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Subject: Review comments on draft descriptions of CALFED action categories.

Briefly outlined below are my technical comments on each of the 19 CALFED action descriptions provided in your October 6, 1995 letter.

Restoration of Delta Shallow Water Habitat

Shallow water habitat has also been lost as a result of shoreline filling for urban and industrial use and as a result of channelization and levee construction associated with water supply deliveries and flood control. The statement that restoration of shallow water habitat will improve survival and production of native fish species overstates a conclusion which cannot be drawn purely from the available scientific data. Although shallow water habitat is utilized by a number of introduced and native fishes I am not aware of any specific data documenting the fact that shallow water habitat is a limiting resource for these populations. Restoration of shallow water habitat is one action which may in combination with other actions, serve to increase carrying capacity and production of various species of fish.

The rationale behind the statement that, "converting Delta islands into shallow water habitat would require large quantities of fill material" is unclear. Islands such as Big Break, Franks Tract, and Sherman Lake provide habitat for a variety of fish over a range of water depths with no additional filling. Substantial quantities of fill material would be required if deep water habitat was converted to shallow water habitat. Many of the existing island areas, if flooded, would provide water depths ranging from approximately 1-10 feet depending on topographic contours. There are no established design criteria which indicate that a specific water depth (e.g., less than three feet) would be necessary to provide suitable habitat.

Additional constraints associated with the creation of large scale areas of shallow water habitat include alteration of existing hydraulic flow patterns within the Delta, a potential increase in salt water intrusion and a change in the present balance between salt water and fresh water required to maintain salinity regimes, modification of the conveyance capacity of internal Delta channels to provide water supplies to the State and Federal Water Project and other diversions, and the creation of areas which may have reduced circulation which adversely affects flushing and water quality which may impact habitat suitability for target organisms. In addition, creation of large shallow-water habitat areas may contribute to a change in the balance of predator-prey relationships with an increase in susceptibility of migrating species such as juvenile chinook salmon to increased predation by species such as largemouth bass.

A potential benefit of the creation of shallow-water habitat which is not mentioned is an increase in residence time which may improve both primary and secondary production within the system. The notion, however, that "reduce flow velocities to provide high-quality spawning and rearing habitat for resident fish species", is overly simplistic.

In general, there has been considerable enthusiasm expressed by many parties regarding the biological benefits which could be derived from the creation of additional shallow water habitat. While many of these potential benefits are real there are significant issues to be addressed regarding the location and design characteristics of shallow water habitat which provide various benefits to fisheries resources. In addition, there is very little information available on habitat utilization of these areas which would help support a detailed assessment of the potential benefits which would be gained through the creation of shallow water habitat at various locations. The write up could be modified to include a brief discussion regarding the uncertainties and additional requirements for assessing potential biological benefits and design criteria associated with shallow water habitat creation.

Restoration of Delta Riverene Habitat

The benefits of Delta riverene habitat restoration focus on increasing the quantity and enhancing the quantity of habitat for resident fishes, other organisms, and wildlife. One of the principal benefits that may be achieved would be in providing temporary habitat for the juvenile life stages of several anadromous species. Chinook salmon fry are known to rear in the riverene areas along with other species such as Sacramento splittail, and striped bass. Restoration of Delta riverene habitat would contribute to a greater diversity of habitat types than is currently available (e.g., reduction in riprap habitat) which would improve holding and foraging areas for a number of species. Modifications to riverene habitat may also, however, modify basic predator-prey relationships leading to an increase in the abundance of predatory species such as largemouth bass, striped bass, and squawfish.

Constraints on riverene habitat restoration would include modifications to the existing channel and levee configuration to include a larger areas of shallow water edge habitat and increased riparian vegetation. Modifications to riverene habitat would impact flood control carrying capacity, channel conveyance to export facilities, and increase the time and cost required for levee maintenance and repair. Restoration of levee areas may also result in increased levee failures as a result of burrowing wildlife and undetected erosion.

The statement that restoration of Delta riverene habitat can be combined with increased flood protection should be expanded. In general, a number of flood control staff have argued that increases in riparian vegetation and emergent aquatic vegetation decrease channel capacity for flood control thereby creating an adverse impact rather than increased flood protection.

The statement that increases in fish populations resulting from habitat improvements can reduce conflicts between water exports and Endangered Species Act requirements should be expanded. There has been concern expressed regarding the development of habitat in areas adjacent to water projects based on the fear that populations of the threatened or endangered species may increase locally and thereby increase their susceptibility to diversion losses and result in increased constraints on incidental take. The statement as written is true if the creation of additional habitat was sufficient to restore protected species and contribute to delisting. Also, I am not aware of any specific information that would clearly demonstrate that increases in Delta riverene habitat would contribute to a detectable increase in either Delta smelt populations or winter-run chinook salmon populations, the two species currently protected by the Endangered Species Act. The statement appears to be overly simplistic and should be modified to provide a more balanced view of the potential benefits achieved through this action.

Restoration of Delta Riparian Habitat

The statement that restoration of Delta riparian habitat may provide protection of existing levees against erosion seems to be in conflict with current practices. Individuals involved in levee maintenance and repair argue that increased riparian vegetation contributes to levee problems, and hence a program of vegetation control, rather than providing increased protection of levees. It should also be noted that riparian habitat provides an additional source of insects and vegetative material which become part of the energy budget for the Delta and may ultimately contribute to an increase in overall productivity of the system through energy and nutrient input. Riparian vegetation also provides areas having undercut banks and exposed rootballs which may provide protection and forage areas and may contribute to large woody debris which increases habitat diversity, provides holding areas, and provides forage areas for many species. The overall benefits of increased riparian vegetation for various fish species has not been determined.

Additional constraints with regard to increased riparian habitat include an increased demand for removal of large floating material (e.g., trees and limbs) which may adversely affect navigation and recreational boater use. Depending on the area, increased riparian vegetation may also alter hydraulic characteristics of various channels and thereby influence either the flood control capacity and/or their conveyance capacity for providing water supplies.

The discussion of linkages to other CALFED action categories is not always clear. The previous two habitat discussions did not mention land fallowing as one of the linkages. In addition, a number of the linkages may prove to be complimentary to the proposed action while other linkages may indicate conflicts among actions. The text does not distinguish between these two types of linkages. It should also be noted that throughout several of the habitat discussions, statements are made regarding the value of the proposed actions for increasing the quality and quantity of riverene and shallow water habitat. Although this may be true, the text does not appear to provide a consistently balanced discussion of the action by pointing out either a number of the constraints to implementation, potential conflicts with other objectives, or the uncertainties inherent in either the costs or benefits of the proposed action.

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Restoration of Delta Wetland Habitat

The threatened and endangered species that would be benefited directly by an increase in Delta wetland habitat availability should be identified (I presume that these represent a range of both plant and animal species). The statement that establishing wetlands on the interiors of below-sea-level Delta islands can also reduce the rate of island subsistence appears to be incomplete. Although the statement is true, it should be noted that this would represent a significant change in land use practices and thereby may have other economic, social, or environmental effects.

Mention should be made under constraints that there is very little practical experience in developing and managing wetlands within the Delta which can be used as a model for predicting either the costs or benefits of such an action. Furthermore, it should be noted that depending on the location of the wetland, annual variation in salinity and other water quality parameters may affect the types of vegetation which can be sustained and the associated habitat value. Managed wetlands may require controls on water supply (e.g., pumps, interior levees, check gates, etc.) which become part of the annual operating costs of such an action. I also question the availability of suitable areas which currently exist within the Delta and could be readily converted to shallow-water wetlands. Many of the existing Delta islands would appear to be too deep to support the creation of wetland habitat without either extensive filling which may be extremely expensive and/or water control structures for the filling and draining of areas. The design of wetland areas and their location and operations would significantly affect habitat value for a variety of species and therefore the resulting biological benefits of such an action. I have also heard concerns expressed regarding the impacts of additional wetland habitat on municipal water quality (e.g., the creation of THM's) and other water quality issues which need to be addressed as part of the balanced discussion of this action alternative.

Restoration of Upstream Anadromous Fish Habitat

The description of upstream restoration actions is so broad and so general that it would be difficult to identify what actions this alternative is really addressing. In addition to the actions listed there is certainly emphasis on water quality, with specific attention to dissolved oxygen and water temperature conditions, that influence the suitability of upstream habitat for salmonids and the broader issue of land use practices as they relate to such activities as agricultural development, livestock grazing, forest management, and urban development.

The benefits to be derived from upstream habitat improvements depend on the extent to which various habitat parameters, hatchery management, and legal and illegal harvest are limiting or controlling factors determining population dynamics. For example, putting additional spawning gravel into a tributary, although increasing habitat availability, may not result in an increase in production if spawning gravel in that particular area is not limiting. All of the actions identified have the potential to benefit anadromous fish populations, however the benefits cannot be determined without additional information regarding the specific characteristics of the action and the specific environmental conditions within which they would be implemented.

It is not clear how increasing instream flows may increase the risk of flooding in rivers and tributaries; to the contrary many have argued that increasing instream flows would impact reservoir storage and water supplies, but would create additional drawdown and therefore flood control storage capacity which would seem to reduce the risk of flooding on most systems. There are also a number of costs and other constraints associated with restoration of upstream habitat which have not been mentioned as part of this discussion.

The discussion regarding the linkages among upstream habitat restoration and other CALFED actions does not appear to contribute to the understanding of the context within which this specific action alternative should be evaluated. Given the broad and general nature of the description it would be difficult to assess, at this level of consideration, how these actions would be liked to other proposed actions or the implications of potential synergistic benefits or conflicts among various alternatives. Limiting the discussion of these action options to a one-page narrative necessitates such a general treatment of the action alternative that it would be difficult to assess the value or merit of an action.

Restoration of Upstream Riparian Habitat

Are data available which support the inclusion of flow modification as part of the action in support of riparian vegetation? What are the changes in flows (e.g., seasonal timing and/or magnitude) that have impacted riparian vegetation and would be required to be modified as part of this alternative?

Some of the other constraints associated with upstream riparian habitat would include, but not be limited to, impacts on levee maintenance and repair, alteration of channel hydraulics and flood control capacity, increased evapotranspiration, and increased requirements for channel maintenance. Focusing the impact of increased instream flows on reductions in water diversions <u>such as agricultural irrigation</u> should be expanded to include a discussion of impacts on water supply and reliability for not only agricultural usage, but also municipal supplies.

Restoration of Upstream Wetland Habitat

Recent data have indicated that Sacramento splittail adults forage in flooded "wetland" areas along the Sacramento and San Joaquin rivers and that these areas may provide important spawning and juvenile rearing habitat which should be identified as a benefit of this alternative. In addition, the creation of new shallow water wetland habitat in the upstream areas would increase habitat diversity and potentially promote greater primary and secondary production.

Has any estimate of the available area which could potentially be modified to provide shallow-water wetland water habitat in upstream areas been developed? My experience in many of the areas upstream is that river channels have been modified through levee construction and very little area remains available for easy development as wetland habitat. If this assessment is true then major cost constraints would be incurred through levee setback programs which would require the construction of new levees, the relocation of existing roads and infrastructure, and the removal of lands from their existing land-use

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practices. It would appear that other than for a limited number of areas the potential costs and associated adverse impacts with such an alternative may be extremely large. These types of potential conflicts should be identified, to the extent possible, to allow a more balanced discussion of the pros and cons of a particular action alternative. Again, the specific benefits and/or costs will depend on the location and characteristics of the action actually being proposed.

Threatened and Endangered Species Recovery

Winter-run chinook salmon should be specifically identified as one of the aquatic species currently listed under the Endangered Species Act. I would not list, as actions to recover endangered species, gathering comprehensive data on their occurrence, habitat requirements, and life histories nor monitoring populations. These types of actions are aimed at assessing the status of the population and/or developing additional information which can be used as a foundation for developing specific management actions, but are in and of themselves not actions which contribute directly to species recovery.

The discussion of threatened and endangered species recovery is so general that it is difficult to assess this as an action alternative in the context of CALFED. It would seem more appropriate to discuss the various actions which are included as part of other alternatives within the context of species recovery while not identifying species recovery as a separate action item. If species recovery is retained as an action alternative then it would seem appropriate that the CALFED list of actions include consideration of each of the recovery elements identified in recovery plans for winter-run salmon, Delta smelt and other native species, in addition to all of the other recovery plans developed for listed plant and animal species that inhabit the Delta and upstream river systems. For example, recovery plans have identified actions to reduce or minimize the influence of abandoned mines on water quality and fisheries populations within the Sacramento and San Joaquin river systems. Is the control of mine runoff identified as an action option within the CALFED context? If not, how would this action option differ from other actions which are included such as upstream riparian habitat restoration? There are many other examples of proposed actions throughout the system that are not included or discussed as part of the material provided for review.

Establishment of Integrated Habitat Management Programs

Although I agree that a more comprehensive and integrated habitat management program for the Delta and upstream areas would improve the coordination among agencies and the overall efficiency of the planning actions being taken, I have serious reservations as to whether such an effort could actually be accomplished. It has been difficult for multiple agencies to agree on integrated plans for relatively small areas and focus projects. It would appear to be an institutional challenge to develop a consensus on the overall management and direction of an area as broad as the Bay-Delta system with potential conflicting management objectives, priorities, and resource needs.

Acquisition of Long-Term Water Supplies for Fish and Wildlife

Although I don't disagree with the discussion presented on long-term water supplies, I am concerned about the cost of such supplies and the associated lost opportunities for implementing other management actions as a result of a financial commitment to a water supply contract. Water supply contracts are a viable option for improving instream flows and water temperature conditions in relatively small tributaries and/or for limited seasonal periods within the year. I have doubts regarding the economic viability of purchasing a sufficient quantity of water to have a significant effect on Delta outflow or a major pulsed flow event on either the Sacramento or San Joaquin rivers.

The option could be modified to include a consideration of purchasing options to effect the timing of water supply deliveries which may be scheduled for other purposes (e.g., paying for the opportunity to affect the timing of water supply deliveries which would be made for other purposes such as contractual water transfers) or to purchase a relatively small amount of water which could be used to augment flow releases made for other purposes. Additional consideration should also be given to the option of contracting with diverters to modify their seasonal schedule of diversions and/or forego diversions through land fallowing.

Delta Inflow/Outflow/Export Management

Serious reservations have been expressed among a number of parties regarding the concept of establishing a formal Delta watermaster to manage Delta inflow/outflow/exports as suggested by the text.. Furthermore, the CALFED OPS group has the discretion to modify Delta operations under the principle that the modifications result in no net water loss (e.g., a reduction in exports for fisheries would be compensated through an increase in exports at some other date as part of the overall no net loss balancing).

The discussion implies that water allocations within the Delta are not currently being carefully managed. There are undoubtedly additional habitat benefits and water quality benefits that could be derived through alternative management decisions and scenarios. However, it is not clear from the text what this specific action alternative would entail. What specifically is this alternative and what does it mean in context with the existing efforts by USBR, DWR, and others to manage Delta flows in accordance with terms and conditions of State Board decisions which are based, in part, on a balancing of competing demands between fisheries and water supply?

Fish Passage and Migration Improvement

The discussion of fish passage and migration improvements is so general, given the diversity of issues on the Sacramento River and its tributaries, the Mokelumne River, and the San Joaquin River systems that its difficult to interpret the scope and substance of this alternative. The discussion notes the importance of flows in providing passage and migration which would need to be evaluated in context with a variety of other parameters including instream flow requirements, impacts on reservoir storage, and associated impacts on water temperature conditions.

The reference to instream storage under the discussion of the linkage to other CALFED action categories is unclear. Discussion regarding adaptive management as it relates to fish passage and migration improvements is also unclear.

There is no discussion among the various alternatives to help a decision-maker prioritize the relative importance of various problems and the associated action. For example, is fish passage and migration improvement a more or less significant problem than upstream wetland habitat improvements? Decision makers will ultimately need to develop an understanding of the relative importance of the various problems and actions which would be appropriate for addressing those issues. Then consideration of constraints would need to be given to the options to determine their ultimate priority within the overall scheme of this decision-making process. The discussions that are presented in these papers, as a result of their brevity and superficial nature, do not provide a sufficient level of information for making these determinations or understanding the scope and substance of the proposed actions.

Changes in Locations of Diversions

This concept has been discussed over a number of years and field data have recently been compiled on the size and location of various diversions within the Delta and upstream areas (CDFandG) and on entrainment losses at several agricultural diversion sites (DWR). It has been estimated that there are over 2,000 diversions within the Delta and tributaries and that, as a result of irrigation patterns, many of these diversions operate during key months when larval and early juvenile stages of many sensitive species are present. A number of constraints have been identified regarding both the costs and potential biological effectiveness of diversion relocations. There has also been extensive discussion regarding impacts on water supply deliveries of a relocation of the State Water Project diversion from Clifton Court Forebay to Italian Slough which are not mentioned in this description. There have also been discussions regarding the potential costs and benefits of consolidation of various agricultural diversions currently operating within the Delta. Additional detail needs to be provided to assess the merits and potential benefits and costs associated with this action option.

Increased Diversion Capacity

It is my understanding that the State Water Project has the capacity to increase diversions seasonally which exceeds the existing Corps of Engineers permit limitations. Increased diversion capacity offers the opportunity to reduce diversions at other times of the year which may be more biologically sensitive and to take advantage of surplus Delta flows within the context of the no-net water loss principle. Increased diversion capacity, however, may result in increased channel scour, increase fish losses for some species, and may be in conflict with other alternatives discussed including those that modify Delta channel hydraulic characteristics and capacity in an effort to improve aquatic habitat.

A variation which is not discussed would be to coordinate diversion operations between the State and Federal Water Projects to increase the overall diversion capacity of the two projects combined, through preferential operation designed to reduce fish entrainment and other adverse effects. Operational constraints which would otherwise impact project water supplies may then be minimized or avoided allowing, in effect, an increase in diversion capacity over what would have otherwise been allowed under independent standard operating procedures.

Fish Screens

Virtually none of the available intake screening technologies are capable of effectively excluding fish eggs and larvae, which would otherwise be entrained at various water diversions, with high survival. The majority of fisheries losses at unscreened diversions, particularly smaller agricultural siphons located throughout the Delta, appear to be primarily associated with the entrainment of early life stages of fish species. Larger juveniles which have greater swimming performance capability may be able to effectively avoid the velocity fields associated with these small intakes. To the extent that the primary source of fisheries losses is focused on entrainment of fish eggs and larvae additional screening, particularly of the large number of small diversions, may provide less benefit than would be apparent based on only a cursory examination of the issue. Intake screens at larger facilities can be effective in reducing losses of juvenile fish. The statement of purpose may be overly optimistic, in the absence of any more rigorous analysis, concluding that installing or improving fish screens will, "greatly reduce losses at vulnerable life-stages".

The topic of fish screening within the Delta has received considerable attention and analysis by water diverters and resource agency personnel. Variation exists among locations for various diversions, the seasonal timing of diversions, the magnitude of diversions, the location of the diversion within the water column, and a variety of other factors which influence the vulnerability of fish species to losses. The effectiveness of various fish screens is also dependent upon a number of operational factors, environmental conditions, and the particular species and life stages of fish to be protected. In addition, there is considerable concern regarding high detrital loads which occur periodically within the Delta, the influence of complex hydrologic conditions associated with tidal movement, and a variety of other potential constraints which need to be taken into account when balancing costs and benefits associated with fish screening as an option. The discussion in this portion of the paper is superficial and does not reflect the variety of issues associated with this topic. The concept that fish screening installations and improvements should use an adaptive management strategy consisting of real-time monitoring is inconsistent with the overall concept of providing a physical positive barrier screen. Real-time monitoring is effective in reducing fisheries losses through operational changes such as short-term curtailments of diversion or seasonal reductions in diversion flows during periods when the greatest number of target species is susceptible to losses, but has very little if any implication with respect to positive barrier screen installation at diversion points.

Installation of Barriers to Fish Movement

A behavioral (acoustic) barrier is being considered for application at the confluence between Georgiana Slough and the Sacramento River as mentioned in the paper. This does not represent a location "where substantial flows are directed away from historical migratory pathways by export pumping". Georgiana Slough represents a natural channel whose hydraulic conditions are tidally induced and are independent

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of export pumping, and yet provides a pathway for juvenile chinook salmon to move into the central Delta where mortality rates appear to be higher. A similar situation exists at Three Mile Slough, and hence there appear to be conflicts between statements made with respect to the description of this alternative and the actual hydraulic and channel conditions occurring within several locations of the Delta.

The discussion regarding various barriers and the flexibility that their operations would allow in export pumping is too heavily weighted towards anadromous fish, presumably chinook salmon. In addition to concern regarding anadromous species there is considerable concern that the installation of barriers may actually alter hydraulic conditions within the central Delta thereby increasing the susceptibility of resident fish, including Delta smelt, to increased susceptibility to diversion losses. Predation associated with barriers is also a concern.

The concept of using adaptive management in conjunction with real-time monitoring for operation of behavioral barriers is unclear. Real-time monitoring has been proposed as one method to be used in modifying the operation of physical barriers such as closure of the Delta Cross-channel, however in most instances the application of behavioral barriers, such as the acoustic barrier at Georgiana Slough, would be independent of real-time biological monitoring since there are no water supply impacts associated with its operations. Real-time monitoring is primarily designed to maximize the efficiency of management actions, such as closure of the Delta Cross-channel, where a water supply impact is anticipated to occur.

The notion that operation and maintenance of behavioral barriers would be labor intensive and costly does not appear to be founded on actual operating data. There currently are no behavioral barriers operating on a long-term basis within the Delta system and hence, no data is available on potential operational or maintenance costs associated with these barriers. In addition, each behavioral barrier, for example and acoustic barrier or an electrical barrier, would have various operating and maintenance costs depending upon the specific characteristics of the site, the duration of operations, the design and construction at the time of installation and a variety of other factors. The statement appearing in the text appears to be both superficial and not founded on any specific analysis or fact. A comparative analysis of the capital, operating, and maintenance costs between behavioral and physical barriers is currently being prepared, but has not yet been made public.

Adaptive Management Strategies

The discussion of adaptive management strategies appears to be logical on a conceptual basis. The strategy has been used on a number of projects which have already been implemented within the Bay-Delta system. However, other than as a concept the write-up provides very little in the way of substance to describe how adoptive management strategies would be specifically applied to the broader Bay-Delta issues and specifically how such a phased program would be implemented and managed. In the absence of a more detailed analysis it is difficult to assess how the concept of adaptive management would be applied to various alternatives considered as part of this plan. Although I generally agree with the concept of adaptive management it appears that this represents a process for incrementally implementing various project elements and does not represent an action alternative in the same context as several of the other descriptions contained within this package.

Improvement of Fish Salvage Operations

There appears to be nothing new presented with respect to improvements of fish salvage operations of the SWP and CVP as part of this text. These concepts have been discussed and improvements have been made in fish salvage operations since the 1970's. It appears that this particular action alternative may be in conflict with other alternatives in the sense that developing a long-term solution to the Bay-Delta's resource problems may require relocation of the point of diversion rather than simply trying to improve salvage at the existing facilities. In addition, as pointed out in earlier discussions of these alternatives, this particular option does not provide any information regarding the potential magnitude of biological benefits associated with these actions to help evaluate alternatives on a broader priority scale. In general, it appears that modifications to improve fish salvage operations are likely to have relatively little incremental benefit to the variety of fish populations susceptible to salvage.

The concept that adaptive management strategies and real-time monitoring can be used to optimize salvage improvements over the long term is not clear. "Real-time monitoring" is currently part of salvage operations in that the frequency of returning fish to release locations is determined based on the numbers of fish which have been salvaged on a real-time basis. Adaptive management has been applied to the salvage operations for a number of years and incremental improvements have been made. How specifically would adaptive management and real-time monitoring, as proposed in this paper, differ from the process that is currently underway?

Predator Removal and Control

I am not aware of any data that's available to suggest that, "modifying habitat conditions to disfavor the predator species (e.g., higher flows during spring outmigration for species of concern)" represents an effective predator control strategy. The rationale and scientific basis for this conclusion should be documented as part of this write-up. Does predator management in this section refer to Clifton Court Forebay as suggested by the second sentence of the description, or is it a broader issue relevant to a variety of locations within the Bay-Delta system such as those occurring below the Red Bluff Diversion Dam, at the base of Woodbridge Dam, at numerous locations on the San Joaquin River, and elsewhere within the Bay-Delta system?

Based on the discussion of the purpose and constraints of the predator control and removal program it is not apparent that this is a very well developed concept as presented in the action item. In general, predator removal and control has not proven to be effective on large-scale systems such as the experimental removal program performed on the Columbia River or efforts to assess the predator population inhabiting Clifton Court Forebay and to make significant reductions in the predator population abundance. This represents another element of the action plan which has been discussed for years. It is not clear from the discussion what specific action is being proposed or how this would be accomplished. In addition a number of the earlier action items, as discussed in these comments, are likely to increase susceptibility of native fish to predation rather than reduce or control predation losses. Additional information is required on the magnitude of fisheries losses resulting from predation at various locations and the potential alternative management actions that could be implemented. The brief and cursory write-up presented as part of this section is insufficient to evaluate predator removal and control as a potential management action.

Conclusion

The range of action items which are included in the materials sent for review are incomplete in their inclusion of various alternatives which have been considered for improving conditions within the Bay-Delta system. A number of actions have been identified, and documented as part of the winter-run recovery program, the Delta smelt and native fish recovery program and various action plans including much of the material prepared originally for BDOC which are more inclusive and substantially more detailed than the information presented as part of these write-ups. The write-ups present a very superficial discussion of the potential benefits and costs and constraints associated with the various alternatives. It seemed to this reviewer as if a disproportionate amount of the available space (assuming that each element is restricted to one page only) was devoted to listing the various elements and linkages within the context of other alternative actions being discussed (this could be summarized in a single table for all options). In many of these lists, however, the action item was not included as part of the materials included in the review package (e.g., land fallowing). Although the exact context within which these action element descriptions will be used is unclear to this reviewer it appears that the alternatives considered are incomplete, the descriptions superficial, and any decision regarding proceeding with more detailed analyses would be based purely on the broad concept presented rather than any substantive discussion of the potential benefits and constraints associated with the option.

If you have any questions regarding these comments or would like additional information, please do not hesitate to call.

Sincerely,

Charles H. Hanson /by sgh

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