DRAFT STUDY PLAN TO EVALUATE IMPROVED OPERATIONAL PROCEDURES FOR THE DELTA CROSS CHANNEL AND A SCREENED THROUGH-DELTA FACILITY

December 12, 2000

RECORD OF DECISION REQUIREMENTS

The CALFED August 28, 2000 Programmatic Record of Decision (ROD), states that CALFED will improve flood protection and conveyance facilities in the North Delta for water quality and fishery improvements, and avoid water supply disruptions (pg.50). Two of the improvements outlined are addressed by this study plan. They are:

- Evaluate and implement improved operational procedures for the Delta Cross Channel (DCC) to address fishery and water quality concerns (pg. 50).

- Simultaneously evaluate a screened through-Delta facility on the Sacramento River of up to 4,000 cfs (pg. 51).

Specifically, the ROD requires that by October 2000 the following will be completed:

1. Operational studies (such as more intense fish monitoring on both sides of the DCC, opening and closing the gates on tidal cycles, etc.) will begin.

2. A specific study plan will be developed for a thorough assessment of the DCC and a thorough evaluation of the technical viability of a screened through-Delta facility will be developed.

3. Fund and begin studies through CALFED Agency appropriations for the DCC and the technical viability of a screened through-Delta Facility.

This fall the CALFED DCC Project Work Team (DCC PWT) completed requirement 1. This team was formed by the Interagency Ecological Program (IEP) to develop a plan of operations of the DCC for fall 2000 that would address the water quality and fishery concerns raised in the fall of 1999. The team has conducted a series of studies and experiments that are expected to greatly reduce the uncertainties surrounding these issues and provide a solid basis both for DCC operations later this year and serve as pilot studies for many of the studies proposed in this study Plan. These studies were funded by CALFED Agency appropriations with the CALFED's Delta Cross Channel Through Delta Facility (DCCTDF) project teams oversight and coordination. Hydrodynamic and water quality monitoring of DCC tidal operations occurred in September of this year. In November and December juvenile and adult fish tracking studies were conducted under

tidal operations. The general work plan for these pilot studies and corresponding agency contract amounts are summarized in the October 13,2000, DCC PWT document "Intense Study Plan for DCC Fall Operations".

This study plan prepared by the DCCTDF project team is directed towards requirements 2 and 3 above. It addresses the questions and proposed studies that will be conducted over the next three years so that specific recommendations can be made to management on the DCC and the screened through-Delta facility by the end of 2003.

This study plan was the subject of a workshop held on October 27, 2000. Comments received at the workshop are incorporated in this revised draft. The plan will then be subjected to CALFED's scientific review process and then implemented.

INTRODUCTION

In December 1999, under low flow conditions and high export pumping rates, Delta salinity increased when the Delta Cross Channel (DCC) gates were closed to protect emigrating juvenile Sacramento basin salmon. This experience and other similar experiences in recent years have indicated the need for tools that would facilitate operating the system for better balance to meet fishery, water quality and supply objectives. This led CALFED to consider how to preserve both the fish benefits of closing the DCC gates and the water quality benefits of diverting Sacramento River water into the northern interior Delta, particularly during low flow periods.

Options range from tide-related operations of the DCC gates (allowing a large fraction of the normal flow of Sacramento River water to pass through the DCC with the gates open only a portion of the time) to providing a means to convey Sacramento River water to the northern interior Delta when the DCC gates are closed. In the past, planners proposed to accomplished the latter by constructing a single new channel. This study will consider the possibility of a single channel originating at a variety of locations and the possibility of several smaller channels. Any new channels would be screened. Screening the DCC to divert a smaller amount than its present capacity will also be considered. That new channel(s) option is being called the Through Delta Facility (TDF). The range of options includes various combinations of the two approaches.

CALFED Management has directed that both options be evaluated, so that a policy decision can be made on the course of action in October 2003. Further, the direction from management is that a TDF will be selected only if water quality and fishery objectives can not be met through reoperation of the DCC and other CVP/SWP facilities (reservoirs and pumps). Nevertheless, the decision deadline dictates proceeding simultaneously on evaluating both options. CALFED also expects all projects related to this study plan to be self-mitigating for potential effects on fish and wildlife.

The following questions and studies outline the work related to fish populations, fish screen facilities, and water quality needed for both options. That work is outlined under the premise that existing knowledge plus the studies outlined in this document will be sufficient to support the decision called for in October 2003.

In addition to the studies described in this paper, facts needed for environmental documentation for any DCCTDF project selected in 2003 will be gathered between now and 2003. Such environmental documentation work will be described in another document.

The questions and studies are intended to explore consequences of potential water diversions through the DCC and a TDF ranging from the amount diverted through the DCC when it is operated in accordance with present regulations up to the total combined capacity of the DCC and a TDF. Since average flows through an open DCC are approximately 4,000 cfs and the maximum design capacity being considered for a TDF is 4,000 cfs, the capacity of diversions to be considered ranges from 0 when the DCC is required to be closed and a TDF, if built, is not operating to an average of about 8,000 cfs if both were diverting water from the Sacramento River simultaneously.

QUESTIONS PERTAINING TO REOPERATION OF THE DCC

1. **Would opening the DCC gates only at certain tidal stages reduce the diversion of salmon into the Central Delta sufficiently to meet fishery objectives?**

   The survival of downstream salmon migrants passing through the DCC or Georgiana Slough is substantially less than the survival of salmon remaining in the Sacramento River. That has led to provisions in the 1995 WQCP and ESA biological Opinions for listed Chinook salmon requiring closure of the DCC during extended periods of time. The closure was to reduce the fraction of salmon following the route with lower survival, thus improving overall salmon survival.

   Some preliminary model evaluations indicate that a disproportionately large fraction of the Sacramento River water diverted daily through the DCC flows through the channel during flood tide. Also there is some reason to believe that juvenile salmon migrate downstream during ebb tide. This suggests that opening the DCC during flood tide and closing it during ebb tide might produce most of the water quality benefits while diverting many fewer salmon. We need to learn more about juvenile salmon behavior and water flow patterns at the DCC to determine the true potential for achieving such benefits.

   Proposed studies- During the fall of 2000, several groups of marked hatchery reared salmon will be released during various tidal stages in the Sacramento River just upstream of the DCC. Simultaneous trawling in the DCC and in the

Sacramento River immediately below the DCC will estimate the fraction entering the DCC during various stages of the tide. Other juvenile salmon fitted with radio tags will be released upstream and downstream of the DCC to get a second estimate of salmon distribution.

Tidal velocities will be monitored for a three-month period in the DCC and in the Sacramento River upstream of the DCC and downstream of Georgiana Slough to determine a complete picture of flows in relation to the tide. In addition, surface drogues will be released upstream of the DCC simultaneously with salmon releases to track flow in relation to fish movement.

Results of both studies will be evaluated and repeated, with appropriate modifications, as needed to answer the question prior to October 2003.

2. **Would opening the DCC gates only at certain tidal stages protect water quality in the central and south Delta sufficiently to meet water quality objectives?**

Preliminary model evaluations have indicated that water quality in the central Delta could be protected by opening the DCC during flood tides, almost as much as keeping the DCC open all the time. This suggests that opening the DCC during flood tide and closing it during ebb tide might produce water quality benefits that are similar to conditions when the DCC is open all the time.

Proposed studies- During the fall of 2000, and in conjunction with some of the fisheries studies, the DCC will be tidally operated, and EC at Chipps Island and Jersey Point will be analyzed to determine the changes in degree of salinity intrusion. Modeling studies will also be conducted to simulate the water quality effects of tidal operation of the DCC. Results of these studies will be evaluated and repeated, with appropriate modifications as needed, to answer the question by October 2003.

3. **Would opening the DCC gates only at certain times related to day or night reduce the diversion of salmon into the Central Delta sufficiently to meet fishery objectives?**

Some evidence indicates that salmon may migrate differently during day and night, offering some potential for selectively opening the DCC on a diel pattern to reduce the passage of salmon through it.

Proposed studies- The releases of salmon described under Question 1 will be used to track diel differences in migration in addition to tracking tidal differences. The results will be used to evaluate the potential for diurnal changes in gate operations to minimize diversion of salmon to meet fishery objectives, either by itself or in conjunction with tidal differences in operations.

4. Would the selective closure of the DCC gates interfere with the upstream migration of fish, and how does that compare with effects of current operations?

Various fish species migrating up the Sacramento and Mokelumne rivers could have their migrations impaired by operation of the DCC. The most obvious such fishes are adult migratory fish destined for the Sacramento River upstream of the DCC. An unknown, but considerable, number of such fish migrate via the lower San Joaquin River and the Mokelumne River as a result of being attracted by the Sacramento River flowing through the Delta Cross Channel and Georgiana Slough. Tagging studies have document such a migration pattern for salmon, and a similar pattern is probable for a variety of other fishes which spawn in the Sacramento River and rear in the estuary or ocean. Such species include steelhead, white and green sturgeon, striped bass, American shad, splittail and delta smelt.

The effect of closure of the DCC on such migrations has not been evaluated, but it is believed that the effect is minimal, due to closures typically being for extended durations. During extended closures, fish migrating to the Sacramento via the lower San Joaquin and Mokelumne rivers presumably use Georgiana Slough as a migration route. Under the frequent opening and closing being contemplated if tidal or diurnal operation of the DCC proves feasible to minimize the diversion of downstream migrants, more adult fish could be attracted to the DCC and delays in upstream migration could occur. Such delays could be harmful for salmon, particularly if they last longer than 24 hours, and particularly for fall run salmon, which spawn soon after completing their migration to the spawning grounds.

Proposed studies- Pilot studies will be initiated this fall both to gain insight into whether existing operations of the DCC delay upstream migrant salmon and into how many salmon migrate via the DCC. The densities of fish will be monitored by hydroacoustic surveys in the DCC, Georgiana Slough and the Sacramento River. Species, size and numbers will also be monitored by fyke netting in the DCC and Georgiana Slough to provide “ground truth” information for evaluating hydroacoustic results. In the DCC, monitoring would take place prior to closures, during closures and immediately after reopening.

In addition, the fall of 2000 "Adult San Joaquin River Chinook Salmon Telemetry Study" will be extended to cover this area. Up to eight additional fixed telemetry stations, and, if possible, extended mobile survey routes will be considered for this investigation. In addition, consideration will be given to tagging additional salmon, if resources permit.

Follow-up studies would be implemented based on analysis of this fall's studies, and they will include similar studies with other fish species known to migrate via the DCC.

5. Would reducing flow in the Sacramento River below the DCC by up to 4,000 cfs during the time when the DCC is now closed by regulatory restrictions reduce the survival of juvenile salmon or striped bass eggs and larvae?

As described under Questions 8 and 9 below, evidence for reduced survival associated with flow reductions in the Sacramento River exists. While Questions 8 and 9 relate to prospective changes in a different reach of the river, Question 5 relates to conditions regularly experienced between construction of the DCC in 1952 and the recent imposition of restrictions to protect fish.

Proposed studies- Analyze existing data for salmon and striped bass survival and present a report to CALFED Management by March 31, 2001. If CALFED Management considers the results insufficient for the 2003 decision, conduct additional salmon tagging studies and/or striped bass egg and larvae survival studies in 2002 and 2003.

QUESTIONS PERTAINING TO A THROUGH DELTA FACILITY

6. Under what conditions would a TDF improve WQ in the delta? At what seasons and under what flow regimes would a TDF provide measurable benefits? Under the historical pattern of 73 years of hydrology, how often would a TDF prove useful and how long would its period of effectiveness usually be?

When river flows are high and/or exports from the Delta are low, diversions through a TDF may not be necessary for water quality and supply purposes. The frequency of use of a TDF for those purposes will be determined by a combination of natural hydrography and regulatory requirements. The significance from a fishery standpoint is potential adverse effects on fish may be avoided if the TDF is not needed at specific times.

Proposed studies- Standard water project operations and water quality studies will be run and analyzed in conjunction with historical data, to estimate when the TDF can be used for water supply and quality purposes, assuming current supply and regulatory conditions. These preliminary studies will be conducted first. If the study results indicate that certain potential adverse effects on fish can be avoided, policy commitment will be sought to avoid adverse effects through selective operation of the TDF. In that event, some subsequent studies could be reduced in scope. Results from these studies will then be used to refine operation

rules as necessary in a new round of analyses. Absent such commitment, the following studies would proceed with a broader scope.

7. **What water quality improvement would be achieved in the central and south Delta with the TDF? What water quality changes would result in the Sacramento River?**

   Depending on river flow conditions, tidal conditions, quantity of exports and operation of the DCC, use of the TDF would help improve water quality conditions in the central and south Delta. The answers to question 6 will identify when the TDF's use would be proposed. This information will be used to define modeling studies to evaluate the water quality changes resulting from the TDF.

   Proposed studies- Standard water project operations studies will be run to evaluate the degree of water quality improvement in the central and south Delta that can be achieved with the TDF, and any resulting changes in the Sacramento River. These studies will include evaluation of a variety of flow and salinity regimes, and bookend evaluations of TDF operations scenarios to maximize water quality benefits.

8. **Would reducing flow in the Sacramento River between the intake of the TDF and the DCC by up to 4,000 cfs affect the survival of downstream migrant salmon? If both the DCC and TDF diverted water simultaneously, would flow reductions below the DCC affect salmon survival incrementally?**

   Tagging studies suggest that reduced flows in the Sacramento River reduce salmon survival, but the evidence is not definitive. One analytical complication is that survival varies with the route taken, and the proportion of salmon taking different routes has not been measured. These specific questions can not be answered fully and directly without constructing the TDF. A partial answer could be gained by measuring survival only from Hood, as a surrogate for the TDF's intake location, to the DCC and to Steamboat Slough near the Ryer Island Ferry by releasing marked salmon at Hood and measuring survival to the DCC and near the Ryer Island ferry.

   Proposed Studies- Analyze existing data by March 31, 2001, assuming salmon split in proportion to flow and that survival is linear in each reach. If CALFED management considers results insufficient for the 2003 decision, conduct additional tagging studies in 2002 and 2003, with flows for respective release groups differing by 4,000 cfs, and survival being measured to both Chipps Island, the DCC and the Ryer Island ferry, and perhaps to Benicia. The release location for any such studies would be selected based on current thinking about potential locations for the TDF (see questions 16 and 17).

9. Would reducing flows in the Sacramento River from the intake of the TDF and DCC by up to 4,000 cfs affect the survival of striped bass eggs? If both the DCC and TDF were used, would the additional reduction of up to 4,000 cfs below the DCC have an incremental effect on survival of eggs and larvae?

These questions can be examined only by measuring survival of eggs and larvae all the way from the TDF intake location to at least Rio Vista, because the hypothesized mechanism involves the cumulative effect of transport time to traditional feeding areas. The question of what Sacramento River flows are needed to suspend and successfully transport striped bass eggs and larvae downstream has been investigated. Diverting 4000 cfs near Hood, for example, instead of at the DCC would add about 12 miles to the length of river channel where flows would be lower by that amount. Diverting through both the DCC and TDF would reduce flows over the whole reach.

Proposed Action- Review existing information by March 31, 2001. The CVPIA b(2) Fish Team examined some of the available information in 1997. If CALFED management considers existing information insufficient for 2003 decision, conduct additional studies in 2002 and 2003, with flows in the Sacramento River reach downstream from the prospective TDF intake location differing by 4,000 cfs. Particle tracking model studies would estimate transport rates under different flows to provide insight into the likelihood of significant effects of varying flow by up to 4,000 cfs.

10. How would injection of flows up to 4,000 cfs into the Mokelumne River system upstream of the DCC affect the ecology?

Conceptually, two different facility options exist. The TDF might terminate in Snodgrass Slough, thus transforming that dead-end, tidal aquatic ecosystem into a conveyance channel for 4000 cfs of Sacramento River water. This would be of some concern, since the slough as it exists is typical of the shallow water aquatic habitat CALFED calls for increasing as habitat for resident fish species. The primary ecological parameter to be addressed is potential changes in the composition and abundance of fish populations. If changes were predicted, the underlying ecological causes would be evaluated.

On the other hand, this option would essentially eliminate changes in the Mokelumne River, as Snodgrass Slough enters the Mokelumne very near the junction with the Delta Cross Channel.

The other option would be to construct a new channel from the Sacramento River diversion point all the way to the Mokelumne River. This option would avoid changes in Snodgrass Slough, except for those associated with configurations of the new channel that might cross Snodgrass Slough. That would avoid changes in

the ecology of Snodgrass Slough. This option would cause seasonal flow changes in the Mokelumne, but the flow increases are within the range now occurring in high flow periods. The resulting higher flows during low flow periods, however, could have significant effects. A question would be whether attracting Sacramento River bound fish farther up the Mokelumne before providing them with a route back to the Sacramento River would cause greater disruption for the fish in either system. Another question would be whether a new channel would cause a distribution of salmon outmigrants from the Mokelumne into the North and South Forks of the Mokelumne different from that associated with the Snodgrass Slough or DCC options, and whether that in turn affected their survival.

Proposed Studies- To understand how discharging large volumes of water into Snodgrass Slough or the Mokelumne will change the fish populations, the existing populations in Snodgrass Slough and the Mokelumne could be compared to populations in other areas of the Delta where flows are similar to projected future flows in Snodgrass and the Mokelumne. DFG Delta electrofishing surveys have sampled the fish fauna in Snodgrass Slough and elsewhere throughout the Delta. Physical habitat conditions at all sampling locations have been described in general terms. The existing information will be examined by March 31, 2001, and if CALFED management considers existing information insufficient for the 2003 decision, additional fish fauna and comparative habitat studies will be conducted in 2002 and 2003. (Potential effects on upstream migrants would be considered under Question 11.)

11. How many individual fish of each species would attempt to migrate upstream through the TDF?

Presumably, if only one or the other of the DCC and TDF were being used, the number of fish migrating via this route would be the same as the number currently migrating via the DCC, since downstream of the DCC-Mokelumne junction both the flows and the mix of Sacramento and Mokelumne river waters would be the same. The number of current migrants has not been measured, and the consequences would be potentially much more serious, as the new channel would be screened making upstream migration impossible without special design and operating provisions.

Clearly, the best approach is to conduct studies to estimate how many fish currently migrate via the DCC.

An alternative would be to make an estimate of probable maximum numbers by estimating the fraction of the Sacramento River water which would be diverted under various conditions and assume that the fraction of fish following that route would not be greater than that.

If both the DCC and TDF were being used, the flow of Sacramento River water in the Mokelumne below the junction with the DCC would be greater than now and the number of migrants attracted to this route would likely be greater.

Proposed Studies- The studies proposed for Question 4 would provide the information needed for this question for operation of either the DCC or TDF. The projection of effects for the combined operation of the DCC and TDF would require assumptions about the probable magnitude of additional migrants.

12. Would the TDF increase straying of salmon? If so, what management measures would be appropriate?

Straying in this context is defined as adult fish returning to some stream other than the stream where they originated. Some straying of upstream migrants undoubtedly occurs, but it is probably neither measurable nor manageable. The area of origin is generally not identifiable for upstream migrant fall run salmon captured and tagged in the Delta. Their home stream is generally identified by where they go. If we were able to identify that a fish had strayed, what management measure would be available to get it to the appropriate stream? Given that far larger numbers of salmon originate in the Sacramento River system than in the Mokelumne or San Joaquin rivers, and that the ability of salmon to return to the Sacramento once they have entered the San Joaquin/ Mokelumne portion of the Delta is sometimes restricted by operation of the DCC, more salmon likely stray away from the Sacramento than stray toward the Sacramento.

Straying of other runs is probably more subject to study, as essentially all of the other runs originate in the Sacramento system. Hence their appearance elsewhere would be evidence of straying. Such straying would be of considerable concern because of the relative scarcity of those runs.

Another important consideration is that, except for options involving simultaneous operation of the DCC and TDF, the number straying is not likely to change significantly from the number straying now, particularly if the TDF were to be routed through Snodgrass Slough.

Proposed Studies- Some information on straying exists for salmon originating in the Mokelumne River. Evaluation of this question will be limited to the analysis of those data, and to any information obtained incidental to the tagging studies described for Question 4 to enumerate the number of upstream migrants.

13. How many individual fish of each species would be susceptible to diversion into the TDF, and would their cross-sectional distribution in the river affect fish screening decisions?

Past studies have defined the out-migration patterns, so we know which species are present, the approximate seasonal distribution of each species and run, and when they are most abundant. Those studies also provided information on differences in cross-sectional distribution, but the conclusion was that it is not realistic to minimize entrainment through intake design when diverting substantial amounts of water. If the TDF were to be divided into several small diversions, diversion location might be a significant consideration in minimizing exposure of fish to the diversion.

Proposed studies- Re-evaluate existing information (Schaffter 1980; other reports; and studies at the DCC this fall) by December 2000 and present CALFED management with a recommendation as to which species need to be accommodated in design of the screens for a TDF. Collect more data on species occurrence, timing, and distribution within the channel in 2001-2003 only if CALFED Management concludes that available information is insufficient for supporting a decision.

14. Would operation of the TDF and DCC cause ecological changes in the lower San Joaquin River?

The diversion of water from the Sacramento River into the Mokelumne River increases the amount of water discharged into the San Joaquin River in the Central Delta. One result is increased flow in the San Joaquin System below the Mokelumne River. The magnitude of that flow, sometimes called Q-West, has been hypothesized to influence the distribution and survival of a number of fish species, including salmon, striped bass and delta smelt. The normal operational experience when most such hypotheses were developed included diversions through the DCC. Continued diversions through the DCC or the TDF would continue that experience, but the simultaneous operation of the DCC and TDF, would increase lower San Joaquin River flows by up to 4,000 cfs in relation to historical conditions.

Proposed Studies- Summarize existing information about the effects on fish production of flows in the lower San Joaquin River and identify the information which will be gathered by other ongoing studies during the next three years. Present that information along with any recommendations for additional studies to CALFED Management by March 31, 2001. Conduct any approved studies in 2002 and 2003.

15. Would any water quality differences caused by diverting water through the TDF as opposed to, or in addition to, the DCC affect fish abundance?

Under the assumption that only the DCC or the TDF would be used at any given time, the study largely involves a question of the route Sacramento River water follows in getting from the Sacramento River to the junction of the DCC and the

Mokelumne River. Hence the amount of water and water characteristics downstream of that junction should be affected little. Considering the similar water quality in the Sacramento and Mokelumne rivers, water quality upstream of the junction would also seem to have little probability of changing significantly. The most likely characteristic to change may be water temperature, due to differences in transport rate and water volumes.

Under an assumption that both the DCC and TDF would be used simultaneously, effects downstream of the Mokelumne-DCC junction would have to be estimated.

Proposed Studies- Run water quality and water temperature models to examine in a limited fashion the seasonal range in expected conditions, including water temperature. If the initial model results indicate significant effects are likely, do more extensive evaluations. One specific question that will need to be considered is effects on productivity. Both the Sacramento and Mokelumne rivers tend to be less productive than the Delta for lower levels of the food web, so the simultaneous operation of the DCC and TDF would spread low productivity water farther into the Delta.

16. How should the fish facility system for a TDF be constructed to facilitate the upstream passage of fish, and how successful will that approach be?

The fish facility constructed at the intake to a TDF will need a feature that is unique in relation to other fish facilities constructed in the Delta. Namely, some adult fish migrating upstream in the in the Mokelumne system will attempt to migrate upstream through the TDF to the Sacramento River. Most such fish will be of Sacramento River origin, and they will have to be passed through the fish facility system into the Sacramento River.

The magnitude of this problem will be defined in answering Question 11.

There is no proven technology for dealing with this problem, so appropriate evaluations are a necessary part of this program.

Proposed Studies- Somewhat similar upstream passage problems currently exist in the Yolo Bypass when fish encounter the Fremont Weir and at the Sacramento Deep Water Ship Channel when they encounter the lock at the head of the channel. As part of the DCCTDF Program, biological and engineering work will be carried out to solve fish passage problems at those two locations.

The work will include fisheries sampling at both locations to determine the number and kind of fish involved, searches of the literature and contact with experts to identify the best solutions, gathering basic engineering information, design and testing of a pilot scale test model for Fremont Weir and designing a preferred solution for the Ship Channel. Laboratory or scale model testing of

swimming ability of certain fishes and response to specific passage facility designs may also be needed.

The goal will be to have a pilot scale model tested for Freemont Weir and a preferred solution for the Ship Channel developed by the 2003 deadline.

17. What is the best design for a fish facility at the intake to a TDF, and how effective can we expect it to be?

As defined in answering Question 13, many fish migrating down the Sacramento River will be susceptible to diversion into a TDF. Considerable experience exists in this system and elsewhere as to how to design and operate fish facilities to protect such fish. The DCCTDF Program has been planned based on a conclusion accepted by CALFED management that no additional studies are needed to design facilities to protect downstream migrants. The information on upstream migrants provided in answering Question 1 will have to be integrated with the information on downstream migrants in designing the fish facility system for a TDF.

Proposed Program- An interagency fish facility planning team will be established to prepare a preliminary design for fish facilities at the intake to a TDF by the 2003 deadline. This effort will be coordinated appropriately with other ongoing fish facility planning work. The design will satisfy requirements of the NMFS, FWS and CDF&G. The Team will consider intakes of various sizes and locations and integrate biological and engineering needs. Guidance will be sought from a panel of experts from outside the CALFED agencies.

QUESTIONS PERTAINING TO THE OVERALL EVALUATION OF INFORMATION

18. How do the water quality effects identified in response to Questions 1-15 above compare to existing effects of DCC operations on water quality?

The objective of this question is to interpret the water quality related results of Questions 1-15 above in relation to operations under existing regulatory constraints and physical facilities. The answers will consider the natural hydrologic variability occurring in the Delta.

Proposed Action- During preparation of the decision document in 2003, staff will consider the information generated during studies for this project and information generated during implementation of other CALFED programs to provide the best possible answers to these questions. The current efforts to define baseline water quality conditions by linking historical water quality trend analysis

with water quality modeling analysis will be considered in answering these questions.

19. How do any aquatic resources effects identified in response to Questions 1-17 above compare to existing effects of DCC operations on aquatic resources? How could any identified adverse effects be mitigated?

These questions will be addressed both in terms of immediate effects on organisms and effects on populations of adults. Important limitations occur because quantitative effects on populations are very difficult to measure or predict and even relative effects are difficult to estimate when comparing management measures targeting different aspects of a species' life history. Nevertheless, decision makers will want the best possible judgments as to such answers.

Proposed Action- During preparation of the decision document in 2003, staff will consider the information gathered during studies for this project to provide the best possible answers to these questions. One important aspect of this evaluation will be the status of conceptual models to be developed for the various species in other portions of the CALFED program.

20. How do the effects identified in response to Questions 1-17 above compare to effects of other CALFED programs?

Other CALFED programs implemented in the next three years will also affect water quality, water supply and fishery resources. For example, the Environmental Water Account, South Delta improvements, ERP Environmental Water Program water purchases upstream of the Delta, and in-Delta storage may have such effects. It is reasonable to expect that the individuals making the DCCTDF decision in 2003 will want to be informed of any such effects which have already occurred or are projected to occur as a result of actions and decisions by other programs.

Proposed Action: During preparation of the decision document in 2003, staff will describe such effects as well as can be done with existing information. Most such effects will be projections, because program implementation will not have proceeded to the point where very many effects will actually have been measured.