmon? *** WHAT IS "ADEQUATE"? I BELIEVE THAT NEW SCREENS AND AN OPERABLE HOR BARRIER (ESPECIALLY ONE WHICH WOULD WORK AT HIGHER RIVER DISCHARGES) WOULD GIVE VERY SIGNIFICANT INCREASES IN PROTECTION. I WOULD RE-STRUCTURE VAMP, GIVEN A CHANCE, BUT I DOUBT THAT WILL HAPPEN! NOW IF WE ONLY HAD PROGRESSIVE MANAGEMENT... ***

- 3.13. Are export losses of steelhead confined primarily to hatchery fish? (Check this year's and last year's salvage for marked fish; and check timing relative to stocking records and locations.)
- 3.14. Fish/WQ conflict – Water quality would benefit more from July exports, whereas fish would be better off if we wait to transfer water south until August.
- 3.15. Are there risks to yearling smelt, salmon, and steelhead at Delta Wetland intakes in winter? *** PROBABLY SO. THERE WOULD UNDOUBTEDLY BE A CONCENTRATION OF PREDATORS IN THE VICINITY OF THE INTAKES, AS WE SEE IN OTHER SYSTEMS. THE RISKS WOULD PROBABLY BE PROPORTIONATE TO BOTH THE LOCAL PREDATOR POPULATION AND THE (USUALLY) TEMPERATURE-MEDIATED ACTIVITY LEVEL OF THE PREDATOR MIX (ESPECIALLY CRAPPIE AND STRIPED BASS). ***
- 3.16. If we manage exports on a daily basis, is there a potential risk of a QWEST roller coaster effect? *** ASSUMES FACTS (Q-WEST IS RELEVANT) IN DISPUTE ***
- 3.17. Experiments in one season may not apply to other seasons. *** OK ***

4. Fish Habitat as Mitigation for Exports

- 4.1. Can fish habitat improvements mitigate for or reduce impacts of exports? *“A through-Delta alternative should require improved habitat in the central Delta to slow fish egg/larval dispersal toward pumping plants to allow these life stages to mature, to increase food web interactions, to stimulate fish growth and survival, and to facilitate fish/habitat relationships that might otherwise be adversely affected by changes in tidal hydrodynamics attributable to south Delta exports.”* WOULD ANYONE IN THE GROUP SUBSCRIBE TO THE FOLLOWING HYPOTHESIS? HABITAT RESTORATION IN THE CENTRAL DELTA PLANNED WITH THE THROUGH DELTA ALTERNATIVE WILL IMPROVE SURVIVAL OF ALL FISH SPECIES SUFFICIENTLY TO OFFSET FULLY MORTALITY CAUSED BY THE DIRECT AND INDIRECT EFFECTS OF EXPORT PUMPING. IF NOT THAT, HOW FAR ALONG THE CONTINUUM OF NO OFFSETTING TO FULL OFFSETTING IS THE LIKELY OUTCOME? *** THE FIRST PART OF CHADWICK'S “HYPOTHESIS” IS AN EXTREME STATEMENT (I DON'T MEAN THAT UNKINDLY), AND I THINK IT WOULD BE RISKY TO ADOPT IT WHOLESALE AND WITHOUT OTHER INFORMATION, SINCE THERE ARE SO MANY OTHER VARIABLES WHICH DESERVE TO BE ADDRESSED. IT IS POSSIBLE, BUT THE QUESTION IS A MATTER OF SCALE AND NEEDS FURTHER DEVELOPMENT. I BELIEVE IT WOULD CERTAINLY GET US A LONG WAY DOWN THE ROAD (GIVEN ENOUGH SCALE), BUT IT WOULD BE FOOLISH TO FAIL TO ADDRESS MANY OTHER FACTORS. ***
- 4.2. Will habitat improvements benefit fish populations regardless of changes in exports? *“The team differs in the importance of habitat relative to salvage losses in the declines of Bay-Delta fish, and the relative potential benefits of habitat*

*improvement and salvage reductions in the recovery of these fish species. The team agrees on habitat actions and the priority for implementing them in Stage 1." "The salmon team agreed on a list of habitat actions for stage 1 from the ERPP, not the AFRP. The salmon team never received a list of the AFRP priority actions so the priorities were based largely upon the ERPP. The salmon team consequently based their assessments on upstream ERPP actions, not on upstream AFRP actions." "Some team members believe that improving habitat is far more important than reducing salvage losses, while other members believe improvements in both are essential." *** I'M A LITTLE CONFUSED BY THIS, BUT I GUESS I COME DOWN ON THE SIDE OF "BOTH". IS CHEMISTRY PART OF HABITAT (I BELIEVE IT IS). ****

5. Fish and Facilities

- 5.1. **Closure of Delta Cross Channel:** Does closure of the DCC really benefit Sacramento salmon? *** CERTAINLY NOT AS MUCH AS WE HAVE BEEN ASSUMING. I HAVE OFFERED AN ALTERNATIVE EQUATION, WHICH I BELIEVE IS STILL FAIRLY LIBERAL. ON THE OTHER HAND, I STILL ADVOCATE A "NORMALLY CLOSED" CONDITION UNTIL A FISH-FRIENDLY DELTA IS DEVELOPED. ***
- 5.2. **New Screens:** Would construction of screens at south Delta pumping plants reduce losses of fish? *** YES, ESPECIALLY IN CONJUNCTION WITH ELIMINATION OF PREDATION PROBLEMS IN CCFB AND IMPROVEMENTS IN FISH SALVAGE / HANDLING / TRANSPORTATION / RELEASE. ***
- 5.3. **Head of Old River Barrier:** *"A barrier at the head of Old River is a concern as it may aggravate the potential of Sacramento or central and southern Delta fish being drawn to the south Delta pumping plants. The team concluded that such a barrier would be essential for restoring San Joaquin salmon, steelhead, and splittail populations, and that a capacity to variably operate the barrier would limit concerns for delta smelt and other Delta and Sacramento River fish. *** THE AVAILABLE DATA (e.g. HANSON'S WORK IN '94), SUGGEST THAT FEARS OF FISH BEING DRAGGED TAIL FIRST TO THE PUMPS ARE OVERBLOWN. TIDAL HYDRODYNAMICS SUPPORTS THIS. ****

5.4.

6. Delta Habitat Conditions and Exports

- 6.1. Does interior Delta have poorer water quality and habitat, and as a consequence have lower probability of survival? *** CERTAINLY THERE ARE LOCAL AREAS OF POORER WATER QUALITY, SUCH AS STOCKTON HARBOR AND VARIOUS DEAD-END OR SUBSTANTIALLY UNCIRCULATED SLOUGHS AND CHANNELS, WITH POORER WATER QUALITY. I BELIEVE A BIGGER ISSUE, HOWEVER, IS LOCAL CONCENTRATIONS OF PREDATORS AND LACK OF HABITAT DIVERSITY/COVER IN MANY OF THE "CONVEYANCE" CHANNELS. THE "LOWER PROBABILITY OF SURVIVAL" PHRASE MAY ASSUME THAT

“SURVIVAL INDEX” DATA ACCURATELY REFLECT SURVIVAL AS OPPOSED TO “CATCHABILITY”. I BELIEVE THEY ACCURATELY REFLECT THE LATTER AND NOT THE FORMER, AND THAT THERE IS A SIZEABLE ARTIFACT WHICH NEEDS ADDRESSING. ***

- 6.2. Is this due to exports or physical configuration? *** I BELIEVE THERE IS LITTLE OR NO DISAGREEMENT THAT EXPORTS “IMPROVE” WATER QUALITY, AT LEAST IN GENERAL, IN THE DELTA. I ALSO BELIEVE THAT PREDATOR AGGREGATIONS ARE “PROBABLY” (?) A BIG FACTOR DRIVING “REAL” SURVIVAL IN THE DELTA. I BELIEVE THAT PHYSICAL CONFIGURATION FEEDS (YOU SHOULD EXCUSE THE PUN) INTO THE PREDATOR ISSUE THROUGH THE ESCAPE COVER PARAMETER AND THROUGH THE LOWER TROPHIC ASPECTS OF THE FOOD WEB AS WELL. IF RESIDENCE TIME COULD BE INCREASED THROUGH PHYSICAL CONFIGURATION, EGG/LARVAL SURVIVAL FOR CERTAIN SPECIES MAY ALSO BE SIGNIFICANTLY IMPROVED. ***

7. Fish Distribution and Abundance

- 7.1. Are salvage data a reasonable surrogate for real-time monitoring of fish distribution and abundance? ***YES***
- 7.2. Would delta smelt distribution likely change with changes in exports and inflows? *** GOOD QUESTION. HANSON’S ’94 EXPERIMENTS SUGGEST NOT, BUT MORE WORK SHOULD BE DONE. THERE’S PROBABLY SOME EFFECT, BUT DIFINITIVE DATA ARE LACKING. PROBABLY LESS THAN WE ARE ASSUMING. ***

8. Winter Run Chinook Salmon

- 8.1. Is there a risk to winter run salmon from exports? *** YES, BUT AT A RELATIVELY LOW LEVEL. ON THE OTHER HAND, THE SPECIES IS IN REAL TROUBLE, AND ALL REASONABLY AVAILABLE MEANS TO PROTECT SHOULD BE IMPLEMENTED. ***
- 8.2. To what extent is that risk reduced by new screen facilities and greater frequency of closure of DCC? *** ON A POPULATION LEVEL, A SMALL BUT POTENTIALLY MEANINGFUL INCREASE IN PROTECTION COULD BE EXPECTED BY MORE FREQUENT DCC CLOSURE, AT LEAST UNTIL DELTA PREDATOR ISSUES ARE EFFECTIVELY ADDRESSED. IMPROVED SCREENS AND SALVAGE / HANDLING / SORTING / HOLDING / TRANSPORT / RELEASE METHODS AND EQUIPMENT WILL ALSO HELP. THE LEVEL OF RISK AT THE PROJECTS SHOULD BE COMPARED TO THAT AT THE PITTSBURG AND CONTRA COSTA POWER PLANTS FOR PERSPECTIVE (APPLY THIS TO ISSUE 8.1) ***
- 8.3. Do proposed ERP habitat improvements decrease risk to winter run? *** NEEDS MORE SPECIFICITY. ***

- 8.4. What are the indirect risks of exports on winter run? *** NEEDS MORE SPECIFICITY. ***
- 8.5. Are Stage 1 risks acceptable? Can risks be adequately minimized through adaptive management? *** NEEDS MORE SPECIFICITY ***
- 8.6. What upstream EWA flow actions would benefit winter run? *** PRIMARILY TEMPERATURE CONTROL. ***
- 8.7. What can we expect from ERP for winter run in Stage 1?
- 8.8. Can we differentiate winter run smolts from other smolts in salvage data? ***YES, BUT WE DON'T. THE GENETICS TOOLS ARE AVAILABLE, BUT USE IS NOT A SUFFICIENTLY HIGH PRIORITY TO PRODUCE RESULTS WITH A RELATIVELY SHORT TURN-AROUND TIME. THE TECHNOLOGY IS AVAILABLE, IT'S JUST NOT BEING USED. ***
- 8.9. Would a shift to higher October to March exports from expanded Banks even if confined to wet years increase risks to winter run? *** PROBABLY NOT, GIVEN OTHER EXPECTED IMPROVEMENTS. ***

9. Spring-Run Chinook Salmon

- 9.1. Could late summer and early fall transfers from Yuba storage cause spawning in gravel beds that would later become dewatered? *** YES, IF WE ARE CARELESS. ***
- 9.2. How much do spring chinook yearlings depend on the first flow pulse of the water year? How can we protect them from export impacts? *** THIS QUESTION NEEDS CLARIFICATION. ***

10. Fall Run Chinook Salmon

- 10.1. What are the indirect and direct effects on fall run fry from winter Delta exports?
- 10.2. Are proposed new screening systems adequate to protect fall run fry? *** YES. ***

11. Steelhead

- 11.1. Are salvaged steelhead primarily hatchery fish released in February? Are wild fish vulnerable to export facilities?
- 11.2. Are new screen systems adequate to protect wild steelhead? *** YES ***

12. San Joaquin Fall Run Chinook Salmon

- 12.1. Does survival of downstream migrating subyearlings in spring improve with closure of HOR barrier? If so how much is the improvement? Does it reduce the need for screens at the south Delta pumping plants? IS THERE ANYONE WHO THINKS THE ANSWER TO THE LAST QUESTION IS YES? *** DO AN ADULT EQUIVALENCE ANALYSIS AND FIND OUT.***
- 12.2.

13. Delta smelt

- 13.1. Do changing exports and flows change the distribution of delta smelt adult spawners, prespawners, and young? *** DATA CONFLICT TO SOME DEGREE. HANSON'S '94 DATA (I GUESS I'M RIDING THIS HORSE PRETTY HARD...) SUGGEST NO, AT LEAST NOT MUCH. THE ASSOCIATION WITH X2, TO THE EXTENT THAT IT IS FIRM, SUGGESTS YES...TO THE EXTENT THAT X2 IS ALTERED BY EXPORTS AND FLOWS. ***
- 13.2. Would delta smelt benefit from releasing water to outflow from Bacon Island storage? *** POTENTIALLY, BUT *ONLY* IF THIS PRODUCED A CHANGE IN THE AREA OF PREFERENCE FOR THIS SPECIES. ***
- 13.3. How should potential actions vary from year to year based on population abundance index? *** THROUGH AN ADULT EQUIVALENCE ANALYSIS, COUPLED WITH RELATIVE (OR, PREFERABLY, ABSOLUTE) ABUNDANCE ESTIMATES. ***
- 13.4. What are the potential effects relating to larval smelt? Are larval smelt far less important because they are less valuable in terms of adult equivalents? *** YES, ON AN INDIVIDUAL ORGANISM BASIS, AS REFLECTED IN LONG-ESTABLISHED AND WIDELY ACCEPTED FEDERAL POLICY. ***

14. Splittail

- 14.1. Would splittail benefit from HOR barrier? *** SJR SPLITTAIL PROBABLY WOULD ***
- 14.2. Would splittail benefit from SJ flow pulses? *** HARD TO SAY. POSSIBLY NOT, IF THE SJR MAIN STEM COULD SUPPORT A REARING POPULATION...IN FACT, IF PULSE FLOWS "PUSHED" YOY SPLITTAIL OUT, THIS COULD BE A NEGATIVE EFFECT. IF THE SJR WOULD NOT SUPPORT A REARING POPULATION, DENSITY-DEPENDENT EMMIGRATION WOULD PROBABLY OCCUR NATURALLY. ***
- 14.3. Would splittail benefit from new screens and JPOD? *** YES, ESPECIALLY IN CONJUNCTION WITH IMPROVED SALVAGE / SORTING / HOLDING / TRANSPORT / RELEASE STRATEGIES AND EQUIPMENT. ***
- 14.4. Would these new features adequately protect SJ splittail? *** PROBABLY. ***

15. Striped Bass

- 15.1. Would new screens and habitat enhance striped bass survival sufficiently to allow proposed changes in system operations under EWA without further jeopardizing population or existing fishery? *** LARGE POLITICAL COMPONENT HERE!! ***

15.2. Should striped bass be a factor in operation decisions? *** ALSO A
LARGE POLITICAL COMPONENT HERE! ***