97-A55 ERPP ESO Comments from Chuck Vogelsang, et al

OCT 14 1997

COMMENTS: CALFED BAY-DELTA PROGRAM'S ECOSYSTEM RESTORATION PROGRAM PLAN

p. = page; P. = paragraph; l. = line; V. = volume

Volume I - Visions for Ecosystem Elements: General Comments

As a vision document the volume provided good descriptions for what one might wish the ecosystem to look like. The document would be more effective if it were condensed to about a third of its present size.

The CALFED Vision for the ecosystem is ambitious. Some of the goals and actions rely on finding willing sellers of land and water rights, incentives for cooperative agreements, and additional water for augmenting flows.

Using different decades as a reference to set population goals for restoration of various fish species is inconsistent. Restoration of fish populations to 1960's levels would be very difficult; the goals of 1970's to 1980's levels seems more realistic. It is unlikely that any restoration program can provide a Bay-Delta ecosystem like that in existence in the 1960's. Too many things are outside CALFED's purview or beyond its control. CALFED should consider goals that focus more on reversing the decline or low abundance levels of desirable species, rather than setting static levels based on historic data. Through the adaptive management process, targets for abundance and distribution for individuals species could be set as the response of those species to restoration is measured.

The ERPP identifies Implementation Objectives, which are defined as "...the most specific and detailed description of what the ERPP strives to maintain or achieve for an ecosystem element" (V. I, p. 5; Vs. II and III, p. 7). As the most specific statements of the ERPP end-points, implementation objectives should state in quantifiable terms the level and extent of the attributes necessary to reach each objective. Implementation objectives should be specific quantifiable statements to ensure that monitoring and focused research results can be used to assess whether the various objectives are being met. Measuring the response of the ecosystem to restoration actions in terms of a specific implementation objective is one of the three major objectives of the General Ecosystem Monitoring program described in Volume III. Vague or general objectives work against such an assessment because there is often an unclear or incomplete linkage between what is desired (the objective) and the information necessary to assess attainment. Several of the implementation objectives could be stated in quantifiable terms (e.g., "Restore chlorophyll 'a' abundance in San Pablo and Suisun Bays, and in the Delta to levels that occurred in the 1960's and early 1970's"); however, many of the implementation objectives are

general statements lacking any quantitative basis (e.g., "The implementation objective for Bay-Delta hydraulics is to establish and maintain a hydraulic regime in the Bay-Delta to provide migratory cues, create and maintain habitat, and facilitate species distribution and transport"). Where possible, the length of time to reach each objective should also be stated.

Water quality variables other than water temperature such as dissolved oxygen and specific conductance, are rarely mentioned, yet these variables have major effects on habitat quality. These variables may become more important as restoration projects increase shallow water habitat. Most estuaries have major problems with water temperature and dissolved oxygen concentration, because of decaying vegetation produced in shallow water habitats. In addition high nutrient loads in east coast estuaries have promoted the growth of dinoflagellates that kill fish. These water quality considerations need to be given adequate attention.

There is a lack of consideration given to natural disturbances. Natural disturbances (e.g. flood and drought) should be discussed and included in the restoration plan. These events should trigger management scenarios that safeguard resources. For example, ENSO years could trigger adjustment of ocean harvest quotas. Additional study of the probability and potential damage of these events could be used to guide alternative restoration or emergency restoration planning.

There is not adequate data to support many of the assumptions in Volume I and Volume II, particularly with regard to increasing flows for increasing primary productivity and increasing late winter/spring flows for several fish species. Few literature citations are provided throughout the documents. References to the peer-reviewed and gray literature would give the reader a better sense of the confidence in the information.

Throughout Volume I it is noted that levee construction in the 1800's "created narrow channels and eliminated vast areas of tule marsh." While this is not disputed, the affects of early levee construction on fish are largely unknown. Further, such actions predated declines in fish abundance documented since the 1960's and 1970's.

Volume I - Visions for Ecosystem Elements: Specific Comments

p.7-8. Table 1. Summary of ecosystem processes has overlooked processes important to the maintenance of all ecosystem habitats listed in the table. Ecosystem processes essential for the support of brackish and saline emergent habitat include restoration of natural tidal prism, restoration of natural tidal hydrology including first order tidal creeks extending into high tidal marsh, and restoration of natural variability of tidal disturbance regimes which are related to these mentioned processes. These important processes are necessary to support sensitive species and groups. Restoration of process to maintain habitat capable of supporting sensitive species such as California clapper rail and black rail would need to be restored to pre-diking conditions present prior to the 1960s time period mentioned in the Bay-Delta hydraulics section of the table.

p.10. Species and Species Groups What about plants? (E.g. Mason's lilaeopsis, Suisun thistle)

p.10. Table 1. The species and species groups section of Table 1 should include sensitive plant species and communities. Sensitive endemic plants are likely a better barometer of ecosystem health than migratory species in that they are restricted to historic sites and may reflect the best possible measure of ecosystem restoration success. Sensitive indicator plants should include both species which grow channel-side and have adapted to the outboard sides of levees such as Mason's lilaeopsis and Delta tule pea, but should also include species such soft bird's beak and Suisun thistle which are endemic to this Estuary, and are both restricted to high tidal marsh and linked to first order tidal creeks. These are indicators which may provide a true "ecosystem" perspective.

p. 15. Table 1. Ecological Elements: Disturbance. "Disturbance" should be called "anthropogenic disturbance" . There are natural disturbance processes which are critical to the ecological integrity and function of natural estuarine systems. "Disturbance" is often portrayed in a negative context. The ecological literature is full of examples of "positive" disturbance events (i.e. the importance of natural fire frequency for regeneration of redwood trees; tidal flows themselves are considered a necessary disturbance in wetland systems).

p.16-17. Table 2. The maintenance of the aquatic foodweb is listed as an essential ecological process. The maintenance of the transitional wetland foodweb which extends from the aquatic zone up gradient through low, middle, and high tidal marshes and into the adjacent upland is also a critical process if this is to be a complete "ecosystem" restoration plan as opposed to a aquatic ecosystem or fish rehabilitation plan. Furthermore, there are critical foodweb linkages from the high marsh - upland ecotone which extend into the aquatic food web and contribute to the detrital based side of the web.

This oversight could result in management actions which may prove to be beneficial to fish but detrimental to resident plant and avian species of the high marsh. This may be particularly true with regard to sensitive communities in the Suisun Marsh.

P.20. Table 4. Consider adding a dot for sediment to 1, 2; stream temperature to 2; hydraulics to 2,3,6; watershed processes to 1; food web to 11,12.

p.26. Bullets under "Species directly linked to streamflow include:" Delta smelt should be added since X2 criteria are mainly for smelt and salmon.

p.44-53. Central Valley Stream Temperatures. This section should provide adequate references and documentation for the information presented. Data and reports that show there is a "temperature problem" and specifically document the impacts to fish that use the areas for purposes of spawning, rearing, and migration should be presented. Day versus night average temperatures currently occurring in the system should be addressed and how that relates to

implementation strategies. The role of turbidity should be discussed. The section focused on salmon and did not address other fish species. Attached are some references concerning temperature effects on fish.

p.52. Bay-Delta Hydraulics, Integration with Other Restoration Programs. This section describes two other physical features (the Temporary Barriers Program and the Delta Cross-Channel gates) that affect Delta hydraulics. There is no discussion of integrating these existing features with projects proposed in the ERPP or other existing activities affecting Delta Hydraulics.

p.52. Bay-Delta Hydraulics, Implementation Objective, Targets, and Programmatic Actions. Paragraph 2 states, "The general target for restoring and maintaining healthy Bay-Delta hydraulics is to focus on restoring hydraulic patterns typical of those exhibited when the ecosystem was functioning in a healthy state (e.g., 1960's)." Does data exist that clearly defines what "healthy" Delta hydraulics are?

P.54.P5 Note that >20 ug/l is not productive for the San Joaquin, and a major bloom for the Sacramento; >20 ug/l chlorophyll concentrations were measured in Suisun Bay in 1993.

p.54-60. Bay-Delta Aquatic Foodweb. This section needs to be expanded to include more current thinking about the aquatic foodweb and the limitations of our knowledge. As written, this section provides a simplistic treatment of a very complex issue. Many of the conclusions in this section rely on correlations in abundance changes and the timing of those changes. The main solutions offered are to increase spring outflow and create shallow-water habitat. These two changes are thought to increase production through food-chain effects. It is not clear that these changes will provide the intended affect, and the expectations for species benefits may be unrealistic. For example, the section acknowledges introduced species, but does not consider the largely irreversible affects these introductions have had on the ecosystem and the foodweb. Creation of shallow-water habitat may primarily benefit introduced species. Further, the section does not address the observed decoupling between primary production and benthic herbivore production. Limitations in our understanding of the underlying mechanisms of foodweb dynamics will undoubtedly affect the ability to make changes. As stated on page 36 in Volume III of the ERPP, "Adaptive management requires that the mechanisms behind observed ecosystem responses are understood. Without this understanding it may not be possible to efficiently and confidently redirect restoration actions."

p.56.P.1. Asian clam density has varied and are less now than initially. Copepod species have change, but has total biomass?

p.56.P.2. Bay-Delta Aquatic Foodweb. Text in this paragraph suggests the decline in abundance of many resident or migratory species is due to the decline in zooplankton biomass. While circumstantial evidence exists, a cause-effect relationship is lacking for the few species (e.g.,

striped bass) which have been investigated. More recently, there are indications that lower abundances of Delta smelt may be due to food limitation; however, more work is needed to conclude this. Proving food limitation is controlling fish population abundance is very difficult.

p.57.P.5. Bay-Delta Aquatic Foodweb. Many species of zooplankton underwent their largest declines between 1970 and 1980, well in advance of the 1987-92 drought. See Obrebski, Orsi, and Kimmerer. 1992. IESP Technical Report 32.

p.58.P.1. Bay-Delta Aquatic Foodweb, Vision Section. This vision statement does not recognize the shift in energy flow that has occurred in some parts of the estuary. For example, although zooplankton abundance has declined in Suisun Bay, herbivore productivity (i.e., productivity of Potamocorbula) in Suisun Bay is still very high. Thus, in Suisun Bay energy from primary production flows mainly to the benthos instead of to zooplankton in the water column. The vision should be expanded to consider restoration of primary and secondary production, and increasing zooplankton biomass.

p.58-59. Bay-Delta Aquatic Foodweb, Integration with Other Restoration Programs. This section reads as a list of other programs and policies that may result in the creation/restoration of habitat or improvement in water quality. What is missing is <u>how</u> these programs will be integrated to achieve the vision.

p.88.P.3. l.7-8. The largest remaining undiked saline emergent wetlands in Suisun Marsh are not restricted to narrow bands along the margins of Suisun Bay. The extensive relict tidal marshes associated with Cutoff Slough and eastern Hill Slough flank the Potrero Hills in the north central Suisun Marsh and are especially unique in that there is a wetland continuum from tidal slough through low, middle and high marsh zones and into adjacent uplands which are rich with associated vernal pools.

p.92.last P. l.9 Shouldn't "native" be "endemic"? Many plants are native to the Delta.

p.95.P.3 Bullet 1. Implementation action: restoration of tidal wetlands by involving setback of levees result in limited ecological function as these wetlands are separated from the historic margins of the estuary. The upper edge of such restored marshes are typically steep, disturbed levee slopes. Most floristic diversity in tidal marshes was concentrated along the upper marsh edge where transitions between high tidal marsh and local soils, seeps, and drainages created ecologically important variation in environmental conditions. There is evidence for this fact on the landscape today at the relict Rush Ranch and Hill Slough tidal marshes in Suisun. Many rare or locally extinct plant species had high affinity for, or ecological dependence on these transitional zones. Further more, both clapper rails nest along first order tidal creeks in high tidal marsh of Suisun and the North Bay. Black rails also occupy the high marsh zone. Indented pockets of wetlands in levee systems may provide some ecological value to aquatic species, but exclude other

targets of the CALFED program.

p.110.P.2 What are the perennial grass species found in these grasslands?

p.110.P.5 Native bunchgrasses are fire resistant and adapted to relatively frequent fires because their perennating buds are near the ground and protected by the rest of the plant. Current fire suppression activities may favor nonnative annuals because infrequent catastrophic fires destroy the bunchgrasses when very hot fires burn the thatch which has built up over time. Maybe a definition of "fire-resistant" would clarify this. The last sentence doesn't make sense.

p.116 Why are no sensitive plants included as ecosystem elements? For example Mason's lilaeopsis is listed as State Rare, Suisun thistle is federal proposed threatened, soft bird's beak is State rare and federal proposed endangered, etc.

p.116.P.1 In sentence starting "Table 9..." habitat type should be replaced with "species or species group."

p.125. Table 10. The presence of Delta Green Ground Beetle is currently only confirmed at the Jepson Prairie Reserve. However, there are large vernal pool systems immediately north of the Potrero Hills between Hill Slough and Luco Slough, and also near Denverton Slough in Suisun Marsh. These vernal pools are similar in size and character to Olcott Lake at Jepson Prairie, and this region of Suisun includes the southwestern most edge of the Jepson Prairie floristic province. The vernal pools are on private property and have not been surveyed, but they are potential habitat for Delta green ground beetle. They are known to support the endangered Contra Costa Goldfields.

p.125. Table 10. This table is intended to highlight zones where CALFED actions may assist in the recovery of species and species groups. There are a number of plant species in the primary project area which are targeted for recovery under the state and federal endangered species acts. CALFED should seriously consider adding these important plant resources to the program focus if this is to be an "ecosystem" based project.

p.121-124. Table 9 & 10 Bay-Delta aquatic foodweb organisms are missing

p.128-129. One of the goals and one of the programmatic actions for Delta smelt need clarification. Goal: To develop a wider distribution of delta smelt in the trawl survey. Please be more specific on this distribution. Concerning the programmatic action of predator removal at Clifton Court Forebay, predators in CCF can go in and out at will, so it is ineffective to remove them. What is meant by this action?

p.160-163. Resident Fish Species. This sections fails to recognize and discuss the adverse-impacts non-native fishes have on native fishes.

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p.183.P.2. l. 4-5. California clapper rail populations have also been limited due to loss or degradation of tidal saltmarshes for waterfowl hunting and management in addition to the mentioned diking for agricultural, industrial and urban uses.

p.183.P.3. l. 9. and p.183.P.4. l.1. "Fresh" emergent habitat should be changed to "brackish" emergent habitat. California clapper rails are not know to freshwater emergent marsh. The Sacramento - San Joaquin Delta is outside of the range of this species. California clapper rails do occur in brackish and salt marsh vegetation of Suisun Marsh, and other wetlands downstream of the Carquinez Straits. Cattails and bulrushes are found in brackish and salt marshes in this Estuary, some species are quite salt tolerant, and they are not restricted to freshwater emergent marshes.

p.184.P.3. Clapper rail habitat utilization in Suisun Marsh and the Napa Marshes suggests that a natural network of small tidal creeks which begin in the high marsh and grade down into large tidal slough and bays are essential habitat components for successful breeding populations of this species.

p.185.P.4. bullet 2. Clapper rail recovery habitat should include tidal slough habitats supporting pickleweed, cordgrass, bulrushes, and cattails as stated - but should also include adjacent high marsh meadows characterized by pickleweed - saltgrass plant associations. Examples of this habitat are present at relict tidal marsh locations in Suisun Marsh and in the North Bay (Examples: Rush Ranch and Corte Madera Marsh).

p.186.P.3. Black rails are especially abundant in undiked tidal marshes of Suisun Marsh. They are most often associated with dense stands of American bulrush (Scirpus americanus) immediately adjacent to high marsh meadows supporting pickleweed - saltgrass associations. They are often associated with soft bird's beak, an endangered plant of the high tidal marsh.

p.217. Delta Green Ground Beetle. See comments page 125.

p.223. Table 11. Stressors. Refer to earlier comment that disturbance processes can be both positive and negative. In this case, disturbance should be qualified as negative anthropogenic disturbance rather than natural disturbance which can be an essential ecological process. It has long been understood that the highest species diversity in ecological communities occurs at intermediate levels of disturbance. This is a basic ecological principle which has been demonstrated in a broad variety of ecological systems.

p.228 To consolidate and screen small diversions in the Delta, an incentive plan to encourage participation by local diverters should be investigated.

p.251 Zebra mussel. Information should be included on zebra mussels clogging pipes and other structures; they are not just a threat from grazing.

p.245.P.5 Water hyacinth may float ashore and smother out Mason's lilaeopsis (especially after being killed by herbicides), but it doesn't compete with it in the sense of growing in the same niche (hyacinth is a floating aquatic, lilaeopsis is a rooted intertidal zone species). Mason's lilaeopsis is listed as Rare by the State of California, but has no federal status (used to be C2).

Volume I - Visions for Ecosystem Elements: Typographical Comments

p.3 Overview. Where is figure 1 ?

p.7.col 2, l.3. Introduction to Vol 1. Begin should be plural.

p.26.P.5 Sentence doesn't make sense, suggest eliminating lines 1 and 2, start with "Maintaining".

p.27.l.2. Insert " materials:" after organic.

p.36.l.1 Under Linkage - Healthy not Health.

p.40.l.2 Insert "to" after "parallel"

p.41.l.5 Eliminate comma.

p.92.last P. l.5 "And" should be "are".

p.95 "30,00-" should be "30,000".

p.110.P.2. Move second sentence"Many annual....." to just before the last sentence of the paragraph.

p.110.P.2 Insert"in grasslands after "Vernal pools occur..." in 3rd sentence.

p.110.P.5 "Annual" misspelled.

Volume II - Ecological Zone Visions: General Comments

Much of the information to support the visions in Delta and Suisun Marsh/North San Francisco Bay ecological zones is missing or does not reflect current understanding of the some of the processes and needs of key aquatic species. The wrong assumptions on processes and species needs lead to implementation objectives, targets and programmatic actions that may not achieve the desired objectives.

Below are a few examples of problems in the section on the Delta and Suisun

Marsh/North San Francisco Bay ecological zones:

p.10. The report cites changes in the Delta's wetted perimeter between 1906 and 1993. For purposes of evaluating the impact of loss of wetted perimeter in the Delta ecosystem, changes during the period when many of the observed declines in aquatic resources would be more useful - ie.. from 1960 to 1990.

p.12. The report indicates that there have been "slightly" increased water temperatures in the Delta. This conclusion is of no use without defining "slightly", showing which periods of the year these "slight" increases occur and data to support the conclusion. This supporting information is critical because of subsequent recommendations for actions to decrease water temperatures.

p.12. The report shows entrainment indices for each decade from 1950 through 1980 but provides no indication of how these indices could be used to develop objectives, targets, etc.

p.15 and elsewhere. The report makes the point that losses of nutrients, phytoplankton and zooplankton to diversions have a major impact on system productivity. Although this sounds plausible, data from our system don't support this conclusion. For example, Wim Kimmerer has calculated that losses of zooplankton through the State and federal diversions have minimal impact on zooplankton standing crop.

p.15 and elsewhere. Introductions of exotic species to the estuary have occurred through several pathways - not only by ballast water discharges as implied in the text.

p.16 and elsewhere. The text states that higher late spring and winter flows will help restore delta smelt as will increased shallow water habitat. These assumptions are not supported by data in the report and could not be supported by current data we have on the species.

p.16 and elsewhere. Much of the information on splittail isn't supported by what is known about splittail data and, as with most of the discussion on factors controlling species abundance, no supporting data are presented. Splittail have rebounded with near record numbers in 1995. The adult population never showed a decline. It doesn't appear that losses to diversions affect splittail abundance.

p.33 and elsewhere. There is little or no evidence that flows have much effect on productivity of algae and zooplankton, especially in Suisun Bay. There is no relation between phytoplankton standing crop and flow and the former relation between some key zooplankters has either deteriorated or disappeared. Indications are that detritus and other material washing into the system are more important sources of organic carbon than phytoplankton growing in the system. The bottom line is that increasing flows would have little or no effect on basic productivity with Potamocorbula in place.

This list could go on. Scientific support in this volume is critical because the material provides much of the basis for recommended actions to restore fish and wildlife.

We have similar concerns in the discussion of the Feather River/Sutter Basin Ecological Zone and offer the following comments:

p.247 and elsewhere. Recommendations for the Feather River should be based on more recent data. A key action in the ERPP is to adopt minimum Feather River flows based on DFG (1993). DWR and DFG presently have a multi-year flow study underway in the Feather River. It seems prudent to wait until these results are available. Some specific concerns about the DFG (1993) criteria are provided below.

Higher minimum Feather River flows in Autumn may not substantially improve salmon spawning and egg incubation. The DFG proposal includes minimum flows of 1,700 cfs during the Oct. 15-Dec.31 period. The 1,700 cfs level is similar to the present requirements following Normal to Wet water years, but is higher than levels required when Lake Oroville is low during Critical and Dry years. The proposed flow levels would occur downstream of Thermalito outlet, where a relatively low percentage (25%) of spawning typically occurs. Hence, there may be little benefit to the majority of the salmon population.

There may be little benefit from higher late-spring flows in the Feather River. Also central to the DFG proposal is flows of 3,000-4,000 cfs during the May 1-June 15 period. These flows are unlikely to provide much benefit for young salmon as virtually all juveniles migrate downstream before then. Although American shad are present in the Feather River during the late spring, we question whether the flow proposal would improve the spawning run. Unlike most other tributaries in the Sacramento River, there is no statistical relationship between the distribution of spawning American shad and the relative flow from the Feather (Painter et al. 1977; DWR, unpublished data).

The Feather River temperature recommendations may benefit Shad, but not Steelhead. In contrast to flow (described above), there is a good relationship between shad spawning activity and temperature, so managing the river with DFG's (1993) target late spring water temperatures could indeed help spawning. However, higher temperatures could adversely affect young Feather River steelhead, which rear through spring and summer in at least modest numbers. UC Davis, under contract from DWR, is presently developing a temperature model that may help to address this issue.

Many of the restoration actions identified in Volume II involve ongoing operation and maintenance (e.g., weed control, screen and fish passage maintenance, and levee maintenance). Was this ongoing operation and maintenance considered in developing the strategies for restoration?

Volume II - Ecological Zone Visions: Specific Comments

p.9-19. Description of the Zone There are discussions of sensitive birds, fish, invertebrates, reptiles, amphibians, mammals. What about sensitive plants?

p.9-75. Sacramento-San Joaquin Delta Ecological Zone. It would be useful to compare the current land use in the Delta to the land use envisioned (via restoration) through the ERPP. This comparison could provide insight into the feasibility (from an economic and land use standpoint) of the proposed restoration.

p.22. Sacramento-San Joaquin Delta Ecological Zone, Central and West Delta Ecological Unit. This section is missing a table showing land use within the unit. This table is needed to place the statement in paragraph 2, page 29 in the proper context.

p.27. Sacramento-San Joaquin Delta Ecological Zone, South Delta Ecological Unit. This section should include discussion/consideration of the seasonally low dissolved oxygen problem in the San Joaquin River below Stockton.

p.28.P2. Sacramento-San Joaquin Delta Ecological Zone, South Delta Ecological Unit. A barrier at the head of Old River must consider the needs of the agricultural interests in the area.

p.30. Midchannel Islands and Shoals, Fresh Emergent Wetland, Perennial Grasslands and Inland Dune Scrub- these habitats are important for sensitive plants, too.

p.32. Why are no visions for sensitive plants included (Mason's lilaeopsis, etc.)?

p.35. Sacramento-San Joaquin Delta Ecological Zone, Integration With Other Restoration Programs. What entity will be responsible for integrating implementation over the long term? The proposed approach will require new levels of coordination that do not currently exist. This is not taken into account.

p.37. Sacramento-San Joaquin Delta Ecological Zone, Ecological Process, Target 2. The stated target is "Provide a late-April to early May outflow that emulates the spring inflow from the San Joaquin River... These flows would be achieved through base flows from the Sacramento River ..." More explanation is need here. It is unclear how Sacramento River water would serve to emulate spring inflow from the San Joaquin River.

p.42-53. Sacramento-San Joaquin Delta Ecological Zone, Habitats Section. What is the basis for the habitat mix and quantities identified to support the population objectives. For example, how was it decided that 7,000 acres of shallow-water habitat is needed in the North Delta, while establishment of 500 acres of deep open-water area is targeted. What is the basis (especially ecological basis) for using the 1906 habitat mix as the baseline for comparison?

p.49. Sacramento-San Joaquin Delta Ecological Zone, Riparian and Riverine Aquatic Habitats. The identified targets are to restore riparian habitat along "largely nonvegetated, rip-rapped banks of Delta island levees along the Sacramento and San Joaquin rivers..." Much of this restoration would be accomplished through conservation easements. How would this restoration affect the ability to maintain these levees?

p.55. Sacramento-San Joaquin Delta Ecological Zone, Invasive Aquatic Plants, Target 1. This target does not seem plausible. Existing programs are not able to achieve this target. What new programs are envisioned to achieve this target?

p.56. Sacramento-San Joaquin Delta Ecological Zone, Invasive Aquatic Organisms. Ballast water is not the only vector for the introduction of aquatic organisms.

p.75.P.1. l.14 - 16. The largest intact undiked tidal wetlands remaining in Suisun Marsh are NOT along the bayshores, but are associated with Cutoff Slough and Hill Slough in north central Suisun Marsh.

p.75.P.2. l.3. Suisun Marsh and North San Francisco Bay also support many native plant communities including several significant rare and endangered plants which are dependent of wetland processes.

p.75.P.3. l.5. Stressors to Suisun and North Bay saline emergent plant communities which support sensitive plant and wildlife resources also include freshwater discharges which are outside of the natural variability of seasonal runoff. For example, fresh wastewater treatment outfalls sustained outside of the normal runoff season have been proven detrimental to saline emergent wetlands. Stressors may also include water management activities which result in increased depth and duration of flooding in high marsh zone beyond the range of natural variability and seasonality.

p.76.P.3. l. 3. Ecological processes essential to a healthy Suisun Marsh and San Francisco Bay include both freshwater inflow within natural (unimpaired) variability and also tidal inflow to deliver important ocean salts and maintain this brackish - saline system. In addition, rare events such as extreme pulse flow hydrographs associated with high outflow years AND rare events such as extreme winter drought conditions which this system experienced historically may be equally important in maintaining the biological diversity of this zone of mixed salinity.

p.76.P.4. l. 1. The statement that freshwater inflow to the Bay is the physical process with the greatest influence on aquatic and wetland habitats is highly speculative as many components of this ecosystem have not been studied through long term monitoring or controlled experimentation. This statement may also be fish-biased, and does not reflect the importance of process throughout the study area. Data is extensive with regard to the aquatic food web and waterfowl populations in the Delta and Suisun Marsh. There has not been a comprehensive

ecosystem based monitoring and scientific research program which includes elements such as tidal marsh plant communities, nongame avian species, terrestrial invertebrates, etc. A better statement would be that HYDROLOGY is the single physical process with the greatest influence on aquatic and wetland habitats. In areas downstream of the X2 isohaline which are well mixed, ocean tides clearly dominate over and above freshwater inflow. The historical dominance of halophytic vegetation in Suisun Marsh also suggests that tidal hydrology may be more important to Suisun than freshwater inflow hydrology.

p.76.P.4 and 5. The historic tidal prism prior to diking of the Suisun and North Bay marshes was also higher than present conditions. The historic variability of the tidal prism should be discussed in addition to upper watershed inflow.

p.76.P.4 and 5. Freshwater inflows from the local watersheds in the Vaca Mountains and Coast Range have also been modified from historic conditions. It is unclear whether local watershed hydrology and Delta outflow have been evaluated for this entire zone.

p.79.P.4. l.1. An increase in jet ski use in Suisun Marsh following the improvement of local public launch facilities is also causing erosion and noise disturbance problems directly impacting sensitive channel side plant communities and nesting clapper rails in relict tidal marsh habitats.

p.80.P.6. This paragraph should be expanded. The aquatic foodweb is linked to the transitional wetland food web which extends up into the high marsh and adjacent uplands. Important ecological links exist which ultimately contribute to the detrital based portion of the aquatic food web. We should not limit our thinking to the water's edge if this is to be a comprehensive ecosystem based program.

p. 81.P.10. l.9. Suisun Marsh Salinity Control Gate operation did not begin until the fall of 1988.

p.81.P.11. l.5. Suisun Marsh also harbors sensitive plant species and communities including several rare species. The Suisun thistle is a Suisun endemic and is found nowhere else in the world.

p.82 - 83. The vision for the Suisun/North Bay Ecological Zone is well written with the exception of the omission of important plant resources which may be superior indicators of ecological health - they can't fly or swim away if conditions are not satisfactory!

p.83.P.4. l.13- 14. The discussion of restoring connectivity between ecologically significant areas is important, and the need to protect the landscape linkage between Suisun Marsh and the adjacent uplands/vernal pool complex of Jepson Prairie as mentioned is extremely important! Linkages and opportunities to connect existing relict tidal marsh such as Rush Ranch and the eastern reach of Hill Slough should also be given highest priority for obvious ecological benefit. A restoration program which links Jepson Prairie and connects existing tidal marsh around the

Potrero Hills could benefit all target species in this zone.

p.84.P.3. Tidal marsh restoration opportunities along the Contra Costa shoreline are not as likely to produce positive benefits and species recovery as those in the interior of Suisun Marsh due to the extensive contaminants problems such as the mentioned selenium discharges, in addition to the frequency and risk of oil spills, and the heavy metal contamination sites in this zone.

p.87. Why are no visions for Sensitive Plants included (Suisun thistle, soft-haired bird's beak, Mason's lilaeopsis, etc)?

p.93.P.5. Target associated with Bay - Delta aquatic foodweb should be expanded to support basic research to define and understand the important links between the aquatic food web and adjacent terrestrial or transitional wetland food web for a better understanding of this ecosystem which is not fish-biased.

p.99.P.3. The most significant invasive plant in this Suisun/North Bay zone is *Lepidium latifolium* (perennial pepperweed). This invasive is a problem in both diked and tidal marshes. Giant reed and Eucalyptus are not a significant problem in Suisun Marsh. Eucalyptus trees support the extensive heron and egret rookeries in this zone, which are also a sensitive wildlife resource.

p.101. Species. Where have all the flowers gone.....? Sensitive plants should be included as important biological indicators.

p.101.P.2. Target 1. Prohibition of jet ski traffic in these sensitive zones would also be a positive recovery step for California clapper rails and black rails.

p.101.P.7. Harvest of Fish and Wildlife. A public education program to inform duck club owners of ecological importance of native coyotes in the Suisun region may help prevent the potentially devastating spread of red fox further into Suisun and the Delta. Many Suisun landowners perceive coyotes to be a threat to nesting waterfowl and routinely shoot them. Coyotes are native to the system, and tend to keep foxes out. The spread of the non-native red fox into this zone will likely result in more significant losses to nesting waterfowl, shorebirds, and rails.

Volume II - Ecological Zone Visions: Typographical Comments

p.12.P.3 First and last sentences say the same thing.

p.17. Incomplete sentence bottom of column one, "American shad production with....". Should this say "American shad production <u>increases</u> with..."?

p.22. Incomplete sentence ... "construction of Friant Dam began to significantly alter hydraulic patterns, particularly during ??? water years".

p.53. Program Action 1A, l.4. Suggest changing "...to establish and mature shoreline riparian vegetation" to "allow mature shoreline riparian vegetation to establish."

Volume III - Vision for Adaptive Management: General Comments

This is the best Volume of the ERPP. It is well written and gets to the point. We suggest that the information in Volumes I and II be presented in a format similar to Volume III. The CALFED staff should be commended for such a comprehensive treatment of adaptive management. A scientific research program should be an integral part of the feedback loop for adaptive management. Also, it might be worthwhile to more directly link the information in Volume III with the information in Volumes I and II.

The significant problem with this volume is our concern that not all of the CALFED agencies, staff, and stakeholders fully appreciate the concept of adaptive management as being used by CALFED. Adaptive management at the basin-wide scale being proposed requires an unprecedented commitment of resources and patience. Many of the potential drawbacks are listed on pages 10 and 11 but are subsequently glossed over. We are not certain that the Central Valley system can be adaptively managed, but if it can it will come with a huge price tag, involve considerable uncertainty (especially in the early years), and require an order of magnitude better integration of science and management than we have seen to date. This integration will be particularly difficult because CALFED will be changing a multitude of variables at the same time and scientists will face the difficult and, perhaps, impossible task of trying to figure out what happened and why.

Volume III - Vision for Adaptive Management: Specific Comments

p.10-11. Adaptive Management, Potential Drawbacks of Adaptive Management. Expansion of this section is necessary. Although the list of drawbacks seems inclusive, there is no discussion of how to deal with these drawbacks and their repercussions.

p.14. Key provisions of the HCP should include descriptions of the habitat types as well as specific species.

p.23-26. Some of the implementation strategies seem weak, relying heavily on current programs

and not developing additional ways to implement actions.

p.30. Listed and potentially listed species should have a higher priority than striped bass in the ranking criteria.

p.38.P.4. The acknowledgment of the lack of an overall estuary and river wetland monitoring program for plant and wildlife communities should be treated comprehensively in later sections on the need for focused research and in Appendix 4 in a detailed monitoring subprogram. These discussions seem to be missing.

p.49. Scales of ecosystem indicators. Where have all the flowers gone? Sessile rare plant populations may be extremely important biological indicators for this program. A few plant community types are listed, but there are not plant indicator species.

p.77. Focused Research. General Comment: Restoration ecology is a young science. Clearly a strong scientific research program may be critical to the success of CALFED. Scientific inquiry should feed into and result from the adaptive management process. Scientific monitoring is only one component of scientific research. Monitoring tells us "what" and suggests correlations, but it does not tell us "why" or "how" and is often not predictive. It will be important to have a companion research program of both landscape scale ecological experiments, and small scale controlled manipulative experiments to tease out important causative mechanisms and increase our ability to rehabilitate these systems. The Pacific Estuarine Research Lab has developed experimental mesocosms in tidal marsh settings. These types of experimental units may be useful for large scale field experimentation in our estuary.

p.77. Focused Research. General Comment 2. There continues to be a suggested emphasis on restoration of shallow water habitat for fish. The full ecosystem recovery suggested in these documents will require more comprehensive wetland restoration. There are opportunities for such restoration in Suisun Marsh. Within Suisun, most of Grizzly Island was diked by the turn of the century and has experienced subsidence similar to the Delta lands. However, other wetlands within Suisun were diked for waterfowl hunting within the last 35 years. This long term progression of diking has resulted in a mosaic of diked wetlands with different characteristics. There may be more opportunity within Suisun to create fully functioning tidal wetlands than the water side pockets of habitat associated with setback levees which are suggested for the Delta.

p.107. Appendix 4. The Monitoring of Ecosystem Indicators is an excellent example of the limitations and bias of this program. The aquatic ecosystem is extensively monitored, and focused research is proposed and described. This does not represent comprehensive ecosystem monitoring and research needs of the ecosystem coverage described in the CALFED documents.

Attachment: References for Temperature Effects on Fish

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