Fish Restoration Program Agreement

Implementation Strategy

Habitat Restoration and Other Actions for Listed Delta Fish

Department of Water Resources and Department of Fish and Game in coordination with the US Fish and Wildlife Service and the National Marine Fisheries Service

Cover: Prospect Island, Sacramento River Deep Water Ship Channel, and Liberty Island (Photo Credit: Dale Kolke)

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Department of Water Resources
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1. Introduction

1.1 Purpose

The Fish Restoration Program Agreement (FRPA) (Appendix A), between the Department of Fish and Game (DFG) and the Department of Water Resources (DWR), was signed on October 18, 2010. FRPA addresses specific habitat restoration requirements of the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions (Biological Opinions) for State Water Project (SWP) and Central Valley Project (CVP) operations. FRPA is also intended to address the habitat requirements of the DFG Longfin Smelt Incidental Take Permit (ITP) for SWP Delta operations. The primary objective of the FRPA program is to implement the fish habitat restoration requirements and related actions of the Biological Opinions and the ITP in the Delta, Suisun Marsh, and Yolo Bypass and is focused on 8,000 acres of intertidal and associated subtidal habitat to benefit delta smelt, including 800 acres of mesohaline habitat to benefit longfin smelt, and a number of related actions for salmonids. DFG and DWR intend that habitat restoration actions implemented in compliance with the USFWS biological opinion that also meet the habitat restoration requirements of the ITP will operate to satisfy the acreage requirements of the ITP.

The purpose of this Implementation Strategy is to describe the process by which DWR and DFG will implement the FRPA program, and to satisfy Section B of FRPA. Section B of FRPA requires DWR, with assistance from DFG, to develop an Implementation Schedule that will identify restoration actions, estimated costs, targeted acreage, and a timeline for DWR's implementation of restoration actions to satisfy DWR's obligations under the Biological Opinions and ITP. Appendix B lists the specific habitat restoration requirements of FRPA, the Biological Opinions, and the ITP that pertain to this program. This document lays out the strategy to address these requirements. In addition, DWR and DFG will complete the necessary environmental compliance documents to implement site specific habitat restoration projects; this may include tiering from existing programmatic documents where appropriate.

Pursuant to FRPA, DFG will work cooperatively with and assist DWR in establishing the management and financial framework necessary to implement the FRPA program. DWR, with assistance from DFG, will begin a process to fund, plan, and implement actions, including aquatic habitat restoration to benefit delta smelt, longfin smelt, and winter-run and spring-run Chinook salmon (hereafter referred to as Covered Fish Species) to mitigate impacts to these species caused by the SWP Delta operations. Specifically, these actions include:

- Delta Smelt Biological Opinion Reasonable and Prudent Alternative (RPA) Component 4;

- NMFS Biological Opinion RPA Actions 1.2.6 and 1.6.2 in partnership with the US Bureau of Reclamation (Reclamation);
- NMFS Biological Opinion RPA Action Suite 1.6 and 1.7. FRPA will not be lead, but will provide funding and technical support assistance only;
- ITP Condition 7.

DWR's obligations focus on delta smelt, longfin smelt, and winter-run and spring-run salmon, and may also benefit steelhead, sturgeon, and other native fish species.

1.2 FRPA Goals and Objectives

The goals of FRPA, as mutually agreed upon by DWR and DFG, are to:

- Identify and implement actions that will address the habitat restoration requirements of the Biological Opinions and ITP;
- Facilitate interagency planning discussions to achieve the above goal;
- Facilitate interagency project planning forums to achieve a process that will include public openness and the interests of stakeholders;
- Utilize and incorporate sound science and current available information in developing restoration and enhancement designs;
- Maintain consistency with the Bay Delta Conservation Plan (BDCP), Delta Stewardship Council's (DSC) Delta Plan, Ecosystem Restoration Program (ERP) strategies, and other large-scale planning efforts.

Objectives to achieve these goals are to:

- Restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh, including 800 acres of mesohaline habitat to benefit longfin smelt, to enhance food production and availability for native Delta fishes;
- Restore processes that will promote primary and secondary productivity and tidal transport of resources to enhance the pelagic food web in the Delta;
- Increase the amount and quality of salmonid rearing and other habitat;
- Increase through-Delta survival of juvenile salmonids by potentially enhancing beneficial migratory pathways;

1.3 Program Description

The FRPA program is a joint effort between DWR and DFG in coordination with USFWS, NMFS, and Reclamation to satisfy DWR's requirements for habitat restoration and related actions to benefit fish under the Biological Opinions and ITP. The program will also satisfy requirements in FRPA. The FRPA program structure and support are discussed in this section, along with estimated costs, acreage targets, and timelines. Restoration actions are another major program component and are discussed in Section 2.

1.3.1 Program Structure and Support

The FRPA program will have a project-based organizational structure (Fig. 1) that utilizes teams to implement specific actions and provide implementation, program support, and coordination. The individual project teams will be staffed by DWR, DFG, and potentially other agency personnel, and will report to and receive direction from the Coordination and Management Team. The Coordination and Management Team is composed of staff and lower management personnel from DWR, DFG, Reclamation, NMFS, and USFWS. The Coordination and Management Team will report directly to the Policy Team, which is composed of upper management personnel from DWR and DFG. The Project Sponsor, DWR Deputy Director for Delta and Statewide Water Management, will provide overall direction and have decision-making authority for the program, including approval of the FRPA specific action SWP Project Charter (see Section 2.2.1). Director Decision Memos will be used to communicate recommended actions to the Directors of DWR and DFG, and obtain approval for implementation.

The Coordination and Management Team and the Policy Team will work with the 5-Agency Group and Implementation Management Team overseeing the Biological Opinions and ITP to ensure coordination and acceptance of FRPA efforts by DFG, USFWS, and NMFS. In addition, FRPA teams will also work with the BDCP's Fish Agency Strategy Team (FAST) to ensure coordination and acceptance of FRPA efforts for the BDCP where appropriate. This effort is being initiated under the recent BDCP Habitat Credit Memorandum of Agreement (see Section 1.4). Stakeholders, other agencies, and DWR and DFG legal counsel will also be advising the various teams throughout the implementation process.

The core DWR program support consists of one Senior Environmental Scientist, three Environmental Scientists, and one Scientific Aid. One Staff Environmental Scientist and one Associate Government Program Analyst will also assist on a part-time basis to manage the FRPA financial components. Additional DWR staff will assist as needed and available. DWR FRPA staff will lead and implement the habitat restoration requirements of the Biological Opinions and ITP in the Delta. DWR FRPA staff may provide limited staff support to habitat restoration efforts in Suisun Marsh and Yolo Bypass. However, the primary responsibility of the FRPA program in these areas will be to provide project funding as a partner on actions that will provide for habitat acreage credits or to satisfy specific actions under the ITP and NMFS RPA Suite 1.6 and 1.7.

DWR is also funding eight support positions in DFG (six Staff Environmental Scientists, one Environmental Scientist, and one Wildlife Habitat Supervisor) under the FRPA program. Major responsibilities for these positions will include assisting DWR in its restoration planning and implementation activities, monitoring and reviewing DWR's implementation schedule, and supporting operational decision-making associated with avoidance and minimization measures required under the Biological Opinions and the ITP.

Fish Restoration Program Agreement

Roles & Responsibilities/Decision-making Chart

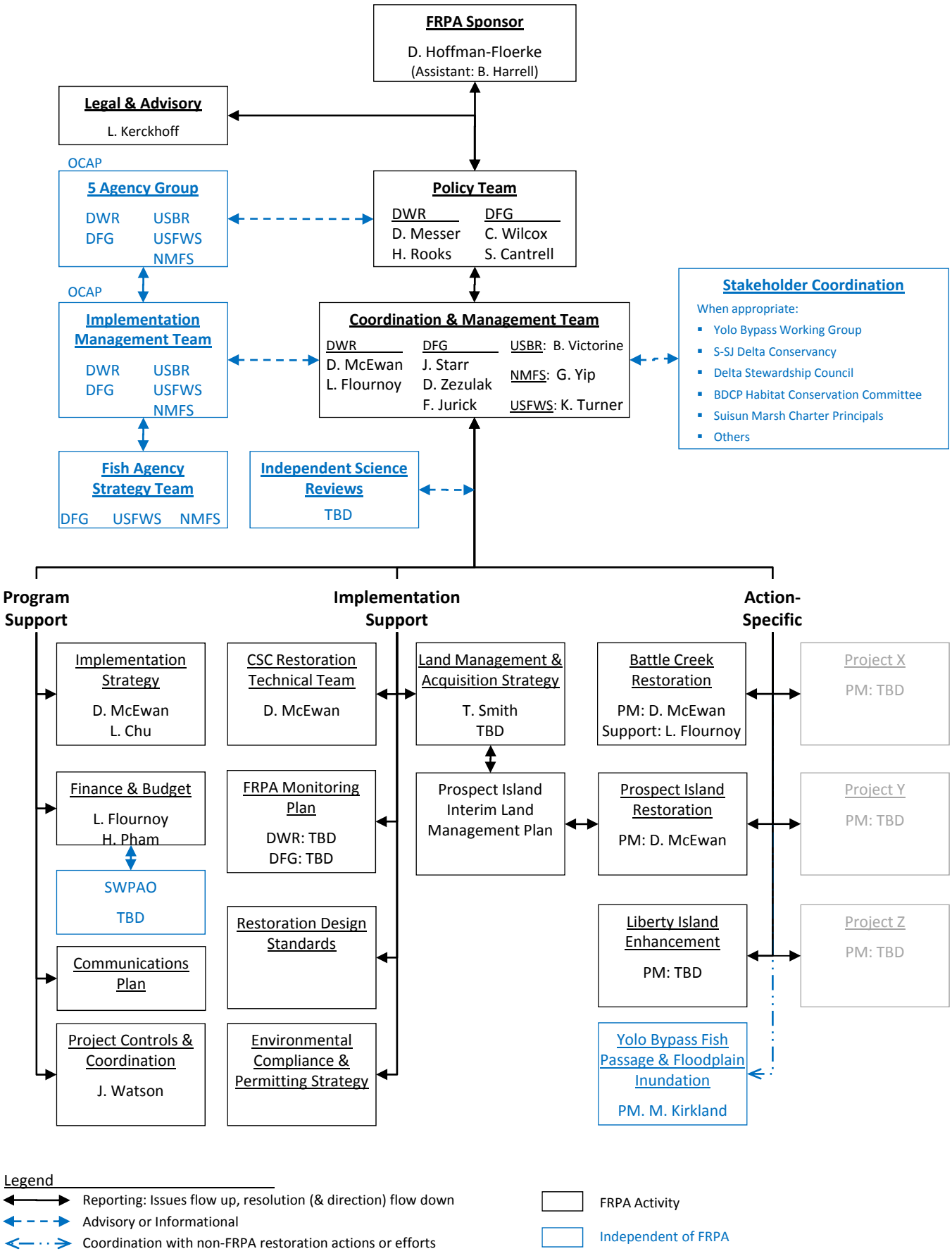

Figure 1. Roles, responsibilities, and coordination of FRPA

Science and technical support will be provided through interagency and related efforts. Interagency technical teams for the Cache Slough Complex, Suisun Marsh, and Yolo Bypass will provide scientific and technical review of the individual restoration actions, depending on the location of the project. Overall technical guidance and independent science review may also be provided by the Interagency Ecological Program (IEP) Management Team, the Delta Science Program, or others as appropriate. The Delta Stewardship Council Delta Plan and the BDCP both include discussions and processes that describe how DWR (and other habitat restoration implementing agencies) will work with USFWS, NMFS, and DFG (hereafter referred to as the Fishery Agencies) in designing, implementing, and crediting restoration projects, including the FAST process mentioned above. DWR will work with these agencies through the procedures described in these guiding documents when they are finalized.

1.3.2 Estimated Costs, Acreage Targets, and Timeline

During the FRPA negotiations, the estimated costs, acreage targets, and timelines for the FRPA program were developed as part of the agreement. The costs were based on an estimated cost per acre of restored aquatic habitat to benefit delta smelt, annual funding for anadromous fish actions, and program staffing and administration costs. An annual and 10-year total cost estimate to implement the entire Fish Restoration Program has been prepared by the FRPA Project Team as described below, and in Table 1. All costs, acreage targets, and timelines are based on the best available information and will be updated as additional information is available, and at least annually as part of reporting (see Section 4.3).

DWR and DFG management developed a per-acre cost estimate to determine the estimated cost of the FRPA implementation over the 10-year term of the agreement. The estimate of $20,000 per acre is based on previous DWR/DFG restoration project costs and is considered a reasonable upper average cost-per-acre estimate of restored habitat to use for restoration planning purposes. This estimated cost includes all components necessary to implement restoration actions, including land acquisition and management, planning, design, environmental documentation and permitting, construction, re-vegetation, monitoring, adaptive management, and long-term operation and maintenance. Based on the estimated cost of $20,000 per acre and the 8,000 acre restoration requirement, the cost to implement this aquatic habitat component of FRPA is estimated to be $160 million. Other costs associated with the program include a one-time $12 million in funding to fulfill NMFS RPA Action 1.2.6 (Battle Creek restoration), $1.5 million annually for anadromous fish actions in the Yolo Bypass (NMFS RPA Suite 1.6 and 1.7) with concurrence of DFG and the other Fishery Agencies, and annual program administration support and staffing costs for DWR and DFG. Total FRPA program costs are currently estimated at $205 million, but actual costs may vary.

Based on the 10-year agreement term and acreage requirements of the Biological Opinions and ITP, the acreage targets for the 8,000 acres of aquatic habitat to benefit delta smelt were derived proportionately for milestones at years 4, 6, 8, and 10 as indicated in Table 1. The acreage is applied toward these milestones upon securing and initiating implementation.

Fish Restoration Program Agreement		Estimated Costs in Millions ($)										
POTENTIAL RESTORATION - MITIGATION ACTIONS	ACRES[1]	Year 1	2	3	4	5	6	7	8	9	10	TOTAL
8,000 acres Intertidal-Subtidal (includes 800 acres in mesohaline area)												
Actions within Cache Slough Complex and Delta												
Prospect Island	1316											
Liberty Island	TBD											
Lower Yolo Ranch	1560											
Western Cache Slough Complex	TBD											
Little Holland Tract Acquisition	TBD											
Eastern Egbert Tract Restoration Project	TBD											
Calhoun Cut Ecological Reserve	196											
Actions within Suisun Marsh and Nearby Areas												
Hill Slough Tidal Marsh Restoration	950											
Rush Ranch	80											
Overlook Club	245											
Meins Landing	660											
Restoration Support Contract (estimated)												
Estimated Costs - 8,000 acre Requirement[2]		$8	$11	$15	$18	$18	$18	$18	$18	$18	$18	**$160**
Battle Creek Salmon and Steelhead Restoration[3]	NA	$6	$6									**$12**
Anadromous Fish Actions (Yolo Bypass and other)[3]	NA											
Lower Putah Creek Realignment	NA											
Lisbon Weir Improvements	NA											
Tule Canal Connectivity	NA											
Fremont Weir Fish Passage	NA											
Yolo Bypass Floodplain habitat	NA											
Estimated Costs - Anadromous Fish Actions		$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	**$15**
Subtotal - All Restoration Actions												**$187**
Program Support												
DFG Staffing Resources (8 PY's)		$0	$1.15	$1.15	$1.15	$1.15	$1.15	$1.15	$1.15	$1.15	$1.15	**$10**
DWR Staffing Resources (5 PY's)		$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	$0.75	**$8**
Subtotal - Program Support												**$18**
Percent progress - mitigation acreage target					35%		60%		80%		100%	**100%**
Total Estimated FRPA Program Costs												**$205**

1 Total acres for project; acreage credit will be determined at a later date.

2 Estimated costs based on $20,000 per acre to acquire and restore habitat for 8,000 acres required = $160 Million. Actual costs may vary.

3 FRPA will provide funding only for these projects

Table 1. Estimated costs and acreage targets for potential FRPA restoration actions

Within this 8,000 acre requirement, 800 acres of aquatic habitat in the mesohaline zone are required to satisfy the ITP.

Section 7.1 of the ITP lists restoration milestones, beginning with the acquisition and planning for the restoration of at least 160 acres of habitat within two years of issuance of the ITP, and 160 acres every two years, to complete restoration of 800 acres within 10 years. The ITP requires the habitat to be intertidal and associated subtidal wetland habitat in the mesohaline zone (Suisun Bay or Marsh) with hydrologic connectivity to open waters.

1.4 FRPA's Relationship to Other Programs

In addition to the habitat restoration efforts taking place under FRPA, there are a number of other Delta and Suisun Marsh restoration and planning efforts underway with which the FRPA program will need to coordinate. Among these are:

- Delta Stewardship Council Delta Plan,
- Bay Delta Conservation Plan,
- Suisun Marsh Habitat Management, Preservation, and Restoration Plan,
- Ecosystem Restoration Program Stage 2 Conservation Strategy,
- Delta Native Species Recovery Plan,
- Sacramento-San Joaquin Delta Conservancy Interim Strategic Plan.

It is the intent of FRPA to work within the established framework of these and other planning efforts, and to facilitate the implementation of the habitat restoration components of these programs where appropriate. The Delta Plan and BDCP both include discussions and processes that describe how agencies can ensure consistency in the planning and implementation of habitat restoration projects. A brief description of how FRPA will coordinate with the applicable planning and restoration efforts is presented below.

DWR and DFG intend to communicate with the Delta Stewardship Council and the Delta Conservancy to ensure actions taken pursuant to FRPA are consistent with the Delta Reform Act of 2009 (SB X7 1, Steinberg), and the Delta Plan when it is adopted (estimated completion date of June 2012). The Delta Reform Act requires that proposed covered actions in the Delta be consistent with the Delta Plan. The Delta Conservancy has attended FRPA Coordination and Implementation Strategy meetings since early in 2011.

Consistent with the BDCP Planning Agreement, DWR and DFG agree that the mitigation actions implemented pursuant to FRPA may also, if appropriate be considered BDCP Early Implementation Actions intended to mitigate ongoing SWP Delta Pumping Facilities impacts on Covered Fish Species. The locations and general nature of the mitigation actions proposed by FRPA are consistent with the preliminary discussions of conservation areas and actions for the BDCP.

In addition, the BDCP parties recently finalized the *Memorandum Of Agreement Regarding The Early Implementation Of Habitat Projects For The Central Valley Project And State Water Project Coordinated Operations Criteria And Plan And Bay Delta Conservation Plan* (BDCP Habitat Credit MOA, Appendix C). This MOA sets forth a process of identifying and evaluating habitat projects intended to contribute toward SWP and CVP acreage requirements under the federal and state Endangered Species Acts, such as the habitat projects currently proposed for implementation under FRPA. The process is intended to provide assurance that acquisition and restoration of lands for habitat projects prior to implementation of BDCP will be credited toward meeting the BDCP restoration acreage objectives. FRPA will be coordinating with the MOA effort as it is implemented to provide for an efficient review, guidance, and approval process on applicable FRPA actions.

Habitat crediting will occur through the FAST process described in the BDCP Habitat Credit MOA. FAST is intended to provide technical review to the Water Agencies (DWR, Reclamation, or SFCWA) regarding the planning of habitat projects that, once developed and implemented, are expected to assist the BDCP to achieve its stated goals and objectives and contribute to the objectives of the Biological Opinions and the ITP. FAST is designed to provide an initial concept review, early technical assistance, and a prospectus review (a review of the type and amount of credit the Water Agency believes their proposed project will yield). Once the prospectus is accepted, the Fishery Agencies (NMFS, USFWS, DFG) will prepare a Crediting Recommendation and issue the Water Agency a final crediting determination for the project.

DWR is currently negotiating a Memorandum of Agreement with the State and Federal Contractors Water Agency (SFCWA MOA) to provide ongoing coordination in planning and implementing restoration projects in the Delta, Suisun Marsh, and the Yolo Bypass. The SFCWA MOA will allow DWR and SFCWA to jointly implement restoration projects that could be credited toward DWR's obligations set forth in the Biological Opinions and the ITP. The SFCWA MOA will also allow SFCWA to carry out restoration projects on its own which could later be funded by DWR and credited toward DWR's obligations set forth in the Biological Opinions and the ITP. Projects proposed under FRPA may be eligible for implementation through the SFCWA MOA, and DWR will also coordinate its activities under FRPA with SFCWA according to the procedures set forth in the MOA. SFCWA is also a party to the BDCP Habitat Credit MOA.

As stated in the SFCWA MOA, a DWR/SFCWA workgroup meets monthly to coordinate planning and implementation of restoration actions. The workgroup is responsible for reviewing potential restoration actions. The BDCP Habitat Coordination Committee, composed of representatives of several agencies, serves as an additional venue for resolving many planning and implementation issues that arise during consideration of projects. After potential restoration projects are identified, they will then be reviewed by FAST as described in the BDCP Habitat Credit MOA (see above).

The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (SMP) is intended to resolve historical conflicts by balancing protection and enhancement of existing waterfowl and wildlife values, conservation of endangered species, and protection of state and federal

water project supply quality in the Suisun Marsh. FRPA is engaging where possible as a potential funding partner in upcoming restoration projects in accordance with the SMP.

The USFWS Delta Native Fishes Recovery Plan (DNFRP) is a strategy for the conservation and restoration of Delta native fishes through the development of measures that address the unique biological needs of species and threats to their existence. As one of the Conservation Recommendations in the Delta Smelt Biological Opinion, USFWS recommends that Reclamation and DWR develop and implement restoration measures that are consistent with this plan.

In the development of the Delta Vision Strategic Plan, the Delta Vision Blue Ribbon Task Force recommended that the ERP Conservation Strategy serve as the foundation for what will ultimately become the ecosystem component of several regional conservation plans, including the BDCP. The ERP Conservation Strategy has several processes that identify, evaluate, and fund restoration actions. The ERP and DSC are coordinating efforts to ensure that ERP actions are consistent with the Delta Plan and other planning efforts. The FRPA program will coordinate with both the ERP and DSC to ensure that all actions taken pursuant to FRPA are consistent with and forward the goals of both the Delta Plan and ERP.

2. Proposed Restoration Actions

Actions proposed for implementation through FRPA will be guided by restoration scientific principles and influenced by restoration constraints (see Section 2.5). Each action will have numerous project components that may vary based on the type of action and level of FRPA involvement, and include both near-term and potential future actions within the FRPA action area. The action area includes the Yolo Bypass, the Legal Delta, and Suisun Marsh pursuant to the habitat restoration requirements of FRPA, the Biological Opinions, and the ITP. Battle Creek restoration in the upper Sacramento River basin is also included in FRPA and the Biological Opinions. DWR's responsibility for this project is limited to providing a one-time $12 million funding contribution for the current Battle Creek Salmon and Steelhead Restoration Project.

2.1 Restoration Scientific Principles

Restoration project design will be well-grounded in conservation biology and restoration science, will use the best available science, and will use adaptive management procedures to assure the overall success of the restoration actions. The term "restoration" is intended to encompass the concepts of rehabilitation, reconciliation, protection, and conservation. The goal for designing a restoration project is not to re-create a specific historical configuration; rather, restoration projects will aim to reestablish natural ecological processes and functions, leading to sustainable resilient healthy systems that meet the needs of native species and communities. Overarching restoration principals for habitat restoration under FRPA include:

- Preserve ecological succession and dynamism of the landscape, and evolutionary trajectory of species;
- Minimize the use of artificial, highly engineered systems and features to achieve restoration goals. Focus instead on restoration of historical physical, ecological, and biological processes to achieve desired results.
- Minimize intervention and impacts caused by the restoration action; work with existing landscape features and processes as much as possible;
- Seek to emulate the historical condition, where known, which will serve as the primary guidance for restoration;
- Recognize that full restoration to historical conditions will likely not be possible in most cases; reconciliation to achieve some aspects of the historical condition may be more realistic;
- Design projects so that they can be adaptively managed and minimize the need for long-term maintenance;
- Provide a diversity of habitat types to benefit multiple Covered Fish Species;
- Design and incorporate habitat features that discourage colonization by non-native species.

The above principals are consistent with guidelines established for other planning efforts, including CALFED and the DSC draft Delta Plan.

2.2. Action Components

Each action will have numerous components (listed below) that may vary based on the type of action and level of FRPA involvement. All FRPA actions will at least have a financial component. DWR anticipates significant assistance from DFG and its own consulting team in implementing proposed restoration actions.

2.2.1 Financing

The FRPA program is funded in whole by DWR through SWP funding to meet permit compliance for SWP Delta operations. Although the FRPA program will have an annual budget, each FRPA action or project component will have an individual budget within the larger program budget. Implementation of actions required by the Biological Opinions or ITP is funded by SWP funds as part of the ongoing SWP operations and maintenance, and requires coordination with DWR's State Water Project Analysis Office (SWPAO) through an internal procedure based on Water Resources Engineering Memorandum (WREM) 65 (Appendix D).

WREM 65 sets forth the procedure to initiate, authorize, administer, and manage SWP programs in a consistent and professional manner. This memorandum requires a SWP Program Initiation and Management Document (SWP Project Charter) be completed for all new SWP projects or programs that exceed $1,000,000, and also recommends that SWP projects costing less than $1,000,000 follow these procedures as a guideline, and complete a SWP Project

Charter as well. Approval levels for all new SWP programs and projects are indicated on the SWP Project Charter template (Appendix D).

SWP Project Charters will be developed for each FRPA habitat restoration action. The individual SWP Project Charters will be provided to SWPAO and routed for consideration, signature and final approval by the SWP Deputy Director (FRPA Projects Sponsor). As part of the SWPAO process, FRPA staff will present the proposed action to both the State Water Contractor (SWC) Delta Committee, and the SWC Finance Committee as directed by SWPAO. When the SWP Project Charter for a specific action is approved, the funding procedures begin and the necessary funding processes will be implemented.

For properties transferred to DFG, the establishment of an endowment fund is normally required to ensure adequate funding for operation, monitoring, and maintenance of mitigation actions such as habitat restoration projects. However, for properties transferred to DFG from DWR pursuant to a FRPA action, the long-term costs for implementation or individual actions will be directly funded by DWR in lieu of endowment funding since DWR is able to provide adequate funding assurances into the future based on DWR's long-term SWP water supply contracts.

Pursuant to the Burns-Porter Act, DWR is authorized to use SWP revenue without annual approval by the State Legislature to pay the operations and maintenance of the SWP (Water Code Section 12937(b)). This revenue is not appropriated under the annual State budget process. Costs incurred to pay for the long term operations and maintenance of fish and wildlife mitigation areas for SWP activities are considered SWP maintenance and operations obligations, included within the first priority before payment of other SWP obligations.

In addition, DWR has a strong AA bond rating and is in a good financial position to make any on-going payments for mitigation purposes. DWR's SWP contractors, which include Metropolitan Water District of Southern California, also have strong credit ratings, which provide additional assurances of DWR's ability to make on-going payments for fish and wildlife mitigation purposes required by FRPA. DWR has notified the SWP contractors of the mitigation costs estimated by FRPA for compliance with the Biological Opinions and ITP, which is now being included in annual charges to the SWP contractors.

2.2.2 Restoration Action Identification and Land Acquisition

Potential restoration sites will be chosen using the conservation strategies for the Sacramento-San Joaquin Delta and Suisun Marsh that meet the goals of the Biological Opinions and the ITP. Potential restoration sites will need to have undergone the process requirements described in the BDCP Habitat Credit MOA process. DWR is working with DFG, USFWS, NMFS, and others to identify potential habitat restoration sites and actions through FRPA that are required under the Biological Opinions and ITP. Some general areas of the Delta, Suisun Marsh, and Yolo Bypass have been identified as being conducive to aquatic habitat restoration (action identification and selection are described in more detail in Sections 2.3 and 3). Prior to

planning and implementation of restoration actions, specific parcels will be identified and acquired through a number of options. Site acquisition could be through any of the following pathways:

- utilizing existing State or public lands,
- through other public restoration efforts in the above areas,
- through a non-governmental organization (NGO) or Joint Powers Authority (JPA), such as the State and Federal Contractors Water Agency (SFCWA), and
- working with willing landowners, if the parcels are not already public lands.

Land acquisition will be accomplished through either fee title or a conservation easement. DFG will use its Habitat Management Land Acquisition Checklist to evaluate the acceptability of any property to be transferred as part of its consideration of the proposed restoration action.

Both DWR and DFG have real estate services associated with their departments. Properties can be acquired by either DWR's Real Estate Branch (REB) contained within its Division of Engineering (DOE) or Wildlife Conservation Board (WCB) that can acquire properties. In addition, there may be opportunities to acquire properties in partnerships with other entities. If lands are acquired by DWR or DFG, REB or WCB will be the lead on contacting landowners and negotiating the final purchase, with assistance from DFG and DWR's FRPA staff. DWR may also use SFCWA, an NGO, or a JPA to acquire properties for restoration.

2.2.3 Legal and Land Management Issues

There are numerous legal and land management issues related to acquiring restoration sites and implementing actions. In addition to acquisition of sites through fee title or conservation easements, there are various agreements and documents that will be needed to implement any restoration action. DWR and DFG legal counsels will be involved in all land acquisition and land management processes, and other related processes when necessary. Efforts to change or abandon any easements that may exist on acquired property will require thorough legal review. If properties for restoration are acquired by DWR, its REB will be lead on negotiations and agreements to modify existing easements, if necessary, so that the restoration projects are not constrained.

Other potential land management issues that may need to be addressed include infrastructure removal or maintenance, levee inspection and maintenance, vandalism repair, fence and road maintenance, mowing, trespassing, poaching, and trash removal.

When a site is proposed for acquisition for restoration purposes, a land management lead will be identified who will ensure that an interim land management plan will be in place upon acquisition or shortly after. This land manager will also lead the development of a post-restoration land management plan and oversee any activities needed.

2.2.4 Stakeholder Involvement and Public Outreach

Stakeholder involvement and public outreach are an important component of restoration action implementation to ensure collaboration, acceptance, and transparency. Local agencies and public involvement will occur during the restoration action implementation process. First, the FRPA process will seek potential projects and actions through a range of currently operating forums and technical teams working to develop habitat restoration opportunities throughout the action area. Second, during the planning and design phase of specific projects, there will be periodic planning update meetings to allow stakeholders, landowners, and local agencies to exchange information, discuss concerns, and provide input. Third, public involvement will be sought during the development of the environmental documents necessary to implement any project in compliance with the California Environmental Quality Act (CEQA) as defined by State law.

2.2.5 Planning and Design

DWR and DFG, along with other agencies and interested stakeholders will collaborate on the planning and design of project alternatives. An adaptive management approach will be used throughout the project planning and design process, as described in Section 4.4. The interagency technical teams (e.g. the Cache Slough Complex Interagency Technical Team) will serve as technical advisors for individual project design. Major considerations of final design selection are: efficacy and success for long-term ecological restoration in the Delta and recovery of Covered Fish Species; feasibility and cost; potential impacts to nearby landowners and other stakeholders; opportunities for advancing Delta science; compatibility with potential future projects; and ability to change project design in light of monitoring results if necessary.

2.2.6 Environmental Compliance and Permits

Environmental compliance and permitting is an integral component of action implementation. Individual projects will be subject to CEQA and possibly National Environmental Policy Act (NEPA) analysis. It is anticipated that most projects will require an Environmental Impact Report under CEQA. DWR is anticipated to be the lead for most FRPA restoration actions. However, actions may be implemented by DFG or other project proponents. In this case, environmental compliance and permitting will be the responsibility of the project lead with assistance from DWR if needed.

All impacts will be addressed pursuant to CEQA and NEPA. In addition relevant existing agreements and contracts between DWR and other parties will be upheld unless amended. As project lead, DWR and other project leads will follow the steps described in Section 3 before committing to a definite course of action for a specific habitat restoration site. DWR will prepare CEQA documentation as early in the planning process as possible to enable environmental considerations to influence project design and mitigation measures. This will occur before project plans are finalized, but late enough in the project development to provide

detailed information about the likely effects, how they can be minimized, and to evaluate alternatives. DWR intends to thoroughly assess all reasonable alternative designs that could mitigate or avoid significant effects.

DWR may develop environmental compliance documents in-house, but will most likely utilize environmental consultants to prepare these documents. DFG will provide review and assistance where needed. DWR will serve as lead agency and DFG as responsible agency unless circumstances require that a different lead agency and responsible agency be used. DWR will be responsible for all DWR and DFG costs associated with CEQA compliance for restoration projects called for under FRPA.

In addition to CEQA and NEPA, numerous permits will be needed prior to the implementation of restoration actions (see Appendix E). DWR will comply with all Endangered Species Act (ESA) and California Endangered Species Act (CESA) regulations and requirements during the development and implementation of the restoration projects. It is anticipated that, because of potential effects to flood systems for some of the restoration projects (particularly in the Yolo Bypass), the U.S. Army Corps of Engineers (USACE) and Central Valley Flood Protection Board permit compliance will be necessary as well. In addition, given the likelihood that dredged or fill materials will be discharged into federal and state waters, Central Valley Regional Water Quality Control Board permits will likely be necessary. Other potential regulatory agencies that may require permits include State Lands Commission; Delta Stewardship Council; DFG; State Historic Preservation Office (SHPO); and others as appropriate and/or identified during the CEQA and NEPA process.

2.2.7 Monitoring and Adaptive Management

DWR, with the assistance of DFG and other agencies, will develop monitoring and adaptive management plans for each restoration site (see Section 4). Monitoring and adaptive management may also occur on an area-wide or regional level that would also support the project level effort. The degree of adaptive management (active versus passive) will be determined based on the project design, and monitoring needs will be identified based on project goals and objectives with the intent of validating preliminary modeling predictions.

Per the DSC Delta Plan, proposed ecosystem restoration actions will be required to develop a formal strategy consistent with the adaptive management framework described in the Delta Plan.

2.2.8 Construction

For most actions, DWR will assume the lead role in project oversight, construction, contracting, and management with assistance from DFG. For those actions implemented by other entities or programs, DWR may provide financial assistance or cost share. If a proposed action is to enhance an existing project or habitat, DWR and DFG will work with the habitat manager for that specific area. Project oversight will be as described above for the proposed habitat

restoration action and all activities will be done in coordination with the project or land manager.

For those projects where DWR is lead, DOE will develop the design specifications and oversee the advertise-bid-award process for construction contracts. DOE will also provide contract management and oversight and construction oversight as directed by FRPA staff and consultants. Best management practices will be used to minimize project impacts including disturbance, noise, other impacts, and greenhouse gas emissions. As-built drawings will be prepared as part of the construction component. If necessary, a re-vegetation or site maintenance plan will be included to address requirements necessary for long-term project management and maintenance during the construction component.

2.2.9 Post-Project Management

DWR commits to funding in perpetuity the management and long-term maintenance of all completed habitat restoration projects done under the aegis of FRPA. A long-term management plan for the restoration will be developed and finalized during the planning and design phase. The plan will include responsibilities, strategy, and tasks for land management, monitoring, and other items needed to adaptively manage and maintain the site into the future to meet restoration goals. A long-term management agreement will be entered into between DFG and DWR for sites that DFG will manage. This agreement will include a long-term management plan, projected costs for long-term operations and maintenance, and a written commitment from DWR to fund the total long-term operations and management costs.

2.3. Near Term Actions

Restoration actions primarily fall into two categories:

- Near-Term Actions - those that have already been identified or are in the planning stages, and
- Potential Future Actions - those that have yet to be identified.

Near-Term Actions are listed below. The framework for analyzing and selecting Potential Future Actions is described in Section 3.

Near-Term Actions are projects that are in some phase of planning or have been specifically identified in the Biological Opinions or Longfin Smelt ITP. These are identified actions that will be evaluated for implementation to initiate, if appropriate, mitigation to restore habitats that enhance productivity or provide habitat for Covered Fish Species. Several Near-Term Actions, which are all in various stages of planning and may be incorporated into the FRPA program, have been identified:

- In the Cache Slough Complex (Figure 2):
    - Prospect Island Tidal Habitat Restoration

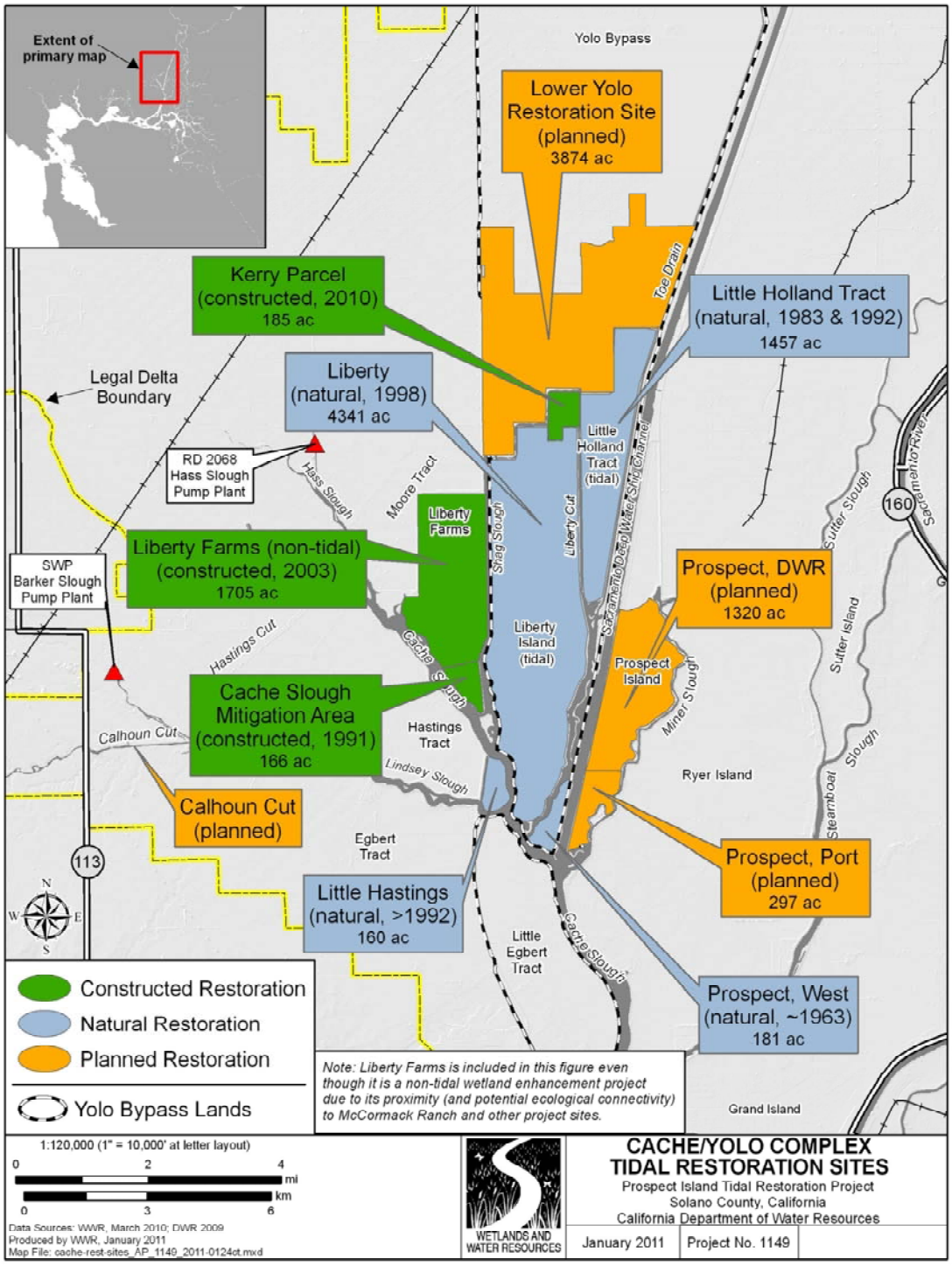

Figure 2. Near-term habitat restoration actions in the Cache Slough Complex

    - Liberty Island/Lower Cache Slough Enhancement Plan
    - Little Holland Tract Acquisition and Enhancement
    - Lindsey Slough Freshwater Tidal Marsh Enhancement
    - Lower Yolo Ranch Aquatic Habitat Restoration
- In the Suisun Marsh (Figure 3):
    - Hill Slough Tidal Marsh Restoration Project
    - Meins Landing Tidal Marsh Restoration project area
    - Rush Ranch
    - Overlook Club
- In the Yolo Bypass (Figure 4):
    - Lower Putah Creek Re-Alignment and Floodplain Restoration
    - Lisbon Weir Improvements
    - Tule Canal Connectivity
    - Fremont Weir Fish Passage
    - Increased Yolo Bypass Floodplain Inundation
- Battle Creek Salmon and Steelhead Restoration Project

The expected beneficial outcomes of the restoration actions are:

- a mosaic of dynamic habitats supporting numerous species at a significant scale;
- connection to the Yolo Bypass, Sacramento River, and Suisun Marsh;
- increased food supply for fish, birds, and marine mammals;
- landward migration of intertidal marsh over time; and
- improved hydrology so fish can reach habitats and primary production can reach the Sacramento River or other Delta waterways.

Large quantities of plankton and detritus produced by the tidally influenced wetlands would support forage on-site as well as within the Sacramento-San Joaquin Delta and Suisun Marsh (via tidal action transport). The projects will accommodate sea level rise to maintain functions of the conservation area over the long term.

Detailed descriptions of Near Term Actions can be found in Appendix F.

2.4 Potential Future Actions

Potential Future Actions are restoration projects that are expected to begin implementation in the next six to ten years. These projects would be located in the Delta, Suisun Marsh, and Yolo Bypass where existing conditions are conducive to restoration or enhancement of tidal wetlands or other habitats beneficial to the Covered Fish Species. The process of identifying, analyzing, and selecting these projects is described in the Action Selection Framework section (Section 3).

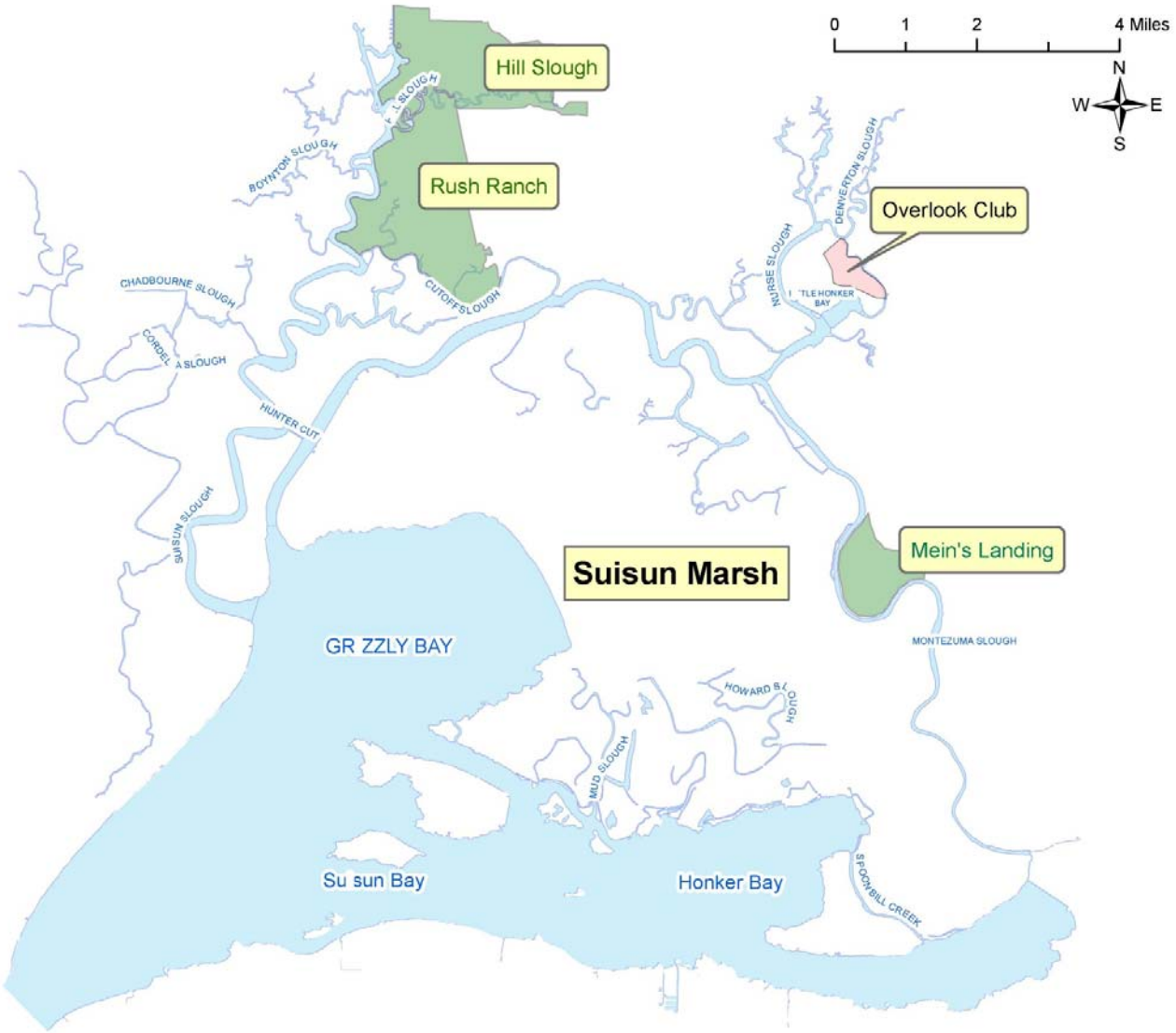

Figure 3. Near-term habitat restoration actions in Suisun Marsh

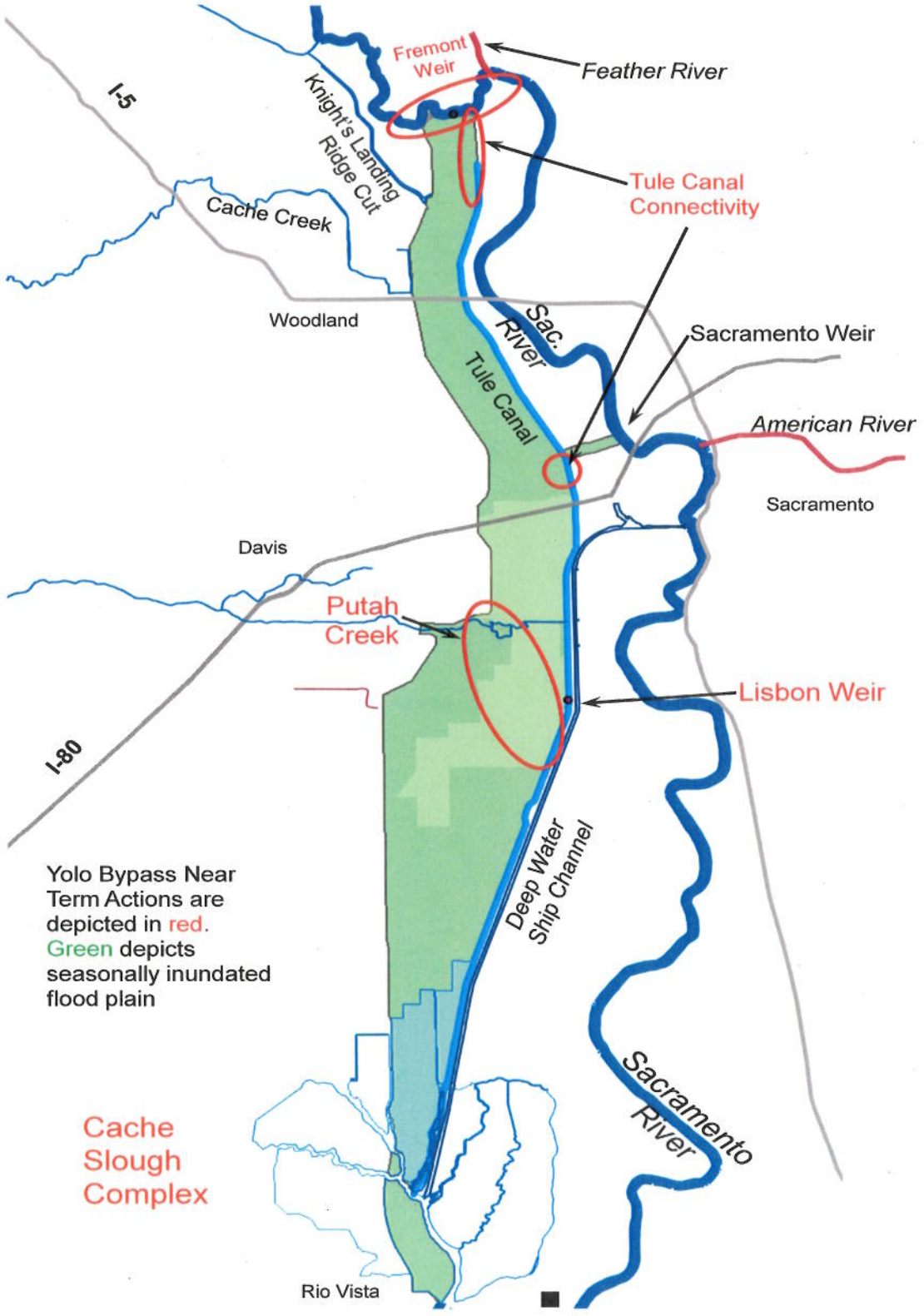

Figure 4. Near-term habitat restoration actions in the Yolo Bypass.

For tidal wetlands, elevation is probably the most important attribute for future restoration. Figure 5 shows elevations that are conducive to tidal marsh restoration. Tidal marsh generally forms between mean lower low water and mean higher high water, which in the Cache Slough Complex is between 2 and 6.5 feet above sea level (Environmental Work Group 2008). The areas that are most suitable for tidal marsh restoration are in the north Delta, which includes the Cache Slough Complex, rather than the central or interior Delta where subsidence has reduced the suitability of terrestrial areas for tidal marsh restoration.

Areas where elevations are conducive to tidal marsh restoration include (see Figure 5 for data sources):

- Western Cache Slough
- Hasting's Tract
- Eastern Egbert Tract

Potential Future Actions in the Cache Slough Complex could include:

- Fund baseline assessments and land acquisition at potential project sites;
- Develop additional tidal marsh at appropriate elevations;
- Preserve and possibly enhance current functional habitat on Little Holland Tract, Liberty Island, and other similar areas;
- Protect vegetation and habitat in the freshwater sloughs in Lindsey, Barker, and Cache Sloughs;
- Lower Yolo Bypass/Cache Slough Complex Water Diversion Evaluation and Management

The Suisun Marsh region could also provide restoration opportunities beyond those that have currently been identified. These areas include former tidal marshes that have been diked (and in many cases drained). Potential future restoration actions would include land acquisition and restoration of tidal action to provide habitat to support Covered Fish Species and to reduce ongoing adverse effects of diked lands management. FRPA would work with existing Suisun Marsh efforts primarily as a funding partner on projects.

Planning for ecological enhancements in the Yolo Bypass focuses on improving upstream and downstream fish passage, reducing straying and stranding of native fish, increasing the availability of floodplain habitat for fish rearing and spawning, and stimulating the food web in the Yolo Bypass. Modifications will need to be compatible with flood management and balance the value and needs of other existing land uses in the bypass such as agriculture, waterfowl and wildlife management, and recreation and outdoor education, and will need to consider additional constraints such as vector control and methylmercury management. Water diversions in the lower Yolo Bypass and Cache Slough Complex could be evaluated to determine if there are ecological impacts associated with current water management. If so, this could be investigated to determine if changes could be made that would reduce impacts while still meeting the needs of water users. Acquiring easements or fee title from willing land owners is likely to be required in order to allow project actions to occur. FRPA would work within the existing Yolo Bypass efforts primarily as a funding partner on projects.

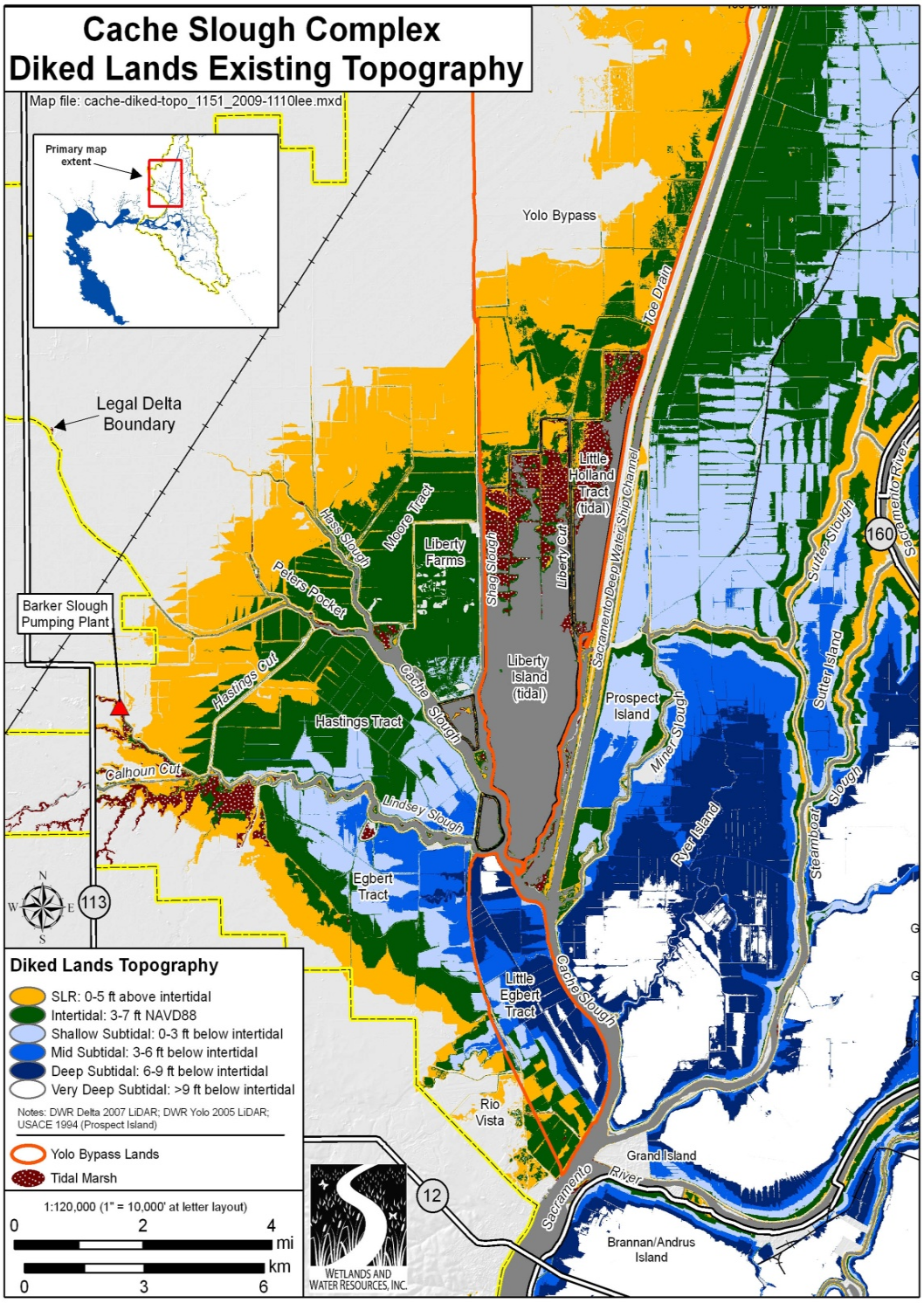

Figure 5. Land elevations within the Northern Delta

2.5 Restoration Challenges

A variety of institutional and resource challenges or constraints beyond DWR's control could impede restoration efforts under FRPA and make it difficult to achieve the FRPA acreage targets. The Implementation Strategy briefly describes some of these constraints and a generalized strategy for response through the FRPA program. Challenges or constraints may include ecological, regulatory, socio-political, land-use conditions, fiscal, or others. Response measures to ecological constraints will largely be developed and implemented as part of the adaptive management program. Previously described public outreach efforts will be an important process to address land-use constraints.

In the event of changed circumstances that create a challenge to restoration efforts, the FRPA Coordination and Management Team would evaluate the challenge or constraint, characterize interests, identify options to resolve the issue, and determine the appropriate course of action at the program or project level. This process would include close coordination with the Fishery Agencies through their membership on the FRPA Coordination and Management Team.

Some likely or potential challenges or constraints that FRPA may encounter during implementation include:

- **Modifications to the Biological Opinions or Longfin Smelt ITP** - Should substantial changes in the Delta, new scientific information, or regulatory changes result in modifications to the Biological Opinions or Longfin Smelt ITP, DWR and DFG, in cooperation with Reclamation, will meet and confer to determine what changes to this Implementation Strategy, if any, should be made to reflect the terms of the modified Biological Opinions and ITP.

- **Acquisition of suitable land in the amount needed for restoration actions** - FRPA assumes that sufficient land will be available within the Delta, Suisun Marsh, and Yolo Bypass to implement the actions set out in this Implementation Strategy. Since the amount of existing public lands may not be sufficient to meet FRPA acreage objectives, purchasing fee title or conservation easements on private lands from willing sellers will be part of the Implementation Strategy. For these reasons, DWR and DFG may experience difficulties in acquiring land for FRPA Potential Future Actions. FRPA will work and partner with other restoration planning efforts and entities where possible to help ensure that lands are suitable for restoration and to help meet FRPA acreage goals.

- **Land and water use and environmental conflicts** – Counties, landowners, and other stakeholders have concerns regarding the conversion of lands currently in agricultural production to natural habitat. In response to this, Yolo County has recently enacted a moratorium on habitat restoration, and it is possible that other Delta counties may do likewise. As a State agency, DWR is not bound by zoning restrictions or moratoriums of this nature. However, in order to facilitate restoration in a cooperative manner, DWR

will make every effort to work cooperatively with the county governments and comply with county ordinances and policies.

- **Levee failures** – Single or multiple levee failures may affect both the ability to restore areas and the benefits to Covered Fish Species provided by FRPA actions after implementation. Multiple levee failures could be of such magnitude that it renders most responses through FRPA infeasible, precludes implementation of actions outlined in the strategy, or significantly diminishes the function of FRPA restored habitat. FRPA will identify and undertake actions to the extent reasonable and practicable within the parameters of this Implementation Strategy's adaptive management program to moderate the ecological effects of potential multiple levee failures on existing projects.

- **Environmental laws, regulations, and other requirements** - Various State and federal permits and authorizations will be necessary to carry out restoration actions. Changes or modifications that may be needed to an action during implementation to ensure compliance with these laws or regulations may result in reduced progress and an extended schedule for completion. The FRPA program will be as pro-active as feasible to avoid potential schedule impacts through early coordination with regulatory entities.

- **Climate change** - Climate change is anticipated to cause changes over the next century that will impact potential recovery efforts throughout the Delta, Suisun Marsh, and Yolo Bypass. These changes are expected to include increased temperatures, changes in weather patterns, and a rise in sea levels. Climate change and its associated effects will create some uncertainty in the ability of FRPA to meet its objectives. FRPA restoration actions will be developed to address the range of predicted effects of climate change on sea level and watershed hydrology over the term of FRPA using the best scientific information available. Accommodations for sea level rise will be built into all restoration projects.

3. Action Selection Framework

The proposed fish restoration actions described in FRPA Attachment 4, and any additional FRPA actions, will be identified and mutually agreed upon by DWR and DFG in coordination with the USFWS and NMFS through the process described below.

The BDCP Habitat Credit MOA and draft Delta Plan both include discussions and processes that describe how DWR (and other habitat restoration implementing agencies) will work with the Fishery Agencies in designing, implementing, and crediting restoration projects. DWR will work with these agencies through the procedures described in these documents, listed above, to facilitate a uniform process designed to coordinate habitat restoration activities that will complement each other.

3.1 Action Identification Process

The Fish Restoration Action Development and Evaluation Process includes:

- Potential restoration actions will be identified by DFG, DWR, other agencies, stakeholders, public, and others.
- Potential restoration actions will be evaluated and developed by DFG and DWR in coordination with Reclamation, USFWS and NMFS following the criteria set forth in Section 3.2, below.
- Proposed fish restoration actions will be evaluated using the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) conceptual models or other equivalent tools, and will be peer reviewed using the Action Selection Framework or its successor.
- Proposed fish restoration actions may be modified by information obtained from the public, other agencies, the DRERIP evaluation, or other sources.
- Proposed fish restoration actions will undergo FAST project review, as described in the BDCP Habitat Credit MOA.
- Proposed fish restoration actions agreed upon by DFG and DWR will be submitted, in coordination with Reclamation, to the Fishery Agencies for review and comment as to consistency with requirements in the Delta Smelt Biological Opinion RPA Component 4 and the applicable Salmon Biological Opinion RPA Actions, and to obtain written approvals for proposed restoration actions prior to any commitment of resources.
- A written approval as to consistency with the Longfin Smelt ITP for proposed restoration actions will also be obtained from DFG prior to any commitment of resources.

Figure 6 shows the process by which projects will be selected for implementation.

3.2 Action Selection Criteria

DFG and DWR will consider fish restoration actions pursuant to the process described herein, using the following criteria, without limitation:

- Aquatic habitat restoration actions in the Delta, Suisun Marsh, and Yolo Bypass will focus on restoration of intertidal and shallow subtidal habitats, primarily for the benefit of pelagic and salmonid fish species. Other habitats that will be considered are floodplain and open water. The acres of habitat restored or enhanced are expected to provide either direct or indirect benefits by enhancing spawning and rearing habitat for Covered Fish Species, and increasing primary and secondary productivity in the Delta or Suisun Marsh. These habitat actions are expected to mitigate for impacts that occur as a result of SWP Delta operations as described in the Biological Opinions and ITP, and support higher larval and juvenile fish survival and increased fitness of spawning adults by improving conditions for the production of forage species.

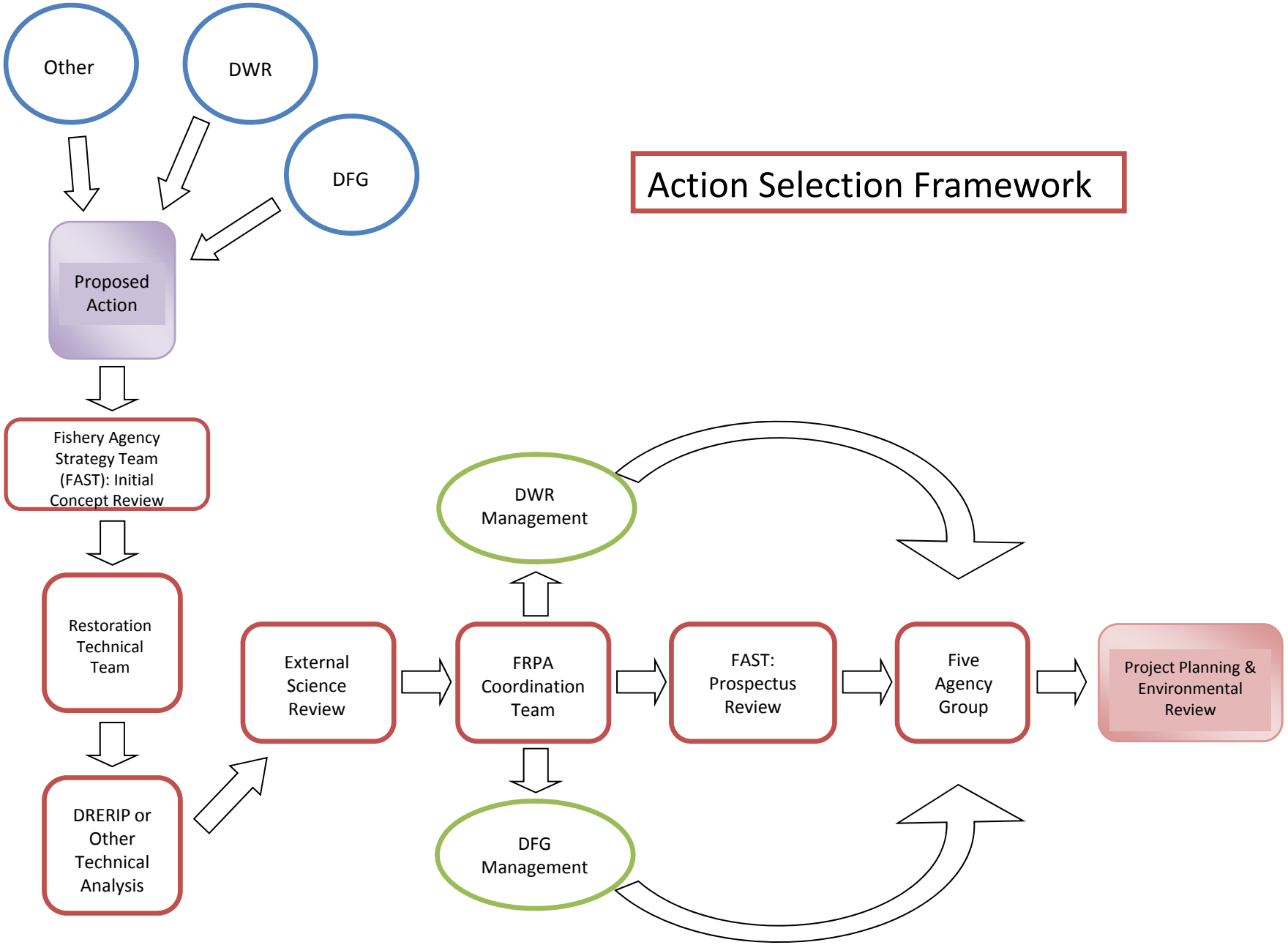

Figure 6. Framework for analyzing and selecting proposed actions for implementation

- In addition to the criteria listed above, mitigation actions primarily for the benefit of the salmonid fish species shall include:
    - restoration of habitat to provide upstream passage, and over- summering, and spawning and rearing habitat in Battle Creek,
    - barrier removal in the Yolo Bypass which improves access to suitable migratory pathways, and/or
    - restoration of functional stream geomorphology and floodplain in the Delta and Yolo Bypass which provides rearing habitat for emigrating juveniles. These actions are expected to increase available spawning habitat, improve over-summering adult survival, increase spawning success, and increase juvenile survival and fitness.

3.3 Action Acreage Crediting Evaluation

As part of their review of each restoration action, DFG and DWR, in coordination with USFWS and/or NMFS, will determine the amount of acreage to be credited to satisfy requirements of the Biological Opinions and the Longfin Smelt ITP and for credit under the BDCP in accordance with the BDCP Habitat Credit MOA. The amount of acreage credit will be based upon the criteria in Section 3.2 and the evaluation conducted in Section 3.1, unless this is superseded by the BDCP Habitat Credit MOA. The credit release schedule will be developed through the FAST process by the Fishery Agencies and the project-specific MOA will establish the amount of credit that will be given for the project.

For cost-share restoration actions, acreage credit will be pro-rated based on DWR's SWP funding contribution towards the implemented action and the monitoring and maintenance efforts over the life cycle of the project. If the action contains distinct elements, the credit will be based on the acreage of those elements and monitoring and maintenance costs to the extent funded by DWR SWP funds.

3.4 Review of Action Progress

DFG and DWR will monitor the effectiveness of the restoration actions towards meeting the criteria in Section 3.2 above, as follows:

- At years five, eight, and every subsequent five years or earlier if necessary, the results of restoration actions will be evaluated by an independent science panel or advisor as agreed to by DWR and DFG to determine if the restoration actions are meeting intended restoration criteria for the Covered Fish Species.

- DFG and DWR in coordination with Reclamation, USFWS and NMFS will review implementation of restoration actions after Year Four of the FRPA and each two years thereafter, to determine progress towards achieving the total amount of restoration acreage pursuant to FRPA Section F.3.2.a.

- If the evaluation as described in the first bullet above indicates that restoration actions are not performing to the criteria established in the restoration plan for the site, DWR and DFG, in coordination with USFWS and NMFS, will determine measures as necessary to address the problem based on an assessment of relevant technical data and scientific understandings. DWR will implement those measures and these costs will not be counted towards meeting the objectives of the Biological Opinions and Longfin Smelt ITP.

4.0 Monitoring and Reporting

The Biological Opinions and the ITP require a variety of monitoring and reporting associated with the fish habitat restoration requirements and related actions at both the overall habitat and site-specific project level. FRPA has no specific additional monitoring requirements, but does include additional reporting requirements for an annual program report and a report on the effectiveness of restoration actions at specified periods.

4.1 Required Monitoring Under the Biological Opinions and ITP

The Biological Opinions and the ITP require various monitoring associated with the habitat restoration efforts under FRPA. These include an overall monitoring program for the 8,000 acres to benefit delta smelt, post-project monitoring for juvenile salmonid habitat, and site-specific monitoring plans for the 800 acres to benefit longfin smelt.

The Delta Smelt Biological Opinion, RPA Component 4 states:

> "*An overall monitoring program shall be developed to focus on the effectiveness of the restoration actions and provided to the Service for review within six months of signature of this biological opinion. The applicant shall finalize the establishment of the funding for the restoration plan within 120 days of final approval of the restoration program by the Service.*"

DWR needs further clarification from the USFWS on this requirement before a monitoring program can be developed. Specifically, DWR needs guidance on how to develop a monitoring program to assess the effectiveness of the restoration projects before the restoration plans have been developed themselves.

The NMFS Salmonid Biological Opinion Action 1.6.2 states:

> "[An Enhancement Plan for Liberty Island/Lower Cache Slough] *shall be monitored for the subsequent five years, at a minimum, to evaluate the use of the area by juvenile salmonids and to measure changes in growth rates. Interim monitoring reports shall be submitted to NMFS annually, by September 30 each year, and a final monitoring report shall be submitted on September 30, 2015, or in the fifth year following implementation of enhancement*

actions. NMFS will determine at that time whether modification of the action or additional monitoring is necessary to achieve or confirm the desired results."

The required monitoring is post-project monitoring subsequent to implementation of habitat enhancement in the Liberty Island/Lower Cache Slough.

The ITP Condition 7 states:

"To improve overall habitat quality for longfin smelt in the Bay Delta Estuary, Permitee shall fund the acquisition, initial enhancement, restoration, long-term management, and long-term monitoring of 800 acres of inter-tidal and associated sub-tidal wetland habitat in a mesohaline part of the estuary…..The identification and development of the restoration sites, and the development of site-specific management and monitoring plans shall be appropriate to improve habitat conditions for longfin smelt and shall be submitted to DFG for review and approval. "

4.2 Monitoring Plan Implementation

Aquatic monitoring will focus on regional and site-specific habitat characteristics associated with the fish species of concern. Five categories of metrics will be evaluated: 1) physical and chemical, 2) vegetation, 3) fish, 4) food web, and 5) processes. Monitoring metrics will be relatively simple and measureable for a wide range of projects. Metrics will be measured both within the project location and in associated open waters adjacent to project locations. As much as possible, metrics will allow pre- and post-project comparison.

Monitoring plans will be developed as part of each restoration action, and will include both pre- and post- project monitoring requirements. These plans will be independently reviewed and evaluated by technical teams or a science panel. Monitoring will rely as much as possible on data from existing regional monitoring efforts under the Interagency Ecological Program (IEP). Additionally, site-specific monitoring data will be collected within each project site prior to restoration action. Expansion of long-term Delta-wide monitoring efforts will assist with the fulfillment of monitoring requirements (See Section 4.1).

Pre-project baseline monitoring will occur prior to project implementation, and will include sampling of any pre-existing aquatic habitats within the restoration area as well as sampling in aquatic habitats adjacent to project sites. Post-project monitoring will occur within each project site and in associated open waters. Data will be used for both adaptive management and long-term management purposes (See Section 4.4) with the goal of evaluating the success or failure of a particular action.

IEP has several long-term monitoring programs that collect data throughout the Delta and are discussed below. Monitoring from regions where restoration occurs can provide comparable pre- and post- project data. While the Suisun Marsh and Central Delta regions are well covered by existing monitoring, the Cache Slough region is largely excluded from current long-term

biological monitoring efforts. Although some programs have begun sampling in the Cache Slough Complex in recent years, there are no permanent long-term monitoring stations located in the Cache Slough Complex. FRPA staff will work with IEP to expand existing monitoring programs to establish permanent sampling sites in the Cache Slough region.

Existing monitoring programs that currently sample in, or could possibly be expanded to sample in, restoration regions include, but are not limited to:

- Continuous physical monitoring achieved by USGS and DWR's continuous monitoring stations recording stage, velocity, temperature, turbidity, and salinity. Additional stations could provide valuable information on the baseline hydrodynamics and changes caused by restoration projects;
- The Environmental Monitoring Program (DWR and DFG) that conducts monthly water quality, phytoplankton, zooplankton, and benthic sampling;
- Spring Kodiak Trawl, Summer Townet, and Fall Midwater Trawl surveys that sample juvenile and small bodied adult fish at least monthly;
- 20mm survey that samples late larval/early juvenile fish;
- Smelt larvae survey;
- USFWS Delta Juvenile Fishes Monitoring Program that conducts monthly beach seine and larval sampling;
- UC Davis Sampling Program in the Suisun Marsh; and
- DWR Yolo Bypass adult fish, juvenile fish, and lower trophic level sampling.

The five categories of metrics that will be evaluated are summarized in Table 2 (adapted from Ted Sommer, DWR unpublished report). Where possible, pre- and post-project comparisons will be made. Also, regional comparisons will be made (for example, between the Cache Slough region and the Central Delta region) to evaluate the cumulative impact of restoration actions within a region. Comparing metrics measured within restoration areas with measurements taken in adjacent main channels will provide information on the connectivity of restoration areas with adjacent habitats. Table 2 is a list of potential metrics that may be evaluated; however the actual metrics will be determined on a project-by-project basis.

4.3 Reporting Requirements

Section I of the FRPA Agreement describes the reporting requirements under FRPA, which include an annual program report and a report on the effectiveness of restoration actions at specified periods. Both are described below.

For annual reporting, DWR, in coordination with DFG, shall prepare an annual report on programs and projects being implemented under FRPA. The report will include financial reporting, the progress of each project towards meeting the intended restoration goals and implementation schedule, and the current status, constraints, and relative accrued benefits of those projects (See Appendix G).

Table 2. Potential metrics to be evaluated

Basic Approach

1. The metric should be relatively simple.
2. The metric should be measurable for a wide range of projects in the region
3. As much as possible, the metric should allow a pre- and post-project comparison.

Category	Metric	Pre- and Post- Project Comparison	Regional Comparison	Adjacent Channel Comparison	Comments
Physical and Chemical	Inundation regime	X			Gauges, ADCP's, model output
	Tidal excursion	X			Gauges, ADCP's, model output
	Residence time	X		X	ADCP's, modeling
	Temperature	X	X	X	Continuous loggers
	Turbidity, salinity	X	X	X	Continuous loggers
	DO	X	X	X	Continuous loggers, discrete sampling
	pH	X	X		
	Nitrogen (NH3, NH4, NO3)	X	X		Discrete sampling
	Chlorophyll a and/or b	X	X	X	Discrete sampling
	Pesticide levels	X	X	X	Discrete sampling
	MeHg	X	X	X	Bioaccumulation
Vegetation	Area of emergent vegetation by species	X	X		Aerial imagery & ground-truthing
	Area of SAV by species	X	X		Aerial imagery & ground-truthing
	Terrestrial habitat area by type	X			Aerial imagery & ground-truthing includes seasonal wetlands, agriculture, grasslands, riparian
Fish	Use of restored habitat	X		X	Can use a combination of sampling and telemetry methods. Sampling methods are dependent on the target species. Possible methods include: trawl, fyke, RSTR, gill net, seining, ichthyoplankton nets
	Number and size of fish by species	X	X	X	
	Growth		X		
	Residence time	X	X	X	
	Seasonal % alien	X			
Food Web	Chlorophyll a	X	X	X	Continuous, discrete
	Phytoplankton species	X	X	X	Discrete, includes *Microcystis*
	Primary production	X	X	X	DO or C14 method? Discrete
	Zooplankton species & density	X	X	X	Discrete
	Mesozooplankton species & density	X	X	X	Discrete Food Web
	Benthic invertebrate species & density	X	X		Discrete

Category	Metric	Pre- and Post- Project Comparison	Regional Comparison	Adjacent Channel Comparison	Comments
Food Web	Epiphytic invertebrate species & density	X	X		Discrete
	Fish diet composition		X		Discrete
Processes	Transport of Sediment	X	X		All of these would require combining the parameter measurements (above) with flow estimates. The use of transport models is also expected.
	Export of organic carbon	X	X		
	Loading of nitrogen by type	X	X		
	Loading of pesticides	X	X		
	Loading of MeHg	X	X		
	Export of phytoplankton	X	X		
	Export of zooplankton	X	X		

ADCP = Acoustic Doppler Current Profiles; DO = Dissolved Oxygen; MeHg = methylmercury; SAV = Submerged Aquatic Vegetation; RSTR = Rotary Screw Trap.

Periodic reporting on the effectiveness of restoration actions is required at year five and eight, and every five years subsequently. This is also discussed in Section 3.4, Review of Action Progress. DWR, in coordination with DFG, will review and jointly prepare a report on the effectiveness of restoration actions implemented under FRPA using monitoring data from the restoration actions implemented and current scientific understanding for the following purposes:

- To assess the effectiveness of restoration actions undertaken and funding provided in achieving the expected benefits to the fish species covered in the restoration plan;

- To evaluate the effectiveness of the restoration actions to collectively provide the expected benefits in relation to satisfying the obligations under the Delta Smelt Biological Opinion, the Salmon Biological Opinion, and the Longfin Smelt ITP.

The review of the restoration projects identified in FRPA will follow a process that will be developed by DWR, in cooperation with DFG, Reclamation, USFWS, and NMFS and may be included in the implementation agreement for the specific project. Based upon the results of this review, implementation may be altered according to the adaptive management principles identified in the ERP Stage 2 Conservation Strategy for the Delta and Suisun Marsh , or as may

be identified in the BDCP, or as may be developed by DWR in cooperation with DFG, Reclamation, USFWS, and NMFS.

4.4 Adaptive Management

This section describes key elements of the adaptive management strategy that relate to implementation of FRPA actions pursuant to the Biological Opinions and ITP. The adaptive management approach will be consistent with the BDCP and the Delta Stewardship Council's Delta Plan.

Principles for adaptive management

The BDCP Independent Science Advisors' Report on Adaptive Management describes the following principles for effective adaptive management:

- The scope and degree of reversibility of each proposed action (i.e., conservation measure) determines the form of adaptive management that can be applied (e.g., "active" or experimental adaptive management versus "passive" adaptive management).
- The knowledge base about the ecosystem is key to decisions about what to do and what to monitor, and includes all relevant information, not just that derived from project specific monitoring and analysis.
- Program goals should relate directly to the problems being addressed and provide the intent behind the conservation measures; objectives should correspond to measurable, predicted outcomes.
- Models should be used to formalize the knowledge base, develop expectations of future conditions and conservation outcomes that can be tested by monitoring and analysis, assess the likelihood of various outcomes, and identify tradeoffs among conservation measures.
- Monitoring should be targeted at specific mechanisms thought to underlie the restoration action, and must be integrated with an explicitly funded program for assessing the resulting data.
- Prioritization and sequencing of restoration actions should be assessed at multiple steps in the adaptive management cycle.
- Specifically targeted institutional arrangements are required to establish effective feedback mechanisms to inform decisions about whether to retain, modify, or replace a restoration action.
- A dedicated, highly skilled team is essential to assimilate knowledge from monitoring and technical studies and make recommendations to senior decision makers regarding programmatic changes.

An adaptive management plan will be developed for each restoration action. Adaptive management will begin with the project design phase, and continue through project implementation, evaluation, and any necessary modifications, as described in the nine-step

adaptive management framework outlined in the Delta Stewardship Council's draft Delta Plan. This framework for adaptive management identifies three main areas as follows:

- Plan (define the problem; establish goals and objectives; model linkages between objectives and proposed actions; select research, pilot, or full-scale action);
- Do (design implementation action; implement action and monitoring); and
- Evaluate and Respond (analyze, synthesize, and evaluate; communicate current understanding; adapt).

While a variety of actions will be funded by FRPA, the key element will be the restoration of aquatic habitat in the Delta and Suisun Marsh to mitigate for impacts to surface acres of aquatic habitat in the Delta determined by DFG and the Biological Opinions to have been impacted by SWP Delta operations. Other programs (*e.g.*, restoration at Dutch Slough and the BREACH III study at Liberty Island) have been designed to test various aspects of restoration techniques and ecosystem thresholds, and while not yet complete, the process of design has already helped focus on the importance of land/tidal elevation on the chances of success and the costs of restoration.

Several categories of uncertainties related to Delta tidal marsh ecosystems are described in Table 1 of the Dutch Slough Adaptive Management Plan. Where possible, an active adaptive management approach will be implemented to improve knowledge regarding these uncertainties. Monitoring and reporting for all projects will focus on the outcome of the conservation actions as follows:

- Do the target species spawn, rear, or forage in or around the created habitats?
- Is there tidal transport of nutrients and/or lower trophic productivity to the adjacent open water?
- Do invasive aquatic weeds or *Microsystis* invade the sites?
- Does the restored habitat support increased populations of exotic predatory fish species?
- Other questions specific to the individual project or methodology.

Where monitoring and reporting indicate negative outcomes of restoration actions, such as invasive weeds or exotic predatory fish species or do not meet project goals and objectives, corrective measures will be taken to meet the objectives of the restoration action.

5.0 Post-Project Maintenance

Plans for individual restoration projects shall include DWR funding sufficient to accomplish full implementation of restoration actions, including property transfer once restoration is deemed complete and maintenance of the action into perpetuity.

5.1 Property Transfer and Management Costs

Property ownership and management details will be set forth in subsequent project specific agreements, including a management plan as required under the USFWS Biological Opinion. These agreements will include assurances for sufficient funding through DWR's SWP operations and maintenance budget for perpetual operation and maintenance of the restoration project. Property acquired and restored pursuant to these agreements for which title is not held by DFG or the Delta Conservancy will be protected with a conservation easement in favor of an entity approved by DFG, USFWS or NMFS or with an acceptable alternative instrument. Such property will be protected by a separate agreement for each site on terms that provide DFG, USFWS, or NMFS sufficient access and rights, as appropriate, to monitor and/or operate and maintain the property in accordance with the approved restoration plan for the site. Condition 7.2 of the ITP contains additional requirements on the acquisition and transfer of lands.

5.2 Funding

Plans for individual restoration projects shall include DWR funding sufficient to accomplish full implementation of the action, which may include, but is not limited to, restoration planning, environmental review and documentation, permitting, interim management prior to restoration, restoration implementation, operation and maintenance activities, in perpetuity, pre- and post-project monitoring to evaluate project success in meeting the planned restoration objectives, and adaptive management. DWR funding will cover DFG incurred costs necessary to assist in planning and implementing the action.

6.0 References

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APPENDIX A. FISH RESTORATION PROGRAM AGREEMENT

AGREEMENT BETWEEN THE DEPARTMENT OF WATER RESOURCES AND THE DEPARTMENT OF FISH AND GAME REGARDING IMPLEMENTATION OF A FISH RESTORATION PROGRAM IN SATISFACTION OF FEDERAL BIOLOGICAL OPINIONS FOR STATE WATER PROJECT DELTA OPERATIONS

This Agreement is made on October 18, 2010 between the Department of Water Resources (DWR) and the Department of Fish and Game (DFG) regarding implementation of a fish restoration program through creation or restoration of fish habitat or other activities in satisfaction of requirements in the 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion for Delta Smelt; the 2009 National Marine Fisheries Service (NMFS) Biological Opinion for Salmonids, Green Sturgeon and Killer Whales for the Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP); and the Longfin Smelt Incidental Take Permit for SWP operations, hereafter referred to as the "Fish Restoration Program."

RECITALS

A. On December 15, 2008, the USFWS issued a Biological Opinion on Delta Smelt and the Coordinated Operations of the CVP and SWP (Delta Smelt BiOp). The Delta Smelt BiOp includes a Reasonable and Prudent Alternative (RPA) requiring changes in CVP and SWP operations necessary to prevent jeopardy to the continued existence of delta smelt. By December 15, 2019, the Delta Smelt BiOp RPA, Component 4, requires that DWR complete a program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh and to develop management plans, monitoring, and financial assurances for the restoration sites developed in satisfaction of the RPA. (Delta Smelt BiOp p. 283-284; see also BiOp Attachment B, Action 6 further describing the RPA.) DWR desires, through this Agreement, to address procedures pursuant to which DFG will assist DWR in satisfying this requirement. A copy of the RPA Component 4, including Attachment B Action 6, is attached to this Agreement as Attachment 1.

B. On June 4, 2009, the NMFS issued a Biological Opinion on Salmonids, Green Sturgeon, and Killer Whales for the Long-term Operations of the CVP and SWP (Salmon BiOp). The Salmon BiOp includes a Reasonable and Prudent Alternative (RPA) requiring changes in CVP and SWP operations necessary to prevent jeopardy to the continued existence of winter-run Chinook salmon, spring-run Chinook salmon, steelhead, sturgeon, and killer whales. The Salmon BiOp RPA provides for mitigation through various actions by DWR and U.S. Bureau of Reclamation (Reclamation) to address impacts to salmonids. Actions that DWR desires to address through this Agreement are funding restoration actions on Battle Creek (Action I.2.6, Salmon BiOp p. 603) and restoring floodplain rearing habitat for

salmonids in the lower Sacramento River basin (e.g., Liberty Island/Lower Cache Slough) in cooperation with DFG, USFWS, NMFS, and the U.S. Army Corps (Action Suite I.6, Salmon BiOp p. 607-10). For Action I.6.1, if the 8,000 acres of tidal habitat in the Delta Smelt BiOp RPA Component 4 also provides suitable rearing habitat for salmonids, these acres may be used in partial satisfaction of Action I.6.1 (Salmon BiOp p. 609). DWR further desires, through this Agreement, to address procedures pursuant to which DFG will assist DWR in satisfying the requirements in the Salmon BiOp. A copy of the Salmon BiOp Actions I.2.6 and Suite I.6 are attached to this Agreement as Attachment 2.

C. On July 16, 2009, based upon a request from DWR, DFG found the Delta Smelt BiOp is consistent with the California Endangered Species Act (CESA) for the authorization of take of delta smelt by the SWP.

D. On September 3, 2009, based upon a request from DWR, DFG found the Salmon BiOp is consistent with CESA for the authorization of take of, winter-run Chinook salmon and spring-run Chinook salmon by the SWP. On May 26, 2010, DFG issued a replacement consistency determination for the Salmon BiOp.

E. On February 23, 2009, DWR received from DFG incidental take authorization of longfin smelt for the SWP operations pursuant to section 2081 of the Fish and Game Code (SWP Longfin Smelt Incidental Take Permit (ITP No. 2081-2009-001-3)). The SWP Longfin Smelt ITP Condition 7 requires that DWR improve the overall habitat quality for longfin smelt in the Bay Delta Estuary through acquisition, restoration, long-term management and monitoring of 800 acres of intertidal and associated subtidal wetland habitat in a mesohaline part of the estuary. (Longfin Smelt ITP p. 14-15, 17-18.) DFG and DWR intend that restoration of habitat in compliance with the Delta Smelt BiOp that also meets the criteria of the Longfin Smelt ITP will satisfy requirements of the ITP. A copy of the Longfin Smelt ITP Condition 7 is attached to this Agreement as Attachment 3.

F. On October 6, 2006, DWR and DFG, along with the California Natural Resources Agency, Reclamation, USFWS, NMFS, seven water agencies and other Delta water users, and four non-governmental organizations, signed the Bay Delta Conservation Plan (BDCP) Planning Agreement. The BDCP is anticipated to provide Federal Endangered Species Act (FESA) and CESA compliance for coordinated SWP and CVP operations in the Sacramento-San Joaquin River Delta through a Habitat Conservation Plan (FESA Section 10), Biological Opinions (FESA Section 7), and a Natural Community Conservation Plan (NCCP) (Fish and Game Code Section 2800 et seq.). Consistent with the NCCP Act, FESA and CESA, the Planning Agreement recognizes that the Agreement parties can elect to preserve, enhance, or restore, either by acquisition or other means, aquatic and associated riparian and floodplain habitat in the Planning Area that support native species of fish, wildlife, or natural communities prior to approval of the BDCP" and that "the Fishery Agencies agree to credit such resources toward the land and water acquisition or habitat protection, enhancement, and restoration requirements of the BDCP, as appropriate, provided

these resources are appropriately conserved, restored or enhanced, and managed and contribute to the BDCP's conservation strategy." (Planning Agreement Section 7.7.1, p. 18.) DFG and DWR intend that actions carried out to meet the requirements in the Delta Smelt BiOp, Salmon BiOp, and the Longfin Smelt ITP will also be credited towards satisfaction of the habitat restoration conservation measures of the BDCP.

G. On November 12, 2009, the Delta Reform Act (Act) was signed into law by Governor Schwarzenegger. The Act creates a new agency, the Delta Stewardship Council, to implement the coequal goals of providing a more reliable water supply and protecting, restoring and enhancing the Delta ecosystem. The Council is required to adopt a Delta Plan by January 1, 2012. The Act also designates the Delta Conservancy as the primary state agency for implementation of ecosystem restoration. DFG and DWR intend to communicate with the Delta Stewardship Council and the Delta Conservancy to ensure actions taken pursuant to this Agreement are consistent with the Act and the Delta Plan when it is adopted.

H. On December 30, 1986, DWR and DFG entered into the "Agreement Between The Department Of Water Resources And The Department Of Fish And Game To Offset Direct Losses In Relation To The Harvey O. Banks Delta Pumping Plant" (known as the "Delta Fish Agreement"). DWR and DFG intend to continue implementation of the Delta Fish Agreement. This Agreement is not intended to modify or otherwise affect the Delta Fish Agreement.

I. DWR and DFG intend through this Agreement to develop a fish restoration program by establishing the framework for selecting, funding, and implementing specific restoration projects, and management and funding plans for those same restoration projects. The commitment of specific funding for and implementation of the restoration actions or other activities will be made by DWR through execution of subsequent agreements with other entities, such as, if appropriate, DFG, USFWS, and NMFS. At the time of execution of this Agreement, the project proposals specifically identified for restoration required by the federal BiOps and the Longfin Smelt ITP are not well enough defined as to their location, specific land modification, or restoration requirements to provide meaningful information for environmental assessment. Therefore, at this time environmental analysis of any restoration proposals or other activities referred to in this Agreement would be premature. In addition, execution of this Agreement will not effectively preclude any alternatives or mitigation measures that CEQA would otherwise require to be considered, including the alternative of not going forward with a restoration proposal, if a project were to be found infeasible or to have unacceptable impacts on the environment such that other alternatives or mitigation may be considered. Thus, prior to project implementation, DWR and DFG commit through this Agreement to satisfy CEQA requirements for restoration proposals at the time when sufficient information is available for meaningful analysis of the restoration proposals or actions referred to herein.

Now therefore, in accordance with the Recitals and in consideration of the terms and conditions herein, DWR and DFG agree to the following:

A. Fish Restoration Program.

1. This Agreement commits DFG to work cooperatively with and assist DWR to establish the management and financial framework necessary to implement a fish restoration program that will satisfy DWR's obligations under the Delta Smelt BiOp RPA Component 4 identified above in Recital A, Salmon BiOp RPA Actions I.2.6 and Suite I.6 identified above in Recital B, and the Longfin Smelt ITP Condition 7 identified above in Recital E.

2. Consistent with the BDCP Planning Agreement, the restoration proposals or actions described above in section A.1 and established by this Agreement to cover impacts of SWP operations as described in the Delta Smelt BiOp, the Salmon BiOp, and the Longfin Smelt ITP will contribute to meeting the habitat acreage required of, and funded by, DWR for BDCP as tidal and associated subtidal habitat and other appropriate habitat acreage conservation measure targets identified in the BDCP. Prior to committing to any specific restoration actions, DWR, in cooperation with DFG, will submit the restoration proposals developed through this Agreement to USFWS and NMFS to obtain their review and written concurrence that the restoration proposals would satisfy requirements of their respective biological opinions and the BDCP for fish restoration.

3. Fish restoration requirements for the Delta Smelt BiOp RPA Component 4, Salmon BiOp RPA Actions I.2.6 and Suite I.6, and the Longfin Smelt ITP Condition 7 may be met by the following:

   a. Creation or restoration of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. Some potential actions and estimated funding to provide this restoration acreage are described in Attachment 4, "Proposed Agreement Commitments and Estimated Costs." Attachment 4 is not a final or binding list of actions and may be modified by DWR and DFG from time to time as additional information is developed.

   b. Implementation of Delta Smelt BiOp RPA Component 4 fish habitat restoration. Prior to committing to a specific project proposal or restoration action, DWR, in cooperation with DFG, shall submit the fish restoration proposal to USFWS to obtain USFWS review and written approval of the project proposal as satisfying the habitat restoration conditions required in the Delta Smelt BiOp.

   c. Implementation of Salmon BiOp RPA fish habitat restoration actions. Prior to committing to a specific project proposal or restoration action for salmon, DWR, in cooperation with DFG, shall submit the fish restoration proposal to NMFS to obtain NMFS review and written approval of the project proposal as

satisfying the habitat restoration conditions required in the Salmon BiOp. The restoration actions that satisfy the Delta Smelt BiOp may be accepted by NMFS in satisfying restoration obligations of Salmon BiOp RPA Action I.6.1.

d. Implementation of Longfin Smelt habitat restoration actions. The 800 acres of habitat restoration required in Condition 7 in the Longfin Smelt ITP will be satisfied upon DWR satisfying 800 acres of habitat restoration under the Delta Smelt BiOp in the mesohaline zone of the Delta (in Suisun Bay or Marsh) with hydrologic connectivity to open waters. Prior to committing to a specific project proposal or action, DFG and DWR shall agree in writing that the proposed project satisfies Condition 7 of the Longfin Smelt ITP.

4. The proposed fish restoration projects will be selected by DWR, with assistance from and in cooperation with DFG, after coordinating and obtaining appropriate approval from USFWS, and NMFS, and DFG, as provided in Section 3 above. Restoration plans for those selected habitat enhancement projects will be implemented through specific implementation agreements that provide for compliance with all permitting and regulatory requirements.

5. This Agreement shall not restrict DWR's right to delegate to, contract with, or carry out cooperative programs with other public agencies or appropriate entities to plan or implement all or any part of a habitat restoration action for purposes of satisfying the Delta Smelt BiOp, Salmon BiOp, or Longfin Smelt ITP. For purposes of this Agreement, implementation by such an entity will be deemed to be implementation by DWR and all crediting provisions of this Agreement shall be applicable to such restoration actions if implemented in accordance with this Agreement and a project specific implementation agreement as described in Section 4. To the extent that any activity covered by this Agreement is carried out by such an entity, DWR will ensure that the planning is carried out with DFG's participation and assistance as provided for herein.

B. Implementation Schedule. Without delay, and no later than twelve (12) months from the effective date of this Agreement, DWR, with assistance from DFG, shall develop a schedule for a fish restoration program through the creation or restoration of fish habitat or other activities (Implementation Schedule). The Implementation Schedule will identify restoration actions, estimated costs, targeted acreage, and a timeline for DWR's implementation of restoration proposals or actions for purposes of satisfying DWR's obligations under the Delta Smelt BiOp, Salmon BiOp, and Longfin Smelt ITP.

C. CEQA. DWR, and if applicable DFG or any other entity, will comply with CEQA prior to implementing the restoration projects called for under this Agreement. DWR will serve as lead agency and DFG as responsible agency unless circumstances require that a different lead agency and responsible agency be used. DWR will be responsible for all DWR and DFG costs associated with CEQA compliance of

restoration projects called for under this Agreement and as and provided under Section E below.

D. Identification, Monitoring, Evaluation, Review, and Approvals. DWR, with assistance from DFG and other entities, if appropriate, will develop a process for determining whether a proposed restoration project should be selected for purposes of satisfying DWR obligations under the Delta Smelt BiOp, the Salmon BiOp, and Longfin Smelt ITP and obtaining habitat restoration credit.

E. Funding. Plans for individual restoration projects shall include DWR funding sufficient to accomplish full implementation of the action, which may include, but is not limited to, restoration planning, environmental review and documentation, permitting, interim management prior to restoration, restoration implementation, operation and maintenance activities, and monitoring to evaluate project success in meeting the planned restoration objectives. DWR funding will cover DFG incurred costs necessary to assist in planning and implementing the action.

F. Commitments and Financing.

1. Starting in year one and continuing for each year thereafter DWR will provide funding for DFG staff to assist DWR in its planning activities and to monitor and review DWR's implementation of the activities described above in Section E, in this Section F, and in Section H below, as well as supporting operational decision-making associated with avoidance and minimization measures required under the Delta Smelt BiOp, Salmon BiOp, and Longfin Smelt ITP (See Attachment 4).

2. For meeting the objectives of this Agreement, DWR will fund DFG's staffing costs to assist DWR in planning and implementing restoration proposals including, but not limited to, tracking the Implementation Schedule, negotiating land transfer agreements, managing transferred lands, assessing and evaluating results, and helping develop adaptive management plans (See Attachment 4). DWR and DFG will mutually agree on the tasks and level of effort to be performed by DFG. DFG will submit a 3-year budget plan with tasks and costs annually to be reviewed, modified if necessary, and approved by DWR each year. The annual budget will also include detailed tasks conducted by DFG, staff hours and costs. DFG will also prepare timely quarterly reports to DWR on its tasks, staff hours and costs for review by DWR.

3. A phased approach will be used for funding and implementation of actions as set forth below:

3.1. Year One Commitments and Financing.

In order to immediately start to restore habitats needed to ensure sufficient production, spawning and rearing for fish species covered under the Delta Smelt

and Salmon BiOps and Longfin Smelt ITP, during Year One DWR will fund, plan, and implement to the extent practicable, those actions specified in Attachment 4, or equivalent actions, to the extent required to meet DWR's obligations under the BiOps and the ITP. The $12 million funding commitment towards Battle Creek restoration will be satisfied by a one-time up-front payment to Reclamation for this purpose when requested in writing by DFG.

3.2. Year Two through Ten Commitments and Financing.

In Years Two through Ten, or until all restoration actions required under the Delta Smelt and Salmon BiOps and Longfin Smelt ITP have been fully implemented, DWR and DFG will work together to initiate or continue implementation of the restoration actions. To accomplish this, DWR will:

a. Initiate or continue restoration or creation of a total of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. DWR intends to achieve this by securing and initiating implementation of 35% of the total acreage by year four, 60% by year six, 80% by year eight and 100% by year ten, or as otherwise provided by Section F.3.1. above, and diligently pursuing implementation to completion. DWR, USFWS, NMFS, and DFG may agree on other mitigation actions for meeting the required amount of acreage.

b. DWR and DFG recognize that the BDCP may become effective prior to the time when all restoration actions described in this Agreement have been completed. Therefore, this Agreement shall guide the planning for habitat restoration actions related to the existing Delta Smelt and Salmon BiOps and the Longfin Smelt ITP until the BDCP and its associated biological opinions and incidental take permits become effective, at which time DWR and DFG intend that this Agreement would terminate and the BDCP documents and the BDCP Implementation Agreement would guide all subsequent habitat restoration processes.

c. Should unforeseen circumstances arise that render the timely implementation of these restoration actions infeasible, DWR, DFG, USFWS, and NMFS will meet and determine how to address the delay and any potential effects of the delay.

G. Acreage Credit. DWR will receive acreage credit for fish habitat restoration upon securing acreage designated for restoration and initiating implementation of the restoration proposals or actions consistent with the obligations under the Delta Smelt BiOp, Salmon BiOp, and Longfin Smelt ITP and as defined by a credit memo agreed upon with USFWS, NMFS, or DFG, as appropriate, in advance of taking any restoration actions.

H. Property Transfer and Management Costs. Property ownership and management details will be set forth in subsequent project specific agreements which will include

assurances for sufficient funding through DWR's SWP operations and maintenance budget for perpetual operation and maintenance (O&M) of the restoration project. Property acquired and restored pursuant to this Agreement for which title is not held by DFG will be protected with a Conservation Easement in favor of an entity approved by DFG, USFWS or NMFS or with an acceptable alternative instrument. Such property will be protected by a separate agreement for each site on terms that provide DFG, USFWS, or NMFS sufficient access and rights, as appropriate, to monitor and/or operate and maintain the property in accordance with the approved restoration plan for the site.

I. Reporting.

1. DWR, in coordination with DFG, shall prepare an annual report on programs and projects being implemented under this Agreement. The report will include financial reporting, the progress of each project towards meeting the intended restoration goals and Implementation Schedule, and the current status, barriers, and relative accrued benefits of those projects.

2. At year 5 and 8, and every 5 years subsequently, DWR, in coordination with DFG, will review and jointly prepare a report on the restoration actions implemented under this Agreement using monitoring data from the restoration actions implemented and current scientific understanding for the following purposes:

   a. To assess the effectiveness of restoration actions undertaken and funding provided in achieving the expected benefits to the fish species covered in the restoration plan;

   b. To evaluate the effectiveness of the restoration actions to collectively provide the expected benefits in relation to satisfying the obligations under the Delta Smelt BiOp, the Salmon BiOp, and the Longfin Smelt ITP.

3. The review of the restoration projects identified in this Agreement will follow a process that will be developed by DWR, in cooperation with DFG, USFWS, and NMFS and may be included in the implementation agreement for the specific project. Based upon the results of this review, implementation may be altered according to the Adaptive Management principles identified in the ERP Stage 2 Conservation Strategy for Suisun Marsh and the Delta, or as may be identified in the BDCP, or as may be developed by DWR in cooperation with DFG, USFWS, and NMFS.

4. DWR, in coordination with DFG shall submit their joint reports to USFWS and NMFS.

J. Substantial Changes. Should substantial changes in the Delta or new scientific information result in modifications to the Delta Smelt BiOp, Salmon BiOp or Longfin Smelt ITP under circumstances where the BDCP has not become effective, DWR

and DFG will meet and confer to determine what changes to this Agreement, if any, should be made to reflect the terms of the modified BiOps and/or ITP.

K. Withdrawal. Either DWR or DFG may withdraw from this Agreement with 60 days written notice. Such withdrawal shall not affect any project specific agreements entered into between DWR, DFG and/or other entities pursuant to this Agreement prior to the date of withdrawal.

L. Dispute Resolution. In the event a dispute arises out of any term or condition of this Agreement, DFG and DWR shall meet as soon as possible to resolve the dispute. DFG and DWR shall then attempt to negotiate a resolution of such dispute. Notwithstanding the above provision, neither DFG nor DWR waive any rights or duties it may have pursuant to federal and state laws, rules, or regulations.

M. Amendments. This Agreement may be amended by mutual written agreement of DWR and DFG.

N. Headings. The paragraph headings in this Agreement have been inserted solely for convenience of reference and are not a part of this Agreement and shall have no effect upon its construction or interpretation.

O. Effective Date and Term. This Agreement shall become effective upon signatures below and shall continue except as otherwise provided herein.

Mark Cowin, Director
Department of Water Resources

Date: 10/18/2010

John McCamman, Director
Department of Fish and Game

Date: 10/18/2010

Approved as to legal form and sufficiency:

Cathy Crothers, Acting Chief Counsel
Department of Water Resources

Date: Oct. 14, 2010

Thomas Gibson, General Counsel
Department of Fish and Game

Date: Oct 18, 2010

Attachments Incorporated into this Agreement by the references above:

1. Delta Smelt BiOp RPA Component 4
2. Salmon BiOp RPA Actions I.2.6 and Suite I.6
3. Longfin Smelt ITP Condition 7
4. Proposed Agreement Commitments and Estimated Costs

ATTACHMENTS 1, 2, AND 3

water year was wet or above normal as defined by the Sacramento Basin 40-30-30 index, all inflow into CVP/SWP reservoirs in the Sacramento Basin shall be added to reservoir releases in November to provide an additional increment of outflow from the Delta to augment Delta outflow up to the fall X2 of 74 km for Wet WYs or 81 km for Above Normal WYs, respectively. In the event there is an increase in storage during any November this action applies, the increase in reservoir storage shall be released in December to augment the December outflow requirements in SWRCB D-1641.

Given the nature of this Action and to align its management more closely with the general plan described by the independent review team and developed by Walters (1997), the Service shall oversee and direct the implementation of a formal adaptive management process. The adaptive management process shall include the elements as described in Attachment B. This adaptive management program shall be reviewed and approved by the Service in addition to other studies that are required for delta smelt. In accordance with the adaptive management plan, the Service will review new scientific information when provided and may make changes to the action when the best available scientific information warrants. For example, there may be other ways to achieve the biological goals of this action, such as a Delta outflow target, that will be evaluated as part of the study. This action may be modified by the Service consistent with the intention of this action based on information provided by the adaptive management program in consideration of the needs of other listed species. Other CVP/SWP obligations may also be considered.

The adaptive management program shall have specific implementation deadlines. The creation of the delta smelt habitat study group, initial habitat conceptual model review, formulation of performance measures, implementation of performance evaluation, and peer review of the performance measures and evaluation that are described in steps (1) through (3) of Attachment B shall be completed before September 2009. Additional studies addressing elements of the habitat conceptual model shall be formulated as soon as possible, promptly implemented, and reported as soon as complete.

The Service shall conduct a comprehensive review of the outcomes of the Action and the effectiveness of the adaptive management program ten years from the signing of the biological opinion, or sooner if circumstances warrant. This review shall entail an independent peer review of the Action. The purposes of the review shall be to evaluate the overall benefits of the Action and to evaluate the effectiveness of the adaptive management program. At the end of 10 years or sooner, this action, based on the peer review and Service determination as to its efficacy shall either be continued, modified or terminated.

RPA Component 4: Habitat Restoration

This component of the RPA (Action 6 of Attachment B) is intended to provide benefits to delta smelt habitat to supplement the benefits resulting from the flow actions described above. DWR shall implement a program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. These actions

may require separate ESA consultations for their effects on federally listed species. The restoration efforts shall begin within 12 months of signature of this biological opinion and be completed by DWR (the applicant) within 10 years. The restoration sites and plans shall be reviewed and approved by the Service and be appropriate to improve habitat conditions for delta smelt. Management plans shall be developed for each restoration site with an endowment or other secure financial assurance and easement in place held by a third-party or DFG and approved by the Service. The endowment or other secure financial assurance shall be sufficient to fund the monitoring effort and operation and maintenance of the restoration site.

An overall monitoring program shall be developed to focus on the effectiveness of the restoration actions and provided to the Service for review within six months of signature of this biological opinion. The applicant shall finalize the establishment of the funding for the restoration plan within 120 days of final approval of the restoration program by the Service. There is a separate planning effort in Suisun Marsh where the Service is a co-lead with Reclamation on preparation of an Environmental Impact Statement. Restoration actions in Suisun Marsh shall be based on the Suisun Marsh Plan that is currently under development.

RPA Component 5: Monitoring and Reporting

Reclamation and DWR shall ensure that information is gathered and reported to ensure:
1) proper implementation of these actions,
2) that the physical results of these actions are achieved, and
3) that information is gathered to evaluate the effectiveness of these actions on the targeted life stages of delta smelt so that the actions can be refined, if needed.

Essential information to evaluate these actions (and the Incidental Take Statement) includes sampling of the FMWT, Spring Kodiak Trawl, 20-mm Survey, TNS and the Environmental Monitoring Program of the IEP. This information shall be provided to the Service within 14 days of collection. Additional monitoring and research will likely be required, as defined by the adaptive management process.

Information on salvage at Banks and Jones is both an essential trigger for some of these actions and an important performance measure of their effectiveness. In addition, information on OMR flows and concurrent measures of delta smelt distribution and salvage are essential to ensure that actions are implemented effectively. Such information shall be included in an annual report for the WY (October 1 to September 30) to the Service, provided no later than October 15 of each year, starting in 2010.

Reclamation shall implement the RPA based on performance standards, monitoring and evaluation of results from the actions undertaken and adaptive management as described in RPA component 3. RPA component 3 has a robust adaptive management component that requires a separate analysis apart from those required under this component. Some of the data needed for these performance measures are already being collected such as the FMWT abundances and salvage patterns. However, more information on the effect of

ACTION 6: HABITAT RESTORATION

Objective: To improve habitat conditions for delta smelt by enhancing food production and availability.

Action: A program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh shall be implemented. A monitoring program shall be developed to focus on the effectiveness of the restoration program.

Timing: The restoration efforts shall begin within 12 months of signature of this biological opinion and be completed within a 10 year period.

Background

The historic Delta was a tidal wetland-floodplain system including about 350,000 acres of tidal wetland. Almost all of the historic wetlands in the Delta have been lost due to conversion to agriculture and urban development. The Delta currently supports less than 10,000 acres of tidal wetland, all of which is small and fragmented. This conversion of the Delta's wetlands beginning in the mid-nineteenth century has resulted in a landscape dominated by agricultural lands intersected by deep and comparatively uniform tidal channels.

Delta smelt feed mainly on zooplankton throughout their life cycle (Nobriga and Herbold 2008) with the copepod Pseudodiaptomus forbesi being the dominant prey item for juvenile delta smelt in the summer (Lott 1998; Nobriga 2002; Hobbs et al. 2006). Diatoms form the base of the pelagic foodweb and primary consumers (e.g. copepods) appear to be food-limited in the Delta and Suisun (Muller-Solger et al. 2002; Sobczak et al. 2002). Pelagic productivity in the Delta and Suisun Bay has been declining for several decades with a steep decline following the introduction of the overbite clam in 1986 (Kimmerer and Orsi 1996). Histopathological evaluations have provided evidence that delta smelt have been food-limited during the summer months (Bennett 2005). This finding has been corroborated by recent work on juvenile delta smelt as part of ongoing studies on the POD. Moreover, recent studies suggest a statistical association between delta smelt survival and the biomass of copepods in the estuary (Kimmerer 2008).

Overall research in other estuaries has indicated that tidal wetlands are highly productive. Although definitive studies have not been done on the type and amount of productivity in freshwater tidal wetlands of the Delta, brackish tidal wetlands of Suisun Marsh are one of the most productive habitats in northern San Francisco Bay-Delta estuary (Sobczak et al. 2002). It is likely that restored freshwater tidal wetlands in the Delta would have higher productivity than the brackish wetlands of Suisun (Odum 1988). A large portion of the production in Suisun Marsh consists of high quality phytoplankton-derived carbon (Sobczak et al. 2002) that is an important food source for zooplankton and therefore can contribute to the base of the pelagic foodweb. Modeling suggests that the tidal wetlands of Suisun currently provide about 6 percent of the organic carbon to the pelagic habitats of Suisun Bay (Jassby et al. 1993). In addition, sampling in Liberty Island shows that these freshwater tidal habitats can be a source of high-quality phytoplankton that contribute to the pelagic food web downstream (Lehman et al. 2008). Thus, restoration of large amounts of intertidal habitat in the Delta and Suisun could enhance the ecosystem's pelagic productivity.

Justification:

Since it was introduced into the estuary in 1988, the zooplankton Pseudodiaptomus forbesi has been the dominant summertime prey for delta smelt (Lott 1998; Nobriga 2002; Hobbs et al. 2006). There is evidence suggesting that the co-occurrence of delta smelt and Pseudodiaptomus forbesi has a strong influence on the survival of young delta smelt from summer to fall (Miller 2007). The Effects Section indicates that

Pseudodiaptomus distribution may be vulnerable to effects of export facilities operations and therefore, the projects have a likely effect on the food supply available to delta smelt.

The near complete loss of tidal wetlands from the Delta threatens the persistence of delta smelt by reducing productivity at the base of the pelagic foodweb. Primary production in tidal wetlands of the Northern San Francisco estuary has been shown to support high zooplankton growth (Muller-Solger et al. 2002). This action should therefore enhance the foodweb on which delta smelt depend. This action is designed to increase high quality primary and secondary production in the Delta and Suisun Marsh through an increase in tidal wetlands. Exchange of water between the tidal wetlands and surrounding channels should distribute primary and secondary production from the wetlands to adjacent pelagic habitats where delta smelt occur. This exchange should be optimized through intertidal habitat restoration designed to incorporate extensive tidal channels supported an appropriately sized vegetated marsh plain which will provide the necessary tidal prism to maintain large tidal exchange.

New evidence indicates how tidal marsh may benefit delta smelt even if they do not occur extensively within the marsh itself. Specifically, monitoring suggests this species is taking advantage of recently-created tidal marsh and open water habitat in Liberty Island. The fact that delta smelt make heavy use of habitat in the Cache Slough complex has been evident in sampling by the DFG's Spring Kodiak trawl and 20 mm surveys (www.delta.dfg.ca.gov). The Spring Kodiak trawls show that delta smelt are present in channels of the Cache Slough complex during winter and spring; the collection of larval delta smelt in subsequent 20-mm surveys indicates that these adult delta smelt eventually spawn in the vicinity. In addition, the use of Cache Slough complex by delta smelt includes habitat on Liberty Island. The island flooded in 1998 and has evolved rapidly into a system of open-water and tidal marsh habitat. Recent sampling of Liberty Island by USFWS biologists (http://www.delta.dfg.ca.gov/jfmp/libertyisland.asp) revealed that delta smelt both spawn and rear in Liberty Island. Light traps collected relatively high numbers of larval delta smelt in several locations of Liberty Island during the 2003 spawning period for this species. Moreover, subsequent beach seine sampling showed that older delta smelt were present at all ten of their sampling stations during 2002-2004 and in all seasons of the year (USFWS, unpublished data). These results are particularly striking because they were from a period when delta smelt was at record low abundance. Collection of delta smelt from shallow inshore areas using seines indicates that the fish do not occupy deeper pelagic habitat exclusively. These results seem reasonable in light of the area's consistently high turbidity (Nobriga et al. 2005; DWR, unpublished data) and zooplankton abundance (e.g. Sommer et al. 2004), both of which are important habitat characteristics for delta smelt (Bennett 2005; Feyrer et al. 2007). In any case, these data suggest that freshwater tidal wetlands can be an important habitat type to delta smelt with proper design and location.

A monitoring program shall be developed to focus on the effectiveness of the restoration program. This program shall be reviewed and modified as new information becomes available.

on timely hydrologic and biological considerations. Important factors differ from year to year, and need to be considered in operations planning. They include the projected size of the winter-run year class (and thus the extent of habitat needed); timing and location of spawning and redds based on aerial surveys; the extent of the cold water pool, given air temperatures; and operation of the Temperature Control Device to provide optimal use of the cold water pool. Preparation of a draft plan also allows for iterative planning and feedback. Operations can be tailored each year to achieve the optimal approach to temperature management to maintain viable populations of anadromous fish, based on the best available information.

The Calfed Science Program peer review report on temperature management emphasized the importance of refining temperature management practices in the long term and included recommendations for doing so. The requirement to hire an independent contractor to recommend specific refinements to the procedures in this RPA responds to these recommendations.

Action I.2.5. Winter-Run Passage and Re-Introduction Program at Shasta Dam

See Fish Passage Program, Action V

Action I.2.6. Restore Battle Creek for Winter-Run, Spring-Run, and CV Steelhead

Objective: To partially compensate for unavoidable adverse effects of project operations by restoring winter-run and spring-run to the Battle Creek watershed. A second population of winter-run would reduce the risk of extinction of the species from lost resiliency and increased vulnerability to catastrophic events.

Description of Action: Reclamation shall direct discretionary funds to implement the Battle Creek Salmon and Steelhead Restoration Project. Phase 1A funding is currently allocated through various partners and scheduled to commence in Summer 2009 (Reclamation 2008c). DWR shall direct discretionary funds for Phase 1B and Phase 2, consistent with the proposed amended Delta Fish Agreement by December 31 of each year, Reclamation and DWR will submit a written report to NMFS on the status of the project, including phases completed, funds expended, effectiveness of project actions, additional actions planned (including a schedule for further actions), and additional funds needed. The Battle Creek Salmon and Steelhead Restoration Project shall be completed no later than 2019.

Rationale: Modeling projections in the BA show that adverse effects of ongoing project operations cannot be fully minimized. Severe temperature-related effects due to project operations will occur in some years. This RPA includes an exception procedure in anticipation of these occurrences (see Action I.2.2). Establishing additional populations of winter-run is critical to stabilize the high risk of extinction resulting from the proposed action on the only existing population of this species. $26 million has been identified for this project in the American Recovery and Reinvestment Act of 2009.

minimum flows for anadromous fish in critically dry years, in lieu of the current 5,000 cfs navigation criterion. Recommendations shall be made to NMFS by December 1, 2009. The recommendations will be implemented upon NMFS' concurrence.

In years other than critically dry years, the need for a variance from the 5,000 cfs navigation criterion will be considered during the process of developing the Keswick release schedules (Action I.2.2-4).

Rationale: In some circumstances, maintaining the Wilkins Slough navigation channel at 5,000 cfs may be a significant draw on Shasta reservoir levels and affect the summer cold water pool necessary to maintain suitable temperatures for winter-run egg incubation and emergence. Reclamation has stated that it is no longer necessary to maintain 5,000 cfs for navigation (CVP/SWP operations BA, page 2-39). Operating to a minimal flow level based on fish needs, rather than on outdated navigational requirements, will enhance the ability to use cold-water releases to maintain cooler summer temperatures in the Sacramento River.

Action I.5. Funding for CVPIA Anadromous Fish Screen Program (AFSP)

Objective: To reduce entrainment of juvenile anadromous fish from unscreened diversions.

Action: Reclamation shall screen priority diversions as identified in the CVPIA AFSP, consistent with previous funding levels for this program. In addition, Reclamation/CVPIA Program shall evaluate the potential to develop alternative screened intakes that allow diverters to withdraw water below surface levels required by the antiquated Wilkins Slough navigation requirement criterion of 5,000 cfs.

Rationale: Approximately ten percent of 129 CVP diversions listed in Appendix D-1 of the CVP/SWP operations BA are currently screened. Of these, most of the largest diversions (greater than 250 cfs) have already been screened; however, a large number of smaller diversions (less than 250 cfs) remain unscreened or do not meet NMFS fish screening criteria (NMFS 1997; *e.g.*, CVP and SWP Delta diversions, Rock Slough diversion). The AFSP has identified priorities for screening that is consistent with the needs of listed fish species. Screening will reduce the loss of listed fish in water diversion channels. In addition, if new fish screens can be extended to allow diversions below 5,000 cfs at Wilkins Slough, then cold water can be conserved during critically dry years at Shasta Reservoir for winter-run and spring-run life history needs.

Action Suite I.6: Sacramento River Basin Salmonid Rearing Habitat Improvements

Objective: To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin, to compensate for unavoidable adverse effects of project operations. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River.

The suite of actions includes near term and long-term actions. The near-term action (Action I.6.2) is ready to be implemented and can provide rearing benefits within two years of issuing this Opinion. The long-term actions (Actions I.6.1, I.6.3, and I.6.4) require additional planning and coordination over a five- to ten-year time frame.

These actions are consistent with Reclamation's broad authorities in CVPIA to develop and implement these types of restoration projects. When necessary to achieve the overall objectives of this action, Reclamation and DWR, in cooperation with other agencies and funding sources, including the Delta Fish Agreement and any amendments, shall: (1) apply for necessary permits; (2) seek to purchase land, easements, and/or water rights from willing sellers; (3) seek additional authority and/or funding from Congress or the California State Legislature, respectively; and (4) pursue a Memorandum of Agreement with the Corps.

Similar actions addressing rearing and fish passage are under consideration in the BDCP development process and may ultimately satisfy the requirements in Actions I.6 and I.7. BDCP is scheduled to be completed by December 31, 2010.

Action I.6.1. Restoration of Floodplain Rearing Habitat

Objective: To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River.

Action: In cooperation with CDFG, USFWS, NMFS, and the Corps, Reclamation and DWR shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. In the event that this action conflicts with Shasta Operations Actions I.2.1 to I.2.3, the Shasta Operations Actions shall prevail.

Implementation procedures: By December 31, 2011, Reclamation and DWR shall submit to NMFS a plan to implement this action. This plan should include an evaluation of options to: (1) restore juvenile rearing areas that provide seasonal inundation at appropriate intervals, such as areas identified in Appendix 2-C or by using the Sacramento River Ecological Flow Tool (ESSA/The Nature Conservancy 2009) or other habitat modeling tools; (2) increase inundation of publicly and privately owned suitable acreage within the Yolo Bypass; (3) modify operations of the Sacramento Weir (which is owned and operated by the Department of Water Resources) or Fremont Weir to increase rearing habitat; and (4) achieve the restoration objective through other operational or engineering solutions. An initial performance measure shall be 17,000-20,000 acres (excluding tidally-influenced areas), with appropriate frequency and duration. This measure is based on the work by Sommer *et al.* (2001, 2004) at Yolo Bypass and on recent analyses conducted for the BDCP process of

inundation levels at various river stages. (BDCP Integration Team 2009).[28] The plan may include a proposal to modify this performance measure, based on best available science or on a scientifically based adaptive management process patterned after Walters (1997).

This plan also shall include: (1) specific biological objectives, restoration actions, and locations; (2) specific operational criteria; (3) a timeline with key milestones, including restoration of significant acreage by December 31, 2013; (4) performance goals and associated monitoring, including habitat attributes, juvenile and adult metrics, and inundation depth and duration criteria; (5) specific actions to minimize stranding or migration barriers for juvenile salmon; and (6) identification of regulatory and legal constraints that may delay implementation, and a strategy to address those constraints. Reclamation and DWR shall, to the maximum extent of their authorities and in cooperation with other agencies and funding sources, implement the plan upon completion, and shall provide annual progress reports to NMFS. In the event that less than one half of the total acreage identified in the plan's performance goal is implemented by 2016, then Reclamation and DWR shall re-initiate consultation.

The USFWS' Delta smelt biological opinion includes an action to restore 8,000 acres of tidal habitat for the benefit of Delta smelt. If these 8,000 acres also provide suitable rearing habitat for salmonids, they may be used in partial satisfaction of the objective of this action.

This action is not intended to conflict with or replace habitat restoration planning in the BDCP process.

Rationale: Rearing and migration habitats for all anadromous fish species in the Sacramento basin are in short supply. Project operations limit the availability of such habitats by reducing the frequency and duration of seasonal over-bank flows as a result of flood management and storage operational criteria. Recent evaluations on the Yolo Bypass and Cosumnes River have shown that juvenile Chinook salmon grow faster when seasonal floodplain habitats are available (Sommer *et al.* 2001, 2005; Jeffres *et al.* 2008). Sommer *et al.* (2005) suggest these floodplain benefits are reflected in adult return rates. This action is intended to offset unavoidable adverse effects to rearing habitat and juvenile productivity of winter-run, spring-run, and CV steelhead in the Sacramento River basin, by increasing available habitat that is inundated with the frequency and duration of suitable floodplain rearing habitats during December through April.

In high flow years (*e.g.*, similar to 1998), this action can be achieved solely by inundation of the Yolo Bypass. In other years, this action may be accomplished by a combination of actions such as increasing the year-to-year inundation frequency of existing floodplains such as portions of the Yolo Bypass, by restoring rearing habitat attributes to suitable areas, through restoration or enhancement of intertidal areas such as Liberty Island, creation or re-establishment of side channels, and re-created floodplain terrace areas.

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[28] The analyses assumed a notch in the Fremont Weir.

Action I.6.2. Near-Term Actions at Liberty Island/Lower Cache Slough and Lower Yolo Bypass

Description of Action: By September 30, 2010, Reclamation and/or DWR shall take all necessary steps to ensure that an enhancement plan is completed and implemented for Liberty Island/Lower Cache Slough, as described in Appendix 2-C. This action shall be monitored for the subsequent five years, at a minimum, to evaluate the use of the area by juvenile salmonids and to measure changes in growth rates. Interim monitoring reports shall be submitted to NMFS annually, by September 30 each year, and a final monitoring report shall be submitted on September 30, 2015, or in the fifth year following implementation of enhancement actions. NMFS will determine at that time whether modification of the action or additional monitoring is necessary to achieve or confirm the desired results. This action shall be designed to avoid stranding or migration barriers for juvenile salmon.

Action I.6.3. Lower Putah Creek Enhancements

Description of Action: By December 31, 2015, Reclamation and/or DWR shall develop and implement Lower Putah Creek enhancements as described in Appendix 2-C, including stream realignment and floodplain restoration for fish passage improvement and multi-species habitat development on existing public lands. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a progress report towards the successful implementation of this action. This action shall not result in stranding or migration barriers for juvenile salmon.

Action I.6.4. Improvements to Lisbon Weir

Action: By December 31, 2015, Reclamation and/or DWR shall, to the maximum extent of their authorities, assure that improvements to the Lisbon Weir are made that are likely to achieve the fish and wildlife benefits described in Appendix 2-C. Improvements will include modification or replacement of Lisbon Weir, if necessary to achieve the desired benefits for fish. If neither Reclamation nor DWR has authority to make structural or operational modifications to the weir, they shall work with the owners and operators of the weir to make the desired improvements, including providing funding and technical assistance. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a report on progress toward the successful implementation of this action. Reclamation and DWR must assure that this action does not result in migration barriers or stranding of juvenile salmon.

Rationale for Actions I.6.2 to I.6.4: These actions have been fully vetted by CDFG and found to be necessary initial steps in improving rearing habitat for listed species in the lower Sacramento River basin. These improvements are necessary to off-set ongoing adverse effects of project operations, primary due to flood control operations. Additional descriptions of these actions are contained in the draft amendment to the Delta Fish Agreement (CVP/SWP operations BA appendix Y).

6.4 To ensure the minimization measures designed to minimize take of the Covered Species are effective, Permittee shall conduct inspection, maintenance and reporting on all of the fish screens at the NBA, RRDS, and Sherman Island diversions during November through June. Permittee shall submit a plan, within 3 months of Permit issuance, detailing the inspection, maintenance and reporting scope and schedule that cover the fish screen and any other components that may affect screening efficiency. After the plan is approved by DFG, the Permittee shall adhere to the maintenance, inspection and reporting schedule described in the plan. Effectiveness monitoring requirements for these facilities is described below in Condition 8.

7 Measures That Contribute to Full Mitigation

DFG has determined that permanent protection of inter-tidal and associated sub-tidal wetland habitat to enhance longfin smelt water habitat is necessary and required under CESA to fully mitigate the impacts of the taking on the Covered Species that will result with implementation of the Project. The following measures, when implemented in conjunction with the flow measures in Condition 5 above, will enhance the estuarine processes and open water habitat beneficial for longfin smelt and provide some additional habitat for longfin smelt in deeper areas. These measures, in conjunction with the flow measures which minimize and partially mitigate take, will fully mitigate take of longfin smelt from the proposed Project.

7.1 To improve overall habitat quality for longfin smelt in the Bay Delta Estuary, Permittee shall fund the acquisition, initial enhancement, restoration, long-term management, and long-term monitoring of 800 acres of inter-tidal and associated sub-tidal wetland habitat in a mesohaline part of the estuary. This condition is intended to provide benefits supplemental to the benefits resulting from the flow requirements described in Condition 5 above. The identification and development of the restoration sites, and development of site-specific management and monitoring plans shall be appropriate to improve habitat conditions for longfin smelt and shall be submitted to DFG for review and approval. The restoration efforts shall begin with the acquisition and planning for restoration of at least 160 acres within 2 years of issuance of this Permit. Subsequent restoration efforts shall restore at least 160 acres every 2 years and all restoration shall be completed by Permittee within 10 years. If longfin smelt are not listed by the Fish and Game Commission at the March 2009 meeting, the inter-tidal and sub-tidal wetland habitat restoration requirement shall be 20 acres for the period from February 23, 2009 to March 6, 2009 and shall be completed by December 31, 2010. These acreages are above and beyond any acres already under development or planned that are required for compliance with any existing CESA permits. Implementation of this may require separate CESA and CEQA consultations to evaluate, minimize and mitigate any restoration effects on other listed species

7.2 DFG's approval of the Mitigation Lands (Lands) must be obtained prior to acquisition and transfer by use of the Proposed Lands for Acquisition Form or by other means specified by DFG. As part of this Condition, Permittee shall:

7.2.1 Transfer fee title to the Lands, convey a conservation easement, or provide another mechanism approved by DFG over the Lands to DFG under terms approved by DFG. Alternatively, a conservation easement over the Lands may be conveyed to a DFG-approved non-profit organization qualified pursuant to California Government Code section 65965, with DFG named as a third party beneficiary under terms approved by DFG.

7.2.2 Provide a recent preliminary title report, initial Phase 1 report, and other necessary documents. All documents conveying the Lands and all conditions of title are subject to the approval of DFG, and, if applicable, the Department of General Services.

7.2.3 Reimburse DFG for reasonable expenses incurred during title and documentation review, expenses incurred from other state agency reviews, and overhead related to transfer of the Lands to DFG. DFG estimates that this Project will create an additional cost to DFG of no more than $3,000 for every fee title deed or easement processed.

7.3 All land acquired for the purposes of implementing this Condition shall be evaluated and all appropriative and riparian rights obtained with the land acquisition shall be recorded. All water rights obtained and not necessary for implementation of the long-term management and monitoring plan shall be transferred to in stream beneficial uses under Water Code Section 1707.

8. **Monitoring and Reporting:**

Permittee shall ensure that information is gathered and reported to ensure proper implementation of the Conditions of Approval of the Permit, that the intended physical results of these Conditions are achieved, and that appropriate and adequate information is gathered to evaluate the effectiveness of these actions on the targeted life stages of longfin smelt so that the actions can be refined, if needed.

8.1 Permittee shall fund its share of the Interagency Ecological Program to continue the following existing monitoring efforts, all of which are key to monitor the Covered Species response to Project operations and the Conditions of Approval of this Permit. These include sampling of the FMWT, Spring Kodiak Trawl, 20-mm Survey, Smelt Larval Survey, and Bay Study.

8.2 Permittee shall fund additional monitoring related to the extent of the incidental take of longfin smelt and the effectiveness of the minimization measures. Immediate needs include extension of the time period of the existing smelt larval

Permit. The Permittee shall continue to work and coordinate with DFG salvage staff to ensure as close to real time information sharing as feasible.

9 **Funding Assurance**

To the extent authorized under California law, Permittee shall fully fund all expenditures required to implement minimization and mitigation measures and to monitor compliance with and effectiveness of those measures, as well as all other related costs.

9.1 Permittee shall provide sufficient funding for perpetual management and monitoring activities on the required compensatory habitat lands (Lands) identified in Condition 7. To determine the amount sufficient to fund all monitoring efforts and the operations, maintenance and management on the Lands, the Permittee shall prepare a Property Analysis Record (PAR) or PAR-equivalent analysis prior to providing the funding for each approved Lands parcel. The Permittee shall submit to DFG for review and approval the results of the PAR or PAR-equivalent analysis. This analysis will be reviewed by the DFG to determine the appropriate first year management costs and long-term funding amount necessary for the in-perpetuity management of the Lands. As each parcel of the Lands is acquired and following DFG review and approval of the PAR, the funding shall be provided by Permittee.

9.2 Permittee may proceed with the Project before completing all of the required mitigation (including acquisition of Mitigation Lands), monitoring, and reporting activities only if Permittee ensures funding to complete those activities by providing funding assurance to DFG. Within 3 months after the effective date of this Permit, 20% of the funding assurance shall be provided. Additional 20% payment shall be provided at years 2, 4, 6 and 8. The funding assurance shall be provided in the form of a bond in the form of Attachment C or irrevocable stand-by letter of credit in the form of Attachment D or another form of funding assurance approved by the Director, demonstrating DWR's financial commitment through SWP secured funding sources. The funding assurance will be held by DFG or in a manner approved by DFG. The funding assurance shall allow DFG to draw on the principal sum if DFG, at its sole discretion, determines that Permittee has failed to comply with the Conditions 6, 7 and 8 of this Permit. The funding assurance (or any portion of such funding assurance then remaining) shall be released to the Permittee after all of the Permit Conditions have been met as evidenced by:

- Timely submission of all required reports;
- An on-site inspection by DFG; and
- Written approval from DFG.

Even if funding assurance is provided, the Permittee must complete the required acquisition, protection and transfer of all required Lands and record any required conservation easements no later than 10 years after the issuance of this Permit, as

specified in Condition 7. DFG may require the Permittee to provide additional Lands and/or additional funding to ensure the impacts of the taking are minimized and fully mitigated, as required by law, if the Permittee does not complete these requirements within the specified timeframe.

The funding assurance shall be in the amount of $2,400,000.00 based on the following estimated costs of implementing the Permit's mitigation, monitoring and reporting requirements. The Permittee shall notify the DFG upon furnishing each of the following financial assurances, or substantial equivalent approved by DFG:

a) Land acquisition costs for impacts to habitat, calculated at $1,500.00/acre for 800 acres: $1,200,000.00.

b) Costs of enhancing Lands, calculated at $250.00/acre for 800 acres: $200,000.00.

c) Endowment costs initially estimated at $1,000,000.00, or substantial equivalent approved by DFG.

Amendment:
This Permit may be amended without the concurrence of the Permittee if DFG determines that continued implementation of the Project under existing Permit conditions would jeopardize the continued existence of a Covered Species or that Project changes or changed biological conditions necessitate a Permit amendment to ensure that impacts to the Covered Species are minimized and fully mitigated. DFG may also amend the Permit at any time without the concurrence of the Permittee as required by law.

Stop-Work Order:
To prevent or remedy a potential violation of permit conditions, DFG will consult with Permittee to address the potential violation and will give Permittee a reasonable time to correct the potential violation and implement possible alternative actions before issuing a stop-work order. Director may issue Permittee a written stop-work order to suspend any activity covered by this Permit for an initial period of up to 25 days to prevent or remedy a violation of Permit conditions (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. Permittee shall comply with the stop-work order immediately upon receipt thereof. DFG may extend a stop-work order under this provision for a period not to exceed 25 additional days, upon written notice to the Permittee. DFG shall commence the formal suspension process pursuant to California Code of Regulations, Title 14, section 783.7 within five working days of issuing a stop-work order.

Compliance with Other Laws:
This Permit contains DFG's requirements for the Project pursuant to CESA. This permit does not necessarily create an entitlement to proceed with the Project. Permittee is responsible for complying with all other applicable state, federal, and local laws.

Proposed Agreement Commitments and Estimated Costs

Attachment 4

Restoration - Mitigation Actions [1]	Action Features	Anticipated Benefits	Status	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
SECTION A. Delta Smelt & Longfin Smelt Actions														
A1. Early Implementation Actions														
Cache Slough Complex a. Prospect Island b. Liberty Island	a. Up to 1316 acres. b. TBD based on enhancement of existing habitat over baseline conditions.	Habitat benefits for improved estuarine processes and function to support delta smelt, longfin smelt and other Fish Species.	In Progress											
A2. Additional Potential Mitigation Actions for In-Delta Acreage														
Actions in the Delta, Suisun Marsh, and Cache Slough Complex: a. Western Cache Slough Complex b. Little Holland Tract Restoration Project c. Eastern Egbert Tract Restoration Project d. Hill Slough West Tidal Marsh Restoration	a. Acres to be determined. b. Acres to be determined. c. Acres to be determined. d. 207-1100 acres	a. Food web, tidal processes, habitat. b. Tidal Processes, habitat, d. Habitat benefits for improved estuarine processes and function to support delta smelt, longfin smelt and other Fish Species.	Planning											
SECTION B. Anadromous Fish Actions														
B1. Early Implementation Actions														
Battle Creek Phase 2	Open 31.5 miles of spawning/rearing habitat	Winter/spring-run, Chinook, spawning/rearing	Planning	$12,000,000 One time-fixed cost										$12,000,000
B2. Additional Potential Anadromous Actions														
a. Lower Putah Creek Re-Alignment b. Lisbon Weir Improvements c. Tule Canal Connectivity d. Fremont Weir Fish Passage e. Yolo Bypass Floodplain Habitat f. Additional Listed Anadromous Fish Species Project Opportunities	Improved juvenile rearing, upstream passage for adult anadromous fish and downstream passage for juvenile anadromous species • Water Right purchase • Water/energy bypass purchase • Tributary restoration action • Fish passage improvements	a. Fall-run Chinook b. Passage – Chinook, sturgeon, splittail c. Passage – Chinook, sturgeon, splittail d. Passage – Chinook, sturgeon, splittail e. Spawning, rearing, and foodweb – splittail, Chinook, rearing f. TBD	Ongoing											
Section C Total Estimated costs														
				$20 Million[2]			$36 Million		$40 Million		$32 Million		$32 Million	$160 Million
SECTION D.														
DFG Staff Resources	Estimated Staff necessary to support mitigation activities. 8 PYs Total: 5 PY- Planning and Monitoring 3 PY- restoration habitat management planning & transfer agreements.	Facilitate implementation of mitigation actions.		$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$10,000,000
DWR Staff Resources	Estimated Staff necessary to support mitigation activities. Total 5 PYs New Positions.			$750,000	$750,000	$750,000	$750,000	$750,000	$750,000	$750,000	$750,000	$750,000	$750,000	$7,500,000
YEARLY SUMMATION of COSTS				**$33,750,000**	**$1,750,000**	**$1,750,000**	**$37,750,000**	**$1,750,000**	**$41,750,000**	**$1,750,000**	**$33,750,000**	**$1,750,000**	**$31,750,000**	**$187,500,000**
Percent progress towards agreement mitigation acreage. To Be Determined (TBD).				**• TBD (up to 3000 acres)**	**TBD**	**TBD**	**35%**	**TBD**	**60%**	**TBD**	**80%**	**TBD**	**100%**	**100%**

[1] Delta Fish Agreement Actions that DWR will continue to implement include:
Delta Bay Enhanced Enforcement Project (DBEEP); Suisun Marsh Fish Screen Operations and Maintenance Project; Prospect Island Habitat Restoration Project; Spring-Run Warden Overtime Program; Deer Creek Water Exchange Program; Mill Creek Water Exchange Program; Butte Creek Fish Passage and Monitoring Program; San Joaquin River Maintenance Project- Tuolumne, Merced, Stanislaus Rivers Gravel and Habitat Maintenance; Tuolumne River Salmon Habitat- La Grange Gravel Project; Merced River Salmon Habitat- Wing Deflector Gravel Project; Merced River Salmon Habitat- Robinson Reach and Ratzlaff Reach; Merced River Hatchery; Hills Ferry Barrier San Joaquin Project; Upper Western Stone Project- Merced River Habitat Project.

[2] These funds are to be expended over the first three to five years, or as determined when the projects are fully designed. Estimated costs based on $20,000/acre to acquire and restore habitat, actual costs will vary.

APPENDIX B. REQUIRED ACTIONS OF THE FISH RESTORATION PROGRAM

Appendix B: Required Actions of the Fish Restoration Program Agreement

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
A1. Early Implementation Action: Cache Slough Complex: Prospect Island and Liberty Island Projects. Habitat benefits for improved estuarine processes and function to support delta smelt, longfin smelt and other Fish Species.	Attachment 4- FRPA- Proposed Agreement Commitments Table	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Prospect Island- 1. Up to 1316 acres. Liberty Island- 2. TBD based on enhancement of existing habitat over baseline conditions. Creation or restoration of 8000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. The 800 acres of habitat restoration required in Condition 7 in the Longfin Smelt ITP will be satisfied upon DWR satisfying 800 acres of habitat restoration under the Delta Smelt BiOp in the mesohaline zone of the Delta (in Suisun Bay or Marsh) with hydrologic connectivity to open waters. Prior to committing to a specific project proposal or action, DFG and DWR shall agree in writing that the proposed project satisfies both Condition 7 of the Longfin Smelt ITP and theDelta Smelt BiOp.	DWR & DFG: DWR Dennis McEwan Lead on Project. Aquistion of Prospect Island- January 2010/ MOU BETWEEN DFG and DWR REGARDING HABITAT CREDIT PRIOR TO THE ACQUISITON OF PROSPECT ISLAND PROPERTY- December 29, 2009
A2. Additional Potential Mitigation Actions for Acreage: Actions in the Delta, Suisun Marsh, and Cache Slough Complex: a. Western Cache Slough Complex, b. Little Holland Tract Restoration Project, c. Eastern Egbert Tract Restoration, d.Hill Slough West Tidal Marsh. (Benefits for: a. Food web, tidal processes, habitat/ b. Tidal Processes, habitat, d. Habitat benefits for improved estuarine processes and function to support delta smelt, longfin smelt and other Fish Species.)	Attachment 4- FRPA- Proposed Agreement Commitments Table	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Western Cache Slough, Little Holland Tract, Eastern Eggbert Tract- Acres to be determined. Hills Slough Project 207-1100 Acres estimated. (Benefits for these locations: Food web, tidal processes, habitat/ Habitat benefits for improved estuarine processes and function to support delta smelt, longfin smelt and other Fish Species.)	DWR &DFG- DWR Dennis McEwan Lead on Project/ CSC / Katie S.J. -Susiun Marsh Program Lead.
B1. Battle Creek Project Funding: One Time Funding Contribution from FRPA (limited*). DFG Project for Battle Creek- benefits Winter/spring-run, Chinook, spawning/rearing- Open 31.5 miles of spawning/rearing habitat. FRPA Amendment 1, signed on 11/15/10, clarifies that the funds required to go towards the Battle Creek Project, (per FRPA and the NMFS BiOp for salmon Action 1.2.6) will be paid for with a $12 million fixed cost, payable over two consecutive fiscal years.	Attachment 4- FRPA- Proposed Agreement Commitments Table & FRPA Amendment 1	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	DWR will pay the sum in two payments of approximately $6 million each, first to an escrow for the Wildlife Conservation Board (WCB) per direction of DFG during 1/2011, and then to the U.S. Bureau of Reclamation (USBR) after 7/1/2011. The $12 million sum that will go towards the Battle Creek Project will ensure that phase 1A & 2 are fully funded and that the project will be completed, thereby meeting DWR's obligation under NMFS BiOp Action 1.2.6. DWR has received written concurrence from NMFS that the $12 for Battle Creek will satisfy this requirement.	DWR & DFG & USBR : DWR Lead on Project- Stephani Spaar /USBR Lead on Project- Mary Marshall/ Randy Nelson - WCB-DFG Lead on Project Escrow Transfer
B2. Additional Potential Anadromous Actions a. Lower Putah Creek Re-Alignment; b. Lisbon Weir Improvements; c. Tule Canal Connectivity; d. Fremont Weir Fish Passage; e. Yolo Bypass Floodplain Habitat. Benefits include improved juvenille rearing, upstream passgae for adult and anadromous fish and downstream passage for juvenille anadromous fish species.	Attachment 4- FRPA- Proposed Agreement Commitments Table	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Possible Actions: Water Rights Purchases/ Water Exchamge or Bypass Program/ Tributary restoration Actions/ and Fish Passage Improvements.	DWR & DFG- DWR Dennis McEwan / (Marianne Kirkland) DFG- Fred Jurick

Appendix B: Required Actions of the Fish Restoration Program Agreement

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
Section 3a. Creation or restoration of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. Some potential actions and estimated funding to provide this restoration acreage are described in Attachment 4, "Proposed Agreement Commitments and Estimated Costs." Attachment 4 is not a final or binding list of actions and may be modified by DWR and DFG from time to time as additional information is developed.	Section A3. Page 4 FRPA	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Actions will be consistent with the requirements in the BiOps.	DWR &DFG- DWR Dennis McEwan Lead on Project
Section 3b. Implementation of Delta Smelt BiOp RPA Component 4 fish habitat restoration. Prior to committing to a specific project proposal or restoration action, DWR, in cooperation with DFG, shall submit the fish restoration proposal to USFWS to obtain USFWS review and written approval of the project proposal as satisfying the habitat restoration conditions required in the Delta Smelt BiOp.	Section A3. Page 4 FRPA	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Actions will be consistent with the requirements in the BiOps.	DWR &DFG- DWR Dennis McEwan Lead on Project
Section 3c. Implementation of Salmon BiOp RPA fish habitat restoration actions. Prior to committing to a specific project proposal or restoration action for salmon, DWR, in cooperation with DFG, shall submit the fish restoration proposal to NMFS to obtain NMFS review and written approval of the project proposal as satisfying the habitat restoration conditions required in the Salmon BiOp. The restoration actions that satisfy the Delta Smelt BiOp may be accepted by NMFS in satisfying restoration obligations of Salmon BiOp RPA Action I.6.1.	Section A3. Page 4 FRPA	Dates should be consistent with NMFS Salmon BiOp Requrirements.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Actions will be consistent with the requirements in the BiOps.	DWR & DFG- DWR Dennis McEwan / (Marianne Kirkland) DFG- Fred Jurick
Section 3d. d. Implementation of Longfin Smelt habitat restoration actions. The 800 acres of habitat restoration required in Condition 7 in the Longfin Smelt ITP will be satisfied upon DWR satisfying 800 acres of habitat restoration under the Delta Smelt BiOp in the mesohaline zone of the Delta (in Suisun Bay or Marsh) with hydrologic connectivity to open waters. Prior to committing to a specific project proposal or action, DFG and DWR shall agree in writing that the proposed project satisfies Condition 7 of the Longfin Smelt ITP.	Section A3. Page 4 FRPA	Dates should be consistent with Longfin Smelt ITP Requrirements.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	Actions will be consistent with the requirements in the ITP.	DWR &DFG- DWR Dennis McEwan Lead on Project
Implementation Schedule. DFG and DWR shall jointly develop an implementation plan schedule. The Implementation Schedule will identify restoration actions, costs, targeted acreage, and a timeline for DWR's implementation over the term of FRPA.	Section B: Page 5 FRPA		Due October 2011- Within 12 Months from the effective date of signature of FRPA. (October 18, 2010).	DWR-Fish Restoration Program section and DFG Water Branch will complete this task together.	DWR &DFG- DWR Dennis McEwan Lead on Project / DFG Lead - Fred Jurick
Section I Reporting- 1. DWR, in coordination with DFG, shall prepare an annual report on programs and projects being implemented under this Agreement. The report will include financial reporting, the progress of each project towards meeting the intended restoration goals and Implementation Schedule, and the current status, barriers, and relative accrued benefits of those projects.	Section I.: Page 8 FRPA.	December 15, 2019.	Within Ten Years from the effective date of signature of FRPA, on October 18, 2010. (October 18, 2020)	DWR-Fish Restoration Program section and DFG Water Branch will complete this annual reporting together and submit it to NMFS and USFWS (and also provide info to SWC). Annual Reporting: within 1 year from the effective date of this Amendment and every year thereafter.	DWR & DFG- DWR Dennis McEwan / DFG- Fred Jurick

Appendix B: Required Actions of the Fish Restoration Program Agreement

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
Section I. Reporting- 2. At year 5 and 8, and every 5 years subsequently, DWR, in coordination with DFG, will review and jointly prepare a report on the restoration actions implemented under this Agreement using monitoring data from the restoration actions implemented and current scientific understanding for the following purposes: a. To assess the effectiveness of restoration actions undertaken and funding provided in achieving the expected benefits to the fish species covered in the restoration plan; b. To evaluate the effectiveness of the restoration actions to collectively provide the expected benefits in relation to satisfying the obligations under the Delta Smelt BiOp, the Salmon BiOp, and the Longfin Smelt ITP.	Section I.: Page 8 FRPA.	At FRPA year 5 and 8, and every 5 years subsequently.	At FRPA year 5 and 8, and every 5 years subsequently	DWR-Fish Restoration Program section and DFG Water Branch will complete this annual reporting together and submit it to NMFS and USFWS (and also provide info to SWC). Five-year reporting: At year 5 and 8, and every 5 years subsequently.	DWR & DFG- DWR Dennis McEwan / DFG- Fred Jurick
DFG Staff Resources- Estimated Staff necessary to support mitigation activities. 8 PYs Total: 5 PY- Planning and Monitoring 3 PY- restoration habitat management planning & transfer agreements. Facilitate implementation of mitigation actions. Cost Estimate Budgetted- $1 Million/Year Annual SWC Cost.	Attachment 4- FRPA- Proposed Agreement Commitments Table	ASAP	Contract Start Date= July 1, 2011 --Estimated Cost for Ten Years from signature of FRPA (October 18, 2010).	DFG Interagency Contract with DWR fpr FRPA Staffing is being processed and has a start date of July 1, 2011. DFG needs to have an Interagency Contract (in order to "fill" their FRPA positions) between DWR-DFG for this Staff Cost and Task Work.	DWR &DFG- DWR Laura Flournoy Lead on Contract/ Dennis McEwan Program Contact & Invoices Oversight
RPA 4: Habitat Restoration - DWR shall implement a program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. Restoration Actions in the Suisun Marsh shall be based on the the Suisun Marsh Plan that is currently under development. RPA 4 and Attachment B-Action 6: The restoration effort shall begin within 12 Months of the signature of this biological opinion and shall be completed in a ten year period.	Delta Smelt BiOp- 283 and Attachment B Supplemental Information Action 6 page 379	December 15, 2009 – Begin restoration efforts. December 15, 2019 – Complete restoration.	None Specified. Interpretting that because we signed FRPA on October 18, 2010 that we would need to have 8,000 acres to be complete by October 18, 2020. (Ten Years)	Pg. 379 Action 6: The restoration effort shall BEGIN within 12 Months of the signature of this biological opinion and shall be completed in a ten year period. (December 15, 2009 – Begin restoration efforts/ December 15, 2019 – Complete restoration. ? or is it October 18, 2010 Begin/ October 18, 2020 ? Based on date of FRPA Signature)	**January 2009**- BCP Spring Finance Letter (FY 09/10) was approved for FRPA Program positions for DWR. **January 2010**- Prospect Island Aquistion by DWR with an MOU for Prospect between DFG & DWR completed December 29, 2009. (Restoration Actions in Suisun Marsh will be based on the Suisun Marsh Plan.)
RPA 4: Habitat Restoration-- Conservation Recommendations: The Service recommends that Reclamation and DWR develop and implement restoration measures consistent with the current Delta Native Species Recovery Plan.	Page 295-296- Conservation Recommendations Section- Item #1			We will be sure that consistency with other plans, including the Delta Native Species Recovery Plan occurs.	Restoration Actions in Suisun Marsh will be based on the Suisun Marsh Plan.
RPA 4: Habitat Restoration Management Plans - Management plans shall be developed for each restoration site with an endowment or other secure financial assurance and easement in place held by a third-party or DFG and approved by the Service. DWR shall finalize the establishment of the funding for the restoration plan. The applicant shall finalize the establishment of the funding for the restoration plan within 120 days of final approval of the restoration program by the Service.	Delta Smelt BiOp-284 and Attachment B Supplemental Information Action 6 page 379	284-4- Funding Establishment is due 120 days after approval by the Service.(SWP Funds)	284-4- Funding Establishment is due 120 days after approval by the Service.(SWP Funds)	We are interpretting that these Management Plans creation would be Post-Project after restoration. -We are also interpretting that this "within 120 days" part of the statement is confusion between the terms action, site, plan , and program in the text... and that for our purposes it actually applies to each Restoration action- not the entire FRPA Program.	We discussed this action with the Service and to date no clarification has been given, so we are going to go with our interpretation until/if we hear otherwise from the Service.

Appendix B: Required Actions of the Fish Restoration Program Agreement

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
RPA 4: Habitat Restoration Monitoring Program.– An overall monitoring program shall be developed to focus on the effectiveness of the restoration actions and provided to the Service for review within six months of signature of the BiOp. Attachment B- Action 6: Justification- Develop a monitoring program to focus on the effectiveness of the restoration program. The program shall be reviewed and modified as new info becomes available.	Delta Smelt BiOp-284 and Attachment B Supplemental Information Action 6 page 379 and 381 (Justification Section)	5/51/2009		5/15/2009 was unrealistic. FRPA wasn't implemented (signed) unitl October 18, 2010- certiainly cant have a monitoring program, prior to having a program.	
Action I.2.6. Restore Battle Creek for Winter-Run, Spring-Run, and CV Steelhead - To partially compensate for unavoidable adverse effects of project operations by restoring winter-run and spring-run to the Battle Creek watershed. A second population of winter-run would reduce the risk of extinction of the species from lost reslilency and increased vulnerablility to catastrosphic events. DWR shall direct discretionary funds for Phase 1B and Phase 2, consistent with FRPA Amendment 1 *by December 31 of each year. (INCORRECT 12/31 Info).* Reclamation and DWR will submit a written report to NMFS on the status of the project.	Salmon BiOp-page 603		December 2019 - Complete project (This is incorrect).	December 2019 - Complete project (?) This is not correct, NMFS got this wrong- DWR submitted a letter stating such. FRPA lists a $12 million ONE-TIME contribution towards this action once signed. Funds to be given to Battle Creek Project effort through an interagency contract. USBR is the lead for this project, they are the responsible agency for the completion of the project. Compliant with the FRPA Amendment 1- DWR will provide the $12M in a fixed one time cost payment over two consecutive fiscal years. DWR is only required to provide the funding, and is not invloved or responsible for the work on the Battle Creek Project.	DWR is providing two Escrow Payments to WCB in FY 10/11 (1st- $1.608 M/ 2nd- $3.048 M), currently. DWR is working with BOR to provide est. $7.4M (for the remaining portion of the $12M) to the BOR for the Battle Creek Project in the form of an interagency contract with a contributed funds agreement as an exhibit to the contract.
Action I.6.1.In cooperation with CDFG, USFWS, NMFS, and the Corps, Reclamation and DWR shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. Initial performance measure 17,000-20,000 acres of floodplain rearing habitat. Reclamation and DWR (OYBP) shall submit to NMFS a plan to implement the action: - restore juvenile rearing areas that provide seasonal inundation; - increase inundation of publicly and privately owned suitable acreage within Yolo Bypass; - modify operations of the Sac Weir or Fremont Weir; - An initial performance measure shall be 17,000 - 20,000 acres.	Salmon BiOp-page 608-609 (And NMFS "Amended 2009 RPAs" Document)	December 30, 2011 - Plan to implement action due. December 31, 2013 - Restoration of 'significant acreage'. December 31, 2016 - Restoration of more than one half of total acreage identified in performance goal.	DWR will partially fund and provide assistance for this action. Marianne Kirkland is lead and will be responsible for deadlines. The FRPA budget for Action Suite 1.6 Actions is a total of $1.5 M Annually.	Action I.6.1. To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River.	USBR/DWR Project: DES - ESB Marianne Kirkland Lead on Project

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
Action I.6.2. Near-Term Actions at Liberty Island / Lower Cache Slough and Lower Yolo Bypass- By September 30, 2010, Reclamation and/or DWR shall take all necessary steps to ensure that an enhancement plan is completed and implemented for Liberty Island/Lower Cache Slough, as described in Appendix 2-C. - This action shall be monitored for the subsequent five years, at a minimum, to evaluate the use of the area by juvenile salmonids and to measure changes in growth rates. Interim monitoring reports shall be submitted to NMFS annually, by September 30 each year, and a final monitoring report shall be submitted on September 30, 2015, or in the fifth year following implementation of enhancement actions. -NMFS will determine at that time whether modification of the action or additional monitoring is necessary to achieve or confirm the desired results. This action shall be designed to avoid stranding or migration barriers for juvenile salmon.	Salmon BiOp- page 610	September 30, 2010- Complete and implement enhancement plan. Annually by September 30- Interim monitoring report due. September 30, 2015- Final monitoring report due.	DWR will partially fund and provide assistance for this action. FRPA team will be lead on Liberty/Lower Cache Slough projects. Marianne Kirkland is lead on Yolo Bypass projects and will be responsible for those deadlines.	FRPA may provide some funding for the LIberty Island Project needs through the project evaluation process with DFG and other responsible agencies- If agreed upon with DFG.	USBR/DWR- ESB Marianne Kirkland Lead on Projects in Yolo Bypass DES - FISH RESTORATION PROGRAM SECTION- Lead on Liberty /Lower Cache Slough Projects. Due date for this action is unrealistic. DWR is working with DFG to implement plan creation currently. The FRPA implementation strategy will be the enhancement plan for this action. The Appendix 2-C is an incorrect referrence, DWR has told NMFS this and they are supposed to give us clarification on the matter.
Action I.6.3. Lower Putah Creek Enhancements- By December 31, 2015, Reclamation and/or DWR shall develop and implement Lower Putah Creek enhancements as described in Appendix 2-C, including stream realignment and floodplain restoration for fish passage improvement and multi species habitat development on existing public lands. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a progress report towards the successful implementation of this action. This action shall not result in stranding or migration barriers for juvenile salmon.	Salmon BiOp- page 610	December 31, 2015 - Develop and implement enhancement plan. Annually by September 1 - Progress report due	DWR will partially fund and provide assistance for this action. Marianne Kirkland is lead and will be responsible for deadlines. The FRPA budget for Action Suite 1.6 Actions is a total of $1.5 M Annually.	FRPA may provide some funding for the Project needs through the project evaluation process with DFG and other responsible agencies- If agreed upon with DFG.	USBR/DWR Project: DES - ESB Marianne Kirkland Lead on Project
Action I.6.4. Improvements to Lisbon Weir- By December 31, 2015, Reclamation and/or DWR shall, to the maximum extent of their authorities, assure that improvements to the Lisbon Weir are made that are likely to achieve the fish and wildlife benefits described in Appendix 2-C. Improvements will include modification or replacement of Lisbon Weir, if necessary to achieve the desired benefits for fish. If neither Reclamation nor DWR has authority to make structural or operational modifications to the weir, they shall work with the owners and operators of the weir to make the desired improvements, including providing funding and technical assistance. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a report on progress toward the successful implementation of this action. Reclamation and DWR must assure that this action does not result in migration barriers or stranding of juvenile salmon.	Salmon BiOp- page 610	December 31, 2015 - Develop and implement enhancement plan. Annually by September 1 - Progress report due	DWR will partially fund and provide assistance for this action. Marianne Kirkland is lead and will be responsible for deadlines. The FRPA budget for Action Suite 1.6 Actions is a total of $1.5 M Annually.	FRPA may provide some funding for the Project needs through the project evaluation process with DFG and other responsible agencies- If agreed upon with DFG.	USBR/DWR Project: DES - ESB Marianne Kirkland Lead on Project

PERMIT REQUIRED FRPA ACTIONS	REFERENCE #	PERMIT DUE	FRPA DUE DATE	COMMENTS	STATUS
Action I.7. Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass. By December 31, 2011, as part of the plan described in Action I.6.1, Reclamation and/or DWR shall submit a plan to NMFS to provide for high quality, reliable migratory passage for Sacramento Basin adult and juvenile anadromous fishes through the Yolo Bypass. By June 30, 2011, Reclamation and/or DWR shall obtain NMFS concurrence and, to the maximum extent of their authorities, and in cooperation with other agencies and funding sources, begin implementation of the plan, including any physical modifications. By September 30, 2009, Reclamation shall request in writing that the Corps take necessary steps to alter Fremont Weir and/or any other facilities or operations requirements of the Sacramento River Flood Control Project or Yolo Bypass facility in order to provide fish passage and shall offer to enter into a Memorandum of Understanding, interagency agreement, or other similar mechanism, to provide technical assistance and funding for the necessary work. By June 30, 2010, Reclamation shall provide a written report to NMFS on the status of its efforts to complete this action, in cooperation with the Corps, including milestones and timelines to complete passage improvements. Reclamation and/or DWR shall assess the performance of improved passage and flows through the bypass, to include an adult component for salmonids and sturgeon (i.e., at a minimum, acoustic receivers placed at the head and tail of the bypass to detect use by adults).	Salmon BiOp- page 611 (And NMFS "Amended 2009 RPAs" Document)	September 30, 2009 - USBR requests assistance from USACE. June 30, 2010 - USBR status report to NMFS due December 30, 2011 - Develop plan. June 30, 2012 - Begin implementation of plan.	DWR may possibly fund and provide assistance for this action, this has yet to be determined. Marianne Kirkland is lead and will be responsible for deadlines.	Reduce migratory delays and loss of adult and juvenile winter-run, spring-run, CV steelhead and Southern DPS of green sturgeon at Fremont Weir and other structures in the Yolo Bypass.	USBR/DWR Project: DES - ESB Marianne Kirkland Lead on Project
DWR requested a 2081 (Fish and Game Code) Incidental Take Permit (ITP) from DFG for longfin smelt, based partially on the information included in the FRPA as it will be implemented, to also provide benefits to longfin smelt as one of the Fish Species addressed by the FRPA (Note in FRPA context 'Fish Species' = delta smelt, longfin smelt, winter-run and spring-run Salmon).	Longfin Smelt - 2081 Request. Page 21 Section 7.1		DWR and DFG must implement the FRPA in order to comply with the terms of the longfin smelt ITP given to DWR. Need to establish 160 Acres of habitat for Longfin Smelt by February 23,2011 and 160 acres every two	DWR received the Incidental Take Permit for longfin smelt on February 23, 2009, and it expires on December 31, 2018. (ITP Permit # 2081-2009-001-03). Permit Requirements for DFG Incidental Take Permit 2081-2009-001-03 for Longfin Smelt Condition 7.1. Acquisition, initial enhancement, restoration, long-term management and long-term monitoring of 800 acres of inter-tidal and associated sub-tidal wetland habitat in the mesohaline zone of the Delta (in Suisun Bay or Marsh) with hydrologic	We received the ITP from DFG for Longfin Smelt (which is based on the min. 8,000 acres of mitigation in the Delta and Suisun Marsh as laid out in the FRPA).
On July 31at DWR requested a 2080.1 (Fish and Game Code) CESA Consistency Determination from DFG for winter-run and spring-run salmon, which was based on the information included in the NMFS Salmon BiOp, which includes the FRPA actions for winter-run and spring-run salmon.	Winter-Run and Spring-Run Salmon- 2080.1 Request		DWR and DFG must implement the FRPA and comply with the OCAP NMFS Salmon Biological Opinion to meet the terms of this 2081 Consistency Determination.	DWR received the CESA Consistency Determination from DFG for winter-run and spring-run salmon on September 3, 2009. (Section 2080.1 Tracking # 2080-2009-011-00).	We received the CESA C.D. from DFG for Winter-Run and Spring-Run Salmon, (which is based on the NMFS Salmon BiOp and the min. 8,000 acres of mitigation in the Delta and Suisun Marsh as laid out in the FRPA).
DWR requested a 2080.1 (Fish and Game Code) CESA Consistency Determination (C.D.) from DFG for delta smelt (State and Federally Listed), based on the information included in the BiOp RPA 4 (=FRPA).	Delta Smelt- 2080.1 Request		DWR and DFG must implement the FRPA and comply with the OCAP USFWS Delta Smelt Biological Opinion to meet the terms of this 2081 Consistency Determination.	DWR received the CESA Consitency Determination from DFG for delta smelt on July 16, 2009. (Section 2080.1-Tracking # 2080-2009-007-00)	We received the CESA C.D. from DFG for Delta Smelt (which is based on the USFWS Delta Smelt BiOp and the min. 8,000 acres of mitigation in the Delta and Suisun Marsh as laid out in the FRPA).

APPENDIX C. MEMORANDUM OF AGREEMENT REGARDING THE EARLY IMPLEMENTATION OF HABITAT PROJECTS FOR THE CENTRAL VALLEY PROJECT AND STATE WATER PROJECT COORDINATED OPERATIONS AND BAY DELTA CONSERVATION PLAN (BDCP HABITAT CREDIT MOA)

MEMORANDUM OF AGREEMENT
REGARDING
THE EARLY IMPLEMENTATION OF HABITAT PROJECTS
FOR THE CENTRAL VALLEY PROJECT AND STATE WATER PROJECT COORDINATED OPERATIONS and BAY DELTA CONSERVATION PLAN

I. PURPOSE

This Memorandum of Agreement ("MOA") sets forth the agreement of the parties regarding the process of identifying and evaluating Habitat Projects that are intended to contribute to the habitat protection, enhancement, and restoration acreage requirements for operations of the State Water Project ("SWP")under the federal and state Endangered Species Acts and for operations of the Central Valley Project ("CVP") under the federal Endangered Species Act. This process is intended to provide assurance that acquisition and restoration of landsfor such Habitat Projects prior to implementation of the Bay Delta Conservation Plan ("BDCP") will be credited toward meeting the restoration acreage objectives in the BDCP Conservation Strategy.

II. PARTIES

A. This MOA is entered into as of the effective date by and among the California Department of Water Resources("DWR"), the United States Bureau of Reclamation ("Reclamation") the State and Federal Contractors Water Agency ("SFCWA"), collectively "the Water Agencies," and the California Department of Fish and Game ("DFG"), the United States Fish and Wildlife Service("USFWS"), and the National Marine Fisheries Service("NMFS"), collectively "the Fishery Agencies."

B. It is anticipated that individual water agency members of the SFCWA may implement Habitat Projects. In this event, such agencies may become a Water Agency by executing this MOA.

III. DEFINITIONS

A. "Bay Delta Conservation Plan" and "BDCP" mean the joint habitat conservation plan and natural community conservation plan prepared in accordance with the Planning Agreement and to be submitted for approval under Section 10 of the federal Endangered Species Act and section 2820 of the California Fish and Game Code.

B. "BDCP Conservation Strategy" means the actions detailed in the November 18, 2010 draft Chapter 3 of the BDCP, as may be revised in subsequent drafts and a final Chapter 3.

C. "Credit" and "Credits" meanthe acreage and linear mileage contributions of particular HabitatProjects toward meeting the requirements of the Delta Smelt Biological Opinion, the Salmonids Biological Opinion, the Longfin ITP, and the BDCP conservation strategy; in this MOA, use of the verb "to credit" means to recognize and provide Credits.

D. "Delta Smelt Biological Opinion" means the biological opinion issued by USFWS on December 15, 2008 and any subsequent biological opinion issued by USFWS on the CVP and SWPoperations.

E. "Fishery Agency" and "Fishery Agencies" means USFWS, NMFS, and DFG, individually and collectively.

F. "Fishery Agency Strategy Team" or "FAST" means a review team composed of technical level representatives from each Fishery Agency and Reclamation that will work with the Proponent Water Agency to review and assist in planning Habitat Projects and provide guidance to the Water Agency on the expected benefits of proposed Habitat Projects in meeting theRestoration Objectives.

G. "Habitat Projects" means projects that, once developed and implemented, are expected to provide valuable conservation benefits and contribute to the Restoration Objectives of the Longfin ITP and the BDCP Conservation Strategy, and will contribute towards completion of actions included in the Reasonable and Prudent Alternatives for the Delta Smelt Biological Opinion and the Salmonids Biological Opinion.

H. "Longfin ITP" means the Incidental Take Permit issued by DFG on February 23, 2009 for the SWP with respect to longfin smelt, pursuant to Fish and Game Code Section 2081.

I. "Planning Agreement" means the Planning Agreement regarding the Bay Delta Conservation Plan dated October 6, 2006, as amended in 2009, by DWR, Reclamation, USFWS, NMFS, DFG, and several other entities.

J. "Proponent Water Agency" means a Water Agency or other agency that is proposing to implement a particular Habitat Project.

K. "Prospectus" means information on a proposed Habitat Project provided to the Fishery Agency Strategy Team ("FAST") for the purposes of defining the type and amount of Credit the Habitat Project would yield if implemented as planned.

L. "Restoration Objectives" means the acreage and linear mileage objectives and/or requirements for habitat protection, conservation, enhancement, and/or restoration contained in the Delta Smelt Biological Opinion, the Salmonids Biological Opinion, the Longfin ITP, and the BDCP Conservation Strategy or actions regarding habitat restoration included in the Reasonable and Prudent Alternatives for the Delta Smelt Biological Opinion and the Salmonids Biological Opinion.

M. "Salmonids Biological Opinion" means the biological opinion issued by NMFS on June 4, 2009 and any subsequent biological opinion issued by NMFS on the CVP and SWP operations.

N. "Water Agency" and "Water Agencies" means DWR, Reclamation, SFCWA, and a member of SFCWA that has executed this MOU, individually and collectively.

IV. RECITALS

A. Whereas: The USFWS Biological Opinion of December 15, 2008 on the continued long-term coordinated operations of theCVP and SWP with respect to delta smelt ("Delta Smelt Biological Opinion"), the NMFS Biological Opinion of June 4, 2009 on the CVP and SWP operations with respect to salmonid species ("Salmonids Biological Opinion"), and the California Department of Fish and Game ("DFG") Incidental TakePermit of February 23, 2009 for the SWP with respect to longfin smelt ("Longfin ITP"), eachhave requirements for habitat preservation, enhancement, and restoration programs, which the Habitat Projects are anticipated to help fulfill.

B. Whereas: The 2006 Planning Agreement regarding theBDCP states in Section 7.7.1:

> The Parties may elect to preserve, enhance or restore, either by acquisition or other means, aquatic and associated riparian and floodplain habitat in the Planning Area that support native species of fish, wildlife or natural communities prior to approval of the BDCP. The Parties will confer with the Fishery Agencies regarding potential resources to be protected. The Fishery Agencies agree to credit such resources toward the land and water acquisition or habitat protection, enhancement, and restoration requirements of the BDCP, as appropriate, provided these resources are appropriately conserved, restored or enhanced, and managed to contribute to the BDCP's conservation strategy.

C. Whereas: The parties desire to implement Habitat Projects, which will require substantial time, funding, staffing, and other resources. The Water Agencies will contribute resources for Habitat Projects provided that the Water Agencies are authorized to undertake the action, and that there is reasonable certainty that Habitat Projects implemented by the Water Agencies before approval of the BDCP will be creditedtoward the requirements of the Delta Smelt Biological Opinion, the Salmonids Biological Opinion, and the Longfin ITP, as appropriate, and toward applicable BDCP requirements upon approval of the BDCP.

D. Whereas: This MOA reflects the parties' agreement regarding the process by which the parties will work cooperatively to identify Habitat Projects that may result in one or more of the following actions:1)The USFWS will credit Habitat Projects toward the Restoration Objectives of the Delta Smelt Biological Opinion; 2) NMFS will credit Habitat Projects toward the Restoration Objectives of the Salmonids Biological Opinion; 3) DFG will credit Habitat Projects toward the Restoration Objectives of the LongfinITP; and 4) USFWS, NMFS, and DFG agree that the Habitat Projects will contribute to the habitat protection, enhancement, and Restoration Objectives of the BDCP Conservation Strategy.

E. Whereas: Development of BDCP goals and objectives is ongoing, and refinement of conservation measures in response to the final BDCP goals and objectives may further define habitat functions and expected outcomes needed to comply with the terms of the BDCP. Therefore, the parties agree that contribution of an individual HabitatProject toward the BDCP Conservation Strategy may need to be re-evaluated to better identify the expected outcomes of the project for the final BDCP.

V. HABITAT CREDITING PROCESS

A. Overview of the FAST.

1. Upon execution of this MOA, the Fishery Agencies will form the FAST for the purpose of providing review and guidance to the Water Agencies in the planning, development, and implementation of specific Habitat Projects. Upon its formation, the FAST will establish an organizational structure, procedures, and review timelines consistent with this MOA.

2. The FAST shall be composed of at least one technicallevel representativefrom each Fishery Agency and Reclamation, who shall coordinate and organize the participation of additional technical staff from within their respectiveorganization as appropriate. The FAST shall designate one representativeas the primary contact person for coordination with the Water Agencies. As appropriate, the FAST shall also coordinate the participation of other regulatory agencies, such as the U.S. Army Corps of Engineers and the appropriate Regional Water Quality Control Board, with the FAST on a case-by-case basis.

B. Initial Concept Review. At the request of aProponent Water Agency, the FAST shall convene to provide an initial concept review of proposed Habitat Projects. The Water Agency's request for initial concept review will be accompanied with sufficient relevant information on a proposed Habitat Project or Projects to allow the FAST to make an initial assessment on whether the project may be likely to contribute to the Restoration Objectives;an initial assessment on the specific types and amounts of habitatCredits the

Habitat Project is likely to yield; recommendations for adjustments, refinements, or alternatives that should be explored; and recommendations for studies that should be pursued;and identify potential issues with affected local government sponsored Habitat Conservation Plans (HCPs) or Natural Community Conservation Planning (NCCP) programs.The FAST's assessment and recommendations will be provided in writing within a reasonable time.

C. Early Technical Assistance. Following initial concept review for a Habitat Project, the Proponent Water Agency may request early technical assistance of the FAST in the planning and development of the proposed Habitat Project. The FAST will provide such assistance in the form of participation on planning teams, review of technical reports, attendance and guidance at project status meetings, site visits, and other assistance as requested and appropriate, as resources allow.

D. Prospectus Review.

1. At an appropriate time in the development of a specific Habitat Project, the Proponent Water Agency will provide to the FAST a "Prospectus" for the purpose of describing the type and amount of Credit the Proponent Water Agency believes the proposed project would yield. The Prospectus should include:

a. Site Information - Habitat surveys, project designs, and other information, such as environmental planning documents and permitting documentation,evidence of coordination with local government and consistency with locally sponsored HCPs or NCCP programs, if available, relevant to the type and amount of habitat to be created, restored, enhancedand/or preserved;

b. Conservation Strategy - The existing conservation strategy or other framework that identifies regional conservation goals, objectives and criteria and how the project fits within the strategy and/or framework;

c. Site specific Agreement – A proposed agreement to govern the establishment, operation, and management of the proposed Habitat Project;

d. Perpetual Conservation Mechanism – The instrument by which the Proposed Habitat Project site will be protected in perpetuity;

e. Conservation, Restoration and Long-term Management Plan– A proposed long-term management plan that has the primary goal of maintaining the Project habitat for the intended species and natural community conservation objectives; and

f. Funding – Information showing that sufficient funding will be provided to implement the Habitat Project and its long-term management plan.

2. At a mutually acceptable time thereafter, the FASTshall convene a meeting with the Proponent Water Agency to review the prospectus information and determine the type and amount of habitat protection, enhancement and restoration Credit that the Habitat Project would likely yield toward the Restoration Objectives if implemented as planned. The FASTshall make its determination based on the information provided and any other relevant information and in accordance with applicable state and federal law and each Fishery Agencies' written policies and guidelines.If the FAST lacks sufficient information to makeits recommendation, the FAST shall identify and request from the Proponent Water Agency the specific information needed to make its recommendation.

3. The FASTwill prepare and submit to the Fishery Agencies a memorandum describing its recommendation concerning the type and amount of habitat Credit and a proposed Credit release schedule for the Habitat Project under review. For restoration projects pursued as mitigation for a project impact, the documentation memo will refer to Credits as mitigation Credits, except as provided in E.3., below. The Fishery Agencies will review the FAST recommendations and will forward their determination to the Proponent Water Agency. A mechanism will be developed by the FAST to track accumulatedCredits.

E. Habitat Crediting

1. BDCP Crediting - Following approval of the BDCP,Credits that have been determined for restoration projects, as described in D. 3, shall also be applied toward the requirements of the BDCP,where consistent with the BDCP Conservation Strategy and consistent with the Credit release schedule. Such additional Credit shall also be applicable toward requirements of the Section 7 biological opinions prepared by USFWS and NMFS for purposesof the BDCP, and the findings made by DFG in its approval of the BDCP under the Fish and Game Code.

2. Current or Future Biological Opinion Crediting - Based on the determination of the type and amount of habitat Credit made in D.3. above, USFWS is expected to apply the agreed upon types and amounts of habitat Credits of the Habitat Projects toward the requirements of the Delta Smelt Biological Opinion or applicable requirements of any subsequent biological opinion then effective, NMFS is expected to apply the agreed upon habitat Credits of the Habitat Projects toward the requirements of the Salmonids Biological Opinion or applicable requirements of any subsequent biological opinion then effective, and DFG is expected to apply the agreed upon habitat Credits of the

Restoration Projects toward the Longfin ITP or applicable requirements of any subsequent Fish and Game Code 2081Permit for the SWP.

3. Specific Project Mitigation - If, and to the extent that, any HabitatProject is used to mitigate the impacts of specific projects, actions, or activities that are not BDCP covered activities, the project will not count toward the mitigation requirements or conservation objectives of the BDCP.

4. Specific Habitat Projects -For Habitat Projects that are being pursued in whole or in part through FloodSAFE and the CALFED Ecosystem Restoration Program, the Fishery Agencies will consider, on a case-by-case basis, whether theconservation outcomes of specific projects will be applied toward applicable conservation objectives of BDCP upon approval of BDCP, provided thatthe same habitat credit is not attributable to more than one program or project authorized under the federal and state Endangered Species Act (for example, BDCP and a Biological Opinion on a separate levee repair project).

VI. MISCELLANEOUS

A. Relationship to BDCP. The parties anticipate that upon approval of the BDCP, the BDCP Implementing Agreement and other related agreements will provide the mechanism and procedures for the planning, funding, implementation, development, and management of Habitat Projects that implement the BDCP Conservation Strategy. This MOA is not intended to define the procedures for the BDCP and in the event of inconsistencies between this MOA and the subsequent BDCP and related agreements, the BDCP and related agreements shall control.

B. Compliance with Laws. The agency or organization implementing the Habitat Project shall comply with all applicable laws, including, but not limited to, state and federal environmental laws.

C. Preservation of Rights and Authorities. All provisions of this MOA are intended and will be interpreted to be consistent with all applicable provisions of state and federal law. The parties recognize that each party to this MOA has specific statutory and regulatory authority and responsibilities, and that actions of these public agencies must be consistent with applicable procedural and substantive requirements. Nothing in this MOA is intended to, nor will have the effect of, constraining or limiting any public entity in carrying out its statutory responsibilities. Nothing in this MOA constitutes an admission by any party as to the proper interpretation of any provision of law, nor is anything in this MOA intended to, nor will it have the effect of, waiving or limiting any public entity's rights and remedies under any applicable law.

D. Modification. This MOA may be modified upon written agreement of all signatories. Modification may be proposed by one or more signatories. Proposals for modification will be circulated to all signatories for a 20-working day period of review. Approval of such proposals will be indicated by written acceptance by each signatory, which may be executed in counterparts.

E. Party Withdrawal. Any party may withdraw from participation in this MOA upon written notice to the other parties. The MOA shall remain in effect as to the remaining parties, provided the purpose of the MOA is not frustrated by the withdrawal of the particular party.

F. Term of the MOA. This MOA shall become effective on the last date of execution by DFG, DWR, NMFS, Reclamation, USFWS, and SFCWA, and will remain in effect until terminated by mutual agreement of the parties.

G. Funding. Nothing in this MOA may be construed to obligate Reclamation, USFWS, NMFS, or the United States to any current or future expenditure of resources in advance of the availability of appropriations from Congress. No liability shall accrue to the United States for failure to perform any obligation under this MOA in the event that funds are not appropriated or allotted. This MOA does not commit any party to funding of Habitat Projects or actions described in this MOA, including any funding that may be necessary for a party to carry out provisions of this MOA. Funding for a party's participation in actions to implement the process described by the MOA shall be borne by that party.

H. Execution in Counterparts. This MOA may be executed in counterparts.

IN WITNESS WHEREOF, the parties hereto executed this MOA on the date(s) indicated below.

United States Bureau of Reclamation

By: _____
Donald R. Glaser, Regional Director

Date: 9/15/11

United States ~~Fish and~~ Wildlife Service

By: _____
Ren Lohoefener
Regional Director, Pacific Southwest Region

Date: 9/30/2011

National Marine Fisheries Service

By: _____
Rodney R. McInnis
Regional Administrator, Southwest Region

Date: _____

Department of Fish and Game

By: _____
~~John McCamman~~, Director
CHUCK BONHAM

Date: _____

Department of Water Resources

By: _____
Mark W. Cowin, Director

Date: _____

State and Federal Contractors Water Agency

By: _____
Byron Buck, Executive Director

Date: _____

United States Fish and Wildlife Service

By: _____
Ren Lohoefener
Regional Director, Pacific Southwest Region

Date: _____

National Marine Fisheries Service

By: Rodney R McInnis
Rodney R. McInnis
Regional Administrator, Southwest Region

Date: 9-20-11

Department of Fish and Game

By: _____
~~John McCamman~~, Director
Chuck Bonham,

Date: _____

Department of Water Resources

By: _____
Mark W. Cowin, Director

Date: 9/16/2011

State and Federal Contractors Water Agency

By: _____
Byron Buck, Executive Director

Date: _____

United States Fish and Wildlife Service

By: _____
Ren Lohoefener
Regional Director, Pacific Southwest Region

Date: _____

National Marine Fisheries Service

By: _____
Rodney R. McInnis
Regional Administrator, Southwest Region

Date: _____

Department of Fish and Game

By: _____
~~John McCamman~~, Director
Chuck Bonham,

Date: _____

Department of Water Resources

By: _____
Mark W. Cowin, Director

Date: 9/6/2011

State and Federal Contractors Water Agency

By: _____
Byron Buck, Executive Director

Date: _____

United States Fish and Wildlife Service

By: _____
Ren Lohoefener
Regional Director, Pacific Southwest Region

Date: _____

National Marine Fisheries Service

By: _____
Rodney R. McInnis
Regional Administrator, Southwest Region

Date: _____

Department of Fish and Game

By: _____
Charlton H. Bonham, Director

Date: 9.14.11

Department of Water Resources

By: _____
Mark W. Cowin, Director

Date: _____

State and Federal Contractors Water Agency

By: _____
Byron Buck, Executive Director

Date: _____

United States Fish and Wildlife Service

By: _____
Ren Lohoefener
Regional Director, Pacific Southwest Region

Date: _____

National Marine Fisheries Service

By: _____
Rodney R. McInnis
Regional Administrator, Southwest Region

Date: _____

Department of Fish and Game

By: _____
~~John McCamman~~, Director
CHUCK BONHAM

Date: _____

Department of Water Resources

By: _____
Mark W. Cowin, Director

Date: _____

State and Federal Contractors Water Agency

By: _____
~~B~~yron Buck, Executive Director

Date: 9/13/11

APPENDIX D. WATER RESOURCES ENGINEERING MEMORANDUM (WREM 65) AND SWPAO PROJECT CHARTER

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES

WATER RESOURCES ENGINEERING MEMORANDUM NO. 65a

TO:	SWP Program Managers	DATE:	October 4, 2011
FROM:	Carl A. Torgersen Acting Deputy Director	SUBJECT:	State Water Project Program Initiation and Management

This memorandum supersedes Water Resources Engineering Memorandum No. 65, dated March 20, 2006.

PURPOSE

This memorandum sets forth standardized documentation and processes to initiate, authorize, administer, and manage new and legacy programs, projects, and activities funded by the State Water Project (SWP) in a consistent and professional manner.

The processes ensure that upper management has the information necessary to make an informed decision as to whether work should commence, continue, or end. In addition, the processes dovetail into the SWP budget process.

DISCUSSION

The Department of Water Resources (DWR) is responsible for ensuring the reliability of SWP deliveries to its 29 contracting agencies. Doing so requires capital improvements, facilities enlargements, replacements, renovations, and continuous maintenance. The three processes described below will be used to authorize all SWP-funded projects.

Detailed procedures have been developed to support the processes and are available at http://aquanet.water.ca.gov/swpao/swp-pim.

Process	Types of SWP-Related Projects
No. 1	1. Extraordinary projects within existing SWP programs. 2. Major replacement and renovation projects within existing SWP programs. 3. Capitalized projects within existing SWP programs.
No. 2	1. Major additions to or enlargements of SWP facilities, outside the scope of existing SWP programs. 2. Other proposed projects that include SWP funding, outside the scope of existing SWP programs.
No. 3	Emergency projects

DOCUMENTATION

The documentation required to initiate and authorize a SWP-funded project are a trigger, charter, resources agreement, and project management plan (depending on complexity of the project). The documentation required to initiate and authorize a SWP-funded program are a trigger, charter, program component statement, and a program management plan (depending on complexity of the program).

DEFINITIONS

Trigger: A documented request or legislative/regulatory mandate to initiate SWP-related work under the direction of DWR personnel. The trigger document should include a specific description of the work to be performed, the time constraints, and the fund source to use upon the approval of the request.

Charter: A standardized document that describes a proposed activity at a high level but in sufficient detail that a management decision can be made whether to initiate preliminary work on the activity. A charter includes a program/project objective, purpose, background, scope, critical success factors, assumptions and constraints, risks, dependencies, deliverables, milestones, team members, funding, and financing information. It is the responsibility of the program manager to ensure the charter is kept up to date during the life of the project.

Resources Agreement: This document serves as an agreement between the program manager and the cost center manager(s) doing the work. It includes a scope of work, target dates, a list of participants and cost objects to be used to charge work as well as prior, current and future year(s) dollars and hours. The document also identifies the project and program managers who are assigned to the activity. This document replaces the 1498, 1498a, and project detail.

Project Management Plan (PMP): A standardized document which provides a scope of work, schedule, and cost estimate. It discusses quality management, staffing requirements, communications management, risk management, and procurement management. It also identifies the Project Manager; specifies reporting relationships and the participant roles and responsibilities; sources of funding and the SAP cost objects; Funds Centers to which all project costs are allocated; the business and fiscal process requirements to set up the administration of the project; and the monitoring, change control and reporting policies, and procedures. The PMP shall also include the project's status amongst current SWP priorities, and an assessment of potential impacts to DWR's planned programs resulting from the project's implementation or failure to be implemented.

The Program Manager has the discretion to require a PMP that utilizes the *project* and *job* level breakdown. The PMP is a dynamic document maintained by the Project Manager throughout the life of the project. Upon the completion of each project, the PMP shall include a critique in the PMP that summarizes project successes and recommendations for improvements.

Program Management Plan (PGMP): May be used when there are two or more interdependent projects under the same program that require coordination or share the same resources (i.e., budget, staff). The contents of the PGMP may be similar to a project management plan but with a broader program focus. It is a living document that may be amended over the life of the program by the Program Manager. The Program Manager has the discretion to develop a PGMP when needed.

Program Component Statement (PCS): The authorizing document for funding a program and the key monitoring and control document. It is a dynamic document to be maintained by the Program Manager throughout the life of the program. It includes a description of the program component with any authorizing or enacting legislation, a resources section showing specific funding sources (i.e. O&M bond fund, capital revenue bond financing, etc.) for the estimated, budgeted and proposed years, an explanation of any changes between the budget and proposed year, a section to list full time employees (FTEs) and dollars for participation of cost center partners and descriptions of work programs for the budgeted and proposed years.

Program: A portfolio of *projects* or *business activities* that generally benefit from a consolidated approach to achieve a set of defined business objectives. The life of a program may be quite extended; however, it is characterized by the completion of the projects or the business activities under its responsibility.

A typical SWP improvement program may consist of one or more staged projects, or, one or more projects having a unique business objective. The planning, design, and construction of a new or modified facility would typically be regarded as stages or phases within a project; although, depending on the magnitude, complexity, and/or the organizational makeup of the program, consideration may be given to separating the planning, design, and construction activities into individual projects. The Program Manager has the discretion to recommend a management structure that provides the most efficient means to monitor and control the program activities.

Program Manager: The person managing the portfolio of projects or business activities within a program and is responsible for the planning, organizing, leading, and controlling the work. The Program Manager may also be the Project Manager for one or more projects within the same program.

Project: The carefully planned and organized set of jobs to accomplish a specific, one time effort. Projects have a specific scope, schedule, budget, and defined end product.

Project Coordinator: The person designated at the Program Manager's discretion, to coordinate with the Project Manager. This role is typically used when the Project Manager resides outside the Program Manager's division/office.

Participant Coordinator: The person designated as the point of contact for coordinating work assigned to the cost center(s) within their division/office. This role is used when the participant division/office cost center(s) reside outside of the Project Manager's division/office.

Project Manager: The person is the focal point for the project and responsible for creating an environment in which the project team can be successful. This includes but is not limited to planning, organizing, leading, controlling, and reporting progress, schedule and costs, and ensuring that activities are in compliance with all environmental, regulatory, and code requirements, and that the job 'deliverables' are in accordance with the project scope. They are responsible for developing and implementing the *Project Management Plan,* when required. The Project Manager is under the authority and direction of the Program Manager.

Job: The lowest quantifiable level of work that has a specific scope, schedule, budget, and defined end product(s).

Job Manager: The person responsible for delivering the end product(s) within the planned schedule and budget. The Job Manager is under the authority and direction of the Project Manager.

Capitalized Projects: Projects that qualify for capitalized funding as defined in the most current version of Accounting Systems Bulletin No. 83, "Guidelines for Classifying and Financing Costs Chargeable to the State Water Project."

Extraordinary Projects: Projects which do not qualify for capitalizing or funding from the Working Capital Replacement Fund and which are beyond the scope of normal maintenance activities under the Facilities O&M program components.

Replacement and Renovation Projects: Projects which are accomplished with annualized funds from the Replacement Fund and are specifically listed on the Replacement Accounting System Master Replacement List.

Business Activities: The work performed in an ongoing or a continuous basis to support the business objectives defined by the program. The Program Manager is responsible for developing a plan to fund the projects in the program and budget and schedule resources, and monitor performance of the business activities or program management plan.

IMPLEMENTATION

This policy will be implemented immediately.

Signature on file with MAO

Carl A. Torgersen
Acting Deputy Director

SWP PROJECT CHARTER

(Enter Project Title)

Version _____

ID: _____ - _____ - _____ - _____ - _____

1.1 Management Structure & Approval:

PROJECT MANAGER:	SIGNATURE	DATE
PROGRAM MANAGER:	SIGNATURE	DATE
PROGRAM CONTROL OFFICE:	SIGNATURE	DATE
STATE WATER PROJECT ANALYSIS OFFICE:	SIGNATURE	DATE
DIVISION CHIEF:	SIGNATURE	DATE
SWP DEPUTY DIRECTOR:	SIGNATURE	DATE
OTHER DWR EXECUTIVE:	SIGNATURE	DATE

In addition to a Resource Agreement, is a Project Management Plan Required? ☐ Yes ☐ No

1.2 Revision Summary:

1.3 Project Objective Statement:

1.4 Project Purpose and Background:

1.5 Project Scope:

1.6 Critical Success Factors:

1.6.1 Assumptions and Constraints:

1.6.2 Risks:

1.6.3 Dependencies:

1.7 Project Deliverables:

1.8 Milestone Schedule ID: _____ - _____ - _____ - _____ - _____

Milestone	Planned	Actual

1.9 Project Participants: [i.e., Branch Level, Job Manager]

Participating Organizations	Role

1.10 Project Financing:

Funding Source(s)	Fund Description	Total Dollars
State Water Project		
Federal		
G.O. Bond/State General Fund		
Other:		
Total Estimated Project Cost		**$0**

1.11 SWP Funding Information:

	Description	Number
Functional Area		
Funds Center		
Fund		
Reach/Feature		
Recreation Component? ☐ Yes ☐ No ☐ Joint ☐ Specific ☐ None		

APPENDIX E. PERMITS LIKELY TO BE REQUIRED FOR NEAR TERM ACTIONS

APPENDIX E: Permits Likely to be Required for Near Term Actions

(The list below is not all-inclusive. Other permits not listed may be required.)

Streambed Alteration Agreement (DFG)
Endangered Species Act Take (NMFS)
Endangered Species Act Take (USFWS)
California Endangered Species Act Take (DFG)
Section 404 (USACE)
Section 408 (USACE)
Section 401 (USACE/CVRWQCB)
Central Valley Flood Protection Board Encroachment (CVFPB)
State Lands Commission Lease (SLC)
Cultural Resources Certification (SHPO)
Scientific Collecting Permit (DFG)
Applicable County permits

APPENDIX F. DESCRIPTION OF NEAR TERM ACTIONS

APPENDIX F: Description of Near Term Actions

Prospect Island Tidal Habitat Restoration

Project Location. Prospect Island is the most easterly feature of the Cache Slough Complex. The island is bounded by the Sacramento River Deep Water Ship Channel to the west, the remnants of Little Holland Tract to the north, Miner Slough to the east, and the confluence of the Ship Channel and Miner Slough to the south. Total acreage of the island is 1684 acres.
Project Components. The Prospect Island Tidal Marsh Restoration project entails permanently breaching the levees on Prospect Island to restore up to 1320 acres of open water, tidal marsh, mudflats, and shaded riverine aquatic habitat. This would provide spawning and rearing habitat for delta smelt and Sacramento splittail, and rearing and migration habitat for winter-run Chinook salmon. Upland areas in the northern part of the island would accommodate new marsh formation when sea levels rise.

This island offers a unique opportunity for restoration due to minimal subsidence, which has left elevations in the island interior ranging from +1 to –5 feet msl. Therefore, when flooded, water depths would be suitable for supporting tidal wetlands including marsh, mudflats, and shallow water habitats. These habitats are relatively rare in the Delta, and the opportunities for restoring them are limited.

The Cache Slough area, in which Prospect Island is located, has become an important focus for restoration activities in the north Delta to increase and improve the overall habitat for delta smelt. This area has the highest feasibility of tidal marsh restoration in all of the Delta due to the least subsidence, proximity to the highest Delta sediment supply, connection to extensive lowland grasslands, and proximity to Yolo Bypass, the Sacramento River, and the Suisun Marsh. Because the most prevalent population of delta smelt occurs in this region of the Delta, monitoring of species and system response to the project is necessary to manage changes.

Liberty Island/Lower Cache Slough Enhancement Plan

Project Location. Liberty Island lies within the Yolo Bypass and is part of the Cache Slough Complex. It spans Yolo and Solano Counties and covers approximately 5200 acres, the majority of which are under water. The island is bounded by sloughs and remnant perimeter levees: Shag Slough on the west, a “stair step” channel that separates it from mainland Yolo Bypass to the north, Liberty Cut and Prospect Slough to the east, and Cache Slough to the south.

Project Components. The Liberty Island/Lower Cache Slough enhancement plan will detail actions to preserve and enhance habitat, and will establish a monitoring plan to evaluate the use of the area by juvenile salmonids.

Liberty Island is ideal for tidal wetland enhancement due to the minimal subsidence that has occurred on the island, with typical interior island elevations ranging from 5 feet in the north to -10 feet or deeper in the south. The entire island is ringed with deteriorated levees that have

numerous breaches. Within the ten years that the island has been flooded, over 800 acres of freshwater tidal marsh have developed, without any human intervention, management, or funding. Enhancement options might range from making more numerous breaches and allowing subsequent floods and tidal action to bring about the development of slough and island features, to giving tidal marsh channels a head start by excavating starter channels. Naturally forming or created meandering sloughs could improve habitat quality, improve native fish access, and help prevent stranding. Filling agricultural delivery and drainage ditches and leveling the existing road bisecting the property are also possible actions.

Little Holland Tract

Project Location. Little Holland Tract is in the southern portion of the Yolo Bypass, bounded by the Stairstep Channel on the north, Liberty Island on the west and the Deep Water Ship Channel on the East. Consisting of approximately 1640 acres, it is currently owned by the United States Army Corps of Engineers.

Project Components. The levee separating Little Holland Tract from the Toe Drain in the Yolo Bypass failed in 1983 and the tract has been open to tidal influence since that time. Little Holland Tract has reverted to a mixture of tidally influenced emergent wetlands, mudflats, and riparian habitat. The southern half of the tract, which is lower in elevation than the northern half, is almost always under water. Similar to Liberty Island, Little Holland Tract has undergone remarkable restoration since its levee failure to the exclusive credit of natural processes. Nevertheless, the opportunity exists to restore or enhance historic wetlands on Little Holland Tract, bring it under more protective ownership, and create a monitoring and land management plan.

Lindsey Slough Freshwater Tidal Marsh Enhancement

Project Location. This project is located in the Calhoun Cut Ecological Reserve, on the northwest edge of the Delta, just to the west of the confluence of Lindsey Slough, Barker Slough, and Calhoun Cut within the Cache Slough tidal drainage. The property is owned by California Department of Fish and Game.

Project Components. Calhoun Cut, constructed in 1913, is a 13-foot deep shipping channel in Lindsey Slough. Calhoun Cut effectively cut-off tidal flow into two historical channels of Lindsay Slough, which is in DFG's Calhoun Cut Ecological Reserve. The project construct breaches in the north and south embankments, breach a causeway and excavate a starter channel to restore tidal flows into the historical Lindsey Slough channels. The purpose of this project is to benefit native species and improve water quality by restoring connected freshwater tidal marsh and riparian communities, along with other significant wetland habitat. Performance objectives will be monitored to ensure the project minimizes impacts on surrounding land uses. If flow objectives in the historic Lindsey Slough are not met, the project will pursue a blockage in Calhoun Cut.

Lower Yolo Restoration Project

Project Location. The Lower Yolo Restoration Project is located on the northwestern edge of the Delta at the southern end of the Yolo Bypass near Cache Slough in Yolo County. The site encompasses two contiguous parcels: Yolo Ranch (3496 acres) and Yolo Flyway 16 Farms (430 acres) located along the historic wetland-upland edge of the Yolo Basin.

Project Components. This action entails breaching levees along the Stairstep Channelto return tidal action to approximately one half of the 3,400 acre Yolo Ranch to restore tidal marsh-open water habitat and upland and riparian habitats. Yolo Ranch was acquired by Westlands Water District 2007 with the intention of creating tidal marsh and open water to benefit delta smelt and the delta food web. This area is currently being used for farming and grazing.

The primary goals of the project are to enhance regional food web productivity in support of delta smelt recovery and to provide rearing habitats for outmigrating salmonids utilizing the Yolo Bypass. The secondary goals are to support a broad range of other aquatic and wetland-dependent species, including Sacramento splittail, and to restore ecosystem functions of the Delta freshwater tidal marsh/ floodplain/lowland grassland interfaces.

Hill Slough Tidal Marsh Restoration

Project Location. The Hill Slough Restoration Project site is approximately 950 acres located within the DFG Hill Slough Wildlife Management Area, just outside of Suisun City limits in Solano County, California. The site is bounded by State Route 12 and a tidal moat to the north, a maintained tidal channel (Whispering Bay) and Suisun Slough to the west, Hill Slough to the south, and McCoy Creek to the east. (DFG 2011b).

Project Components. The Hill Slough Restoration Project will restore tidal wetlands and moist grassland habitat to approximately 200-1100 acres of diked seasonal and perennial wetlands in northern Suisun Marsh (CDFG 2005). Restoration will re-introduce tidal action to the site, restoring a transition of perennial aquatic habitat in the deepest areas, low intertidal marsh, high intertidal marsh, and lowland alluvial habitat. The restored habitat will provide rearing and productivity for delta smelt and Sacramento splittail, and rearing habitat for Chinook salmon. The desired outcome is a self-sustaining marsh ecosystem created through restoration of natural hydraulic and sedimentation processes and reliance on natural abiotic and biotic successional processes.

The project site is a former tidal brackish marsh and lowland alluvial habitat along the northern edge of Suisun Marsh that currently supports nontidal, seasonally ponded and perennial wetlands, and non-native grasslands. The restoration site is currently diked and drained.

The Hill Slough Restoration Project will restore a mosaic of wetland types including seasonal wetlands, tidal marsh, and subtidal and open water habitat. The purpose of the project is to restore natural hydrologic processes within a significant portion of the project area, thereby

promoting restoration of ecological processes and functions, which will aid in the recovery of listed plant and wildlife species while contributing to primary productivity in the estuary.

Meins Landing

Project Location. Meins Landing is in eastern Suisun Marsh adjacent to the Montezuma Slough.

Project Components. The long-term restoration goal of the project is to develop a multi-species habitat enhancement project, which will provide habitat for marsh-dependent sensitive plant and animal species, including the endangered salt marsh harvest mouse. The property is currently operated as a duck club and managed wetland.

Rush Ranch

Project Location. Rush Ranch Open Space Preserve (2070 acres) located along the northern edge of the Suisun Marsh. The restoration project would focus on a 70 acre diked marsh situated in the northwest corner of Rush Ranch.

Project Components. Since the 1990's, the diked marsh has fallen into disrepair and is now subsided and overgrown with emergent vegetation. Restoration efforts would likely breach the levee to return the marsh to daily tidal inundation and restore natural patterns of sedimentation, marsh plain and channel evolution. Restoration of this area would allow a fully connected transitional zone and connect existing tidal marsh to the north and south.

Overlook Club

Project Location. DWR is currently evaluating the acquisition and restoration of Overlook Club in Suisun Marsh (Property 322). This property, located in Northeastern Suisun Marsh within the Nurse/Denverton Slough Complex, is currently privately owned and managed as diked wetlands for waterfowl. Adjacent habitat includes upland ecotone, broad fringing tidal marshes, and shallow open waters in Little Honker Bay. Relatively high native fish abundance in this region has been documented, and may be related to structural habitat diversity and enhanced primary, and secondary productivity associated with existing tidal marsh and shallow open water habitat.

A wetland restoration feasibility assessment for Overlook Club is in progress, and indicates that tidal marsh restoration at this site would provide benefits to listed native fish species as called for in both the Anadromous Fish and Delta Smelt biological opinions and Longfin smelt Incidental Take Permit.

Project Components. This site is particularly well suited for restoration to tidal marsh, as it includes 160 acres of diked wetlands that are minimally subsided, and remnant tidal channels are intact. Restoration will require minimal landscape modification and has the potential for establishing broad tidal connectivity with the shallow open waters of Little Honker Bay.

Yolo Bypass Conservation Actions

Project Location. These projects will be undertaken in the Yolo Bypass, a 58,000-acre area historical floodplain west of the Sacramento River. The Yolo Bypass extends from Cache Creek and the Fremont Weir at its northern/upstream end to the Cache Slough Complex at its southern/downstream end.

Project Components. The CALFED ERP Implementing Agency Managers and DWR, in consultation with the Yolo Bypass Interagency Working Group, made recommendations for aquatic restoration activities within the Yolo Bypass (CDFG et al. 2007). Five potential restoration opportunities were identified that will improve conditions for native fish species and enhance populations and recovery efforts. This 5-step sequential restoration plan includes:

1. Lower Putah Creek Re-Alignment
2. Lisbon Weir Improvements
3. Additional Multi-species Floodplain Habitat Development
4. Tule Canal Conductivity
5. Fremont Weir Fish Passage

These activities were incorporated into the National Marine Fisheries Service's 2009 anadromous fish biological opinion (NMFS Biological Opinion).

The first step would be to evaluate and develop a plan for the realignment and restoration of lower Putah Creek. This realignment has the potential of creating 130 to 300 acres of shallow water habitat that would help to improve salmonid immigration and emigration to and from Putah Creek, and increase and enhance aquatic and other habitat for other native species. Lisbon Weir restoration would include modification and replacement of the weir to provide better fisheries management opportunities in Putah Creek and the Toe Drain, while improving reliability and reducing maintenance. Expansion of existing shallow water multi-species habitat is proposed to take place through excavation of a low shelf along the Toe Drain and creating small-scale set-back levees. Tule Canal connectivity restoration includes areas between Fremont Weir, the Fremont Weir scour ponds, and the Toe Drain to help reduce stranding of adult and juvenile fish. In addition, other barriers (road crossings, agricultural impoundments) will be identified and evaluated to reduce the impact on habitat connectivity, immigration, and emigration of fish species that use the Yolo Bypass. Lastly, evaluating the feasibility and appropriateness of providing fish passage improvements in and along the Fremont Weir will take place.

In addition to the above, the NMFS Biological Opinion requires a significant increase in acreage of seasonal floodplain rearing habitat in the Bypass. This would likely be accomplished by modifying Fremont and or Sacramento weirs to allow more frequent flooding of the Bypass.

These actions would provide the following benefits:

1. Increase inundation frequency.
2. Improve quality and availability of juvenile salmonid rearing and migration habitat.
3. Improve quality and availability of splittail spawning and rearing habitat.
4. Improve primary production exports to the lower Sacramento River and Delta.
5. Provide for improved salmon and splittail access to Putah Creek.
6. Improve fish passage at Fremont weir.
7. Improve migratory and resident bird habitats.

Battle Creek Salmon and Steelhead Restoration Project

Project Location. The Battle Creek Salmon and Steelhead Restoration project is located in Shasta and Tehama Counties near the town of Manton, California. The upper project limit on North Fork Battle Creek is the natural fish barrier above North Battle Creek Feeder Diversion Dam. The upper project limit on South Fork Battle Creek is the natural fish barrier above South Diversion Dam. The lower project limit is 9 miles upstream of the confluence of Battle Creek and the Sacramento River at a location just below the confluence of Coleman Powerhouse tailrace channel and the mainstem of Battle Creek. Restoration efforts would occur at the hydroelectric project sites along North Fork and South Fork Battle Creek and their tributaries.

Project Components. The purpose of the Battle Creek Salmon and Steelhead Restoration project is to restore approximately 42 miles of habitat in Battle Creek and an additional 6 miles of habitat in its tributaries while minimizing the loss of clean and renewable energy produced by the Battle Creek Hydroelectric Project (Jones & Stokes Associates 2005). The restoration project includes the installation of fish screens and ladders at three diversion dams, the removal of five other diversion dams, and an increase in streamflows by reducing diversions. Habitat restoration would enable safe passage for naturally produced salmonids, including winter-run and spring-run Chinook and Central Valley steelhead, and would facilitate their recovery in the Sacramento River and its tributaries.

APPENDIX G. ANNUAL REPORT TEMPLATE

APPENDIX G: Annual Report Template

DWR's FRPA Annual Report Template

PROJECT NAME:					**Report #**		
Organization:					***Report Date:***		
Address line 1:		***Contact:***			***Reporting Period:***		
Address line 2:			***Email:***			***Phone:***	
City:		***State:***		***Zip:***		***Fax:***	

Summary of Work Completed To Date *(See sample table below)*

Work Items for Review: *The table should number and list all items included for review, as they are included in the Biological Opinions, ITP, or FRPA. The information provided should be cumulative from the start of the project. The table should provide an at-a-glance status of the project work items.*

Due Date: *Annual Report due date.*

%Of Work Complete: *Cumulative percentage of work complete to date. Include the progress of each action towards meeting the intended restoration goals and implementation schedule.*

Date Submitted: *For items for review that are submitted more than once (i.e., progress reports), please leave previous submittal dates on the table so that there is a list of dates within the box. If a draft item for review is submitted, write "draft" after the date.*

Task Title	Deliverable	Due Date	% Of Work Complete	Date Submitted
i.e. I.a. Work with DWR and Fishery Agencies to identify critical fisheries information gaps and special investigation needs. Work with DWR to design and conduct studies.	i.e. Work with DWR as needed to develop a list of critical information gaps and approaches to conducting relevant studies and investigations. Conduct investigations as needed.	(mm/dd/yy)	(__%)	(mm/dd/yy)
i.e. 1.2.6. Battle Creek funds	i.e. Provided $6M contribution to DFG WCB Escrow account	June 2010	50%	June 30, 2010

List of Items for Review

(Include only the items for review, by sub-item number, listed on the Table of Items for Review in Exhibit A)

- ____
- ____

Progress Report Narrative

Introduction

(Provide a brief one or two sentence introduction or summary of the report (e.g., "During the reporting period, project activities focused on completing…," etc.)

Summary of Activities

(List each sub-item from the Table of Items for Review in every progress report. However, limit narrative descriptions to work performed during the reporting period. Provide, by sub-item number, a brief description of milestones, current status, constraints, and relative accrued benefits of each project during the reporting period.

Item 1 - Project Administration (Cumulative ___% complete)

(Describe at sub-item level activities, problems, successes, milestones OR "No work performed this period" OR "Complete")

Item 2 - _____ (Cumulative ___% complete**)**

(Describe at sub-item level activities, problems, successes, milestones OR "No work performed this period" OR "Complete")

(Continue with all items for review)

APPENDIX H. CONFLICT RESOLUTION FORM

Appendix H. Fish Restoration Program Agreement Issue-Resolution Form

General:

				Date:	Today
				Revision:	A
Title:	Insert title			Unique ID:	TBD
Type:	Environmental	Status:	Under Review	Date Resolved:	1/1/11 A
Area:	Programmatic (FRPA)	Location:	Custom		
Impact:	Scope: Low	Schedule:	High	Cost:	None

Resolution Status:		Received:	Completed:	Action Requested / Taken:
Currently With:	Coord. & Mgmt Team	Date	Date	Approve
Created by:	Me		Date	Draft Routed for Comment
Working-level Team		Date	Date	Prepare Recommendation
Coordination & Management Team		Date	Date	Concur
Policy Team		Date	Date	Approve
Sponsor		Date	Date	No Action Required

Description:

Define the problem

Impact:

Describe what is likely to happen if this issue is not resolved

Appendix H. Fish Restoration Program Agreement Issue-Resolution Form

Recommended Action:
Desired outcome

Working Resolution:	**Date Adopted:**
This will be used in the interim - until a final resolution is approved. A working resolution needs concurrence before using it as the basis to move the project forward.	

Final Resolution:	**Date Adopted for Use:**
The approved direction. If different from the working resolution, the team will have to confirm the project to match the final resolution.	

DRAFT – NOT FOR DISTRIBUTION – FOR DISCUSSION PURPOSES ONLY 2008 FWS BiOp Delta Smelt Crediting Decision Model

Please confer with the FAST and refer to the *2008 FWS BiOp Delta Smelt Crediting Decision Model Guidelines* when determining project scores.

Where is the project located?

Choose one location. Identify appropriate location value. Maximum possible one point in this category with the option to get up to two points if the project is occurring in a priority area for delta smelt (i.e. Suisun Marsh, Cache Slough Complex, or West Delta). Place location value in box 1.

Suisun Marsh	Cache Slough Complex	West Delta	North Delta	Central Delta	East Delta	South Delta	Yolo Bypass
2 –Within the central and eastern portions of Suisun **1** – Along the western portion of Suisun	**2** –Within the Cache Slough Complex boundary	**2** – Along the corridor from Suisun Marsh to Cache Slough Complex **1** – Waterways feeding into the corridor between Suisun Marsh and Cache Slough Complex	**1** –Locations closer to the arc connecting Cache Slough Complex, the confluence, and Suisun Marsh **0.5** – Areas further away from the confluence.	**1** – In close proximity to the arc between Cache Slough Complex, the confluence, and Suisun Marsh **0.5** – Areas further away from the arc.	**0.5** – Within the East Delta boundary	**No** credits	**No** credits

1. ☐

What are the benefits to delta smelt?

All benefit categories are additive and will be used when considering the overall score. Identify appropriate value. Maximum possible four points. Place values in their corresponding boxes (2-4).

Improved Rearing Habitat	Improved Spawning Habitat	Food Web Support
2 – Provides high order marsh adjacent channels; energetic; turbid cool low salinity water over a diverse landscape for capturing prey and decreased predation; accessible to delta smelt for direct use. **1** – Increased the overall available rearing habitat; moderately accessible to delta smelt for direct use. **0** – No improved or protected rearing. **Enter value in box 2.**	**1** – Sandy beaches with appropriate water velocities and depths to maintain the habitat and is accessible to delta smelt for direct use. Must have appropriate water quality conditions for delta smelt. **0** – No spawning habitat improved or protected. **Enter value in box 3.**	**1** –Supports local aquatic food web production. **0** – No enhanced food web benefits. **Enter value in box 4.**

2. ☐
3. ☐
4. ☐

Protection, Restoration, Creation, and/or Enhancement?

These two categories are additive. Maximum possible five points. Place values in their corresponding boxes (5 and 6).

Definitions

Protect – Maintenance or retention of existing habitat with specific resource function(s) for delta smelt. This term usually implies legal protection of the habitat, for example a parcel of land protected under a conservation easement.

Restore – Undertaking actions that re-establish tidal marsh habitat in a location where it had been reclaimed, while meeting established reserve design criteria.

Create - To establish habitat or a natural community in an area that did not previously support it.

Enhance – Manipulation of existing habitat to heighten, intensify, or improve a specific resource function(s). Enhancement results in a gain of selected resource function(s), but may also lead to a decline in other resource function(s). The improvement of an existing degraded habitat. Improving the function of habitat that has been degraded or lost, typically due to human actions.

Protect (i.e. land acquisition)	Restore, Create and/or Enhance
2 – The conserved land will be protected in fee title and under a conservation easement. **0** – The project applicant did not provide the funding for land acquisition (fee title) or place the conservation easement on the land. This will typically apply to projects that have undergone previous conservation planning efforts and may have involved federal grant funding, where no credits can be given for the purchase of the land. **Enter value in box 5.**	**3** – Conversion of low quality habitat to very high quality habitat. **2.5** – Conversion of moderate quality habitat to very high quality habitat. **2** – Conversion of moderate-high quality habitat to very high quality habitat. **1.5** – Conversion of high quality habitat to very high quality habitat. **0** – No restoration, creation, or enhancement actions were performed. **Enter value in box 6.**

5. ☐
6. ☐

Place respective score in the numbered boxes. Add scores up to determine total score. Divide by 10, which are the total available points from the decision tree to determine the ratio for the project.

Project Score

☐ (1) + ☐ (2) + ☐ (3) + ☐ (4) + ☐ (5) + ☐ (6) = ☐ (Total) / 10 = ☐ to 1 Ratio*

*The credited acreages are not to exceed the total restored, created, or enhanced acreages (1:1 ratio).

Last Updated 10/28/2013

2008 FWS BiOp Delta Smelt Crediting Decision Model Guidelines

Last Updated 10/28/2013

This guiding document is meant to accompany the *2008 FWS BiOp Delta Smelt Crediting Decision Model* (decision model) and to be used to assist in determining scores and provide rationales for delta smelt habitat criteria identified within the branches of the decision model. Both documents will serve as living documents for determining credits towards fulfilling the 8,000 acres of intertidal and subtidal marsh identified in *RPA Component 4: Habitat Restoration* of the *2008 Coordinated Operations of the Central Valley Project and State Water Project Biological Opinion* (2008 FWS BiOp). Information presented in the *2008 FWS BiOp Delta Smelt Crediting Decision Model* and this document are based on our best understanding of delta smelt at this point in time and will be updated as needed into the future. The values and weight of the various components in the decision model can adapt over time during the implementation of the tidal marsh restoration. Any new updates to theses document will be transmitted to the project proponents during the Fish Agency Strategy Team (FAST) coordination process.

This crediting system is meant to reduce the struggles with determining 2008 FWS BiOp delta smelt credits during the development of the crediting prospectus stage. As projects started coming to the FAST, it was apparent early on that there was a need for a systematic crediting system to be in place based on the uniqueness, complexity, and diversity of the individual restoration projects specific to implementing the 8,000 acres of tidal marsh in the 2008 FWS BiOp. There are currently limited methods and approaches available for determining increases in habitat value from existing conditions that can be translated into credits for a project. This crediting system is envisioned to streamline the process by reducing the time invested in developing a crediting scheme for every project that is presented to the FAST for credit consideration. Rather every project would use this decision model, in coordination with the FAST, to determine credits for a given project.

The context below provides guidance to the various levels within the decision model. Please refer to these sections when filling out the scores in the decision model.

Where is the project located?

Location – Choose one location from the provided options. Use Figure 1 for general delineations of the locations identified in the decision model. Maximum possible one point in this category with the option

to get up to two points if the project is occurring in a priority area for delta smelt (i.e. Suisun Marsh, Cache Slough Complex, or West Delta). Suisun Marsh, Cache Slough Complex, and West Delta can score up to two points to incentivize restoration to occur in areas where delta smelt are predominantly abundant and of higher priority for restoration opportunities for delta smelt habitat.

Delta smelt are endemic to (native and restricted to) the San Francisco Bay and Sacramento-San Joaquin Delta Estuary (Delta) in California, found only from the San Pablo Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties (Moyle 2002, p. 227). For purposes of the 2008 FWS BiOp, delta smelt conservation is limited to the Delta and Suisun Marsh as indicated on page 283 of the 2008 FWS Biological Opinion. Sampling within the Central Delta, East Delta, and North Delta areas have indicated presence of delta smelt. However, due to lower occurrences of delta smelt within these locations, lower priority is given. Historically the South Delta may have been within the species range of occurrence, however, as of more recently it has not served as primary habitat for the species. Although the South Delta may serve as habitat for other native Delta fish species, it is not a focal area for delta smelt conservation. No delta smelt credits will be given for South Delta restoration projects under the 2008 FWS BiOp. Yolo Bypass conservation, like the South Delta, is driven by the needs of other Delta fish species. No delta smelt credits will be given for Yolo Bypass projects (outside of the Delta) at this time.

Below is taken from the decision model to determine project location score.

Suisun Marsh

2 –Within the central and eastern portions of Suisun

1 – Along the western portion of Suisun

Cache Slough Complex

2 –Within the Cache Slough Complex boundary

West Delta

2 – Along the corridor from Suisun Marsh to Cache Slough Complex

1 – Waterways feeding into the corridor between Suisun Marsh and Cache Slough Complex

North Delta

1 –Locations closer to the arc connecting Cache Slough Complex, the confluence, and Suisun Marsh

0.5 – Areas further away from the confluence.

Central Delta

1 – In close proximity to the arc between Cache Slough Complex, the confluence, and Suisun Marsh

0.5 – Areas further away from the arc.

East Delta

0.5 – Within the East Delta boundary

South Delta

0 Credits

Yolo Bypass (outside the Delta)

0 Credits

What are the benefits to delta smelt from the project?

Improved rearing (and foraging) habitat – Maximum possible two points.

Improving useable habitat for delta smelt rearing is valuable to improving their habitat conditions. There is a desire to create rearing habitat near areas where we know delta smelt are known to occur to expand their use of habitat. With the aim being, to have rearing habitat in close proximity or near areas where food web production is made available to delta smelt.

Two points given to projects that improve rearing habitat that provide: high order tidal marsh adjacent channels; energetic habitat; turbid cool low salinity water over a diverse landscape; and habitat that is accessible to delta smelt for use.

One point given to projects that create, restore, or enhance more rearing habitat to what is currently available, however, the habitat may only be moderately accessible to delta smelt to use, either due to proximity of known occurrences or by restoration design. For instance levees or other man-made or environmental barriers may prevent a project from scoring the maximum amount of points in this category.

Improved spawning habitat – Maximum possible one point.

One point will be given for those projects that protect, create, restore, or enhance sandy beach spawning habitat with appropriate water quality, velocities, and depths for delta smelt. Water velocities should be appropriate for maintaining the sandy habitat anticipated to provide spawning habitat for delta smelt. Given the need to still learn more about the type of habitat delta smelt use for spawning, focus should be on protecting existing spawning habitat from future modification to ensure the habitat stays conserved in perpetuity.

Food web support – Maximum possible one point.

One point will be given to projects that provide food web production off of the project site for delta smelt. One point will be given to those projects that support local food web production.

Protection, restoration, creation, and/or enhancement?

Definitions

> **Protect** – Maintenance or retention of existing habitat with specific resource function(s) for covered species. This term usually implies legal protection of the habitat, for example a parcel of land protected under a conservation easement.
>
> **Restore** – Returning a site to its natural/historic habitat type with the same or similar functions. Undertaking actions that establish tidal marsh habitat in a location that historically supported the habitat, but which had been removed typically as a result of human actions.
>
> **Create** - To establish habitat or a natural community in an area that did not previously support it.
>
> **Enhance** – Manipulation of existing habitat to heighten, intensify, or improve a specific resource function(s). Enhancement results in a gain of selected resource function(s), but may also lead to a decline in other resource function(s). The improvement of an existing degraded habitat. Improving the function of habitat that has been degraded or lost, typically due to human actions.

Protect (i.e. land acquisition) – Maximum possible two points.

Two points will be given for those projects where the conserved land is protected in fee title and placed under a conservation easement.

No points will be given for those projects where the project applicant did not provide the funding for acquisition (fee title) or place the conservation easement on the land. This will typically apply to existing projects that have undergone previous conservation planning efforts and may had federal grant funding, where no credits can be given for the purchase of the land.

Restoration, creation, and/or enhancement **–** Maximum possible three points.

3 – Conversion of low quality habitat to very high quality habitat.

Example: Bringing tidal excursion to dry land. The project would provide tides to previously claimed habitat. For instance, what were once wetlands that are now being cultivated for agricultural harvesting that through the project would to be converted to tidal marsh.

Example: Performing earth work of dry land to bring tidal waters onto the project site.

2.5 – Conversion of moderate quality habitat to very high quality habitat.

Example: Infrequently inundated seasonal wetlands that through the project will experience greater tidal excursion.

Example: Removal of aquatic invasive species that will allow for native vegetation to reclaim the site. Active management may be required to maintain the habitat quality.

2 – Conversion of moderate-high quality habitat to very high quality habitat.

Example: Increasing the variation of tidal marsh habitat within an area. The site becomes more energetic with high order channels.

1.5 – Conversion of high quality habitat to very high quality habitat.

Example: Increasing edge habitat within a site.

Example: Screening unscreened diversions on a project site to meet a 0.2 fps approach velocity, often referred to as delta smelt criteria. **0** – No restoration, creation, or enhancement actions were performed.

The credited acreages are not to exceed the total restored acreages (1:1 ratio).

Very high quality habitat may include the following:

- Secure lands, in fee-title or through conservation easements, suitable for restoring tidal natural communities and protect sufficient adjacent uplands to accommodate the future upslope establishment of tidal emergent natural community with sea level rise, and to provide upland habitat and refugia for native wildlife.
- Restore tidal emergent wetlands using techniques and methods that accomplish the following goals:
    - Reestablish tidal connectivity to reclaimed lands and reintroduce tidal exchange to currently former tidelands.
    - Restore and create sinuous and high-density dendritic channel networks within the restored marsh plains.
    - Restore tributary stream functions to establish more natural patterns of sediment transport, which would increase turbidity and thus improve spawning conditions for delta smelt.
    - Create habitat for covered species dependent on tidal marsh natural communities.
- Design levee and dike breaches to maximize the development of tidal marsh plain and create hydrodynamic conditions that disfavor nonnative predatory fish.
- Develop and implement measures to minimize the potential for methylation of mercury in restored tidal marsh communities.
- General methods and techniques that may be used during implementation:
    - Restore natural remnant meandering tidal channels.
    - Excavate channels to encourage the development of sinuous, high-density dendritic channel networks with restored marsh plain.
    - Modify ditches, cuts, and levees to encourage more natural tidal circulation and better flood conveyance based on local hydrology.
    - Prior to levee breaching, re-contour the ground surface to maximize the extent of surface elevation suitable for establishment of tidal marsh vegetation (marsh plain) by scalping higher elevation land to provide fill for placement on subsided lands to raise surface elevations (taking into consideration that the surface sediment in higher elevation land that is seasonally inundated can be a significant source for zooplankton and aquatic invertebrates, and scalping may temporarily remove that resource).

- Prior to breaching, import dredge or fill and place it in shallowly subsided areas to raise ground surface elevations to a level suitable for establishment of tidal marsh vegetation (marsh plain).
- Prior to breaching, cultivate stands of tules through flood irrigation for sufficiently long periods to raise subsided ground surface to elevations suitable to support marsh plain; breach levees when target elevations are achieved.

Scoring Examples

2 + 2 + 1 + 1 + 2 + 3 = 11 / 10 = 1.1 to 1 ratio, however, no more than 1:1 credit can be given. So 1:1 becomes the ratio used for determining acreage credits.

Resulting in 500 credits (500 X 1.0) for 500 acres of restored habitat in Suisun Marsh.

1 + 1 + 0 + 1 + 2 + 3 = 8 / 10 = 0.8 to 1 ratio

Resulting in 400 credits (500 X 0.8) for 500 acres of restored habitat in Central Delta.

Delta Smelt Background Information

Rearing (and foraging) habitat

Delta smelt feed primarily on small planktonic (free-floating) crustaceans, and occasionally on insect larvae (Moyle 2002, p. 228). Historically, the main prey of delta smelt was the copepod *Eurytemora affinis* and the mysid shrimp *Neomysis mercedis*. The slightly larger copepod *Pseudodiaptomus forbesi* has replaced *E. affinis* as a major prey source of delta smelt since its introduction into the San Francisco Bay-Delta. Two other copepod species, *Limnoithona tetraspina* and *Acartiella sinenisi*, have become abundant since their introduction to the San Francisco Bay-Delta in the mid-1990s. Delta smelt eat these introduced copepods, but *P. forbesi* remains a dominant prey item (Baxter *et al.* 2008, p. 22). The diets of larval delta smelt are limited to larval copepods (Nobriga 2002, p. 156). Delta smelt are thought to require a turbid environment for efficient, successful foraging and avoid predators (Feyrer et al. 2007, p. 731). Temperature also affects delta smelt distribution. Delta smelt tolerate temperatures <7.5 to >25.4 ^{o}C (<45.5 to >77.7 °F) (Swanson 2000, p. 387), however warmer water temperatures >25 ^{o}C (77 °F) restrict their distribution more than colder water temperatures (Nobriga and Herbold 2008, p. 12).

Spawning habitat

Larvae are generally most abundant in the Delta from mid-April through May (Bennett 2005, p. 13). Sampling of larval delta smelt in the Bay-Delta in 1989 and 1990 suggested that spawning occurred in the Sacramento River; in Georgiana, Prospect, Beaver, Hog, and Sycamore sloughs; in the San Joaquin River adjacent to Bradford Island and Fisherman's Cut; and possibly other areas (Wang 1991). However, in recent years, the densest concentrations of both spawners and larvae have been recorded in the Cache Slough/Sacramento Deepwater Ship Channel complex in the North Delta. Delta smelt spawning also occurs in Napa River, Suisun Bay and Suisun Marsh during wetter years (Sweetnam 1999; Wang 1991; Hobbs *et al.* 2007). Early stage larval delta smelt have also been recorded in Montezuma Slough near Suisun Bay (Wang 1986).

Although spawning has not been observed in the wild, spawning location and timing has been inferred from the collection of larvae in sloughs and shallow water edge-waters of channels in the upper Delta and in Montezuma Slough near Suisun Bay (Wang 1991, pp. 11-12). Delta smelt of all sizes are found in the main channels of the Delta and Suisun Marsh and the open waters of the Suisun Bay where the waters are well oxygenated and temperatures are usually less than 25 ° C (77 ° F) in the summer (Nobriga *et al.* 2008, pp. 9-11). After several weeks of development, larval surveys indicate that larvae

move downstream until they reach nursery habitat in the "low salinity zone" (LSZ) where the salinity ranges from approximately .5 to 7 parts per thousand (ppt) (Moyle 2002, p. 228; Dege and Brown 2004, pp. 57–58). Juvenile smelt rear and grow in the LSZ for several months, where they are found in relatively shallow open water (Dege and Brown 2004, pp. 56–58). When X2 is located downstream of the confluence at 80 km, the area of suitable habitat is increased encompassing the areas of Suisun and Grizzly Bays (Feyrer et al.2007, p. 24). In winters with high Delta outflow, the spawning range of delta smelt shifts west to include the Napa River (Hobbs et al. 2007, p. 524). Fish inhabiting Suisun Marsh and the Sacramento-San Joaquin River confluence may also spawn near their rearing habitat when water quality conditions enable them (i.e., when flows increase and fresher water moves over these seasonally brackish rearing habitats). In September or October, delta smelt reach adulthood and begin a gradual migration back into freshwater areas where spawning is thought to occur.

Food web support

Introduced species have altered the Delta food web and may have played a role in the decline of delta smelt (Nobriga 1998, p. 20). The overbite clam (*Corbula amurensis*) is a nonnative species that became abundant in the Delta in the late 1980s. Starting in about 1987 to 1988, declines were observed in the abundance of phytoplankton (Alpine and Cloern 1992, p. 951) and the copepod *Eurytemora affinis.* These declines have been attributed to grazing by the overbite clam (Kimmerer *et al.* 1994, p. 86). The overbite clam competes with delta smelt for copepod nauplii (Nobriga and Herbold 2008, p. 23). It is unknown how intensively overbite clam grazing and delta smelt directly compete for food, but overbite clam consumption of shared prey resources does have other ecosystem consequences that appear to have affected delta smelt indirectly. It is believed that these changes in the estuarine food web negatively influence pelagic fish abundance, including delta smelt abundance. Recent studies suggest that summer food limitation remains a major stressor on Delta smelt (Nobriga 1998).

Copepods (*E. affinis*, *Psuedodiaptomus forbesi*), a major prey item for delta smelt, have declined in abundance in the Delta since the 1970s (Kimmerer and Orsi 1996, p. 409). *Limnoithona tetraspina* (no common name) is a nonnative copepod that began increasing in numbers in the delta in the mid-1990s – about the same time that the delta smelt's preferred prey copepod, *P. forbesi*, began declining (Bennett 2005, p. 18). *L. tetraspina* is now the most abundant copepod species in the low salinity zone (Bouley and Kimmerer 2006, p. 219), and is likely an inferior prey species for delta smelt because of its smaller size and superior predator avoidance abilities when compared to *P. forbesi* (Bennett 2005, p. 18).

It has been hypothesized that delta smelt are adversely affected by competition from other introduced fish species that use overlapping habitats, including Mississippi silversides, (Bennett 2005, pp. 49, 50) striped bass, and wakasagi (Sweetnam 1999). Laboratory studies show that delta smelt growth is inhibited when reared with Mississippi silversides (Bennett 2005). Delta smelt and Mississippi silversides have similar morphology, diet, and lifespan, but silversides have a broader diet, and a generally wider ecological niche, a pattern that could give it a competitive advantage over delta smelt. However, there is no empirical evidence to support the conclusion that competition between these species is a factor that influences the abundance of delta smelt in the wild (Bennett 2005, p. 50).

Egeria densa and other non-native submerged aquatic vegetation (e.g., *Myriophyllum spicatum*) can affect delta smelt in direct and indirect ways. Directly, submerged aquatic vegetation can overwhelm littoral habitats (inter-tidal shoals and beaches) where delta smelt may spawn, making them unsuitable for spawning. Indirectly, submerged aquatic vegetation decreases turbidity by trapping suspended sediment, which has contributed to a decrease in both juvenile and adult smelt habitat quality (Feyrer *et al.* 2007; Nobriga *et al.* 2008). Increased water clarity may delay feeding and may also make delta smelt more susceptible to predation pressure.

In summary, we find that introduced species including the overbite clam have altered the Delta food web and constitute a significant threat to delta smelt. It is likely that this threat will increase in the future with the ongoing risk of new species being introduced to the Delta.

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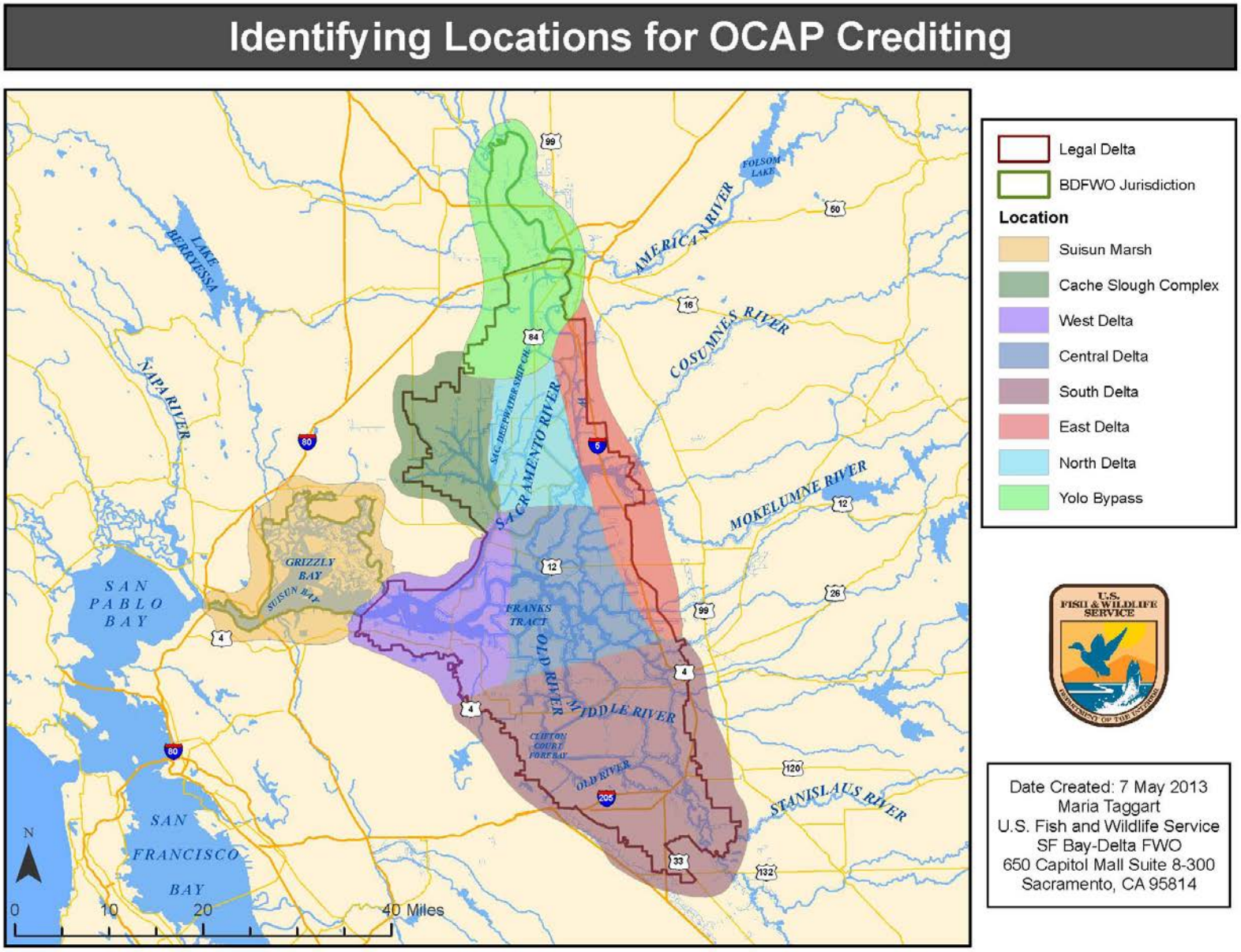

Figure 1. Boundaries for determining where projects lie within the location category in the decision model.