ISSUES FOR DISCUSSION

FOR THE BAY DELTA CONSERVATION PLAN

CALIFORNIA NATURAL RESOURCES AGENCY
SEPTEMBER 9, 2010
DRAFT

OVERVIEW

Information within this "Issues for Discussion" Document is presented only for purposes of facilitating discussion and is not intended as any preliminary or final decision on the Bay Delta Conservation Plan (BDCP). Many of the concepts and descriptions within the Document have been discussed in the BDCP Steering Committee. This Document has not been drafted for the purposes of public review, and is not a planning document contemplated for public distribution as a "public review draft" pursuant to Section 7.4.3 of the BDCP Planning Agreement.

The purpose of this document is to support discussion among key principals in the Bay Delta Conservation Plan (BDCP) about plan elements requiring their guidance for resolution. It is designed to provide context for important inter-related aspects of the BDCP that can further guidance among principals about the BDCP's specific elements offered by the California Natural Resources Agency. Elements of a draft BDCP will be determined and bounded by scientific information appropriate to the regulatory process of an HCP/NCCP. To date, the BDCP has engaged in substantial and iterative analytical processes to better understand the effects of proposed conservation measures on the Delta ecosystem and its fish, wildlife and plant species. This analysis is the subject of ongoing input and development that will continue to inform certain aspects of a draft BDCP.

The BDCP will set out a comprehensive strategy for advancing the co-equal goals of restoring the ecological functions of the Delta and providing a more reliable water supply for California. The current challenges posed by the Sacramento-San Joaquin Delta's collapse have been decades in the making. The BDCP offers the best, and perhaps last, opportunity of this generation's resource managers to improve the Delta estuary and provide for sustainable water supplies. To achieve the promise of the BDCP, we must be willing to face tough issues that have remained intractable even in the face of a steeply declining ecosystem and erratic water supplies. In so doing, the California Natural Resources Agency has prepared the following document to frame important policy choices and propose solutions that strike a needed balance between California's environment and economy.

Bay Delta Conservation Plan
Consolidated Issues List
August 11, 2010

This document incorporates the issues lists submitted by federal and state agencies, water users, and the non-governmental organizations. No attempt was made to exclude, substantively edit, or prioritize the issues submitted by the parties. This list is intended to facilitate discussion and agreement on the list of issues to be addressed in this process. In **BOLD** after each issue is either the State's proposed answer to the issue or the location in the attached document where the issue is addressed.

Conservation Strategy

1. Near-term water operations
    a. What are the near-term water operations (under existing infrastructure) conservation measures? **[Chapter 3: Near-term Operational Criteria p.16]**
    b. How will sideboards of real-time operations be defined or characterized? What will be the scope and limits? **[Chapter 3: Real Time Operations p.17]**
    c. What is the adaptive management range for water operations? **[Chapter 3: Table 2 p.19]**
    d. What would be the process that would allow for changes in water operations? **[Chapter 3: Near-term Operational Criteria p.17]**
    e. What are the near term water supply goals? **[Chapter 3: Biological Goals and Objectives p.7]**

2. Long-term water operations
    a. What are the long-term water operations (with new conveyance facilities) conservation measures? **[Chapter 3: Long-term Operational Criteria p.21 & Appendix A]**
    b. How will sideboards that define the limits of the real-time component of operations be defined or characterized? **[Chapter 3: Real Time Operations p.21 & Appendix A]**
    c. What is the adaptive range for long-term water operations? **[Chapter 3: Long-term Operational Criteria p.21 & Appendix A]**
    d. What would be the process that would allow for changes in water operations? **[Chapter 6: Regulatory Assurances p.33]**
    e. What are long-term water supply goals? **[Chapter 3: Biological Goals and Objectives p.7]**

3. Habitat Restoration
    a. As informed by effects analysis, should adjustments be made to the habitat restoration targets (acreage, type, and timing)? **[Chapter 3: Conservation Measures p.8]**
    b. What is the allocation of responsibility- funding and implementation? **[Chapter 8: Funding Sources and Assurances p.42]**

c. What is the link to operations? **[Chapter 6: Plan Implementation p.31; Table 4 p.32]**

4. Other Stressors
   a. As informed by effects analysis, are there "other stressor" actions proposed to be added to conservation measures? (e.g. Does new information regarding the effects of nitrogen on aquatic species warrant modifications to Other Stressor measures?) **[Chapter 3: Other Stressors p.12 Subject to completion of the Effects Analysis; Chapter 8: Funding Sources and Assurances p.42]**
   b. Within BDCP Authority**[Chapter 3: Other Stressors p.12 Subject to completion of the Effects Analysis; Chapter 8: Funding Sources and Assurances p.42]**
   c. Outside BDCP Authority **[Chapter 3: Other Stressors p.12 Subject to completion of the Effects Analysis; Chapter 8: Funding Sources and Assurances p.42]**

5. Other Conservation Strategy Issues
   a. Goals and Objectives
      i. Are they realistic and achievable as currently proposed? **Yes. [Chapter 3: Biological Goals and Objectives p.6]**
      ii. What are the appropriate metrics and criteria by which to measure progress (application of the logic chain)? **[Chapter 3: Monitoring and Research / Adaptive Management p.22]**
      iii. How will the SWRCB be incorporated into the planning process? **SWRCB is an Ex-offico member of the BDCP Steering Committee. [EIR/EIS Alternatives p.48]**
   b. Relationship of Conservation Measures to Covered Activities
      i. Is the timing for implementation realistic? What projects are ready for implementation upon permitting? **Yes. [Chapter 3: Conservation Measures p.8]**
   c. Adaptive Management
      i. How will adaptive management be conducted and who will decide? **[Chapter 3: Adaptive Management p.22-27]**

Covered Activities

1. Covered Activities
   a. What is the size and configuration of water facilities needed to implement water operations conservation measures and meet water reliability needs? **[Chapter 3: Table 1 Summary of Tunnel/Pipeline Facility Physical Characteristics p.14]**
   b. Who will own the conveyance facilities? **[Chapter 3: Construction of Tunnel/Pipeline Conveyance and Intake Structures p.13]**
   c. Will construction of the conveyance and/or intake facilities be phased? **[Chapter 3: Construction of Tunnel/Pipeline Conveyance and Intake Structures p.13]**

d. Should any "third-party" activities (e.g., agricultural diversions or flood related activities) be included in covered activities? What activities and to what extent? Who would pay and what is the third-party obligation? **[Chapter 4: Description of Covered Activities and Associated Federal Actions p.28]**

Regulatory Approach

1. Regulatory Approach
   a. Who is the permittee? **[Chapter 3: Construction of Tunnel/Pipeline Conveyance and Intake Structures p.13]**
   b. Should the SWP and CVP contractors receive take authorization under the BDCP? **[Chapter 4: Description of Covered Activities and Associated Federal Actions p.28]**
   c. What will be the nature of regulatory assurances under BDCP? (Sec. 7/Sec. 10, permit terms and changed circumstances) **[Chapter 6: Plan Implementation – Regulatory Assurances p.33]**
   d. What will be the nature of assurances that no additional export reductions will be implemented under section 3406(b)(2)? **[Chapter 6: Plan Implementation – Regulatory Assurances p.33]**
   e. Should the BDCP include provisions to support a finding that the plan meets the requirements of Fish and Game Code section 2081, in addition to the NCCPA? **No.**

Implementation

1. Governance **[Chapter 7: Implementation Structure p.36]**

   a. What type of entity implements and manages the plan?
      i. Operations
      ii. Habitat Restoration and Other Stressors
      iii. Science and Adaptive Management

   b. What is the role of DWR and Reclamation in implementing BDCP?
   c. What is the role of fish and wildlife agencies in implementing BDCP?
   d.What is the role of the contractor JPA in implementing BDCP?
   e. What is the role of NGOs in implementing BDCP?

2. Role of independent science
   a. How would independent science be integrated into the decision-making processes? **[Chapter 3: Adaptive Management p.22; Chapter 7: Implementation Structure p.36]**

3. Role of Contractors (Is this SFCWA?) **[Chapter 3: Construction of Tunnel/Pipeline Conveyance and Intake Structures p.13; Chapter 7: Implementation Structure p.36]**
   a. What interest, if any, will contractors have in conveyance facilities?
   b. What role, if any, will contractors play in operation and maintenance?

4. Cost and Funding
    a. How are costs allocated between direct beneficiaries and the public at large? **[Chapter 8: Implementation Costs and Funding Sources - Funding Sources and Assurances p.42]**
    b. How are costs allocated among beneficiaries? **[Chapter 8: Implementation Costs and Funding Sources - Funding Sources and Assurances p.42]**
    c. How are public costs allocated between the state and federal government? **[Chapter 8: Implementation Costs and Funding Sources - Funding Sources and Assurances p.42]**
    d. How will funding obligations be financed by and amortized for the authorized entities over the life of the BDCP? **40 year bonds.**

Effects Analysis

What process will be followed to ensure that a valid effects analysis is used to inform decisions on issues raised above? **[Chapter 5: Effects Analysis – Effects Analysis Process for Completion p.29]**

EIR/EIS

1. Purpose and Need Statement
    a. Should the Purpose and Need Statement be revised? **No.**

2. Analysis of HCPs and NEPA
    a. What are the approaches to mitigation and other conservation measures to be analyzed in the EIS (e.g, evaluation vs. determination)? **The BDCP is a self-mitigating plan for biological resources.**
    b. What is the range of alternatives currently under consideration? **[EIS/EIS Alternatives p.46]**

3. Involvement of the contractors
    a. What is the process for contractor review of effects analysis and administrative drafts? **As described in the NEPA Cooperating Agency Agreement.**

4. Public Review and Comment
    a. Should the draft BDCP and draft EIR/EIS be released for public comment sequentially or concurrently? **[Chapter 5: Effects Analysis p.29]**

Discussion of Issues in Context for Development of BDCP

Prologue

The purpose of this document is to address the BDCP issues noted in the Consolidated Issues List within the context of the format of a BDCP document. The resolution of the individual BDCP issues should be easier to address when viewed together with the other interrelated issues. Noted at the end of some of the sections in this context document is the cross reference to the location in the Consolidated Issues List where the related issue can be found. As noted earlier, this context document is presented only for discussion and analysis purposes and is not intended as any preliminary or final decision on the Bay Delta Conservation Plan (BDCP) or as a product of the BDCP Steering Committee. Although many of the concepts and descriptions within this context document have been discussed in the BDCP Steering Committee, others have not. Therefore, information within this Document should not be attributed to the Steering Committee. This Document has not been drafted for the purposes of public review.

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CHAPTER 1: INTRODUCTION

The Bay Delta Conservation Plan (BDCP or "Plan") addresses the increasingly significant and intensifying conflict between the ecological needs of a number of at-risk species adversely affected by a range of human activities and the need for adequate and reliable water supplies from the Sacramento-San Joaquin River Delta (Delta) for people, communities, agriculture, and industry. The Plan sets out a comprehensive conservation strategy for the Delta designed to advance the co-equal planning goals of restoring ecological functions of the Delta and providing a more reliable water supply for California. The BDCP reflects the outcome of a multi-year collaboration between public water agencies, State and federal fish and wildlife agencies, non-governmental organizations, agricultural interests, and the general public.

The Delta Reform Act of 2009 recognizes the co-equal goals of restoring ecological functions of the Delta and providing a more reliable water supply for California. To achieve those goals the Act calls for the preparation of a Comprehensive Plan for the Delta, by the Delta Stewardship Council. The Comprehensive Plan is to incorporate the BDCP if the Department of Fish and Game determines it meets the requirements of the Natural Communities Conservation Planning Act.

Steering Committee

The BDCP Steering Committee was established in May 2006, and met on a regular and ongoing basis throughout the planning process. In October 2006, the members of the Steering Committee entered into a formal Planning Agreement, consistent with requirements of the NCCPA, for the development of the BDCP. The BDCP Planning Agreement, among other things, defined the goals, commitments, and expectations of the parties regarding the BDCP planning process. It also reiterated the goal of the Steering Committee to develop a conservation plan that would meet the requirements of the ESA and the NCCPA. The meetings of the BDCP Steering Committee serve as the principal forum within which key policy and strategy issues pertaining to the development of the BDCP were discussed and considered.

Planning Goals & Objectives

The BDCP Planning Agreement articulated the following specific planning goals to guide the development of the BDCP and further ensure its consistency with the broader goals of the program:

- Provide for the conservation and management of covered species within the Planning Area;
- Preserve, restore and enhance aquatic, riparian and associated terrestrial natural communities and ecosystems that support covered species within the Planning Area through conservation partnerships;
- Allow for projects to proceed that restore and protect water supply, water quality, and ecosystem health within a stable regulatory framework;

- Provide a means to implement covered activities in a manner that complies with applicable state and federal fish and wildlife protection laws, including CESA and ESA, and other environmental laws, including CEQA and NEPA;
- Provide a basis for permits necessary to lawfully take covered species;
- Provide a comprehensive means to coordinate and standardize mitigation and compensation requirements for covered activities within the Planning Area;
- Provide a less costly, more efficient project review process which results in greater conservation values than project-by-project, species-by-species review; and
- Provide clear expectations and regulatory assurances regarding covered activities occurring within the Planning Area.

Throughout the planning process, the Steering Committee worked to develop a plan consistent with these planning goals. The BDCP reflects these goals and provides the basis for conservation and regulatory outcomes identified in the Planning Agreement. The BDCP process was also guided by the following preliminary set of conservation objectives that were first expressed in the Planning Agreement:

- Provide for the protection of covered species and associated natural communities and ecosystems that occur within the Planning Area;
- Preserve the diversity of fish, wildlife, plant and natural communities within the Planning Area;
- Minimize and mitigate, as appropriate, the take of proposed covered species;
- Preserve and restore habitat and contribute to the recovery of covered species;
- Reduce the need to list additional species;
- Set forth species-specific goals and objectives;
- Set forth specific habitat-based goals and objectives;
- Implement an adaptive management and monitoring program to respond to changing ecological conditions; and
- Avoid actions that are likely to jeopardize the continued existence of covered species or result in the destruction or adverse modification of critical habitat.

These planning goals and preliminary conservation objectives set the initial direction for the BDCP planning process. As the planning process progressed, the Steering Committee identified specific biological goals and objectives that the BDCP would be expected to meet during its implementation. These specific biological goals and objectives are described in Chapter 3.

Geographic Scope

The geographic scope of the BDCP Plan Area encompasses the Sacramento-San Joaquin Delta and additional areas in which conservation measures may be implemented pursuant to the Plan. Take authorizations issued under the BDCP will extend to covered activities that occur within the Plan Area. The BDCP Conservation Strategy is primarily focused on the statutory Delta, as defined in California Water Code Section 12220. However, certain areas outside the statutory Delta contain desirable locations for conservation actions that advance the goals and objectives of the Plan. Areas such as Suisun Marsh, Suisun Bay, and the entire Yolo Bypass including Fremont Weir provide important sites for habitat restoration and

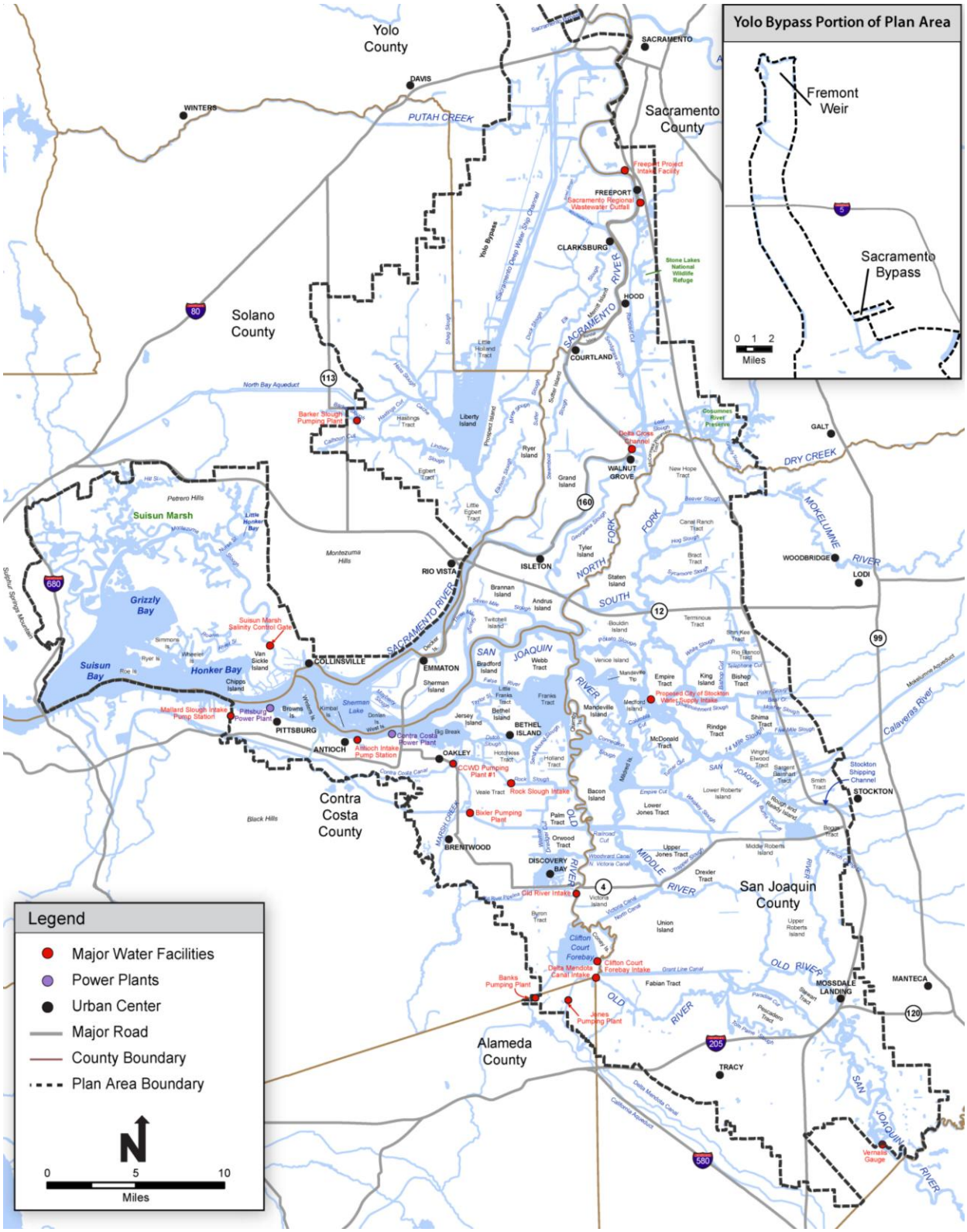
enhancement to support BDCP goals and objectives and are included in the Plan Area (See Figure 1 Planning Area Location). In addition, the Conservation Strategy includes measures that will be implemented outside of the statutory Delta to support or complement regional conservation planning efforts underway in Yolo, Solano, Contra Costa, San Joaquin, and Sacramento counties. As such, the geographic scope of the Plan Area will also encompass habitat lands that are conserved through BDCP actions taken in conjunction with these other regional conservation programs. BDCP is working with the local plan preparers and implementors and the Counties to address their concerns in the development of its conservation strategy. To the extent appropriate, these conservation actions will be implemented through cooperative agreements, or similar mechanisms, between the BDCP Implementation Office and local agencies, interested non-governmental organizations, landowners, or other parties (see Chapter 7).

Species and Natural Communities Resources Addressed

The BDCP was conceived as an aquatic habitat focused plan to address the species most at risk in the Delta and affected by water conveyance and diversion. The recent population declines in delta smelt, longfin smelt, winter-run Chinook salmon, spring-run Chinook salmon, and green sturgeon made these species the primary early focus of the planning effort. Other at-risk fish are included in the Plan, such Steelhead, fall-run Chinook salmon, Sacramento splittail, white sturgeon and two species of lamprey. The Plan also addresses conservation of a large number of birds, mammals, reptiles, amphibians, and plants that use the wetlands of the Delta and surrounding upland habitats. Some important wildlife conserved under the BDCP are giant garter snake, Swainson's hawk, greater sandhill crane, and San Joaquin kit fox.

The BDCP is a State natural community conservation plan and, as such, includes measures to address the conservation of ecosystem functions and biodiversity of aquatic, wetland, and adjacent upland communities. The Plan provides conservation actions for brackish and freshwater tidal marshes, mudflats, riparian forests, grasslands, vernal pools and other natural communities in the Plan Area. Because agricultural lands in the Delta provide habitat for a number of wildlife species, the BDCP includes measures to conserve agricultural land uses that benefit of these species.

Figure 1. Planning Area Location



CHAPTER 2: EXISTING ECOLOGICAL CONDITIONS

The Delta is a highly modified ecosystem, changed by a broad range of human activities including channelization of rivers and sloughs and isolation of floodplains by levees, modification of flows by reservoir operations and water diversions, conversion of natural habitats to agricultural and urban uses, introduction of non-native predator and competitor species, and contamination by toxic chemicals from agricultural and urban sources. Remnants of natural communities remain in the Delta, all in highly altered conditions. The BDCP addresses 14 natural communities in the Plan Area and seeks coverage under ESA and NCCPA for 63 species of fish, wildlife, and plants.

CHAPTER 3: CONSERVATION STRATEGY

Methods and Approach

The BDCP Conservation Strategy addresses ecological stressors and the conservation of biological resources at three levels of ecological scale: 1) ecosystem; 2) natural communities; and 3) individual species. The Conservation Strategy lays out specific and measurable biological goals and objectives, describes conservation measures to achieve the goals and objectives, provides for a monitoring and research program to improve the knowledge base and gauge the success of the plan implementation, and an adaptive management program to allow for improvements to the Conservation Strategy during Plan implementation.

The BDCP conservation measures can be grouped into three main categories:

- Conveyance and water operations conservation measures
- Habitat protection and restoration conservation measures
- Other stressors conservation measures

A range of conservation measures in all three of these categories are included in the plan to address a wide range of ecological stressors on species and allow for a comprehensive and flexible adaptive management oriented conservation strategy (***See Figure 1. Planning Area Location***).

Biological Goals and Objectives

[Issues List: Conservation Strategy 5ai]

Co-Equal Goals Restoring ecological functions of the Delta and providing more reliable water supply for California.

Ecosystem Goals and Objectives focused on improvements to the hydrological, chemical, and biological process of the Delta:

- Provide hydrodynamic conditions that mimic more natural patterns (conveyance and operations)
- Increase aquatic primary and secondary production (habitat restoration, other stressors, conveyance and operations)
- Reduce adverse effects of non-native species (other stressors)
- Reduce adverse effects of contaminants on aquatic ecosystem (other stressors)
- Increase the extent and improve the spatial distribution, function, and connectivity of natural communities within, upstream, and downstream of the Delta (habitat restoration and conservation, conveyance and operations)

Natural Community Goals and Objectives focus on maintaining and enhancing ecological functions and values of natural communities in the planning area that support covered species:

- Increase extent and spatial distribution of intertidal and associated subtidal, riparian, and floodplain natural communities within Delta and Suisun Marsh
- Conserve and manage aquatic and terrestrial natural communities (e.g. grasslands, agricultural lands, seasonal wetlands)

Species Goals and measurable objectives focus on species specific stressors which are not addressed through ecosystem and natural community goals and for covered fish species, species specific viability factors as they relate to life stage occurrence in the Delta:

- Longfin and Delta Smelt – increase the abundance and distribution (self sustaining population)
- Salmon and Steelhead –
  - increase juvenile survival and growth through the Delta
  - increase life history diversity
  - maintain or enhance upstream spawning and rearing habitat in relation to upstream project operations
  - increase adult survival through the Delta
- Green and White Sturgeon – increase the number of sturgeon successfully migrating upstream and downstream through the Delta
- Splittail – maintain and conserve a self sustaining population
- Terrestrial Species – contribute to the conservation within the Planning Area by protecting, restoring, enhancing, and managing natural communities.

Water Supply Goals and Objectives

Water Supply reliability goals and objectives focus on improving both the water supply and water supply reliability of water diverted from the Delta by the SWP and CVP to areas both west and south of the Delta. Other statewide programs are aggressively pursuing activities to improve water conservation, water reclamation, water storage, and other needed water activities. BDCP addresses only one critical piece of the network of actions needed to meet California's ongoing water challenges.

- Improve near-term water supplies of the SWP and CVP above that under the existing regulatory baseline through modifications of the existing Biological Opinions by providing equal or better protection to the populations of listed species using the best available science and new tools. ***[Issues List: Conservation Strategy 1e]***
- Reduce the risk to water supplies currently conveyed through the Delta from climate change, earthquake or levee failure.
- Restore and protect water supply, water quality, and ecosystem health within a stable regulatory framework;
- Improve long-term water supplies of the SWP and CVP to amounts consistent with those prior to the implementation of the most recent Biological Opinions through improved water conveyance. ***[Issues List: Conservation Strategy 2e]***

Conservation Measures

Conveyance and Water Operations Conservation Measures

Refer to Figure 2 BDCP Pipeline/Tunnel Conveyance
[Issues List: Conservation Strategy 3a Subject to completion of the Effects Analysis]

1. Water Facilities and Operation

- Construction of new north Delta diversions with fish screens (see details below)
- Construction of a tunnel/pipeline isolated conveyance facility (see details below)
- Dual operations of north and south Delta facilities in the Long Term (see details below)
- Operations of existing through-Delta conveyance in the Near Term (see details below) ***[Issues List: Conservation Strategy 5b]***

2. Yolo Bypass Fisheries Enhancements

- Construction of a notch and operable gates on the Fremont Weir and new connecting channels to the river and bypass
- Enhancement of fish habitat within and passage through the Yolo Bypass

Habitat Protection and Restoration Conservation Measures

3. Tidal Habitat Restoration

- Restoration of 65,000 acres of freshwater and brackish tidal habitat (marsh, subtidal, upland transition)

4. Seasonally Inundated Floodplain Restoration

- Restoration of 10,000 acres of seasonally inundated floodplain habitat

5. Channel Margin Habitat Enhancement

- Enhancement of 20 levee miles of channel margin habitat

6. Riparian Habitat Restoration

- Restoration of 5,000 acres of riparian forest and scrub within the new floodplain, tidal, and channel margin restorations

7. Non-tidal Marsh Restoration

- Restoration of 400 acres of nontidal freshwater marsh

8. Vernal Pool Complex Terrain Restoration

- Restoration of 200 acres of vernal pool complex habitat

9. Grassland Restoration

- Restoration of 2,000 acres of grassland

10. Create the Preserve System

- Establishment of a preserve system to protect existing habitat and acquire lands for habitat restoration
- Protect existing natural habitat: 8,000 acres of grassland; 400 acres of alkali seasonal wetland complex; 300 acres of vernal pool complex
- Protect and maintain wildlife habitat functions of 4,600 acres of rice lands and 12,020 to 28,040 acres of non-rice agricultural lands

11. Enhance and Manage Preserved Natural Communities

- Enhance and manage habitat function within BDCP conservation lands in perpetuity

Figure 2. BDCP Tunnel/Pipeline Conveyance

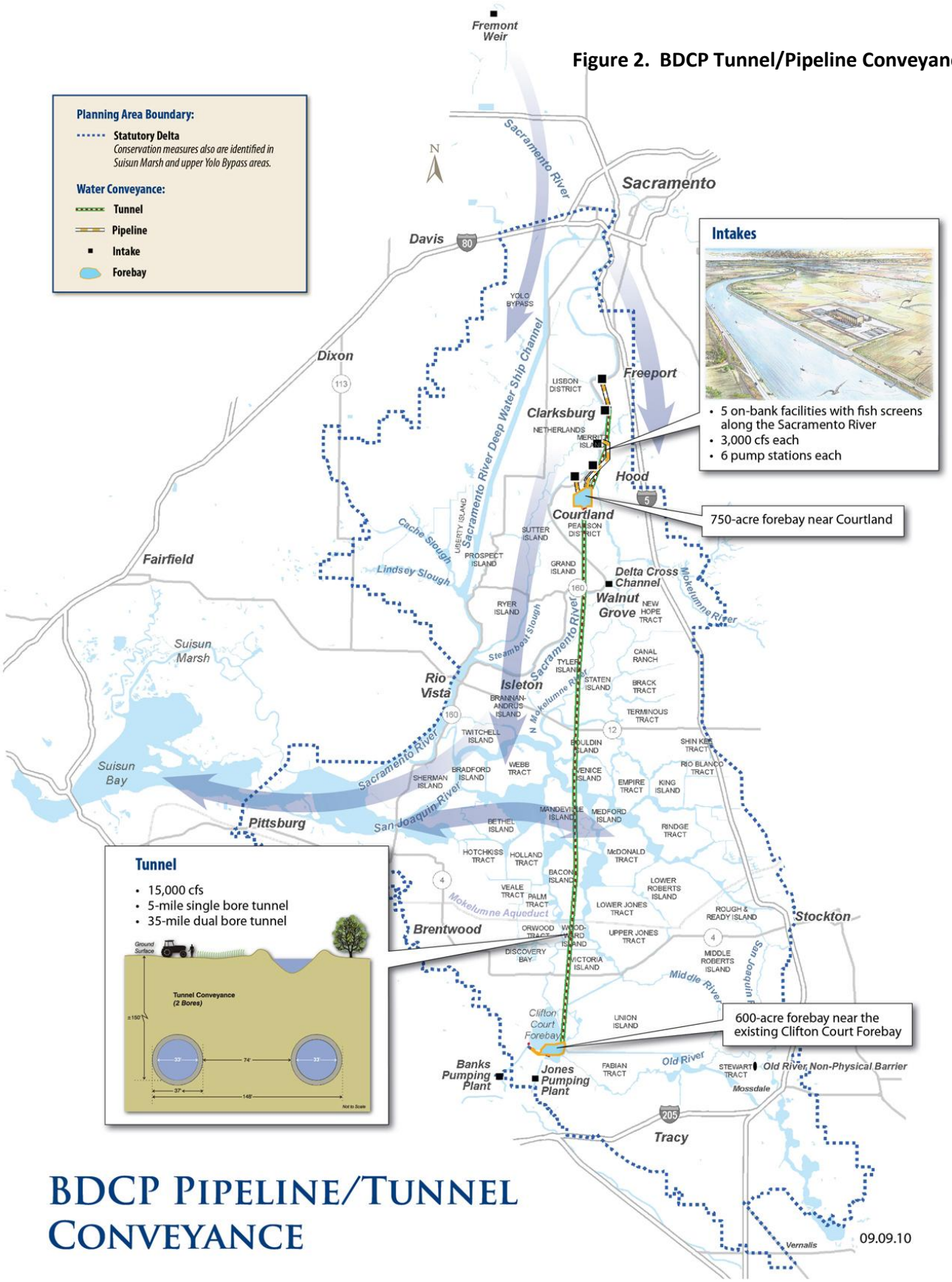
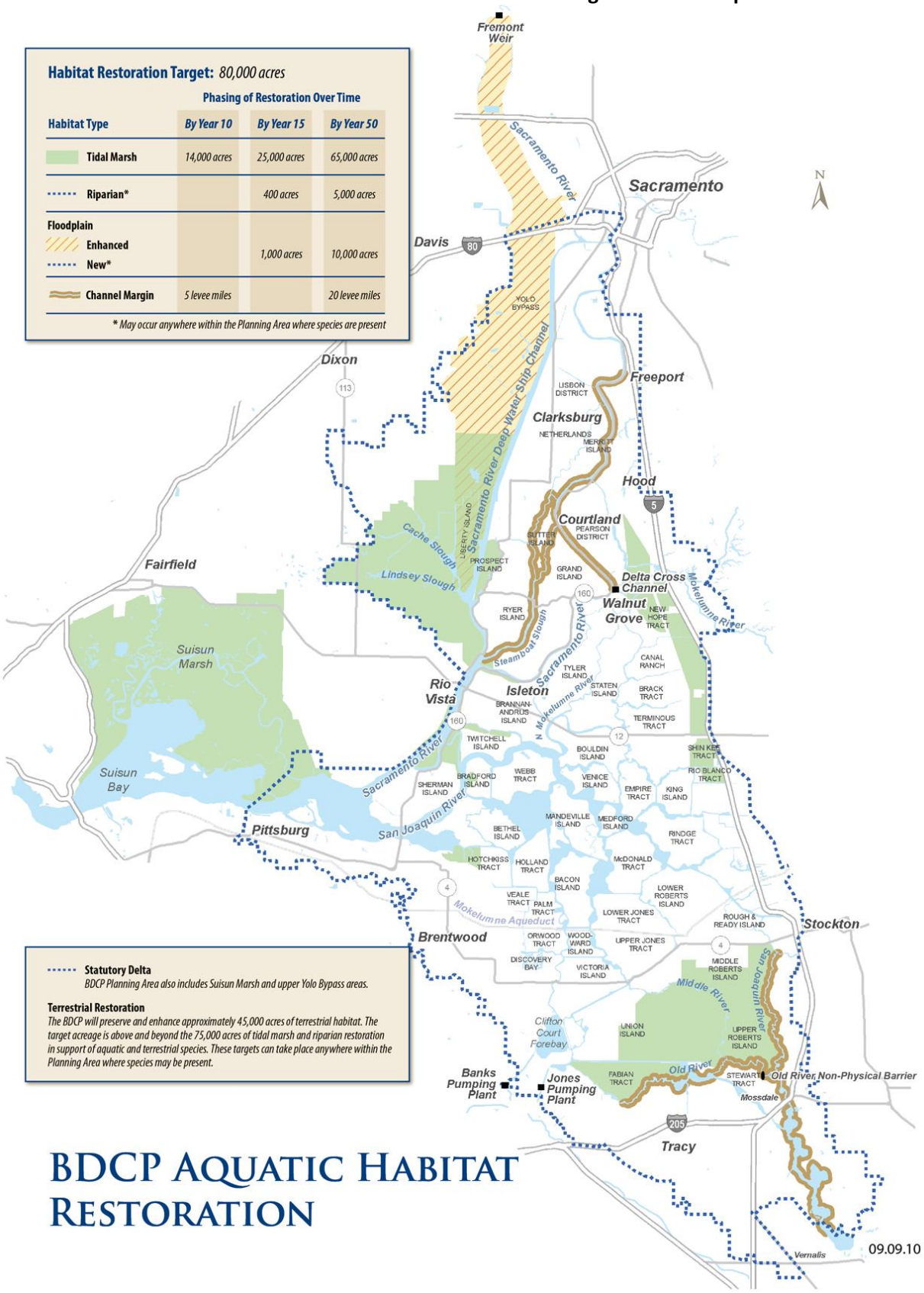


Figure 3. BDCP Aquatic Habitat Restoration



Other Stressors Conservation Measures

[Issues List: Conservation Strategy 4a Subject to completion of the Effects Analysis]

12. Stockton Deep Water Ship Channel Dissolved Oxygen Levels

- Maintain dissolved oxygen concentrations above levels that impair fish passage in the Stockton Deep Water Ship Channel

13. Predator Control

- Reduce predators by conducting focused predator control in high predator density locations.

14. Non-Physical Fish Barriers

- Installation of non-physical barriers at the junction of channels to deter salmonids from entering high predation and entrainment areas.

15. Illegal Harvest

- Provide funding to hire and equip 17 additional Game Wardens and 5 supervisory and administrative staff

16. Hatchery and Genetic Management Plans

- Development and implementation of hatchery and genetic management plans

17. Conservation Hatcheries

- Establishment of new and expansion of existing conservation propagation programs for delta and longfin smelt.

18. Methylmercury Management

- Management of Mercury and Methyl Mercury in restoration areas

19. Nonnative Aquatic Vegetation Control

- Control submerged aquatic and floating aquatic vegetation in tidal habitat restoration areas.

20. Ammonia/Ammonium Investigations

- Investigations of the effects of ammonia and ammonium on fish species and identification of potential approaches to address such effects for the benefit of species.

Construction of Tunnel/Pipeline Conveyance and Intake Structures

[Issues List: Covered Activities 1b; Regulatory Approach 1a; Implementation 3a,b]

DWR will be the permitee under BDCP and will construct, own and operate the new facility. New intakes on the Sacramento River and an isolated conveyance tunnel/pipeline facility will be constructed and become fully operational by the end of the near-term implementation period. Details of the intakes and conveyance facilities are provided in ***Table 1. Summary of Tunnel/Pipeline Facility Physical Characteristics***.

[Issues List: Covered Activities 1c]

The BDCP regulatory actions will allow the immediate construction and operation of all the new intake and water conveyance facilities. However, there will likely be performance criteria against which the new intake facilities must meet prior to full operation.

Table 1. Summary of Tunnel/Pipeline Facility Physical Characteristics

[Issues List: Covered Activities 1a]

Feature Description	Approximate Characteristics
Overall Project	
Conveyance Capacity (cfs)	15,000 cfs
Overall Length (miles)	45 miles
Intake Facilities	
Number of On-Bank-Screened Intakes	5 intakes
Flow Capacity at Each Intake (cfs)	3,000 cfs
Intake Pumping Plants	
6 Pumps per Intake plus one spare, Capacity per Pump (cfs)	500 cfs
Total Dynamic Head (ft)	30 to 57ft
Total Electric Load (MW)	65 MW
Pipeline/Tunnel	
Pipeline/Tunnel #1 connecting Intake #1 and #2 to the Intermediate Forebay, maximum flow 6,000cfs	
Pipeline/Tunnel Length (ft)	27,000 ft
Number of Tunnel Bores; Number of Shafts (total)	1 bores; 3shafts
Tunnel Finished Inside Diameter (ft)	29 ft
Pipeline/Tunnel #2 connecting Intermediate Pumping Plant to Byron Tract Forebay, maximum flow 15,000 cfs	
Tunnel Length (ft)	176,000 ft
Number of Tunnel Bores; Number of Shafts (total)	2 bores; 13 shafts
Tunnel Finished Inside Diameter (ft)	33 ft
Intermediate Forebay	
Water Surface Area (acres)	750 acres

Active Storage Volume (AF)	5,250 AF
Intermediate Pumping Plant	
In Reach 2, at southern end of Intermediate Forebay	
Number of Pumps, Capacity per Pump (cfs) *(Maximum total outflow 15,000 cfs)*	10 at 1,500 (high head) 6 at 1,500 (low head)
Total Dynamic Head (ft)	0 to 90 ft
Total Electric Load (MW)	136 MW
Byron Tract Forebay	
Water Surface Area (acres)	600 acres
Active Storage Volume (AF)	2,000 AF
Power Requirements	
Total Conveyance Electric Load (MW)	210 MW

Near-term through-Delta operations, prior to completion of the isolated facility, and dual operations of the new north Delta and existing south Delta intake facilities are described below.

Near-Term Operational Criteria (for The Purpose of Analysis)

[Issues List: Conservation Strategy 1a]

The Near-term criteria below are for the purpose of analysis and are subject to review pending the results of the Effects Analysis.

The BDCP Near-term time frame is from the date the BDCP permits are issued (expected in 2012) to the time that new diversion facilities are operational (expected sometime between 2019 and 2022). The near-term criteria were developed to provide equal or better protection to at-risk fish species as compared to the existing biological opinions based on the best available science. In addition, they were developed to avoid peak entrainment events of the listed species. The near-term operational criteria start with the existing regulatory conditions contained in the SWP and CVP water permits (Decision 1641), the restrictions on the inflow into Clifton Court Forebay as set forth in the agreement between DWR and the USACE, other regulatory constraints of the SWP and CVP operations and the existing Biological Opinions for the Delta Operation of the SWP and CVP in the delta with the following modifications:

Issue	Changes from Existing BiOps
Fall X2	Delete the fall X2 flow requirement as allowed in the RPA based on best available science
San Joaquin I/E Ration Head of Old River	Replace with the non-physical barrier at the Head of Old River and a focused predation control program
Salmon OMR Flows	Remove calendar and salvage based OMR restrictions and replace with salvage density based export restrictions like those in the salmon decision tree and 2004 salmon BiOp
Delta Smelt OMR flows	Use best available science and tools to evaluate the link between turbidity and Delta smelt distribution to establish operational criteria

Details of the Salmon and Delta Smelt OMR flow replacement criteria are shown in ***Table 2. Near-Term Operational Criteria***. In addition to these operation changes the Delta Smelt Take levels will be updated using a relationship that has been developed between the Fall Midwater Trawl Index, the Potential Entrainment Index (PEI) and salvage. A target PEI of 10% is proposed by DWR. ***Table 3. Delta Smelt 20 MM Take Levels*** shows the new take levels for the various Fall Mid water trawl indexes.

Changing the Initial Operational Criteria

- The initial operational criteria are described in the center column shown in ***Table 2. Near-term Operational Criteria***. The initial operational criteria will be evaluated each year as part of the annual review and the development of the upcoming year Annual Operations Strategy by November.
- The Initial Operational Criteria can be adjusted based on the best available science within the adaptive range set forth in ***Table 2. Near-term Operational Criteria***.
- The decision making process for such changes are set forth in Regulatory Assurances section of ***Chapter 6 (Plan Implementation)*** and ***Chapter 7 (Implementation Structure)***.
- However, the projected long-term water supply impacts to the SWP and CVP of making such changes from the initial operating criteria set forth in ***Table 2. Near-term Operational Criteria*** shall be limited as described in Chapter 6 (see ***Regulatory Assurances section in Chapter 6 – Plan Implementation).***
- The interrelationship between the initial operational criteria, operational range, real-time management and possible changes to the initial operational criteria are discussed in the ***Regulatory Assurances*** section of ***Chapter 6 (Plan Implementation).***

Real-Time Operations

[Issues List: Conservation Strategy 1b, d]

- On a real-time basis the fishery agencies (collectively the NMFS, USFWS and DFG) in consultation with the SWP and CVP water operators, may vary operations within the operational range in ***Table 2. Near-term Operational Criteria*** as they determine to be necessary to protect at risk fish species based on current biological, hydrologic, and operational information. In so doing they will make their *best efforts* to reduce the water supply impacts to the SWP and CVP of making such variations to zero by the end of June each year (See ***Water Operations description and discussion of Annual Operating Plan*** in Chapter 7 and ***Real Time Operations Response Team***).

- DWR will calculate the net water supply impacts of the variations from the initial operating criteria on a daily basis and report this to the fishery agencies at least on a weekly basis.

- As the fishery agencies make variations within the operational range during the year that have water supply costs in relation to the water supply that would have been achieved absent those variations, they and the SWP and CVP water operators will identify actions which can be taken later in the year in their best efforts to make up for water supply losses.

- At the end of each water year an annual review will be conducted that evaluates the performance of the Annual Operations Strategy, the fishery protection variations and water supplies achieved during the previous year. This review will guide the Annual Operations Strategy for the coming year and may lead to changes in the Initial Operational Criteria and the next years Operational Line via the process set forth in Chapter 6 (see section on Regulatory Assurances).

Table 2. Near-term Operational Criteria

Salmon Density Based Export Restrictions

October 1 to February 14 – two tiered criteria and actions

- If the daily older juvenile combined loss density is greater than 8 fish per taf or daily loss is greater than 95,
  - then reduce combined exports to 6,000 cfs for 3 days or until density is less than 8 fish per taf. Reductions based on source of greatest loss.
- If the daily older juvenile combined loss density is greater than 15 fish per taf or daily loss is greater than 120,
  - then reduce combined exports to 4,000 cfs for 3 days or until density is less than 8 fish per taf. Reductions based on source of greatest loss.

February 15 to April 14 – two tiered criteria and actions

- If the daily older juvenile combined loss density is greater than the JPE based take level divided by 2000 (or 2.5 whichever is greater),
  - then reduce combined exports to 6,000 cfs for 3 days or until density is less than the density criterion. Reductions based on source of greatest loss.
- If the daily older juvenile combined loss density is greater than the JPE based take level divided by 1000 (or 2.5, whichever is greater),
  - then reduce combined exports to 4,000 cfs for 3 days or until density is less than the density criterion. Reductions based on source of greatest loss.
  -

January 1 to April 14 – actions to keep take below the 1% level for hatchery Winter Run and Coleman Late-fall salmon (Spring Run surrogates)

- If the daily loss of either Coleman late-fall Chinook hatchery juveniles (spring-run Chinook surrogates) or Livingston Stone winter-run Chinook hatchery juveniles older juvenile cumulative loss is greater than half percent of the release,
  - then consider reduce combined exports to 4,000 cfs until the threat of exceeding the one percent take level has passed. Reductions based on source of greatest loss.

Adult Delta Smelt

Starting December 1 to beginning of Spawning (typically mid-March)

- When turbidity is below the following turbidity conditions, the projects will attempt to manage turbidity by using best available forecasting tools and by managing exports at their discretion in order to reduce the occurrences of the Turbidity Conditions 1 and 2 set forth below.
- It is recognized that in many circumstances turbidity conditions in the Delta are beyond the influence of water project operations.

Turbidity Condition 1:

- 3-day average turbidity at Prisoner's Point (PRI), Holt (HLT) and Holland Cut (HOL) all exceed 12 NTU.

Turbidity Condition 1 Action:

- Maintain the 14-day average Old and Middle River flows no more negative than -6,000 cfs. The Projects will manage turbidity by using best available forecasting tools and by managing exports in an attempt to keep Turbidity Condition 2 from occurring.

Turbidity Condition 2:

- 3-day average turbidity at Old River at Bacon Island (OBI) and Middle River at Middle River (MDM) both exceed 15 NTU.

Turbidity Condition 2 Action:

- Maintain the 14-day average Old and Middle River flows no more negative than -3,500 cfs.

Larval and Juvenile Delta Smelt

Start:

- Beginning of Spawning: (typically Mid- March) and whenever the most recent Delta Smelt survey shows the volume weighted distribution of Delta Smelt in the south-central and South east delta exceeds 10% (Stations 809, 812, 815, 919 901, 902, 906, 910, 912, 915, 918).

End:

- June 30 or when temperatures in CCF exceed 25 degrees C for 3 consecutive days, whichever occurs first.

Action:

- Old and Middle River flows no more negative on a 14-day mean basis.

Nominal Targets - Reflects the results of the BiOp restrictions

- Wet and AN -5,000 cfs
- BN -4,000 cfs
- Dry -3,500 cfs
- Crit. -2,000 cfs
- However, combined SWP/CVP exports will not be reduced below 1,500 cfs.

[Issues List: Conservation Strategy 1c]

Real-time operational range:

- 2,000 cfs to -6,000 cfs based on the real time distribution of spawning adults, juveniles identified in the 20 mm survey and particle tracking results. Use PEI as a tool.
- Variations within the above operational range are allowable with the best efforts goal of no net loss of water supply by the end of June from that which would have occurred if nominal targets set forth above would have been strictly applied.

Table 3. Delta Smelt 20 MM Take Levels
Based on a 10% Potential Entrainment Index for the Season

FMWT	PEI expected take (1995-2009 equation)	BiOp take level
1	3719	56
5	3788	281
10	3876	562
15	3965	843
20	4055	1124
30	4239	1686
40	4429	2248
50	4624	2810
60	4825	3372
70	5032	3934
80	5244	4496
90	5463	5058
100	5687	5621
110	5918	6183
120	6155	6745
130	6398	7307
140	6647	7869
150	6902	8431
160	7165	8993
170	7433	9555
180	7708	10117
190	7990	10679
200	8279	11241

Based on the equation; Cube Rt Salvage = 8.28 + 71.9 PEI + 0.0238 PFMWT

Adult Delta Smelt Take Level

Under development

Long-Term Operational Criteria

[Issues List: Conservation Strategy 2a, 2c]

The long-term BDCP operational criteria will be implemented once the new conveyance system on the Sacramento River becomes operational. This will provide improved flexibility of water project operations and improved protection to at risk fish species.

The initial operational criteria and the adaptive range are shown in ***Appendix A BDCP Long-term Water Operations.***

Changing the Initial Operational Criteria

- The initial operational criteria are described in the center column shown in ***Appendix A BDCP Long-term Water Operations***. The initial operational criteria will be evaluated each year as part of the annual review and the development of the upcoming year Annual Operations Strategy by November.
- The Initial Operational Criteria can be adjusted based on the best available science within the adaptive range set forth in ***Appendix A BDCP Long-term Water Operations***.
- The decision making process for such changes are set forth in Regulatory Assurances section of ***Chapter 6 (Plan Implementation)*** and ***Chapter 7 (Implementation Structure)***.
- However, the projected long-term water supply impacts to the SWP and CVP of making such changes from the initial operating criteria set forth in ***Appendix A BDCP Long-term Water Operations*** shall be limited as described in Chapter 6 ***(see Regulatory Assurances section in Chapter 6 – Plan Implementation).***
- The interrelationship between the initial operational criteria, operational range, real-time management and possible changes to the initial operational criteria are discussed in the ***Regulatory Assurances*** section of ***Chapter 6 (Plan Implementation).***

Real-Time Operations

[Issues List: Conservation Strategy 2b]

- On a real-time basis the fishery agencies (collectively the NMFS, USFWS and DFG) in consultation with the SWP and CVP water operators, may adjust operations within the operational range in ***Table 2. Near-Term Operational Criteria*** as they determine to be necessary to protect at risk fish species based on current biological, hydrologic, and operational information. In so doing they will make their *best efforts* to reduce the water supply impacts to the SWP and CVP of making such variations to zero by the end of June each year (See ***Water Operations*** description and discussion of ***Annual Operating Plan in Chapter 7*** and ***Real Time Operations Response Team***).
- DWR will calculate the net water supply impacts of the variations from the initial operating criteria on a daily basis and report this to the fishery agencies at least on a weekly basis.
- As the fishery agencies make variations within the operational range during the year that have water supply costs in relation to the water supply that would have been

achieved absent those variations, they and the SWP and CVP water operators will identify actions which can be taken later in the year in their best efforts to make up for water supply losses.

- At the end of each water year an annual review will be conducted that evaluates the performance of the Annual Operations Strategy, the fishery protection variations and water supplies achieved during the previous year This review will guide the Annual Operations Strategy for the coming year and may lead to changes in the Initial Operational Criteria and the next years Operational Line via the process set forth in Chapter 6 (see section on Regulatory Assurances).

Monitoring and Research

[Issues List: Conservation Strategy 5aii]

The Implementation Office (see Chapter 7) will establish a Science Coordinator as staff to the Program Manager to coordinate with the Delta Science Program and Interagency Ecological Program (IEP). The BDCP Program will look to the Delta Science Program and Independent Science Board for science support and review. The IEP will be the primary entity responsible for BDCP monitoring and research. The BDCP Science Coordinator will assist the Chief Scientist for the Delta Science Program (DSP) and IEP Lead Scientist in making sure BDCP science activities, reporting, and reviews are coordinated with other science activities being conducted in the Delta.

The Interagency Ecological Program (IEP) will be reconstituted to serve as the lead of BDCP monitoring and research program. The IEP will seek assistance from the Delta Science Program to support the monitoring and research program, particularly selection and implementation of targeted research to address uncertainties associated with the effects of Stressors, Conservation Measures and expected outcomes. The BDCP monitoring program will focus on monitoring actions and data collection and analysis necessary to determine implementation compliance and evaluate the effectiveness of conservation measures such that adaptive management can be used to improve performance and efficiency over time. The monitoring program will also conduct system-wide monitoring to allow for a better understanding of the status of ecological processes, natural communities, and covered species at a larger geographic scale than the Plan Area. The BDCP research program will include directed research applicable to better understanding of Delta systems and species that will provide new knowledge valuable for improving conservation measures.

Adaptive Management

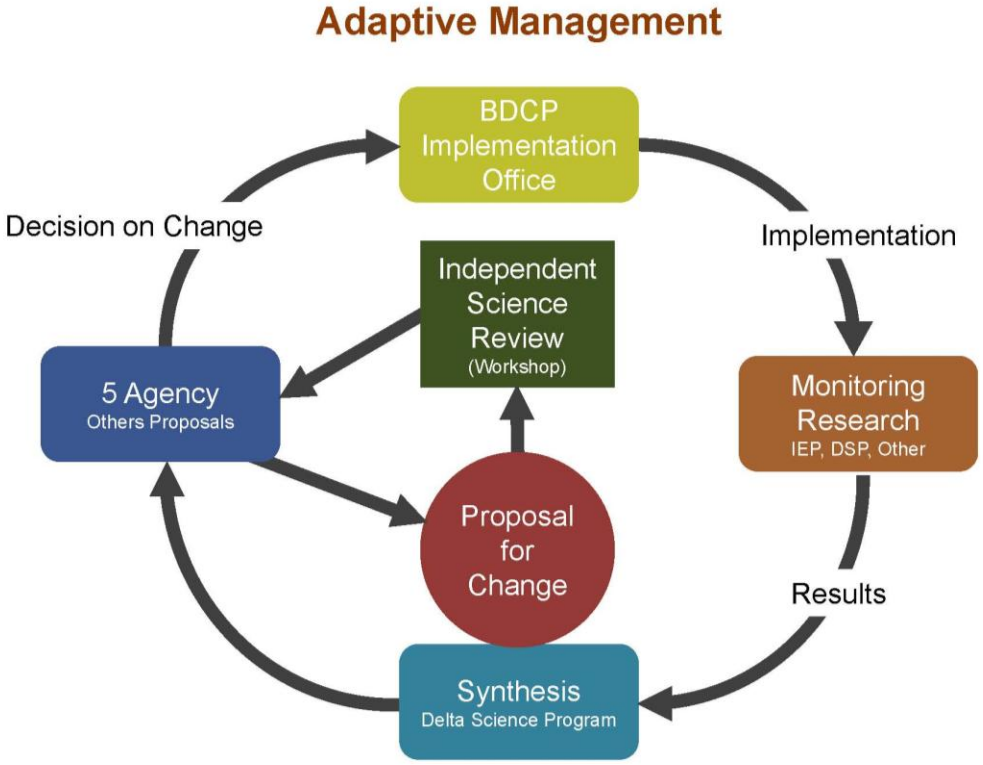
[Issues List: Conservation Strategy 5aii, 5c; Implementation 2a]

Adaptive management is a key component of BDCP implementation given the uncertainties associated with stressors affecting the Delta and expected outcomes of Conservation Measures. Also, the prospect of climate change has been evaluated using new tools to estimate its likely effects on temperature, sea level, water quality and hydrologic conditions in the Bay/Delta Watershed. There is uncertainty regarding these expected changes. The adaptive management program needs to allow modifications to conservation measures to reflect changes in the physical environment over the terms of the permit and our developing

scientific understanding of the factors affecting the covered species and natural communities in the Delta.

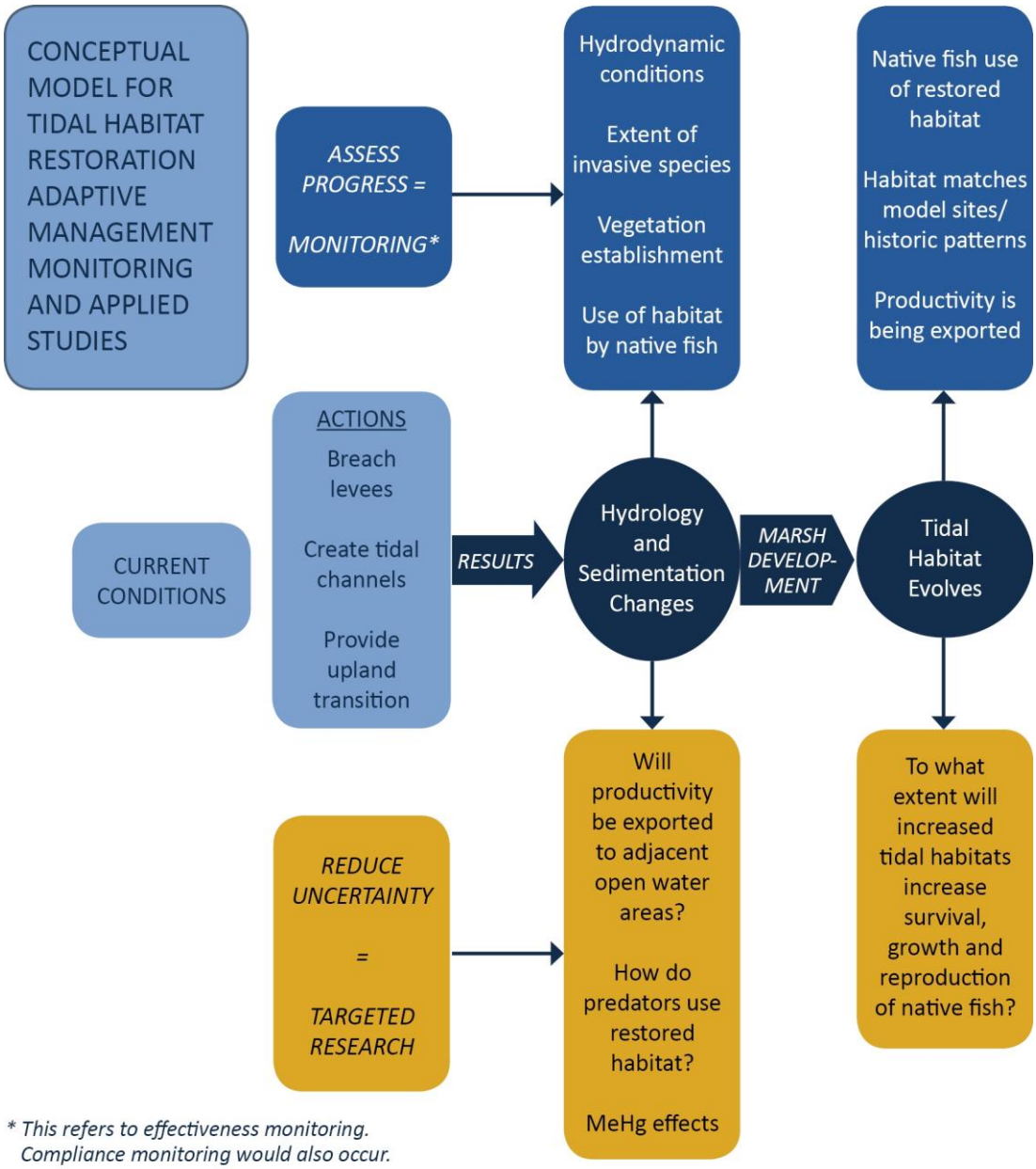
As described above, a large scale monitoring and research program will be needed to develop the necessary understanding of the ecosystem and how BDCP actions affect it, to achieve the goals and objectives of the Plan. The Program will conduct multi-year reviews (at least every 5 years) which will include a compilation of what was accomplished and learned over the previous 5 years of BDCP implementation. This effort will also include a draft plan for the next 5 years of BDCP implementation. This review and plan will include all aspects of the BDCP, including integration of those aspects. The review could be timed with the Delta Science Conference to take advantage of the community of scientists that gather at the conference and the wealth of information shared there. The review would be formal, with presentations to an independent science panel followed by a comprehensive written review of the report and plan by the panel. The Program Manager(s) will receive and consider the comments on the draft 5-year plan prior to submitting the plan to the five agencies for approval. All five of the Directors of USFWS, NMFS, DFG, DWR, USBR must agree on any adaptive management adjustments, and any adjustments must be within the adaptive ranges described in the BDCP. Although it is expected that most adaptive management adjustments would be made as part of the 5-year review, adjustments could be made to water operations criteria as part of the annual water operations review process, or to any aspect of the Program at other times if conditions warrant and the five agencies agree. Any adaptive management adjustments should be subject to an independent scientific review prior to final agreement on the adjustments.

Figure 4. Adaptive Management



An Adaptive Management Team (AMT) ***(see Figure 5. Conceptual Model)*** will be formed by the Program Manager as part of the Implementation Office, including the Science Coordinator, who will chair the AMT, IEP Lead Scientist, DSP Chief Scientist, senior scientists from the DWR and Reclamation, the Fishery Agencies, SFWCA, independent scientists, and scientists representing members of the Implementation Committee. The Team will be responsible for coordinating and conducting the multi-year review, identification of issues needing independent science advice associated with annual decision making, adaptive management related to ongoing implementation and results of monitoring and or research, and or research topics to address uncertainties in coordination with the Delta Science Program and Delta Independent Science Board. The Team will also be responsible for overseeing the synthesis and reporting of current science to the Program Manager and Directors and Regional Directors of DWR, Reclamation, FWS, NMFS and DFG (5 Agency Directors).

Figure 5. Conceptual Model



Adaptive Management Decision Making: ***(See Figure 6. Adaptive Management Staircase and Figure 7. Adaptive Management Process)*** As described above the AMT is charged with overseeing the synthesis of information and identification of findings which could require changes to the implementation of a conservation measures or objectives, or develop questions for independent science advice to inform decision makers. Changes would be considered when targeted research to address a specific uncertainty identified in the DRERIP evaluation or Effects Analysis shows that an expected benefit is not being achieved. In such a case the AMT would determine the significance of the finding and make recommendations to modify the conservation measure or concerning overall ongoing implementation of the conservation measure. The 5 Agency Directors will jointly agree on

final decisions concerning adaptive management changes as part of BDCP implementation. Unresolved issues will be elevated to the Secretaries of Commerce and Interior and the Governor for joint resolution.

Figure 6. Adaptive Management Staircase

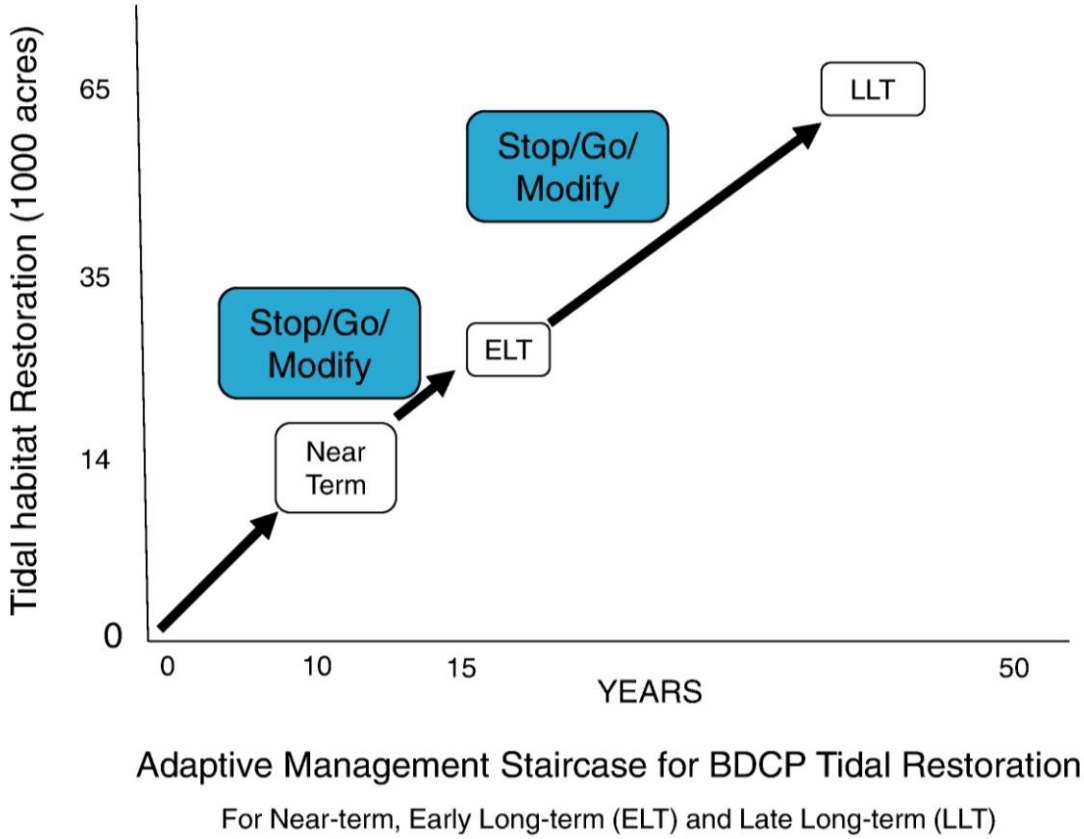
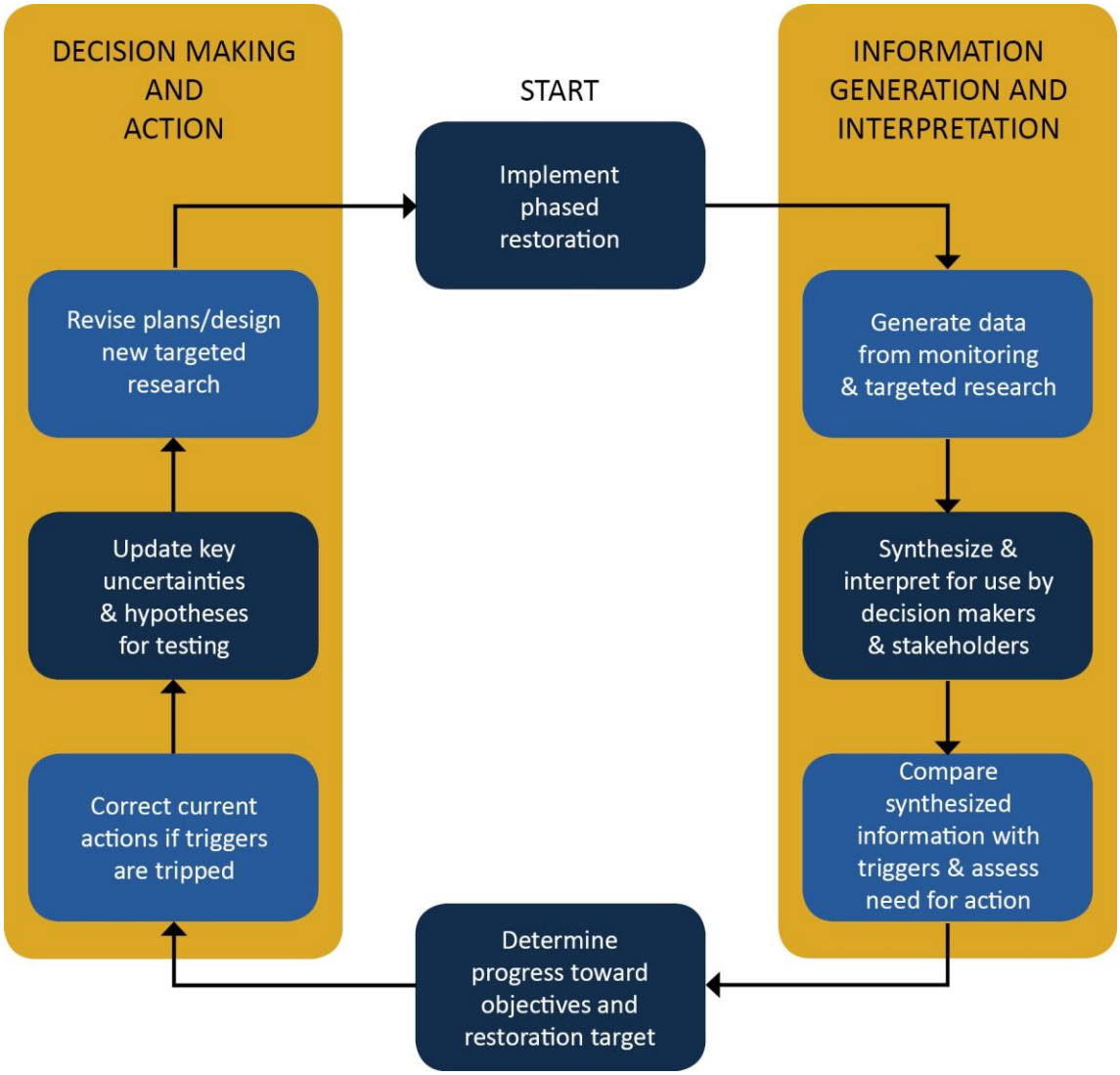


Figure 7. Adaptive Management Process



CHAPTER 4: DESCRIPTION OF COVERED ACTIVITIES AND ASSOCIATED FEDERAL ACTIONS

The activities or actions for which ESA section 10 and NCCPA take authorization will be obtained are listed below and include "covered activities" for those actions undertaken by non-federal parties and "associated federal actions" for those actions that are authorized, funded, or carried out by the Reclamation. The federal actions associated with the BDCP are subject to the ESA section 7 consultation process and, as such, Reclamation will consult with USFWS and NMFS regarding the effect of these actions on listed species and designated critical habitat. Joint federal and non-federal actions also covered by the BDCP.

Covered Activities

- Operations and maintenance of existing SWP facilities including Clifton Court Forebay, Harvey O. Banks Pumping Plant, John E. Skinner Delta Fish Protective Facility, Barker Slough Pumping Plant and North Bay Aqueduct, SWP diversions, and temporary barriers in the south Delta.
- Operation and maintenance activities associated with power generation water use by Mirant Delta, LLC.
- New water facilities construction, operations and maintenance under the BDCP including: the new tunnel/pipeline facility; Fremont Weir and Yolo Bypass improvements; operation of the new North Bay Aqueduct intake (construction not covered); habitat restoration, enhancement and management activities; activities to reduce contaminants; activities to reduce predators and other sources of direct mortality; monitoring and research programs; other conservation actions; and emergency actions.

Associated Federal Actions

- CVP operations and maintenance including the Delta Cross Channel, C.W. Jones Pumping Plant, Tracy Fish Collection Facility, Contra Costa Water District diversion facilities, and CVP diversions.

Joint Federal and Non-federal Actions

- Joint Point of Diversion Operations (JPOD), operations of the new water intake and conveyance facilities, water transfers (only the water operations involving water passing through the Delta – the effects on place of origin and use are not covered), and Suisun Marsh facilities operations and maintenance.

[Issues List: Covered Activities 1d; Regulatory Approach 1b]
Activities/actions beyond those listed above, will not be included in the BDCP unless those activities/actions become part of a BDCP action. In these cases, incidental take authorizations may be extended to individuals and entities that engage in BDCP covered activities/actions through "certificates of inclusion" or by other contractual means.

CHAPTER 5: EFFECTS ANALYSIS – PROCESS FOR COMPLETION

Effects Analysis: Process for Completion

The effects analysis is a critical component of the BDCP. It is the analysis of the biological effects of the Conservation Plan on the covered species in light of its biological objectives. A complete and thorough analysis forms the basis of the Biological Assessment used in the FESA Section 7 and 10 approval process and in making the findings necessary under the Natural Community Conservation Planning Act (Fish and Game code 2835). The analysis will also serve as the basis for the biological analysis of the proposed project and alternatives in the joint Environmental Impact Statement and Report (EIS/R) and under the National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA)

NOTE TO READER: The following is a discussion of the process that is being used to review and complete the effects analysis and will be replaced with the actual results of the effects analysis once it is completed for the November Draft of the BDCP.

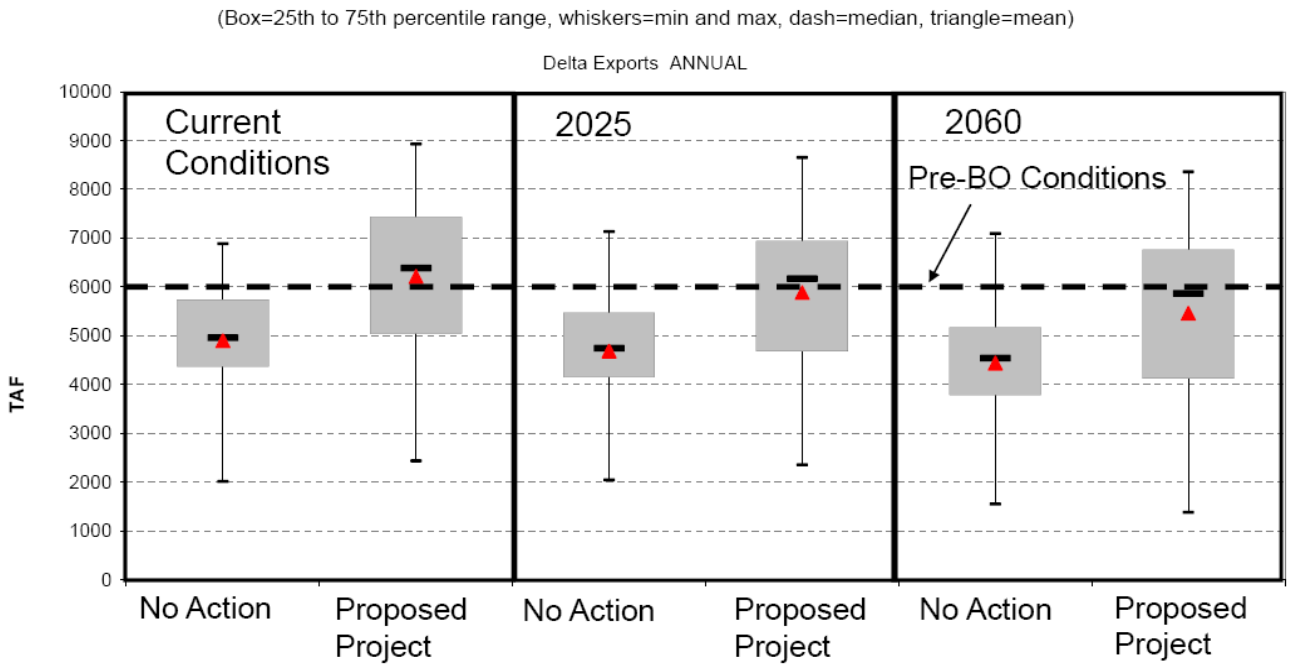
- Complete initial consultant's ***Effects Analysis*** by September 22, 2010 incorporating comments received by September 1, 2010.
- Use conclusions of initial ***Effects Analysis*** as appropriate to revise ***Conservation Measures***.
- Initiate ***Effects Analysis*** of BDCP ***Near-term Operations*** proposal, September 15.
- Continue to refine ***Effects Analysis*** working directly with ***Effects Managers Group*** and technical working groups through October 15 for inclusion in November 18, ***Public Viewing*** draft of BDCP.
- Submit November 18 ***Effects Analysis Methodologies*** for ***Independent Science Review*** conducted by the Delta Science Program.
- Revise initial ***Effects Analysis*** under the direction of the ***Effects Managers Group***, using input from ***Independent Science Review*** and ongoing refinement of for inclusion of a ***Complete Effects Analysis*** in April 22, 2011 ***Public Comment Draft BDCP Conservation Strategy*** that will be released concurrently with the draft EIR/EIS. ***[Issues List: Effects Analysis; EIR/EIS 4a]***
- Initial results, which are still under review, of the ***Effects Analysis*** , focusing on effects of long-term water operations on habitat for covered fish species as well as changes in the risk of entrainment losses at the south Delta export facilities and proposed north Delta intakes, has shown beneficial effects of (1) improved habitat conditions for resident and migratory fish within the Delta resulting from substantial improvements in Old and Middle River reverse flows, and (2) reductions in south Delta entrainment losses, particularly for delta smelt adults. No major adverse

effects on upstream habitat conditions for salmonids or other covered fish species due to the proposed project have been identified to date. The effects analysis completed to date has identified areas of uncertainty in the biological response of fish to several of the changes in habitat conditions. Several specific areas where consideration of refinements to conservation actions may be beneficial have also been identified. The analysis to date provides a strong foundation for the ongoing assessment of the effects of aquatic habitat restoration for the covered fish species, as well as the integration and synthesis of results from the effects analysis in evaluating net benefits of the overall conservation strategy in contributing to the protection and recovery of these species (***see Figure 8. Annual Delta Exports***).

- The ***Effects Analysis*** of the Near-term operating criteria has just begun and needs to be completed. .

- The effect on water supply reliability of the new conveyance facilities is shown in ***Figure 8*** for both the early long-term (2025) and the late long-term (2060). The decrease in the water supply over these years is due to the projected effects of climate change. This figure will be updated to show the effects of the proposed near-term operational criteria once that modeling is complete. The figure presently illustrates the benefits of the proposed project if it could be implemented today under the ***"Current Conditions"*** heading. This is of course not possible but is helpful for illustrative purposes.

Figure 8. Annual Delta Exports



CHAPTER 6: PLAN IMPLEMENTATION

Plan Implementation Schedule

[Issues List: Conservation Strategy 3c]

Implementation of the BDCP Conservation Strategy will be conducted over the 50 year timeframe of the permits. Conservation measures will be implemented at the earliest possible date following planning, design, and regulatory compliance and will be implemented under an adaptive management process. ***Table 4. BDCP Schedule of Cumulative Implementation Outcomes*** provides the schedule for implementation of major facilities construction and habitat protection and restoration conservation measures, with cumulative acreage over time.

Table 4. BDCP Schedule of Cumulative Implementation Outcomes

Conservation Action	Near Term (YR 1-10)	Early Long Term (YR 11-15)	Late Long Term (YR 16-50)
Tunnel/Pipeline & Intakes/Screens Construction completed	YR 10		
Yolo Bypass Enhancements - Fish passage improvements completed - Fremont Weir modifications and Bypass improvements completed	YR 5 YR 10		
Tidal Habitat Restoration	14,000 acres YR 10	25,000 acres YR 15	65,000 acres YR 40
Seasonally Inundated Floodplain Restoration		1,000 acres YR 15	10,000 acres YR 40
Channel Margin Enhancement	5 miles YR 10		20 miles YR 30
Riparian Restoration		400 acres YR 15	5,000 acres YR 40
Non-tidal Marsh Restoration	400 acres YR 10		
Vernal Pool Complex Restoration	100 acres YR 10	150 acres YR 15	200 acres YR 20
Preservation of existing	150 acres YR 10	250 acres YR 15	300 acres YR 20
Grassland Restoration	1,000 acres YR 10	1,250 acres YR 15	2,000 acres YR 30
Preservation of existing	2,000 acres YR 10	3,000 acres YR 15	8,000 acres YR 40
Alkali Seasonal Wetland Preservation		300 acres YR 15	400 acres YR 20
Agricultural Habitat Maintenance	8,000-15,000 acres YR 10	9,500-18,000 acres YR 15	16,620-32,640 acres YR 40

Regulatory Assurances

[Issues List: Conservation Strategy 2d; Regulatory Approach 1c,d]

Regulatory assurances for the water operation aspects of BDCP need to provide the assurance of a stable and transparent regulatory process and a limit on the maximum loss of water supply that can result from that process over the life of the permit due to changes in water operational criteria. This stable regulatory process addresses both water operations on a real time basis and changes to the operational criteria that may be needed over time to reflect the changes in the scientific understanding of water operations effects on covered species and climate change.

Real-time regulatory assurances:

As stated previously in both the near-term and long-term sections in Chapter 3, there needs to be the ability to modify the operational criteria on a real time basis to reflect changes in hydrologic conditions and the fishery responses to these and other conditions. The current state of the science does not currently allow the development of fixed, prescriptive operational criteria that would be adequately protective in all circumstances and provide a balanced water supply. A more flexible approach is needed. However, if that approach is too flexible, then the ability to predict a stable water supply becomes almost impossible. That is currently the case with the existing biological opinions. For example, the operational range of the criteria set forth in the USFWS Biological Opinion could result in water supply variations of about 1.3 Million Acre-feet. Currently, decisions regarding the selection of operational requirements within this operational range are solely at the discretion of the USFWS with no required consideration of the effects on water supply. The process below provides both the flexibility and the stability needed for the real-time protection of fishery resources and provides a stable regulatory system for water operations.

The following is from the real-time sections of both the Near-term and Long-term parts of Chapter 3.

- On a real-time basis the fishery agencies (collectively the NMFS, USFWS and DFG) may vary the operating criteria up of down from the initial operating criteria establish for that year (and within the adaptive range in ***Appendix A BDCP Long-term Water Operations***) as they believe is necessary to protect at risk fish species, provided they make their best efforts to reduce the water supply impacts to the SWP and CVP of making such variations to zero by the end of June each year.

- DWR will calculate the net water supply impacts of the variations from the initial operating criteria on a daily basis and report this to the fishery agencies at least on a weekly basis.

- As the fishery agencies make variations within the operational range during the year that have water supply costs in relation to the water supply that would have been achieved absent those variations, they and the SWP and CVP water operators will identify actions which can be taken later in the year in their best efforts to make up for water supply losses.

- At the end of each water year an annual review will be conducted that evaluates the performance of the Annual Operations Strategy, the fishery protection variations and water supplies achieved during the previous year. This review will guide the Annual Operations Strategy for the coming year and may lead to changes in the Initial Operational Criteria and the next years Operational Line via the process set forth in Chapter 6 (see section on Regulatory Assurances).

Long-term Regulatory Assurances:

The scientific underpinnings of the initial long-term operational criteria shown in Appendix A will likely change over time based upon new scientific understanding, changes to the environment and the Delta and better understanding of how water operations are managed. Cumulative changes in operational criteria could result in an increase or decrease in expected water supplies, based on the best available science. To advance the co-equal goals, the BDCP must include flexibility for changes driven by adaptive management, but also provide some bounds to those changes to provide the regulatory assurance necessary for water supply reliability.

The Annual Operations Review presented in Water Operations section of Chapter 7 and the 5 year review presented in the Adaptive Management section of Chapter 3 could result in suggested changes to the Initial Operational Criteria shown in Appendix A within the bounds of the Adaptive Range show for those criteria. If such a recommendation is forthcoming, then the Directors of the 5 Agencies (USFWS, NMFS, DFG, DWR, USBR) will meet and jointly decide on such changes to the Initial Operational Criteria.

If the populations of covered species are self-sustaining, the Directors will limit modification of the Initial Operating Criteria such that cumulative average water supply impacts to the SWP and CVP are no greater than 250 TAF per year distributed proportionally over hydrologic year types as measured against the water supply derived from the Initial Operational Criteria shown in Appendix A. However, if the population dynamics of covered species have changed to the point that they are not self-sustaining and an independent science review confirms that changes in Operational Criteria are necessary to achieve self sustaining populations of covered species, then the Directors can agree to changes in the Initial Operations Criteria within the Adaptive Range that exceed 250 TAF per year. If the Directors cannot reach consensus then this decision will be elevated to the Secretaries of Commerce and Interior and the Governor of the State of California for joint resolution.

Permit Duration

The Plan Participants are seeking take authorizations from the State and federal fish and wildlife agencies with terms of 50 years. The term of the take authorizations issued under the BDCP would begin from the date of their issuance. The proposed 50-year term is necessary to achieve the overall BDCP goals of water supply reliability and ecosystem restoration. Many of the key elements of the BDCP, including the development of substantial new water conveyance infrastructure and the implementation of an ambitious aquatic ecosystem restoration program, will require substantial commitments of funding and a protracted period to fully realize. The duration of the permits must be sufficient to

justify such expenditures of funds, allow for proper sequencing and effective implementation of the actions contemplated by the Plan, and to afford regulatory stability with respect to the operation of the primary water delivery systems for the State of California. A permit term of 50 years provides a practicable time frame in which to carry out the activities that will be authorized under the Plan, including adaptive management strategies, and maximize the benefits of these activities to species and their habitats.

Management of BDCP conservation lands (tidal, floodplain, terrestrial habitats) does not end with the permit termination. BDCP conservation lands will be managed as habitat preserves in-perpetuity.

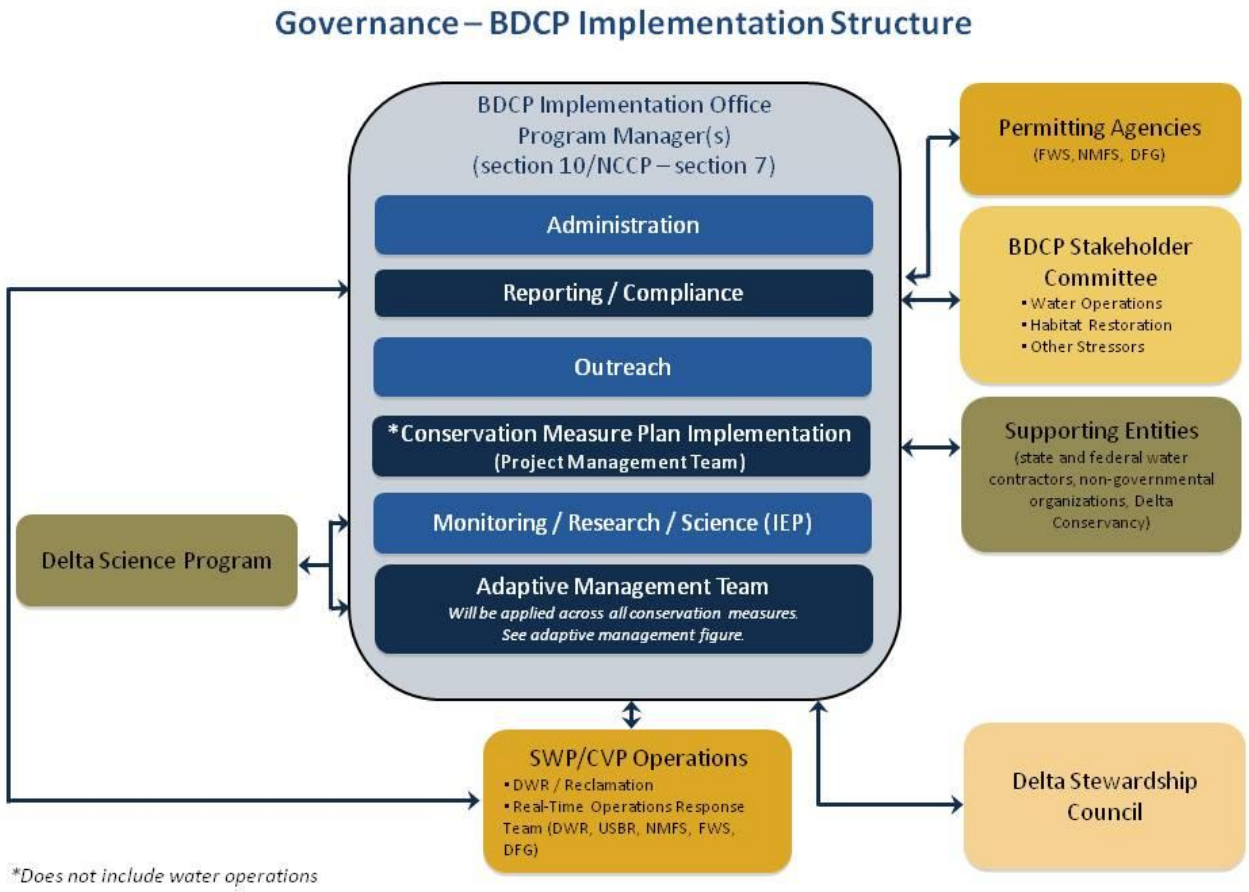
CHAPTER 7: IMPLEMENTATION STRUCTURE

Implementation Structure (Governance)

[Issues List: Implementation 1a-e, 2a, 3a,b]

Program Management – Implementation Office – The BDCP Implementation Office will be established to implement the non-water operations elements of the Plan and assure overall Plan compliance. The BDCP will be managed by a state (DWR) and a federal (Reclamation) Program Manager, or one Program Manager on behalf of the two agencies, if authorized. The Program Manager(s) will be responsible for implementing, coordinating, overseeing, and reporting on implementation of all aspects of the BDCP, including water operations (review only), habitat restoration, measures to address other stressors, monitoring and data collection, scientific research, adaptive management, reporting, and public outreach to assure compliance under Sections 7 and 10 and NCCPA. Delta water operations will be coordinated as described below. The Program Manager(s) will have a core support staff, which will be drawn primarily from DWR and Reclamation as well as from other state and federal agencies, and supporting entities including the State and Federal Water Contractors Agency. The Program Manager will provide for periodic fiscal audits of the Program.

Figure 9. Governance



Supporting Entities – The Program Managers through DWR or Reclamation on behalf of the Program may enter into agreements with other entities to support Program implementation. For example, it is anticipated that the State and Federal Water Contractors Agency will take a primary and substantial role in implementing the BDCP and could do so as a supporting entity under an agreement or agreements with the DWR or Reclamation on behalf of the Program. Other potential supporting entities include the Delta Conservancy, local governments, NGOs, and adjacent landowners covered by HCPs. If necessary, supporting entities will be provided take coverage through Certificates of Inclusion. All Program activities carried out by a supporting entity will be conducted under the direction of the Program Manager(s).

Project Management Team (PMT) – A team of implementing agencies, fishery agencies, supporting agencies and regulatory agencies, as appropriate, will be formed by the Program Manager. The PMT will work with the Program Manger(s) to develop the annual work plan for implementation of Conservation Measures: habitat restoration and other stressors, targeted research to address uncertainties, Conservation Measure implementation related effectiveness monitoring. The PMT will assure that the development of habitat restoration and other stressors measures, monitoring and data collection, research, and other adaptive management activities, are consistent with the BDCP other regulatory requirements and can be implemented in a timely manner. The PMT is not involved in water operations.

BDCP Stakeholder Committee – This Committee will act as a forum in which the Program Manager(s) and participating public agencies and private entities exchange information and discuss matters related to program implementation, and for individual members of the Committee to provide input to the Program Manager(s). Membership will include, at minimum, current Steering Committee members, Delta counties, and other Delta interests. This committee is expected to meet at least twice a year.

Water Operations – DWR and Reclamation will retain their authority and obligation to determine overall water project operations consistent with their various authorities, permit terms and conditions, and other applicable requirements. The Program Manager(s) will assure close coordination of BDCP activities between CVP and SWP Operation Managers and Program activities. DWR and Reclamation will conduct Delta operations in close coordination with DFG, FWS and NMFS and in accordance with permitted operating criteria, and consistent with the following processes.

a. *Annual Operations Review* – No later than November 15 each year, DWR and Reclamation, with participation from DFG, FWS and NMFS, will report on the effects of the prior water year's operations on covered species, identify new data collected, and evaluate the effectiveness of actions and new scientific research. The report will also describe the extent to which water supply projections in the prior year's Annual and Seasonal Operations Strategies were met, and if not, identify factors affecting the ability to meet projections. The report will consider whether any protective actions should be altered within the plan's adaptive management range in light of new information, an inability to meet fishery protection needs, to address changed circumstances, or, consistent with fishery protection needs, an inability to meet water supply targets. The agencies will present this report as well as an initial draft of the Annual Strategy

and Monitoring and Research Plan for Operations (see below) for review by an independent science panel in an open, public forum. The independent science panel will review the report and draft plan, specifically focused on how well the agencies managed the system to meet both the fishery protection needs and water supply targets, and provide a comprehensive written review of the report and draft plan. During this annual review recommendations may be made to adjust the initial operational criteria. These recommendations will be forward to the Directors of the USFWS, NMFS, DFG, DWR and USBR for their consideration. (see Regulatory Assurances section of Chapter 6 Plan Implementation)

b. *Annual Strategy and Monitoring and Research Plan for Operations* – No later than December 15 each year, DWR, Reclamation, DFG, FWS, and NMFS will develop an annual strategy and monitoring and research plan that identifies the operations priorities for both fishery and water supply for the coming year; initial operating criteria for the year depending on hydrology; and monitoring, data collection, research, and adaptive management experiments associated with that water year's water operations. The Annual Strategy and Monitoring and Research Plan for Operations will include the first of three Seasonal Operations Strategies (see below).

c. *Seasonal Operations Strategies* – The initial operating criteria may be no later than December, March, and July of each year, DFG, FWS, and NMFS, with input from DWR and Reclamation, will seasonally evaluate then current hydrologic and fishery information. Based on this information, DWR and Reclamation, with input from DFG, FWS, and NMFS, will update their operating forecasts and expected water supply projections.

d. *Real-Time Operations Response Team* – DFG, FWS and NMFS will continuously monitor Delta conditions and, with input from DWR and Reclamation. On a real-time basis the fishery agencies (collectively the NMFS, USFWS and DFG) may vary the operating criteria up of down from the initial operating criteria establish for that year (and within the adaptive range in Appendix A BDCP Long-term Water Operations) as they feel is necessary to protect at risk fish species, provided they make their best efforts to reduce the water supply impacts to the SWP and CVP of making such variations to zero by the end of June each year. Real-time water operations criteria will be designed to increase fish benefits while recognizing the importance of meeting the water supply target in the Annual Strategy and Monitoring and Research Plan for Operations as revised in the Seasonal Operations Strategies as well as to meet other operational requirements. Final decisions rest with the respective fishery agency

CHAPTER 8: IMPLEMENTATION COSTS AND FUNDING SOURCES

Program Cost Summaries and Tables

The cost to implement the BDCP over the 50 term is provided in ***Table 5. Estimated BDCP Implementation Costs***. Low and high cost estimates are provided that were built from the sum of all low end costs for individual line items and the sum of all high end costs from individual line items, respectively.

Table 5. Estimated BDCP Implementation Costs over 50 Years
(Capital and O & M Cost) in Millions of 2009 Dollars1

Cost Category	Low Estimate		High Estimate	
	Total Cost over 50 years	*Average Annual Cost*	*Total Cost over 50 years*	*Average Annual Cost*
Water Conveyance[2]				
Capital	*$10,639*	*$213*	*$12,075$*	*$241*
Operations	*$ 3,372*	*$67*	*$3,372*	*$67*
Subtotal	***$14,011***	***$280***	***$15,447***	***$308***
Yolo Bypass[3]				
Capital	*$433*	*$9*	*$485*	*$10*
Operations	*$0*	*$0*	*$0*	*$0*
Subtotal	***$433***	***$9***	***$485***	***$10***
Habitat Restoration[4]				
Capital	*$3,257*	*$65*	*$3,789*	*$76*
Operations	*$148*	*$3*	*$158*	*$3*
Subtotal	***$3,404***	***$68***	***$3,947***	***$79***
Other Stressors[5]				
Capital	*$304*	*$6*	*$304*	*$6*
Operations	*$1,002*	*$20*	*$1,254*	*$25*
Subtotal	***$1,306***	***$26***	***$1,558***	***$31***
Program Oversight				
Capital	*$12*	*$0.2*	*$12*	*$0.2*
Operations	*$221*	*$4*	*$221*	*$4*
Subtotal	**$233**	**$5**	**$233**	**$5**
Monitoring and Research[6]				
All Costs	*$1,500*	*$30*	*$3,000*	*$60*
Subtotal	**$1,500**	**$30**	**$3,000**	**$30**
Costs not yet estimated (still under development) Methylmercury Management, Contingency Funding to address Changed Circumstances, EIR/EIS Mitigation (non-biological)				
Partial Total Capital and O&M Costs	**$20,887**	**$418**	**$24,669**	**$493**

1. The BDCP cost model estimates the expected out-of-pocket costs to implement the BDCP over its 50-year term. At this stage, how the BDCP will actually be financed has not been addressed. Doing so would require information not currently available, such as the extent to which debt financing would be used to fund projects, the expected schedule of debt issuance, and likely borrowing costs. Annual financing cost cannot be projected without this sort of information.

2. Low estimate uses DHCCP cost estimate for Tunnel/Pipeline Conveyance option; high estimate uses 5RMK cost estimate. The cost for Water Conveyance Operations includes the following: (1) energy costs for facility operations, (2) non-energy O&M, and (3) costs for replacement of major equipment. Operating costs are based on the Conveyance Facility operating costs presented to the Steering Committee on February 11, 2010. The estimate assumes that annual expenditure for replacement of major equipment does not commence until Year 21 of the plan. Facility operations are assumed to begin between implementation Year 6 and 7 of the plan.

3. Low estimate assumes less flowage easements needed at Yolo Bypass; high estimate assumes more flowage easements needed.

4. Low estimate assumes 50% BDCP cost share of floodplain restoration; high estimate assumes 75% BDCP cost share of floodplain restoration.

5. Low estimate assumes 5% of nonnative vegetation acreage treated annually; high estimate assumes 10% of nonnative vegetation acreage treated annually.

6. Estimate for monitoring and research program is a gross estimate based on an rough annual existing costs for the IEP, POD, USGS, and other programs plus additional costs assumed for new BDCP monitoring and research efforts.

Funding Sources and Assurances

[Issues List: Conservation Strategy 3b, 4a-c; Implementation 4a-c]

Sources of funding for implementing the BDCP conservation measures include the SWP and CVP water contractors, state funds (including bond moneys), federal funds, other agencies and programs (e.g., federal and state flood control programs, entities contributing to toxic contaminants). This section provides a proposed allocation of BDCP funding between direct beneficiaries and the public at large. The sources of funding and the funding share (allocation of funding among the different sources) will be as follows.

The SWP and CVP water users will pay for the water conveyance facility and the mitigation of the impacts associated with its construction. The mitigation costs will be defined as a percentage of the total BDCP habitat costs. Based on the evaluation to date and the limited amount of mitigation of terrestrial habitat loss related to the construction of the water conveyance facilities as currently configured, these costs are projected to be 10-15%.

The 8,000 acres of tidal and associated sub-tidal habitat identified in the Delta smelt Biological Opinion will be paid for by the SWP (with assistance from the CVP water users). They will also pay for any mitigation of the conversion of these acres to tidal and sub-tidal habitat. This cost may be defined as a percentage of the total tidal habitat restoration costs. This is about 12 % (8,000/65,000). The CVP mitigation acreages have not yet been developed.

In addition, the SWP and CVP water users will "contribute to the conservation of the covered species".

Public funds will pay for the remaining costs of the habitat components of BDCP

The CVP and SWP contractors will prioritize the financial responsibility for the ongoing O&M and monitoring costs of habitat protection, enhancement, and restoration actions as part of their contribution toward the conservation of covered species. Such an approach recognizes that public bond funds could be available for capital costs but would be very difficult if not impossible to be guaranteed over the 50 year life of BDCP. However, the SWP and CVP could provide such a long term funding base.

The monitoring program and a portion of the science program defined as needed by BDCP will be paid for by the SWP and the CVP water users as part of their contribution to the conservation of the species. The SWP and CVP are currently funding annual IEP programs at about $17 million in core funding (mandated monitoring) and $8 million in non-core funding (special investigations – currently Pelagic Organism Decline - POD research). Under BDCP requirements theses annual costs could double to a range of $30 -$60 million. Funding for targeted research to address uncertainties about other stressors and the expected outcomes of Conservation Measures and fundamental science questions associated with Delta ecosystem processes and functions has received substantial funding under the CalFed Science Program and Ecosystem Restoration Program, as well as other State and federal programs. It should be expected with the recent establishment of the Delta Stewardship Council that such public funded research will remain a priority and a substantial source of funding for BDCP science needs.

[Issues List: Conservation Strategy 4c]
Implementation of conservation measures addressing other stressors will be paid for by the contributors to that stressor or by public dollars. However, the SWP and CVP will provide funding for a program that is projected to be about $1 Million per year to pay for staff in the BDCP Implementation Office to advocate and pursue research to continue evaluation of other stressors and engage the regulatory agencies to take actions based upon improved scientific understanding to reduce the affects of these stressors on the health of at risk fish species in the Delta. This team will initially focus on ammonia effects and regulatory actions to eliminate those effects.

Allocation of costs among the water beneficiaries is an issue between the SWP and CVP water users. However, the "proportional use" method will be used to allocate these costs in much the same way the costs for the joint use of the San Luis Reservoir was determined.

Habitat Conservation Plans typically contain substantial amounts of funding from general public sources such as state, local and federal sources. Cost shares of the public aspects of the BDCP funding will be split between State and local shares at 50% and the federal share at 50%.

CHAPTER 9: ALTERNATIVES TO TAKE

This chapter provides a comparative assessment of the proposed BDCP conservation strategy and alternate approaches to conservation considered during plan development. As per the federal Endangered Species Act, other approaches to species conservation were evaluated relative to the proposed conservation strategy to determine: 1) potential approaches that would avoid, minimize, and mitigate take, and contribute to the conservation, of covered species, and 2) practicability of options to the proposed strategy. The purpose of this evaluation was to identify the different options that were considered and why the proposed project was selected over other options. Reasons for selecting a given proposed project action over a different action were one or more of the following:

- Proposed approach would have less take than other options
- Proposed approach would be part of a “trade-off” that provides benefits to one set of covered species but necessarily would have adverse effects on other covered species
- Other options that would result in less take are not practicable
- Other options that would result in less take would not meet the project purposes for either water supply reliability or species conservation

CHAPTER 10: INTEGRATION OF SCIENCE IN BDCP DEVELOPMENT

To ensure that the BDCP would be based on the best scientific and commercial data available, the Steering Committee sought input and advice from independent scientists on the key elements of the Plan. Early in the planning process, the Steering Committee established a group of "Science Liaisons" to recommend approaches to ensure an appropriate level of independent scientific input into the development of the BDCP and to coordinate with facilitators tasked with responsibility for arranging and overseeing the independent science process. Consistent with the requirements of the NCCPA and the policy directives of USFWS and NMFS Five-Point Policy, the Steering Committee directed the facilitators to convene independent scientists at several key stages of the BDCP planning process, enlisting well-recognized experts in ecological and biological sciences to produce recommendations on a range of relevant topics, including approaches to conservation planning for aquatic and terrestrial species in the Delta, developing biological goals and objectives, and developing adaptive management and monitoring programs.

Reports prepared by the independence science advisors to the BDCP have included recommended approaches to:

- Conservation of aquatic resources (November 2007)
- Conservation of terrestrial species (November 2008)
- Adaptive management (February 2009)
- Development of a logic chain for goals, objectives, conservation measures, outcomes and metrics (August 2009)

ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL IMPACT STATEMENT ALTERNATIVES

[Issues List: EIR/EIS 2b]

Alternative 1 - Dual Conveyance (Proposed Project)

Conveyance Infrastructure and Operations

Alternative 1 would consist of either a pipeline/tunnel generally located in the central Delta with an Intermediate Forebay and conveyance of water to Clifton Court Forebay in the South Delta. Sub-alternatives include an unlined or lined canal along the eastern Delta, or an unlined or lined canal along the western Delta. All of these options would convey water from five intakes located between Clarksburg and Walnut Grove to a new forebay located adjacent to Clifton Court Forebay. The existing South Delta intakes for Clifton Court Forebay and Jones Pumping Plant would continue to be utilized. The operations would convey up to 15,000 cfs from the North Delta using proposed flows shown in Appendix A.

Habitat Restoration

Alternative 1 proposes to include up to 65,000 acres of Tidal Marsh, up to 20 miles Channel Margin habitat, up to 5,000 acres of Riparian Forest and Scrub, up to 10,000 acres of Seasonally Inundated Floodplain, and modification of Fremont Weir and Yolo Bypass.

Other Stressors

Alternative 1 proposes to include conservation as described in BDCP Steering Committee Handout dated March 25, 2010.

Alternative 2 - Dual Conveyance with Reduced Capacity Conveyance Infrastructure and Operations

Alternative 2 would include a pipeline/tunnel generally located in the central Delta with an Intermediate Forebay and conveyance of water to Clifton Court Forebay in the South Delta. Water would be conveyed from two intakes located between Clarksburg and Walnut Grove to a new forebay located adjacent to Clifton Court Forebay. The existing South Delta intakes for Clifton Court Forebay and Jones Pumping Plant would continue to be utilized. The operations would convey up to 6,000 cfs from the North Delta.

Habitat Restoration

As proposed in Alternative 1.

Other Stressors

As proposed in Alternative 1.

Alternative 3 - Isolated Conveyance
Conveyance Infrastructure and Operations

Alternative 3 conveyance facilities would be as proposed in Alternative 1; however, the proposed operations would discontinue use of the South Delta Intakes and convey up to 15,000 cfs from the North Delta using proposed flows shown in Appendix A with the following exceptions: South Delta Channel Flows would not be applicable; Delta Outflow (July through August and December through January - per D-1641 and September through November - include Fall X2 per the USFWS Biological Opinion); and Operations for Delta Water Quality and Residence Time would not be applicable.

Habitat Restoration

As proposed in Alternative 1.

Other Stressors

As proposed in Alternative 1.

Alternative 4 –
Enhanced Aquatic Conservation with Dual Conveyance
Conveyance Infrastructure and Operations

Alternative 4 would include a pipeline/tunnel generally located in the central Delta with an Intermediate Forebay and conveyance of water to Clifton Court Forebay in the South Delta. Water would be conveyed from four intakes: two intakes would be constructed north of the confluence of Steamboat and Sutter Sloughs with the Sacramento River and two intakes would be constructed south of the confluence. The existing South Delta intakes for Clifton Court Forebay and Jones Pumping Plant would continue to be utilized. The operations would convey up to 12,000 cfs from the North Delta. Operational criteria include the Adaptive Range B from Appendix A as Initial Operational Criteria for the Sacramento River intakes and Old & Middle River flows plus the Fall X2.

Habitat Restoration

Alternative 4 proposes to include up to 65,000 acres of Tidal Marsh, up to 40 miles Channel Margin habitat, up to 5,000 acres of Riparian Forest and Scrub, up to 20,000 acres of Seasonally Inundated Floodplain, and modification of Fremont Weir and Yolo Bypass.

Other Stressors

As proposed in Alternative 1.

Alternative 5 - Separate Corridors
Conveyance Infrastructure

Alternative 5 would include construction of several operable barriers throughout the Delta to primarily convey water from the Sacramento River at the Delta Cross Channel and

Georgiana Slough through the Mokelumne River system to the San Joaquin River, and continuing along an isolated water supply corridor following Middle River and Victoria Canal to Clifton Court Forebay. Other facilities would include, but not limited to, boat locks, various canal extensions, and dredging. The operations would convey up to 15,000 cfs from the North Delta.

Habitat Restoration

As described in Alternative 1.

Other Stressors

As described in Alternative 1.

In addition to the alternatives presented above that will be analyzed in detail in the EIR/EIS the following concepts will be evaluated in some depth but at this point are not expected to be carried forward to the range of alternatives evaluated in the EIR/EIS because they have major implementation challenges and initially appear to be impracticable.

- Dual Conveyance with 100,000 acres of tidal habitat.
- Dual conveyance with 3,000 cfs isolated conveyance
- The SWRCB Flow Criteria (2010) ***[Issues List: Conservation Strategy 5aiii]***

Figure 10. Array of Alternatives

ALTERNATIVE	CONVEYANCE	NORTH DELTA DIVERSION CAPACITY (cfs)	CONVEYANCE ALIGNMENT	OPERATIONAL CRITERIA	RESTORATION CONCEPTS	OTHER STRESSORS
No Project Alternative (same as No Action Alternative	Through Delta	current operations	Through Delta	Per D-1641 as modified by Biological Opinions issued by USFWS and NMFS	Per several federal and State requirements and Biological Opinions issued by USFWS and NMFS	Per several State and federal requirements
Alternative 1 – Dual Conveyance with Intakes #1-5	Dual	15,000	Pipeline/Tunnel East Unlined East Lined West Unlined West Lined	Per BDCP Steering Committee Proposed Project (2/11/10 BDCP Steering Committee Handout)	Per BDCP Steering Committee Proposed Project (3/25/10 BDCP Steering Committee Handout)	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)
Alternative 2 – Dual Conveyance with Intakes #1-2	Dual	6,000	Pipeline/Tunnel	Per BDCP Proposed Project (2/11/10 BDCP Steering Committee Handout)	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)
Alternative 3 – Isolated Conveyance with Intakes #1-5	Isolated	15,000	Pipeline/Tunnel East Unlined East Lined West Unlined West Lined	Similar to BDCP Proposed Project (2/11/10 BDCP Steering Committee Handout) - modified to eliminate South Delta Intakes plus addition of Fall X2	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)
Alternative 4 – Enhanced Aquatic Conservation – Dual Conveyance with Intakes To Be Determined	Dual Intakes 1,2 and two south of Sutter/Steamboat	12,000	Pipeline/Tunnel	Most of Adaptive Range B from the Proposed Project	Similar to BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout) Plus additional 20 miles of Channel Margin Habitat and 10,000 acres of Seasonally Inundated Floodplain	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)
Alternative 5 – Separate Corridors with Screened Intakes at Delta Cross Channel and Georgiana Slough	Through Delta	15,000	Through Delta Channel Modifications	Similar to BDCP Proposed Project (2/11/10 BDCP Steering Committee Handout)	Similar to BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout) with changes in South Delta	Per BDCP Proposed Project (3/25/10 BDCP Steering Committee Handout)

Appendix A
State Proposal
Long-Term BDCP Water Operations Analytical Range
(September 9, 2010 Draft)

1. North Delta Diversion Bypass Flows

Objectives include flows of the functional equivalent thereof to (1) maintain fish screen sweeping velocities, (2) reduce upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Adaptive Range A Operational Criteria	Initial Operational Criteria	Adaptive Range B Operational Criteria
Constant Low-Level Pumping (Dec-Jun): Diversions up to 10% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.	**Constant Low-Level Pumping (Dec-Jun):** Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.	**Constant Low-Level Pumping (Dec-Jun):** Diversions up to 2% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.
Initial Pulse Protection: No pulse flow protection criteria implemented.	**Initial Pulse Protection:** Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to pre-pulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (SubTable A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement. If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same	**Initial Pulse Protection:** No range. (Same as initial operations)

	protective operation.	
Post-Pulse Operations: After initial flush(es), go to Level I post-pulse bypass rule (see SubTable A) until **10** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until **20** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.	**Post-Pulse Operations:** After initial flush(es), go to Level I post-pulse bypass rule (see SubTable A) until **15** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until **30** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.	**Post-Pulse Operations:** After initial flush(es), go to Level I post-pulse bypass rule (see SubTable A) until **20** total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until **45** total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

2. South Delta Channel Flows

Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.

Analytical Range A Operational Criteria

OMR Flows

Old and Middle River flows no less than the values below:

Combined Old and Middle River flows no less than values below* (cfs)					
Month	W	AN	BN	D	C
Jan	-6000	-6000	-6000	-6000	-6000
Feb	-6000	-6000	-6000	-6000	-6000
Mar	-6000	-6000	-6000	-6000	-6000
Apr	-6000	-6000	-6000	-6000	-6000
May	-6000	-6000	-6000	-6000	-6000
Jun	-6000	-6000	-6000	-6000	-6000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-7200	-7200	-7200	-7200	-7200

* Values are monthly average for use in modeling. December 20-31 targets are -6000 cfs and are averaged with an assumed background of -8000 cfs for December 1-19.

Initial Operational Criteria

OMR Flows

- FWS smelt and NMFS BO's model of adaptive restrictions (temperature, turbidity, salinity, smelt presence)

Table below provides a rough representation of the current estimate of "most likely" operation under FWS and NMFS BO's for modeling purposes.

Combined Old and Middle River flows no less than values below* (cfs)					
Month	W	AN	BN	D	C
Jan	-4000	-4000	-4000	-5000	-5000
Feb	-5000	-4000	-4000	-4000	-4000
Mar	-5000	-4000	-4000	-3500	-3000
Apr	-5000	-4000	-4000	-3500	-2000
May	-5000	-4000	-4000	-3500	-2000
Jun	-5000	-5000	-5000	-5000	-2000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6800	-6800	-6300	-6300	-6100

* Values are monthly average for use in modeling. December 20-31 targets are -5000 cfs (W, AN), -3500 cfs (BN, D), and -3000 cfs (C), and are averaged with an assumed background of -8000 cfs for December 1-19. Values are reflective of the "most likely" operation under the FWS Delta Smelt Biological Opinion. Values for modeling may be updated based on review by fishery agencies.

Analytical Range B Operational Criteria

OMR Flows

Old and Middle River flows on a 14 day average basis no more negative than:

- -2000cfs from Dec 1 to Mar 31
- 0cfs from Apr 1 to May 30
- -2000cfs from June 1 to Jun 30
- Same as proposed from Jul 1 to Nov 30:
- SWP CCF Intake and CVP Jones Pumping plants average daily flow no lower than 1,500 cfs

Initial Operational Criteria
South Delta Export – San Joaquin Inflow Ratio[1] • Sliding scale for flows above the established OMR to share additional SJR flows between export and environment; export share would increase at higher flows • Time value of benefit; crediting outside of period in which flows are acquired

[1] The effects of potential increased San Joaquin River inflows on BDCP goals and objectives will be evaluated separately from the BDCP Effects Analysis.

3. Fremont Weir/Yolo Bypass

Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.

Analytical Range A Operational Criteria	Initial Operational Criteria
	Sacramento Weir - No change in operations; improve upstream fish passage facilities
	Lisbon Weir - No change in operations; improve upstream fish passage facilities
Fremont Weir – Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities	Fremont Weir – Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet
Fremont Weir Gate Operations -	
December 1-March 30 open the 17.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.	December 1-March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.
Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 25,000 cfs	Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide

	greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs

6. Delta Inflow & Outflow

Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.

Analytical Range A	Proposed Operations	Analytical Range B
<u>Delta Outflow:</u> Jul-Jan: Per D-1641 Feb-Jun: Per D-1641*, except no Roe Island triggering * Current relaxation of Collinsville standard to 4,000 cfs in May and June revised to state when the Eight River Index is 10.0 or less as established on May 1. ** Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions	<u>Delta Outflow:</u> Jul-Jan: Per D-1641 Feb-Jun: Per D-1641 * Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions	<u>Delta Outflow:</u> **Summer, Winter, and Fall:** Jul-Aug & Dec-Jan: Per D-1641 Sep-Nov: Fall X2 per FWS Smelt BO **Spring:** Feb-Jun: NGO X2-Eight River Index approach in all years (storage off-ramps in all year types will be refined to avoid upstream coldwater storage impacts on all reservoirs). * Proportional Reservoir Release concept will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions ** Continue analysis of NGO watershed unimpaired runoff approach as it relates to PREs and parties outside of BDCP. Carry into "related action" alternative.

4. Delta Cross Channel Gate Operations

Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.

Proposed Operations
Oct-Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec-Jun: DCC gate closed Jul-Sep: DCC gate open

5. Rio Vista Minimum Instream Flows

Maintain minimum flows for outmigrating salmonids and smelt.

Proposed Operations
Sep-Dec: Per D-1641 Jan-Aug: Minimum of 3,000 cfs

7. Operations for Delta Water Quality and Residence Time

Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.

Proposed Operations
Assumptions for analysis: Jul-Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct-Jun: Prefer north delta pumping (real-time operational flexibility)

8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements

Existing M&I and AG salinity requirements.

Proposed Operations
Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Three Mile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.[2]

[2] The results of the water quality modeling from the effects analysis will be used to determine if other actions are needed to address water quality issues that may arise, including water quality in the southern and central Delta for both Agricultural and M&I due to the BDCP Long-term operations.

SubTable A. Post-Pulse Operations for North Delta Diversion Bypass Flows.

Level I Post-Pulse Operations

Based on the objectives stated above, it is recommended to implement the following operating criteria:

- Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.

Dec - Apr

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (see main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs
20,000 cfs	no limit	18,400 plus 30% of the amount over 20,000 cfs

May

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (see separate table)

Level II Post-Pulse Operations

Based on the objectives stated above, it is recommended to implement the following operating criteria:

- Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.

Dec - Apr

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (see main table)
11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000
15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs
20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs

May

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (see separate table)

Level III Post-Pulse Operations

Based on the objectives stated above, it is recommended to implement the following operating criteria:

- Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.

Dec - Apr

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (see main table)
9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000
15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs

May

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (see separate table)

15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs
20,000 cfs	no limit	17,900 plus 20% of the amount over 20,000 cfs

Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (see separate table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs
20,000 cfs	no limit	17,400 plus 20% of the amount over 20,000 cfs

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000
15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs
20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs

Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (see separate table)
11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000
15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs

9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000
15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Jun

If Sacramento River flow is over--	But not over--	The bypass is:
0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (see separate table)
9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000
15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs

Jul-Sep: 5,000 cfs
Oct-Nov: 7,000 cfs