COMMENTS OF
THE NATIONAL MARINE FISHERIES SERVICE
ON CALFED DRAFT PEIS/EIR (March 1998)

PEIS/EIR GENERAL COMMENTS

The PEIS/EIR chapter on Fisheries and Aquatic Ecosystems (chapter 7.1) contains much useful information regarding the potential effects of the CALFED Program alternatives on fisheries, but the narrative in Comparison of Program Alternatives to No Action Alternative (chapter 7.1.2.5) is not conducive to understanding the beneficial and adverse effects of each alternative. Additional development of the presentation format described on page 7.1-20 (i.e. *"organized by alternative and subdivided into ecosystem-level and species-specific impacts"*) would be helpful to the reader, particularly for comparison of the Storage and Conveyance alternatives in the Delta Region. NO

The PEIS/EIR discusses a variety of ways to use water saved by an effective water use efficiency program (e.g. pages 2-15, 6.1-71, and 7.1-12). To realize all the potential benefits of the water use efficiency program presented on page 2-14, CALFED should develop specific goals and objectives for conserved water. NO

PEIS/EIR SPECIFIC COMMENTS

Page 3-2: Table 3-1, Bay-Delta Hydrodynamics - Alternative 3: This description should indicate Alternative 3 comes the closest to restoring historic Delta circulation patterns. OK

Page 3-5: Table 3-1, Fisheries and Aquatic Ecosystems - Other Programs:
"Modifications in flow timing" has the potential to be beneficial to the aquatic environment, but it could also cause significant adverse impacts. OK

Page 6.1-40: Low Inflow/High Pumping Conditions, second paragraph, first sentence:
"In the south Delta, the San Joaquin River experiences reverse flows."
This sentence should clarify that 100% of the San Joaquin River inflow is diverted to Old River under "reverse flow conditions". OK

Page 6.1-72: Column 1, last paragraph: *"Conveyance of water from new storage areas could result in a substantial increase in discharge in local stream channels."*
Substantial increases in discharge in local stream channels could benefit or adversely affect local juvenile salmon or steelhead populations, depending on the timing, magnitude, and duration of the flow. OK

Page 6.1-73: Column 1, second paragraph, last sentence: *"Timing changes would benefit fish and aquatic ecosystems."*
Under some circumstances, timing changes of flows can adversely affect local salmon and steelhead populations. OK

Page 7.1-1: Sidebar - Impacts to Fisheries and Aquatic Ecosystems, Alternative 2: This summary description of Alternative 2 should include impacts associated with upstream fish passage at the screened through-Delta facility near Hood.

Page 7.1-2: Table 7.1-1, Screened through-Delta facilities and the isolated facility intake would cause entrainment-related mortality for Sacramento River fish: This impact may be significant for striped bass eggs and larvae, but state-of-the-art fish screen facilities are likely to screen juvenile salmonids effectively resulting in a "less than significant impact".

Page 7.1-10: Table 7.1-2, Reoperation of reservoirs potentially degrades water temperature conditions and increases spawning and rearing mortality: This impact may be significant for spring-run chinook spawning in the mainstem Sacramento River and Feather River.

Page 7.1-14: Column 2, third paragraph: *"Change in Shasta Reservoir operations may increase temperature-related mortality for winter-run chinook salmon."*
Spring-run chinook may also experience adverse temperature conditions from changes in Shasta Reservoir operations.

Page 7.1-22: Column 1, first sentence: *"Changes in flow that approximate the natural seasonal pattern are assumed to restore flow-related processes in the aquatic ecosystem, including residence times and transport rates."*
The performance of each alternative in relation to this important functional characteristic of the Delta ecosystem should be discussed under section 7.1.2.5 Comparison of Program Alternatives to No Action Alternative.

Page 7.1-30: Column 2, first paragraph, last sentence: *"Actions may include ... recommendations to the regulatory agencies for improved harvest practices relative to maintenance of natural fish populations".*
These harvest management recommendations should be designed in a manner consistent with the CALFED solution principal of "no significant redirected impacts" to fishing interests.

Page 7.1-33: Column 1, first paragraph, first sentence: *"Change in Delta inflow and outflow relative to the No Action Alternative would most likely be minimal".*
In this assessment of fisheries impacts, it is important to note that the hydraulic modeling results are in a monthly time-step which can mask daily conditions. In addition, Alternative 1C is anticipated to increase the magnitude of reverse flows in the central Delta (Table 6.1.2-2). This section should include additional discussion of the potential influence of these flow changes on salmon and other fish species. For example, the discussion of a "pre-development circulation pattern" in the Delta is "generally considered beneficial to anadromous fish" (page 6.1-48) presented under the

Surface Water Resources section would also be appropriate to discuss in relation to the 3 storage and conveyance alternatives.

Page 7.1-33: bottom of column 1 and top of column 2: *"Flow from the new channel constructed under Configurations 2A, 2B, and 2D could cause additional deviation from the natural flow pattern and would have an adverse impact on flow patterns in the eastern and central Delta".*
See comments above for page 7.1-33: Column 1, first paragraph.

Page 7.1-34: top of column 1: *"Reduced flow would affect habitat quality, but the effect of habitat changes cannot be determined with the available information."*
The effects of reduced flows downstream of the intake at Hood in alternative 2 should be similar to those described for alternative 3. In the adjacent column on page 7.1-34, the impacts to striped bass from flow reductions below Hood for Alternative 3 would also apply to Alternative 2.

Page 7.1-35: Column 2, first paragraph, first sentence: Depending on the water year and salmon race, some juvenile chinook can rear in the Delta for several months prior to outmigrating as smolts.

Page 7.1-43: Column 2, second paragraph, second sentence: With four runs of chinook salmon in the Central Valley, adult chinook salmon are migrating upstream virtually year round.

ECOSYSTEM RESTORATION PROGRAM Technical Appendix - GENERAL COMMENTS

The ongoing efforts to revise the ERP are sound and should lead to considerable improvements in the subsequent draft. The initiatives that are the most commendable are:

- Establishment of the scientific core team will increase the continuity and scientific integrity of the program.
- Conceptual model development also has the potential to enhance program continuity by providing a conceptual ecologic framework that will integrate the diverse components of the program.
- The comprehensive monitoring, assessment, and research program (CMARP) is developing protocols for the ERP. Research and monitoring have critical roles in the program, especially in context of adaptive management.

The comments provided here apply to both the draft ERP and ongoing work efforts associated with the CALFED Program.

Adaptive management
The draft ERP needs to include explicit recognition of the technical and practical limitations of adaptive management. The range of opportunities in which adaptive management can be appropriately applied is quite narrow. Adaptive management cannot be the cornerstone of the restoration process, but is one of many useful tools. One appropriate application is in the context of learning more about instream flow needs of target species (Castleberry et al. 1996).

Key watersheds
Key watersheds (or reference sites) are large areas (e.g., greater than 50 km^2) dominated by native organisms or natural processes or that have high potential to be restored to such a condition (Moyle and Yoshiyama 1994, FEMAT 1993). The concept and importance of key watersheds has been promoted widely in the aquatic conservation literature (e.g., Moyle and Yoshiyama 1994, Li et al. 1995, Huntington et al. 1996, Moyle 1996, Rahr et al. 1998), and should be incorporated in the ERP.

Key watersheds provide several benefits to a regional ecosystem restoration effort. Because these watersheds consist of the best remaining natural habitat, they can provide a habitat buffer stable enough to accommodate natural disturbance regimes. These reserves are likely also to serve as both refugia and sources of colonist. Furthermore, key watersheds can provide an important function as controls for adaptive management experiments and for monitoring.

Deer, Mill, and Antelope Creeks in the upper Sacramento drainage, and the Cosumnes River in the lower, have been identified as candidate key watersheds (Moyle and Yoshiyama 1994). The spatial distribution of these key watersheds is biased. Additional watersheds, including at least one San Joaquin tributary and one west-side stream in the Sacramento system, should be considered for restoration to key-watershed condition.

Steelhead-specific Restoration Measures
The ERP contains few measures that are targeted specifically at improving conditions for steelhead; most benefits for steelhead are expected to accrue incidental to actions taken primarily for chinook salmon. Listing of steelhead as a threatened species under the Endangered Species Act has occurred since the release of the draft ERP, and this action should promote greater emphasis on steelhead restoration. Discussions about proposed steelhead-specific restoration actions are underway with ERP staff.

Time Scales
The implementation schedule for the ERP is 25 to 30 years. This time frame is unlikely to adequately encompass the range of temporal variation in natural processes that will obscure the effects of the restoration effort (Lawson 1993). For example, temporal variation in ocean conditions, occurring at decadal scales, can enhance, mask, or

substitute for effects of freshwater habitat restoration (although oceanic effects on California chinook are less dramatic than for other species; Pearcy 1997). This issue should be explicitly addressed.

The advantage of treating this issue explicitly is that it will encourage design of monitoring programs that attempt to quantify the magnitude of contributions of external factors such as ocean survival; attempting to quantify external effects is different in important ways from attempting to exclude such effects.

Ecological Function

How much habitat restoration is necessary to restore fish abundance? The high level of uncertainty surrounding this question led the authors of the ERP to argue that fish abundance will be restored indirectly as a consequence of recovery of ecological process or ecosystem function.

This approach simply shifts the critical question to: How much restoration is necessary to recover ecological function? An equal level of uncertainty (if not more) surrounds this issue. In order to accommodate the inevitable uncertainty in these issues the ERP needs first to acknowledge the uncertainty (which is done broadly in the draft Strategic Plan), and then demonstrate a clear conceptual understanding of key relationships that link habitat condition to ecological processes and fish abundance. Ongoing conceptual modeling efforts provide one mechanism for developing this understanding, but considerable work remains to be done.

Explicit treatment of uncertainty was identified by the Scientific Review Panel as a critical omission of the ERP. A diverse literature exists regarding methods for reducing and accommodating ecological uncertainty. These techniques should be described and applied to the ERP, especially in specific areas where uncertainty is high.

Metapopulation Issues

"Viable populations, well distributed across the landscape" is a National Forest Management Act phrase which succinctly expresses what should be one of CALFED's objectives for each species considered in the program. Key watersheds have an important role to play in metapopulation dynamics. The spatial distribution and connectivity of restored habitats is essential to their ecologic function.

The lack of specificity in the ERP regarding siting of restoration actions is undoubtedly politically and fiscally expedient. However, this lack of specificity precludes us from evaluating the functional connectivity of restored habitat. For example, creation of contiguous migratory corridors of high quality habitat for emigrating salmon in the Delta would greatly enhance the ecologic value of the proportion of habitat restored.

Conceptual Modeling
In complex biological systems, the process of model building often is more informative than the finished model. The accelerated CALFED timeline is truncating the opportunity to learn during the model construction phase.

The accelerated CALFED time line is also prohibiting quantification and verification of the conceptual models that are developed. The resemblance between model behavior and natural processes needs to be tested with pilot projects. The revised ERP document should explicitly discuss these limitations on the incorporation of conceptual modeling into the program, and lay out a process of ongoing model development and refinement that will increase the value of the modeling approach.

An important merit of limiting factor analysis is to identify life stages or environmental factors that clearly are NOT limiting population abundance (Kondolf 1998). Restoration activities that address these factors are less effective and should receive lower implementation priority.

Monitoring
Restoration needs to be measured in terms of quantifiable objectives for desired conditions (Kershner 1997). The Indicators Group and CMARP are defining which specific ecosystem features or processes should be measured. Once a set of indicators is chosen, targets will need to be established. What process, involving what groups, will accomplish this task? The answer to this question needs to be made explicit in order to increase public confidence in the approach, and to obtain the necessary local input.

A comprehensive spatial database needs to be developed, and widespread access to this data should be provided. Geographic information system (GIS) databases have become instrumental in large scale planning. The ERP has not demonstrated an adequate commitment to developing this essential tool. GIS should not be considered optional, or debated because of perceived high costs. Agency concerns about "proprietary" or sensitive data layers should not be allowed to obstruct the process of developing this database.

GIS development should have high implementation priority because it has an important planning function. The ERP's goals of recovering ecologic function can only be achieved if the spatial distribution of restoration efforts makes ecologic sense. GIS is a tool that can provide this spatial sensibility.

Research
The research aspect of CMARP should not be relegated to a minor role. Additional information on life history and habitat requirements are essential for effective conservation of chinook salmon and steelhead. The combination of monitoring and

research into one program raises the possibility that when funding limitations occur, research will be curtailed in favor of sustaining long-term monitoring programs. A firm commitment to long-term research is strongly recommended at the outset. Establishment of a policy that designates a proportion of the CMARP budget to research might head-off difficult choices between these program elements in the future.

Explicit treatment of conflict and tradeoffs
Where conflicts are likely between elements of the program (e.g., stocking of steelhead and striped bass may increase predation on juvenile salmon) the tradeoffs involved should be clearly described. These discussions about tradeoffs can be incorporated into the "linkage with other ecosystem elements" or "integration with other restoration programs" sections of the existing ERP.

ECOSYSTEM RESTORATION PROGRAM Technical Appendix - SPECIFIC COMMENTS

Vol. I, pages 21 to 46, Central Valley streamflows, sediment supply, stream meander, and flood processes; and Vol. II, pages 371 to 396, San Joaquin River Ecological Zone: The ERP visions for the San Joaquin ecological zone include many actions to improve connectivity between the river and its floodplain. However, these measures are not matched with adequately aggressive measures for improving streamflow. The ERP contributes little to increased flows for chinook salmon in the San Joaquin basin beyond the interim measures specified in the Vernalis Adaptive Management Plan (VAMP). Current conditions for San Joaquin salmon are poor, and the VAMP and proposed ERP flow increases will improve conditions. However, due to several limitations, these measures are unlikely to substantially improve the abundance of naturally spawning chinook salmon in the basin.

The limitations that should be addressed include:

- The 31-day spring pulse is too brief; it does not include an adequate proportion of the outmigration period.
- The 10-day pulse events in each of the tributaries does not adequately emulate natural hydrographs.
- No fall attraction pulse flows are provided.
- "Make-up" pumping may increase entrainment and negate the effects of the pulsed flows.

Vol. I, pages 40 - 46, Natural Floodplains and Flood Processes: The Yolo and Sutter bypasses have been identified as locations for intensive habitat restoration. CALFED ERP staff have repeatedly discussed a proposal to develop "live streams" in the bypasses. However, this vision is not adequately presented either in the ERP section cited above, or in the sections dealing with these ecological units in Vol. II (pgs. 26 to 28,42 to 43, for the Yolo Bypass; and pgs. 260 to 261 for the Sutter Bypass.

An obvious source of concern is that if the effort to turn these bypasses into live streams with riparian habitat is successful, and greater proportions of juvenile fish use them as migratory corridors, flows through these streams will need to be guaranteed during droughts. Assurances and operating criteria for these bypass flows should be specified.

Vol. I, pages 47 - 55, Central Valley stream temperatures:
Temperature-related stress associated with inflow from agricultural drains, especially the Colusa Drain, are not adequately addressed. The ERP segment on Central Valley Stream Temperatures should include programmatic actions that specify how temperature effects of drain water can be minimized. Some problems with the Colusa Drain are discussed in Vol. II, pages 209 to 211, but this discussion dismisses adverse impacts. The draft proposed recovery plan for winter-run chinook (NMFS 1997, pg. V-24) identifies the Colusa Drain as a stressor and recommends mitigation actions.

Vol. I, pages 106 to 112, Riparian and Riparian Aquatic Habitats: Remaining shaded riparian aquatic (SRA) habitat throughout the Central Valley is an extremely limited and ecologically valuable resource. Preservation of high-quality existing habitat should be prioritized and these areas used as cores for restoration nodes. Like remaining gravel sources, the ERP should identify these remaining habitat areas as resources deserving protection, and describe incentives for preservation.

Vol. I, pages 153 - 154, Implementation Objective, Targets, and Programmatic Actions:
Protection of historic spawning habitat should be described in the ERP. Although technology may not currently permit efficient movement of winter- or spring-run chinook past dams to allow access to historic habitats, this option may become feasible in the future. Historic spawning habitats in the headwaters of the McCloud, Pit, and Little Sacramento rivers should be protected from degradation that would reduce their value as spawning habitat, if access can be restored.

Vol. I, pages 274 to 280, water diversions and other structures, and Vol. II, pages 151 to 153, reducing stressors in the Sacramento River Ecological Zone: Operation of the Red Bluff Diversion Dam (RBDD) to protect winter-run chinook salmon has reduced the adverse effects of this structure. Nonetheless, the ERP should provide more support for finding a permanent solution for the RBDD such as screened lift pumps that would permit permanent raising of the dam gates.

A similar solution should be endorsed for the Anderson-Cottonwood Irrigation District Dam. The feasibility study to evaluate alternatives to improve fish passage described in the ERP is a necessary step. However, a programmatic statement by CALFED specifying that the preferred approach to resolution of passage problems is to substitute screened pumps for diversion dams wherever feasible, and especially in key watersheds, would be a welcome revision to the ERP. Programmatic targets for

diversion dam removal, paralleling the existing targets for diversion screening, would convey that this stressor needs to be alleviated to a similar degree.

Vol. I, pages 344 to 348; Artificial Fish Propagation: The ERP contains many excellent suggestions regarding artificial propagation. Most of these suggestions are intended to improve the contribution of hatcheries to the recovery of natural populations (NRC 1996).

One aspect of hatchery operations that has not been adequately addressed in the ERP is the exceptional potential hatcheries have to contribute to knowledge. The research function of hatcheries, beyond providing fish for experimental releases in the Delta, should be promoted.

Vol. II, pages 219 to 248, Butte Basin Ecological Zone: Mill, Deer, and Butte creeks are identified in the ERP as locations that support the most robust remaining populations of spring-run chinook. The prolonged holding period of spring-run chinook adults exposes them to risks from poaching and disturbance-induced stress not faced by other chinook races. The ERP recommends purchase of property to protect holding pools used by spring-run chinook on Big Chico Creek. This measure should be generalized throughout the ecological zone. The ERP could benefit spring-run chinook greatly by implementing a key watershed approach and protecting important holding pools by easement, purchase, or by providing incentives to watershed groups in Mill, Deer, and Butte creeks to designate holding areas as sanctuaries for spring-run chinook (see Rahr et al. 1998).

Fall-run chinook also spawn in most of the Butte Basin creeks. Spawning timing of these races is similar, and differences in habitat selection probably was the mechanism that minimized hybridization in the natural system. The degree of hybridization between spring-run and fall-run chinook, particularly in the Feather River and mainstem Sacramento, has been identified as a source of concern (Myers et al. 1998). Hybridization results largely from breakdown of reproductive isolating mechanisms based on spawning habitat choice. Like steelhead, spring-run chinook would benefit greatly from improved access to historic headwaters habitats, which would reduce the potential for hybridization as well as provide many other benefits. Improved passage, in both directions, should be stressed in the watersheds with remnant spring-run chinook populations.

LEVEE SYSTEM INTEGRITY PROGRAM Technical Appendix - GENERAL COMMENT

The existing Technical Appendix is highly programmatic and does not convey any meaningful integration with the ERP. Priorities are identified, but no specific objectives set. Various levee designs are presented, but without suggestions about where they may be used. Lots of descriptive raw data is presented, but except for a consultant's

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report on subsidence mitigation, virtually no interpretation, synthesis, or specific planning recommendations or targets are expressed. The lack of specifics and integration with other programs invites speculation about the potential for conflicts between the levee program and the ERP. Comments from program leads suggest integration between the ERP and Levee programs has occurred, and this needs to be incorporated in the revisions to both documents. If an explicit process for conflict resolution has been developed, it should be described. Ideally the levee program would strongly encourage the implementation of non-structural alternatives to flood control wherever feasible.

WATER QUALITY PROGRAM Technical Appendix - GENERAL COMMENT

The Total Maximum Daily Loads expressed in the water quality program may be inadequate. The Services (FWS and NMFS) are discussing a draft biological opinion with the Environmental Protection Agency regarding the effects on wildlife of selenium, mercury, cadmium, metals in general, and PCP. The allowable concentrations for these contaminants proposed in the draft Water Quality Program are in some cases higher than both those proposed by EPA and much higher than the more stringent "reasonable and prudent alternative" proposed by the Services. The consultation is being elevated, so that headquarters-level review has begun. The CALFED documents should reflect this ongoing conversation among the member agencies.

NO ACTION ALTERNATIVE Technical Appendix - SPECIFIC COMMENT

Appendix A (Modeling Assumptions), Page A-9: Target Reservoir Storage: Under extremely critical water year conditions, the biological opinion for winter-run chinook salmon requires the Bureau of Reclamation reinitiate consultation with the NMFS. Operational rules and carryover targets were not set for these water year types, because storage levels may need to drop below 1.9 MAF to provide an adequate level of temperature control in the upper Sacramento River. In a reinitiated consultation, operations and carryover storage levels will be established, based on existing water supplies and Central Valley Project capabilities, to provide protection from lethal temperature conditions during the winter-run chinook spawning and incubation season.

CALIFORNIA AND FEDERAL ENDANGERED SPECIES ACT COMPLIANCE Technical Appendix - SPECIFIC COMMENT

Page 16: B. General Structure and Purpose, second paragraph: *"The ERPP aims to achieve recovery for those species dependant on the Delta, and to contribute to species' recovery in ecological zones other than the Delta."*

The term "recovery" should be defined. Is the ERPP seeking to develop and implement measures for the conservation and survival of listed species which would result, in a determination, in accordance with the provisions of section 4 of the Federal Endangered Species Act (ESA), that the species be removed from the list? Providing for the ESA recovery of anadromous salmonids pose a particularly difficult task for CALFED and the

ERPP since they are dependant on the Delta and upstream riverine habitat for a portion of their life history and the marine environment for the balance.

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