HANDOUT #6

PROCESS AND SCHEDULE FOR DEVELOPMENT OF THE COMPREHENSIVE BDCP CONSERVATION STRATEGY

DRAFT PROPOSAL 10.29.08

The BDCP Habitat, Other Stressors and Conveyance Working Groups have made substantial progress over the last six months in developing proposals for conservation measures. The challenge now, however, is to integrate all of these separate conservation measures into a comprehensive BDCP strategy. Analysis of the complex interaction between habitat restoration, water management, and other stressors reduction is necessary to not only assemble these measures into a comprehensive plan but also to establish a scientific basis for predicting how the BDCP will benefit covered species. The working groups have taken some initial steps at this analysis, but more focused, integrated analysis is necessary to develop a comprehensive BDCP strategy. We have organized these analytical needs into three broad tasks.

The first task entails detailed analysis of the links between actions to address limiting factors for species abundance, including habitat restoration, other stressors reduction measures, and water operations. The second task involves a continuation of water operations options exploration to evaluate a broad range of possible water operational scenarios for achieving BDCP goals. The third task involves the use of information gleaned from tasks 1 and 2 to develop a comprehensive conservation strategy for achieving the BDCP planning goals.

Task 1: Integrated analysis of habitat restoration, other stressor reduction measures, and water operations measures.

The purpose of the integrated analysis is to evaluate, and to the extent possible, quantify the role of habitat restoration and stressors reduction in achieving the BDCP planning goals.

Evaluate the interaction between habitat restoration, stressor reduction, and water operations. Focus the analysis on key stressors such as the discharge of toxics into the Delta and tributaries to the Delta such as ammonia, inadequate food supply, entrainment, predation, bi-directional flow and velocities in migration corridors, and exotic species colonization. *Target* the analysis on specific geographic areas and evaluate how habitat and/or stressor reduction measures can reduce the need for rigid water management controls on key variables such as the Hood Bypass flows or X2. Utilize hydrodynamic models and other analytical tools or methods to determine how stressor reduction or habitat restoration can interact with water management variables to achieve planning goals.

An integration team, described further in task 3, will provide direction to the consultant on the type specific analyses necessary to advance the planning process. The following list illustrates the type of stressors and analyses that will be evaluated using this integrated approach:

A. Entrainment at South Delta Diversion
   Stressor: Entrainment at the South Delta diversion leads to mortality of covered species. A new diversion point with state of the art fish screens could significantly reduce entrainment in the South Delta.

   Perform a detailed analysis to quantify entrainment reduction benefits at various Hood diversion levels. Utilize particle tracking analysis to quantify entrainment reduction benefits. Note: most of this work has already been done by the consultant team, but needs to be written up and presented.

B. Threat of Increased Mortality in North Delta Channels with Large Hood Diversion
   Stressor: Diversions at hood could increase bi-directional flows and decrease velocities in Steamboat and Sutter Sloughs, which are important migratory pathways for juvenile salmon.

Increased bi-directional flows and decreased velocities could either increase routing of fish through channels with higher levels of predation mortality for juvenile salmonids (Georgiana and mainstem), improve conditions for exotics in all north Delta channels, and increase predation mortality in Steamboat and Sutter Sloughs. Bi-directional flows at diversion points along the Sacramento River could increase the risk of entraining Delta smelt and thereby require more protective screening criteria and water management operations.

Conduct an integrated analysis to evaluate how tidal marsh restoration elsewhere in the Delta could decrease bi-directional flows and increase velocities in Steamboat and Sutter Sloughs. The analysis should also evaluate how physical habitat alteration, predator control, and other stressor reductions strategies could avoid or reduce mortality in these migration corridors. The consultant team has already performed much of this analysis and is in the process of writing it up for review by the conveyance work group.

C. North Delta Migration Corridors
Stressor: Diversions at Hood could decrease the growth and survival of Sacramento Valley anadromous fish. Creation of new migration corridors along flood bypasses, such as the Yolo Bypass, however, could increase growth and survival of salmonids while circumventing the Hood diversion point.

Perform an integrated analysis to evaluate the trade-offs between potential increases in mortality on the mainstem river and Sloughs with increased growth and survival on new migration corridors through flood bypasses.

D. Food Supply for Covered Species
Stressor: Reduced food supply, due to numerous factors, limits growth and survival of some covered species. Increasing the frequency and duration of inundation of flood bypasses, however, could significantly increase food supply for covered species in various parts of the Delta.

Conduct an integrated analysis to evaluate how inundation of flood bypasses could generate food supply for covered species. Analysis should include frequency, duration, and timing of inundation; food web response (types of food resources produced) to various inundation patterns; and transport of food resources to location and timing required.

E. Ammonia and Other Toxic Contaminants
Stressor: The discharge of ammonia toxic contaminants may decrease growth and survival of covered species and limit food availability. Decreased flows due to water diversions may increase the concentrations of toxic.

Undertake an integrated analysis to evaluate the potential magnitude and mechanism of the toxic impacts on covered species and attempt to quantify how reductions in toxics concentrations through decreased discharges or removal in restored wetlands could benefit covered species.

F. Lack of Tidal Marsh
Stressor: Historical loss of tidal marsh habitat combined with stressors from managed wetlands in Suisun Marsh reduces food supply and habitat for covered species and increases local water temperatures. Historical loss of tidal marshes has also changed salinity patterns in the Delta.

Evaluate how restoration of tidal marsh in Suisun Bay and other areas of the Delta would increase food supply and habitat for covered species, decrease temperatures, and change salinity or X2 patterns.

G. Entrainment at Other In-Delta Diversions (text to be added)

H. Control of Non-native Vegetation (text to be added)

I. Harvest and Hatchery Population Enhancement Measures (text to be added)

J. Control of other Toxics including Endocrine Disruptors, Agricultural Chemicals and Methylmercury (text to be added)

K. Other Predator Control Measures (text to be added)

Task 2: Explore and evaluate a broad range of water operational scenarios
The purpose of this analysis is to continue to explore a range of water operations scenarios to determine what operational measures would be most effective , (when combined with the habitat and other stressor reduction methods evaluated in Task 1), in achieving the BDCP conservation and water supply goals.

Conduct further scoping of different water operation concepts through gaming with the CalLite model. Explore and evaluate tradeoffs of modifying key water management variables. The Conveyance work group already convened one CalLite modeling workshop where the following scenarios were preliminarily evaluated:

A. Fluctuating salinity:
Hypothesis: Variable salinity provides a competitive advantage to native species. Evaluate how operations would work under the variable salinity approach (as described by PPIC) with dual conveyance architecture. Determine how far salinity could intrude and to what concentrations, particularly in drought sequences, without substantially reducing water supply yields or the potential for south Delta diversions.

B. Flood western islands:
Hypothesis: Flooding of large tracts of western islands may create large areas of low salinity habitat and allow X2 to be managed more easterly than under the current regime. Evaluate how operations would work if more then 10,000 acres of western Delta islands were purposefully or inadvertently flooded. Evaluate potential for moving X2 eastward while still maintaining large area of low salinity habitat.

C. Increased spring inflow:
Hypothesis: Emulating the natural hydrograph would provide greater flows during the spring when all other biological activity is peaking, thereby improving food supply and other habitat quality factors. Evaluate delta operations with increased spring inflows designed to substantially restore spring hydrographs on rivers flowing into the Delta. Evaluate inflow targets and reservoir operation rules that will increase the frequency and duration of spring flows, particularly in late March and April, sufficient to inundate modified flood bypasses.

D. Increased Delta outflow:
Hypothesis: Increased outflow (decreased X2) is positively correlated with abundance of several covered species. Evaluate potential for achieving substantially higher Delta outflow targets (TBI/NGO proposal) without creating adverse water temperature conditions below key reservoirs.

E. Preferential Hood diversion with no D1641 constraints.
Hypothesis: Moving the diversion point away from the south Delta, when combined with new habitat restoration and other stressor reduction measures, will provide substantial improvement in key ecosystem parameters affecting the populations of covered fish species.

F. Preferential South Delta diversion:
Hypothesis: South Delta diversions would continue at a reduced amount with limited entrainment effects while reducing the need for a higher diversion levels from the North Delta.

G. Fully Isolated Hood Diversion:
Hypothesis: The concept of this scenario is to explore a fully isolated diversion at Hood and significantly increasing opportunities for restoration in the Central and South Delta.

The first round of gaming analysis evaluated the potential for optimizing water supply yield under each of these scenarios without storage. A second round of gaming analysis will explore opportunities for using storage in combination with each of the scenarios to optimize water supply yields. Subsequent rounds of CalLite modeling may also be necessary to iteratively identify and refine water operations that will work in synergy with habitat restoration and stressors reduction to most effectively achieve the BDCP planning goals.

Task 3: Use the results of Task 1 and 2 analyses to develop a comprehensive conservation strategy for achieving the BDCP planning goals.

Form an Integration Team (IT) composed of the co-chairs of the Conveyance, Habitat, Other Stressors, and Governance working groups, fish agencies representatives, and Reclamation representative to work with and guide consultant team and other technical experts in the development of a comprehensive and integrated conservation strategy. The IT would draw from the information, work products, and analyses developed in the working groups to synthesize the draft conservation measures into an integrated conservation strategy. The IT would report to the Steering Committee, but would not supplant the existing working groups. Ongoing interaction between the IT and existing working groups would provide additional information for development of the integrated conservation strategy.

Drawing on the results of analyses performed under tasks 1 and 2, the IT and consultants will assemble various Conservation Measures into regional packages that will be combined into a comprehensive Conservation Strategy, including key water operations, other stressor reduction measures, and habitat elements. As needed, the IT will direct the consultant team to perform additional analysis under tasks 1 and 2 to iteratively refine the packages until there is consensus on one or more to be taken for consideration to the Steering Committee.

The proposed process is as follows:

1. Develop a set of principles for guiding the development of an integrated, comprehensive Conservation Strategy and specific Conservation Measures to be implemented as part of the BDCP.

2. Describe integrated packages of Conservation Measures for each of the Delta regions, including the key physical conveyance features, habitat restoration and other stressor reductions measures to be undertaken in that region, and describing the expected performance of the ecosystem in response to the combined interaction of all those measures in that region. For example, in the North Delta, key elements to be included in the package for that region are: new, multiple diversion points on the Sacramento River with state of the art fish screens, increased Yolo bypass inundation through notching of the Fremont Weir, Cache Slough tidal marsh restoration, ammonia and other toxics reduction measures, channel margin habitat restoration and other measures to reduce predation, and certain operations of the Delta Cross Channel gates. For each region, articulate the scientific rationale for these elements. Explain and quantify to the extent possible how the elements interact to benefit covered species. Characterize the uncertainty regarding the conservation benefits.

Propose strategies for reducing those uncertainties during the interim and near term planning periods.

3. Develop potential flow requirements and other operational parameters based on the expected improvements in ecosystem performance and covered species recovery that can be expected or hypothesized to occur as a result of the synergistic interaction of all the Conservation Measures to be implemented in each region. For example, consider results of existing analysis regarding in stream flow needs at the Sacramento River diversion points, in light of improved habitat and passage opportunities through the Yolo Bypass and Delta-wide habitat restoration effects on tidal excursion, and develop proposed levels of diversion at the new facilities and bypass flow requirements. In the South Delta, consider the habitat restoration opportunities that will result from the Old and Middle River flow regime under preferential North Delta pumping. In the West Delta, consider what outflow requirements may be needed given the creation of more productive habitat in that region or the rest of the Delta. Identify uncertainties and lay out analytical tasks that can be done immediately to reduce the uncertainties for strategy refinement now, or that need to be done over time to refine the strategy.

4. Assemble all the regional packages into a comprehensive Conservation Strategy, including parameters for flow and other operational measures, for the entire Delta region. (The draft strategy may include multiple operational scenarios, based on different themes, e.g., fluctuating salinity, or developed as variations to a single strategy with some cornerstone elements.)

Schedule

It is anticipated that the IT will meet weekly and oversee the development of draft materials by the consultant team for review by the Steering Committee.

Schedule of IT deliverables to Steering Committee:

- Workplan — *October 31, 2008*
- Draft principles, revised regional descriptions, and initial modeling results — *November 14, 2008*
- Initial suite(s) of integrated operational scenarios — *November 21, 2008*
- Modeling results/evaluation of initial suite(s) of integrated operational scenarios — *December 5, 2008*
- Release of complete draft Conservation Strategy with refined and reconfigured operational scenarios — *December 19, 2008*

Note that a detailed ecological evaluation of the draft Conservation Strategy using the DRERIP models/process will be conducted the week of January 12-16, 2009.