CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

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PUBLIC DRAFT | January 2012

2012 Central Valley Flood Protection Plan

A Path for Improving Public Safety, Environmental Stewardship, and Long-Term Economic Stability

Volume I
Attachments 1 through 6

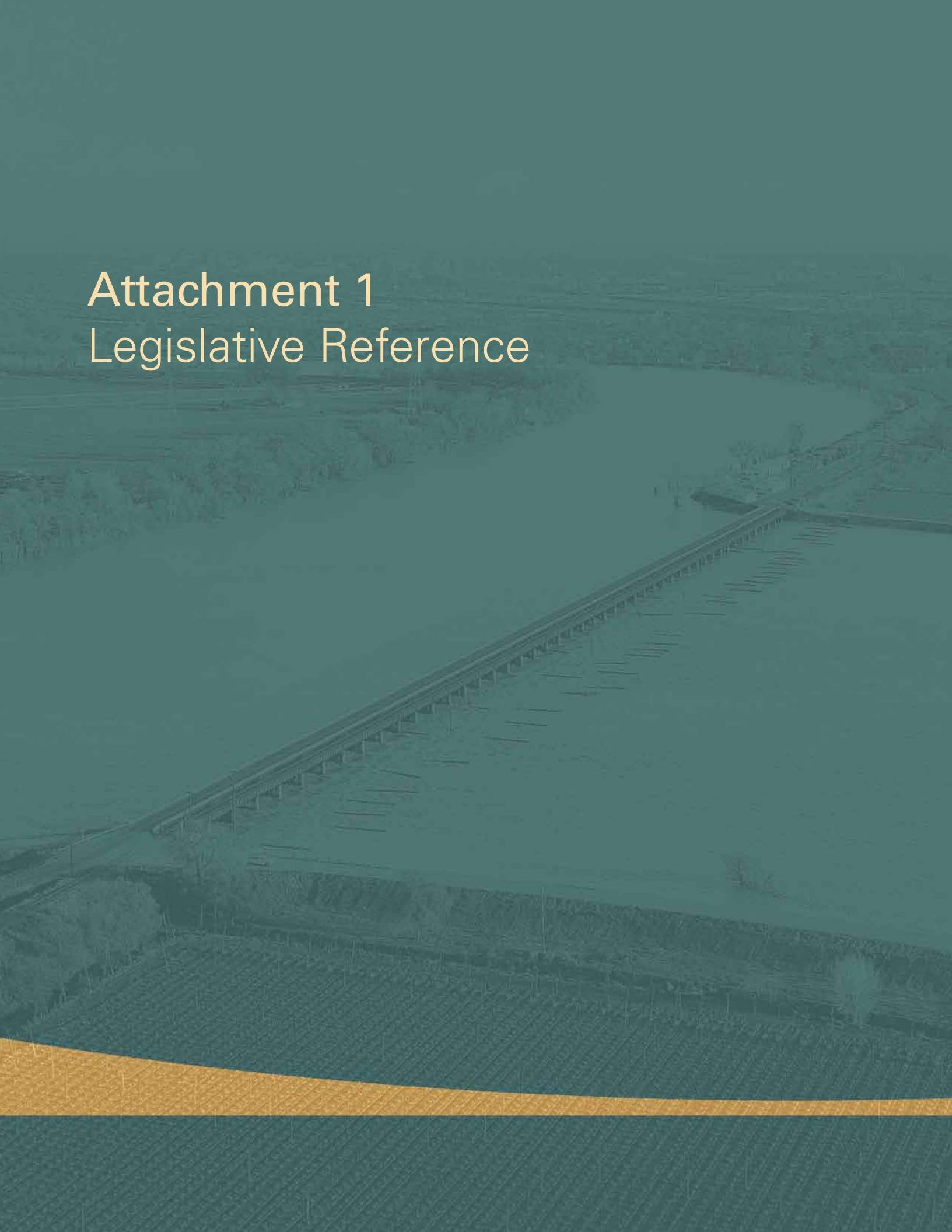
DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

PUBLIC SAFETY ENVIRONMENTAL STEWARDSHIP ECONOMIC STABILITY

Cover Photo: Sacramento Weir (December 24, 1964), DWR Photo Lab

The Sacramento Weir and Bypass discharges excess flows from the Sacramento River (on the left) into the Yolo Bypass (not shown). The 1964-65 water year was marked by one of the most disastrous floods in California's history.

Attachment 1
Legislative Reference



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Public Draft

2012 Central Valley Flood Protection Plan

Attachment 1: Legislative Reference

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Legislative Reference

The California Department of Water Resources (DWR) prepared the Central Valley Flood Protection Plan (CVFPP) pursuant to authorizing legislation as presented in Senate Bill 5, and subsequently described in the California Water Code.

Part 6 of Senate Bill 5 was divided into three Chapters:

- **Chapter 1. General Provisions –** This chapter covers California Water Code Sections 9600 through 9603.
- **Chapter 2. Plan Development** – This chapter covers California Water Code Sections 9610 through 9616.
- **Chapter 3. Plan Implementation –** This chapter covers California Water Code Sections 9620 through 9625.

During development of the CVFPP, DWR prepared several supporting documents and evaluations that collectively meet the provisions of the above mentioned sections of the California Water Code.

The following matrix presents the text of each water code section along with a summary of how DWR is responding to the legislative provisions as part of CVFPP development.

California Water Code Section	DWR Application of Water Code Section
9600. This act shall be known and may be cited as the Central Valley Flood Protection Act of 2008.	The CVFPP was prepared for submission to the Central Valley Flood Protection Board (Board) pursuant to the California Central Valley Flood Protection Act of 2008
9601. The Legislature finds and declares all of the following: **(a)** The Central Valley of California is experiencing unprecedented development, resulting in the conversion of historically agricultural lands and communities to densely populated residential and urban centers. **(b)** The Legislature recognizes that by their nature, levees, which are earthen embankments typically founded on fluvial deposits, cannot offer complete protection from flooding, but can decrease its frequency. **(c)** The Legislature recognizes that the level of flood protection afforded rural and agricultural lands by the original flood control system would not be adequate to protect those lands if they are developed for urban uses, and that a dichotomous system of flood protection for urban and rural lands has developed through many years of practice. **(d)** The Legislature further recognizes that levees built to reclaim and protect agricultural land may be inadequate to protect urban development unless those levees are significantly improved. **(e)** Cities and counties rely upon federal flood plain information when approving developments, but the information available is often out of date and the flood risk may be greater than that indicated using available federal information. **(f)** The Legislature recognizes that the current federal flood standard is not sufficient in protecting urban and urbanizing areas within flood prone areas throughout the Central Valley. **(g)** Linking land use decisions to flood risk and flood protection estimates comprises only one element of improving lives and property in the Central Valley. Federal, state, and local agencies may construct and operate flood protection facilities to reduce flood risks, but flood risks will nevertheless remain for those who choose to reside in Central Valley flood plains. Making those flood risks more apparent will help ensure that Californians make careful choices when deciding whether to build homes or live in Central Valley flood plains, and if so, whether to prepare for flooding or maintain flood insurance.	The essence of these Legislative findings is provided as background within Chapter 1 of the CVFPP. These Legislative findings influenced the selection of the physical elements of the CVFPP (Chapter 3). The findings also influenced the programs and policies for implementing and managing the CVFPP into the future (Chapter 4). During preparation of the CVFPP, DWR worked with stakeholders to define existing regional conditions and likely future challenges; identify problems and opportunities from various perspectives; and define goals, principles, and objectives to guide development and implementation of the CVFPP. The Legislative findings aided in preparing this regional work.
9602. Unless the context requires otherwise, the definitions set forth in this section govern the construction of this part. **(a)** "Board" means the Central Valley Flood Protection Board. **(b)** "Plan" means the Central Valley Flood Protection Plan. **(c)** "Project levee" means a levee that is part of the facilities of the State Plan of Flood Control. **(d)** "Public safety infrastructure" means public safety infrastructure necessary to respond to a flood emergency, including, but not limited to, street and highway evacuation routes, public utilities necessary for public health and safety, including drinking water and wastewater treatment facilities, and hospitals. **(e)** "Sacramento-San Joaquin Valley" means lands in the bed or along or near the banks of the Sacramento River or San Joaquin River, or their tributaries or connected therewith, or upon any land adjacent thereto, or within the overflow basins thereof, or upon land susceptible to overflow therefrom. The Sacramento-San Joaquin Valley does not include lands lying within the Tulare Lake basin, including the Kings River. **(f)** "State Plan of Flood Control" has the meaning set forth in	All definitions specified in this section of CWC are adhered to throughout the 2012 Central Valley Flood Protection Plan, 2012 CVFPP Supporting Technical Analyses and Documentation, and 2012 CVFPP Companion Documents. To avoid confusion with other plans, the acronym “CVFPP” is used throughout the Central Valley Flood Protection Plan in the place of “Plan.

California Water Code Section	DWR Application of Water Code Section
subdivision (j) of Section 5096.805 of the Public Resources Code. **(g)** "System" means the Sacramento-San Joaquin River Flood Management System described in Section 9611. **(h)** "Urban area" has the same meaning as that set forth in subdivision (k) of Section 5096.805 of the Public Resources Code. **(i)** "Urban level of flood protection" means the level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the department.	
9603. (a) The Central Valley Flood Protection Plan shall be a descriptive document, and neither the plan nor anything in this part shall be construed to expand the liability of the state for the operation or maintenance of any flood management facility beyond the scope of the State Plan of Flood Control, except as specifically determined by the board pursuant to Section 9611. Neither the development nor the adoption of the Central Valley Flood Protection Plan shall be construed to constitute any commitment by the state to provide, to continue to provide, or to maintain at, or to increase flood protection to, any particular level. **(b)** The Central Valley Flood Protection Plan reflects a systemwide approach to protecting the lands currently protected from flooding by existing facilities of the State Plan of Flood Control. Any flood protection benefits accruing to lands or communities outside the State Plan of Flood Control are incidental and shall not constitute any commitment by the state to provide, to continue to provide, or to maintain at, or to increase flood protection to, any particular level.	Given that the CVFPP is a broad plan that requires additional feasibility studies to further develop specific physical improvements to the SPFC. Therefore, the CVFPP makes no commitments to any system modifications, but just presents a plan that needs approval and adoption by the Central Valley Flood Protection Board (Board) and confirmation by feasibility studies. The CVFPP focuses on improvements to existing State Plan of Flood Control (SPFC) facilities and specifically excludes improvements to non-SPFC facilities. However, the Board may choose to expand the scope pursuant to Section 9611.
9610. (a) (1) By July 1, 2008, the department shall develop preliminary maps for the 100- and 200-year flood plains protected by project levees. The 100-year flood plain maps shall be prepared using criteria developed or accepted by the Federal Emergency Management Agency (FEMA). **(2)** The department shall use available information from the 2002 Sacramento-San Joaquin River Basin Comprehensive Study, preliminary and regulatory FEMA flood insurance rate maps, recent flood plain studies, and other sources to compile preliminary maps.	DWR has published a series of best available maps to the public in 2008. These maps are available on DWR website.
(3) The department shall provide the preliminary maps to cities and counties within the Sacramento-San Joaquin Valley for use as best available information relating to flood protection. **(4)** The department shall post this information on the board's Internet Web site and may periodically update the maps as necessary.	DWR has published the awareness floodplain maps and is available on DWR website.
(b) By July 1, 2008, the department shall give notice to cities in the Sacramento-San Joaquin Valley outside areas protected by project levees regarding maps and other information as to flood risks available from the Federal Emergency Management Agency or another federal, state, or local agency.	In August 2008, DWR provided preliminary maps (as map books in CD's) to 91 cities and 32 counties within the Sacramento-San Joaquin Valley for use as best available information relating to flood protection. DWR's Floodplain Risk Management Branch extended the best available mapping project -- and developed "statewide" preliminary best available maps for 100-, 200-, and 500-year floodplains. These maps can be accessed by public via a GIS based web viewer (developed by the branch) at http://gis.bam.water.ca.gov/bam In addition, DWR established the Flood

California Water Code Section	DWR Application of Water Code Section
	Risk Notification Program to increase flood risk awareness by effectively communicating that risk to individual property owners, the public, and local, state, and federal agencies.
(c) On or before December 31, 2010, the department shall prepare a status report on the progress and development of the Central Valley Flood Protection Plan pursuant to Section 9612. The department shall post this information on the board's Internet Web site, and make it available to the public.	DWR submitted a CVFPP Progress Report to the Board in January 2011. This report was posted on the Board's website.
9611. The Sacramento-San Joaquin River Flood Management System comprises all of the following: **(a)** The facilities of the State Plan of Flood Control as that plan may be amended pursuant to this part. **(b)** Any existing dam, levee, or other flood management facility that is not part of the State Plan of Flood Control if the board determines, upon recommendation of the department, that the facility does one or more of the following: **(1)** Provides significant systemwide benefits for managing flood risks within the Sacramento-San Joaquin Valley. **(2)** Protects urban areas within the Sacramento-San Joaquin Valley.	A detailed description of existing flood management facilities is included in the State Plan of Flood Control Descriptive Document, prepared as a companion document to the 2012 CVFPP. The hydrologic and hydraulic modeling conducted for the CVFPP includes SPFC and non-SPFC facilities. Reservoirs are a prime example of non-SPFC facilities that provide systemwide benefits. Throughout the CVFPP development, the term is used consistently.
(c) Upon completion of the Central Valley Flood Protection Plan pursuant to this part, the department may identify and propose to the board additional structural and nonstructural facilities that may become facilities of the State Plan of Flood Control, consistent with the Central Valley Flood Protection Plan. The board may add those facilities to the State Plan of Flood Control based on a determination showing how the facility accomplishes the purposes identified in subdivision (b). **(d)** For the purposes of subdivision (c), facilities that may become facilities of the State Plan of Flood Control include bypasses, floodway corridors, flood plain storage, or other projects that expand the capacity of the flood protection system in the Sacramento-San Joaquin Valley to provide flood protection.	During development of the CVFPP, DWR considered both structural and nonstructural elements that may become part of the SPFC and included those in the CVFPP. Selected elements include two new bypasses, new levees needed to expand bypasses, new ring levees to surround some small communities, nonstructural floodproofing for some small communities, and changes in reservoir operations. Decisions by the Board to add these to the SPFC or potential other features would likely occur after future feasibility studies demonstrate viability of these elements and after they are constructed. No specific floodplain storage was included in the plan other than that which results from expansion of the floodways. However, DWR recognized that the Board may choose to add floodplain (transitory) storage in areas where there are willing sellers. DWR also considered improvements to existing non-SPFC levees. While DWR did not include potential improvements to non-SPFC levees in the CVFPP, it did acknowledge that it may choose to participate in funding improvements to these facilities under other State programs if improvements are found to be feasible. In addition, the Board may choose to add some of the non-SPFC levees, especially a few miles of non-

California Water Code Section	DWR Application of Water Code Section
	SPFC urban levee in the Stockton area, to the SPFC.
9612. (a) The department shall prepare, and the board shall adopt, a plan identified as the Central Valley Flood Protection Plan in accordance with this part. **(b)** No later than January 1, 2012, the department shall prepare the Central Valley Flood Protection Plan in accordance with this part, and shall transmit the plan to the board, which shall adopt the plan no later than July 1, 2012.	DWR's CVFPP will be available to the Board no later than January 1, 2012. The project schedule then calls for the Board to then review, revise, and adopt the plan by July 1, 2012. The Board's adoption of the CVFPP is subject to the date of compliance with the California Environmental Quality Act (CEQA) guidelines. If substantial public comments are received which would require the CVFPP to be amended, additional public notices to comply with the CEQA would likely delay the Board's ability to meet the July 1, 2012 date for adoption.
(c) The board shall hold at least two hearings to receive comments on the proposed plan. At least one hearing shall be held in the Sacramento Valley and at least one hearing shall be held in the San Joaquin Valley. The board shall also accept comments in writing with regard to the proposed plan. **(d)** The board may make changes to the proposed plan to resolve issues raised in the hearings or to respond to comments received by the board. The board shall publish its proposed changes to the proposed plan at least two weeks before adopting the plan.	The Board recognizes its responsibilities for review, revise, and adopt the CVFPP.
(e) The plan shall be updated in subsequent years ending in 2 and 7.	As shown in Chapter 4 of the CVFPP, DWR is planning for the 2017 update of the CVFPP and subsequent 5-year updates.
(f) The department or the board may appoint one or more advisory committees to assist in the preparation of the plan. If the department or the board appoints one or more advisory committees, the advisory committee or committees shall include representation by interested organizations.	During preparation of the CVFPP, DWR established and worked with regional groups to assist in identifying goals, constraints, and potential improvements, however, they are not for advisory purposes. During its review leading to adoption of the CVFPP, the Board may decide to appoint one or more advisory committees to assist in revisions to the plan.
9613. (a) Consistent with subdivision (b) of Section 5096.821 of the Public Resources Code, the department may implement flood protection improvements for urban areas protected by facilities of the State Plan of Flood Control before the adoption of Central Valley Flood Protection Plan if the director determines, in writing, that all of the following apply: **(1)** The improvements are necessary and require state funding before the completion of the Central Valley Flood Protection Plan prepared pursuant to Section 9612. **(2)** The improvements will reduce or avoid risk to human life in one or more urban areas. **(3)** The improvements will not impair or impede future changes to regional flood protection or the Central Valley Flood Protection Plan. **(4)** The improvements will be maintained by a local agency that has committed sufficient funding to maintain both the existing and improved	Between 2007 and 2012, DWR invested approximately $1.6 billion of the bond funds approved in 2006 (along with about $490 million in local and $780 million in federal investments) in projects and actions that have reduced flood risk in the Central Valley. Most of these physical improvements to urban area levees have been made through DWR's Early Implementation Projects program. An additional, up to $1.7 billion of bond funding is planned to be available during the next five years for the CVFPP projects.

California Water Code Section	DWR Application of Water Code Section
facilities of the State Plan of Flood Control. **(5)** The affected cities, counties, and other public agencies will have sufficient revenue resources for the operation and maintenance of the facility. **(6)** Upon the allocation of funds for a project, the proposed project is ready for implementation. **(7)** The improvements comply with existing law.	
(b) The flood protection improvements authorized by this section may include improvements to specific facilities of the State Plan of Flood Control or acquisition of flood easements for floodways that support facilities of the State Plan of Flood Control to increase levels of flood protection for urban areas in accordance with subdivision (b) of Section 5096.821 of the Public Resources Code.	The CVFPP includes both improvements to specific improvements and the acquisition of easements to support the SPFC (Chapters 3 and 4 of CVFPP).
(c) The department and the board shall investigate and evaluate the feasibility of potential bypasses or floodways that would significantly reduce flood stage in the San Joaquin River Watershed, upstream and south of Paradise Cut.	The CVFPP includes evaluation of a new bypass in the Lower San Joaquin River basin, specifically along Paradise Cut. Based on its ability to lower flood stage in the Stockton area, the new bypass was selected as part of the CVFPP.
9614. The plan shall include all of the following: **(a)** A description of the Sacramento-San Joaquin River Flood Management System and the cities and counties included in the system.	The State Plan of Flood Control Descriptive Document (DWR, 2010), a companion document to the CVFPP, includes descriptions of the SPFC and the broader Sacramento-San Joaquin River Flood Management System.
(b) A description of the performance of the system and the challenges to modifying the system to provide appropriate levels of flood protection using available information.	The Flood Control System Status Report (FCSSR)(DWR, 2011), a companion document to the CVFPP, directly describes the performance and challenges to modifying the system.
(c) A description of the facilities included in the State Plan of Flood Control, including all of the following: **(1)** The precise location and a brief description of each facility, a description of the population and property protected by the facility, the system benefits provided by the facility, if any, and a brief history of the facility, including the year of construction, major improvements to the facility, and any failures of the facility. **(2)** The design capacity of each facility. **(3)** A description and evaluation of the performance of each facility, including the following: **(A)** An evaluation of failure risks due to each of the following: **(i)** Overtopping. **(ii)** Under seepage and seepage. **(iii)** Structural failure. **(iv)** Other sources of risk, including seismic risks that the department or the board determines are applicable. **(B)** A description of any uncertainties regarding performance capability, including uncertainties arising from the need for additional engineering evaluations or uncertainties arising from changed conditions such as changes in estimated channel capacities.	The State Plan of Flood Control Descriptive Document provides the descriptions of the existing SPFC and the broader system. The FCSSR describes the performance of each facility. Many of the evaluations for the Flood Control System Status Report were conducted by DWR's Urban Levee Evaluations (ULE) program and the Nonurban Levee Evaluations Program (NULE). Levees requiring additional evaluation because of lack of data or other uncertainties are identified by these evaluations and in the FCSSR.
(d) A description of each existing dam that is not part of the State Plan of Flood Control that provides either significant systemwide benefits for managing flood risks within the Sacramento-San Joaquin Valley or	The State Plan of Flood Control Descriptive Document includes a description of each existing dam that is

California Water Code Section	DWR Application of Water Code Section
protects urban areas within the Sacramento-San Joaquin Valley.	not part of the SPFC but provides significant systemwide benefits.
(e) A description of each existing levee and other flood management facility not described in subdivision (d) that is not part of the State Plan of Flood Control and that provides either significant systemwide benefits for managing flood risks within the Sacramento-San Joaquin Valley or protects an urban area.	The FCSSR and the ULE/NULE evaluations describe non-SPFC facilities that may provide systemwide benefits or protect urban areas.
(f) A description of the probable impacts of projected climate change, projected land use patterns, and other potential flood management challenges on the ability of the system to provide adequate levels of flood protection.	Chapter 1 of the CVFPP and its attached Conservation Framework provide general descriptions of potential impacts of climate change. In addition, DWR is continuing work on climate change analyses that are more applicable to extreme events such as flooding than those typically used for climate change evaluations. The new approach is expected to provide improved information on impacts on flood management and to communities receiving protection and in identifying prudent system improvements that are resilient to climate change conditions. DWR intends to continue the methodology development and application for the 2017 CVFPP Update.
(g) An evaluation of the structural improvements and repairs necessary to bring each of the facilities of the State Plan of Flood Control to within its design standard. The evaluation shall include a prioritized list of recommended actions necessary to bring each facility not identified in subdivision (h) to within its design standard.	DWR evaluated the structural improvement necessary to achieve the SPFC design capacity. Based on these evaluations (see Achieve SPFC Design Capacity Approach in Chapter 2 of CVFPP), the structural repairs are very expensive, generally raise flood stages throughout the system, and do not adequately meet the CVFPP goals. Since this was not the recommended approach, a prioritized list of recommended actions was not prepared. However, DWR used information from this evaluation in its selection of the preferred State Systemwide Investment Approach.
(h) The evaluation shall include a list of facilities recommended to be removed from the State Plan of Flood Control. For each facility recommended for removal, the evaluation shall identify both of the following: **(1)** The reasons for proposing the removal of the facility from the State Plan of Flood Control. **(2)** Any additional recommended actions associated with removing the facility from the State Plan of Flood Control.	Chapter 3 of the CVFPP presents a list of facilities that should be considered for removal from the SPFC. Since these are part of a federal project, removal will need to be justified by a feasibility study and Congressional action. Chapter 4 of the CVFPP includes a summary of criteria to be used for the removal process.
(i) A description of both structural and nonstructural methods for providing an urban level of flood protection to current urban areas. The description shall also include a list of recommended next steps to improve urban flood protection.	Chapter 3 of the CVFPP includes structural improvements for urban area protection. Chapter 4 includes enhanced programs for floodplain management (nonstructural). Chapter 4 also includes a list of near-term actions to progress flood

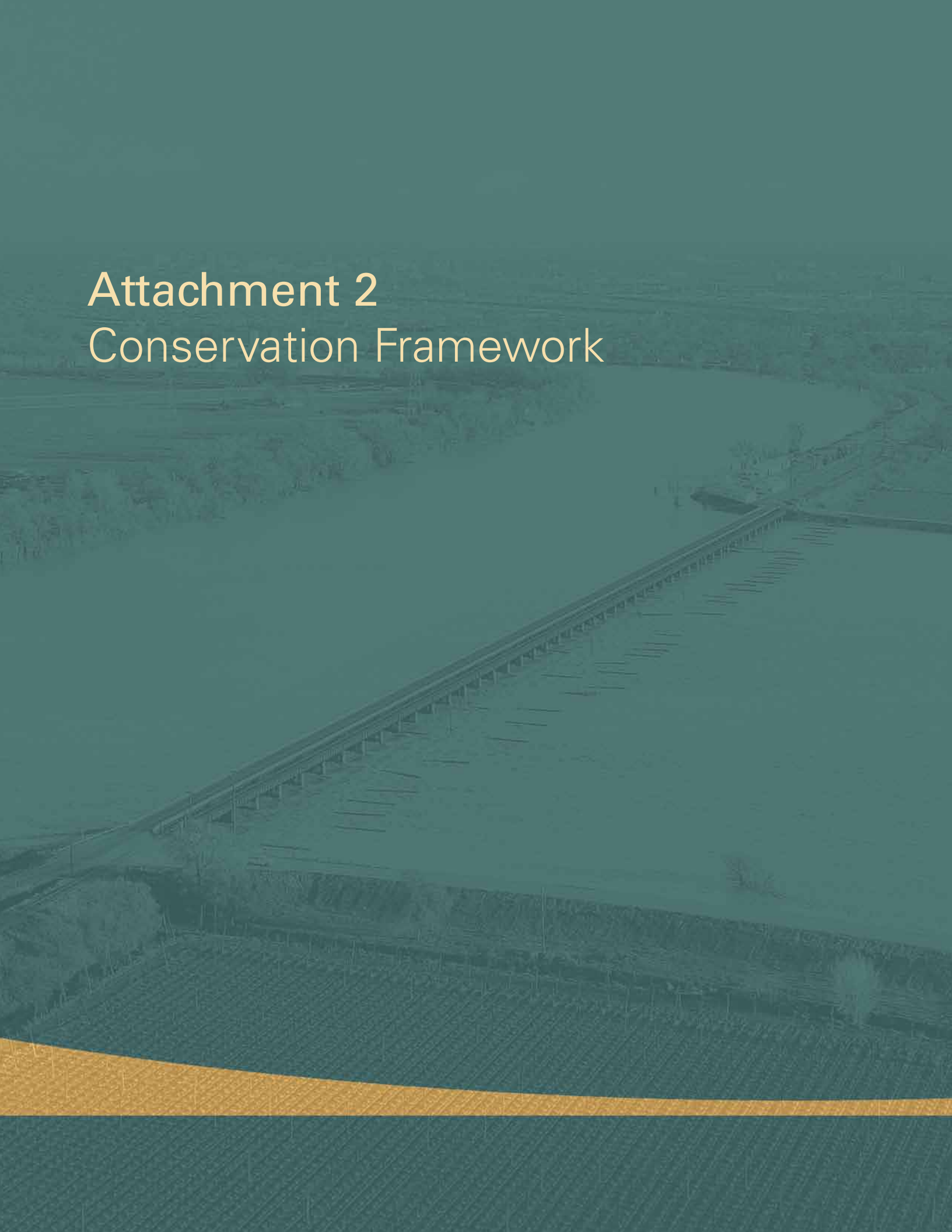
California Water Code Section	DWR Application of Water Code Section
	risk reduction, including those in urban areas, between the 2012 adoption of the CVFPP and its 2017 update. The Criteria for Demonstrating Urban Level of Flood Protection and Urban Levee Design Criteria documents incorporated by reference in the 2012 CVFPP.
(j) A description of structural and nonstructural means for enabling or improving systemwide riverine ecosystem function, including, but not limited to, establishment of riparian habitat and seasonal inundation of available flood plains where feasible.	Chapter 3 of the CVFPP includes a description of structural and nonstructural elements for improving systemwide ecosystem function. These are described for incorporating ecosystem restoration and enhancement along with urban, small community, rural-agricultural, and system flood risk reduction improvements. These are further described in the Conservation Framework attached to the CVFPP. The Conservation Framework will be replaced by a more detailed Conservation Strategy at the time of the 2017 update of the CVFPP.
9615. For the purposes of preparing the plan, the department shall collaborate with the United States Army Corps of Engineers and the owners and operators of flood management facilities.	DWR collaborated with the USACE and owners and operators of flood management facilities throughout preparation of the CVFPP. The USACE participated in regional workgroups. Project records include an Engagement Record. The USACE continues to support ongoing actions on the CVFPP through the Central Valley Integrated Flood Management Study.
9616. (a) The plan shall include a description of both structural and nonstructural means for improving the performance and elimination of deficiencies of levees, weirs, bypasses, and facilities, including facilities of the State Plan of Flood Control, and, wherever feasible, meet multiple objectives, including each of the following: **(1)** Reduce the risk to human life, health, and safety from flooding, including protection of public safety infrastructure. **(2)** Expand the capacity of the flood protection system in the Sacramento-San Joaquin Valley to either reduce floodflows or convey floodwaters away from urban areas. **(3)** Link the flood protection system with the water supply system. **(4)** Reduce flood risks in currently nonurbanized areas. **(5)** Increase the engagement of local agencies willing to participate in improving flood protection, ensuring a better connection between state flood protection decisions and local land use decisions. **(6)** Improve flood protection for urban areas to the urban level of flood protection. **(7)** Promote natural dynamic hydrologic and geomorphic processes. **(8)** Reduce damage from flooding. **(9)** Increase and improve the quantity, diversity, and connectivity of riparian, wetland, flood plain, and shaded riverine aquatic habitats,	The 2012 CVFPP document in its entirety addresses the multiple objectives in CWC 9616. In addition, DWR and stakeholders used these Legislative objectives to form the CVFPP goals described in Chapter 1 of the CVFPP. This resulted in the primary goal of flood risk reduction and four supporting goals that were used to measure performance of the three preliminary approaches and the selected State Systemwide Investment Approach.

California Water Code Section	DWR Application of Water Code Section
including the agricultural and ecological values of these lands. **(10)** Minimize the flood management system operation and maintenance requirements. **(11)** Promote the recovery and stability of native species populations and overall biotic community diversity. **(12)** Identify opportunities and incentives for expanding or increasing use of floodway corridors. **(13)** Provide a feasible, comprehensive, and long-term financing plan for implementing the plan. **(14)** Identify opportunities for reservoir reoperation in conjunction with groundwater flood storage.	
(b) The plan shall include a prioritized list of recommended actions to reduce flood risks and meet the objectives described in subdivision (a).	Chapter 4 of the CVFPP includes a list of Near-Term Priority Actions.
9620. Upon the adoption of the plan by the board, all of the following apply: **(a)** The facilities identified pursuant to subdivision (a) of Section 9614 shall be deemed to be part of the system. **(b)** The board shall act on the recommendations to remove facilities identified pursuant to subdivision (h) of Section 9614 from the State Plan of Flood Control.	Pending actions to be accomplished by the Board.
(c) The department shall develop a recommended schedule and funding plan to implement the recommendations of the plan. To develop the recommended schedule and funding plan, the department may collaborate with local and federal agencies.	DWR plans to complete a Financing Plan for the CVFPP in 2013.
9621. Consistent with the adoption of the Central Valley Flood Protection Plan pursuant to this part, each county shall collaborate with cities within its jurisdiction to develop flood emergency plans within 24 months of the adoption of the plan.	No action from DWR or other State agencies. Pending actions by cities and counties.
9622. Consistent with the adoption of the Central Valley Flood Protection Plan pursuant to this part, each city, county, and city and county shall collaborate with the state and local flood management agencies to provide relocation assistance or other cost-effective strategies for reducing flood risk to existing economically disadvantaged communities located in nonurbanized areas.	No action from DWR or other State agencies. Pending actions by cities and counties. Actions by City and County agencies
9623. Consistent with the adoption of the Central Valley Flood Protection Plan pursuant to this part, each city, county, and city and county shall collaborate with the state and local flood management agencies to develop funding mechanisms to finance local flood protection responsibilities by January 1, 2010.	No action from DWR or other State agencies. Pending actions by cities and counties.
9624. Notwithstanding any other provision of law, this part applies to all cities, including charter cities, and counties included in the plan pursuant to Section 9614. The Legislature finds and declares that flood protection in the Sacramento-San Joaquin Valley is a matter of statewide concern and not a municipal affair as that term is used in Section 5 of Article XI of the California Constitution.	The State's interest in flood management is recognized in the 2012 CVFPP and in the 2012 technical analyses.
9625. (a) By January 1, 2010, the department shall develop cost-sharing formulas, as needed, for funds made available by the Disaster Preparedness and Flood Prevention Bond Act of 2006 (Chapter 1.699 (commencing with Section 5096.800) of Division 5 of the Public Resources Code) and the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Division 43 (commencing with Section 75001) of the Public Resources	DWR has prepared a draft Guidelines for Establishing Local Agency Cost-Sharing Formulas in 2008 and a final version in 2010.

California Water Code Section	DWR Application of Water Code Section
Code) for repairs or improvements of facilities included in the plan to determine the local share of the cost of design and construction. **(b)** The cost-sharing formulas developed by the department shall be established pursuant to Section 12585.7. **(c)** In developing a cost-sharing formula, the department shall consider the ability of local governments to pay their share of the capital costs of the project. **(d)** Prior to finalizing cost-sharing formulas, the department shall conduct public meetings to consider public comments. The department shall post a draft cost-sharing formula on its Internet Web site at least 30 days before the public meetings. To the extent feasible, the department shall provide outreach to disadvantaged communities to promote access and participation in the meetings.	

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

Attachment 2
Conservation Framework



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Attachment 2: Conservation Framework

January 2012

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1.0 Introduction

The Conservation Framework is an integral part of the State of California's (State's) preferred approach to flood management in the Central Valley. To help meet the required objectives of the Central Valley Flood Protection Act of 2008 and the goals of the Central Valley Flood Protection Plan (CVFPP) (with the primary goal regarding public safety), this Conservation Framework outlines the State's intent to accomplish the following:

White pelicans along the Sacramento River

- Improve and enhance natural dynamic hydrologic (flow) and geomorphic processes in the flood management system
- Increase and improve the quantity, diversity, quality, and connectivity of riverine habitats in the flood management system, including the agricultural and ecological values of these lands
- Contribute to the recovery and stability of native species populations and overall biotic community diversity associated with the flood management system

Successful achievement of these goals, as part of achieving other CVFPP goals, is expected to provide multiple benefits, including the following:

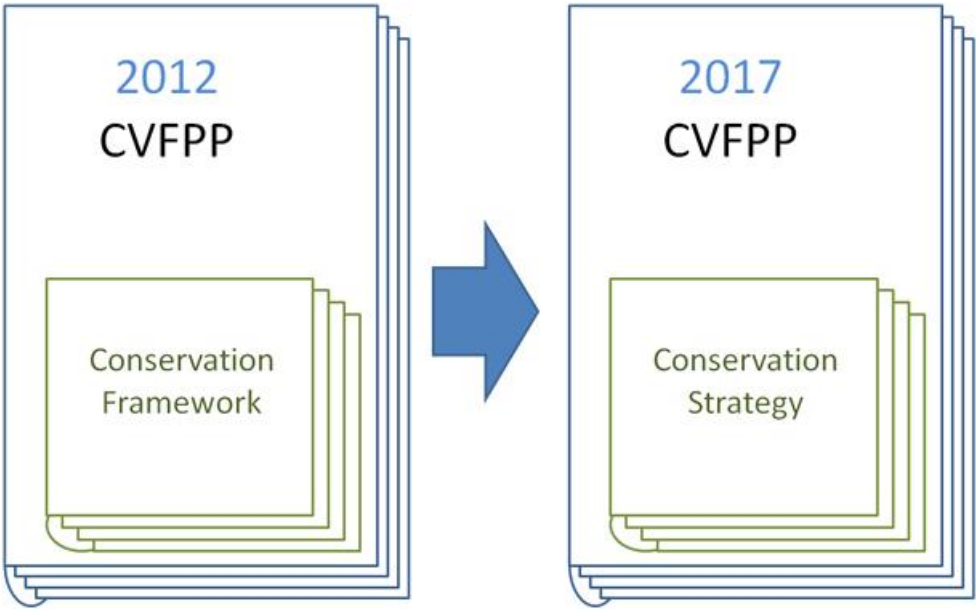
- A more sustainable and resilient flood management system, capable of long-term adaptability to changing hydrological and climatic conditions and providing greater long-term viability for ecosystems and agriculture
- Improved public safety from catastrophic flooding
- Faster delivery of flood risk reduction projects and more efficient and effective environmental permitting

Conservation is the maintenance, enhancement, and restoration of populations, communities, and ecosystem functions to sustain the services, benefits, and values of public trust resources.

The Conservation Framework is the first phase of more comprehensive and integrated planning within the flood management system, leading to a longer term Central Valley Flood System Conservation Strategy (Conservation Strategy). This Conservation Framework provides direction for conservation planning in the context of flood management. It also provides interested organizations (local

governments, State and federal agencies, flood managers, conservation organizations, and agricultural interests) with important planning information and approaches that can, and should be, integrated into flood project planning and implementation. This Conservation Framework describes how the 2012 CVFPP integrates the relevant environmental policies and conservation elements contained in the Conservation Framework with CVFPP implementation. The integration will help minimize impacts on the ecosystem, mitigate for environmental effects, and improve ecosystem functions.

This Conservation Framework will be replaced by a longer term Conservation Strategy, as part of the 2017 CVFPP update, and it will complement the federal Central Valley Integrated Flood Management Study (CVIFMS). The Conservation Strategy will be consistent with this Framework and provide more specifics about integrating flood and conservation actions. This Conservation Strategy may include regional permitting plans (such as Natural Community Conservation Plans (NCCP), Habitat Conservation Plans (HCP), or programmatic Section 7 consultations, for example).



This section of the Conservation Framework describes the broader CVFPP context for Central Valley flood management planning, explains the State's interest in integrated flood and ecosystem management, describes the purpose and development of the Conservation Framework, and outlines the organization of this document.

1.1 Background and CVFPP Context

As authorized by Senate Bill 5, also known as the Central Valley Flood Protection Act of 2008, the California Department of Water Resources (DWR) has prepared a sustainable, integrated flood management plan called the CVFPP, for adoption by the Central Valley Flood Protection Board (Board). The 2012 CVFPP provides a systemwide approach to protecting lands currently protected from flooding by existing facilities of the State Plan of Flood Control (SPFC), and will be updated every 5 years.

1.1.1 CVFPP Planning Areas

For planning and analysis purposes, and consistent with legislative direction, two geographical planning areas were important for CVFPP development (Figure 1-1):

- **SPFC Planning Area** – This area is defined by the lands currently receiving flood protection from facilities of the SPFC (see *State Plan of Flood Control Descriptive Document* (DWR, 2010c)). The State of California's (State) flood management responsibility is limited to this area.

- **Systemwide Planning Area** – This area includes the lands that are subject to flooding under the current facilities and operation of the Sacramento-San Joaquin River Flood Management System (California Water Code Section 9611). The SPFC Planning Area is completely contained within the Systemwide Planning Area which includes the Sacramento River Basin, San Joaquin River Basin, and Sacramento-San Joaquin Delta (Delta) regions.

Planning and development for the CVFPP occurs differently in these planning areas. The CVFPP focused on SPFC facilities; therefore, evaluations and analyses were conducted at a greater level of detail within the SPFC Planning Area than in the Systemwide Planning Area.

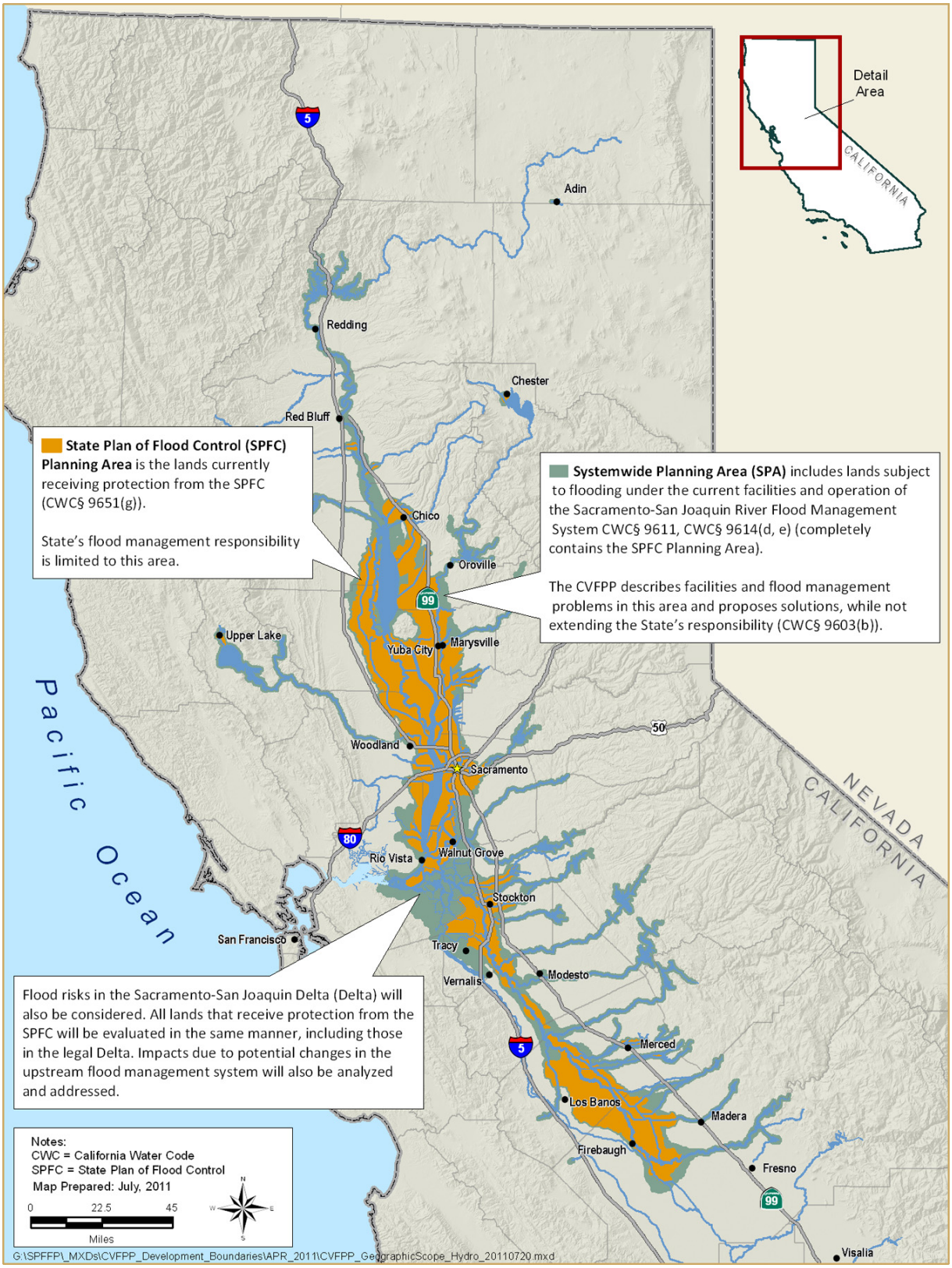


Figure 1-1. Central Valley Flood Protection Plan Planning Areas

1.1.2 2012 CVFPP Planning Goals

As explained in the CVFPP itself, this plan is a critical document to guide California's participation (and influence federal and local participation) in managing flood risk along the Sacramento and San Joaquin rivers. The CVFPP proposes a systemwide investment approach for sustainable, integrated flood management in areas currently protected by facilities of the SPFC. DWR recognizes that many other planning efforts are also underway within the CVFPP planning area (see Attachment 9E: Existing Conservation Objectives from Other Plans) and that it will need to identify opportunities to coordinate, collaborate, and reduce potential conflicts with these efforts. The CVFPP will be updated every 5 years, with each update providing support for subsequent policy, program, and project implementation.

To help direct CVFPP development to meet legislative requirements and address identified flood-management-related problems and opportunities, a primary and four supporting goals were developed:

- **Primary Goal** – Improve Flood Risk Management
- **Supporting Goals**:
  - Improve Operations and Maintenance
  - Promote Ecosystem Functions
  - Improve Institutional Support
  - Promote Multi-Benefit Projects

The Conservation Framework is an integral part of the CVFPP in support of all of these goals. In particular, the Conservation Framework focuses on promoting ecosystem functions and multi-benefit projects. All levels of CVFPP project planning and development will consider opportunities to integrate ecosystem enhancements with flood damage reduction projects.

Incorporating the environmental principles and conservation actions identified in the Conservation Framework can improve flood risk management and O&M.

1.1.3 2012 CVFPP Planning Approaches

In addition to **No Project**, three fundamentally different approaches to flood management were initially compared to explore potential improvements in the Central Valley. These approaches are not alternatives; rather, they bracket a range of potential actions and help explore trade-offs

in costs, benefits, and other factors important in decision making. The approaches are as follows:

- **Achieve SPFC Design Flow Capacity** – Address capacity inadequacies and other adverse conditions associated with existing SPFC facilities, without making major changes to the footprint or operation of those facilities.
- **Protect High Risk Communities** – Focus on protecting life safety for populations at highest risk, including urban areas and small communities.
- **Enhance Flood System Capacity** – Seek various opportunities to achieve multiple benefits through enhancing flood system storage and conveyance capacity.

Comparing these approaches helped identify the advantages and disadvantages of different combinations of management actions, and demonstrated opportunities to address the CVFPP goals to different degrees.

Based on this evaluation, a **State Systemwide Investment Approach** was developed that encompasses aspects of each of the approaches to balance achievement of the goals from a systemwide perspective, and includes integrated conservation elements. Figure 1-2 illustrates this plan formulation process.

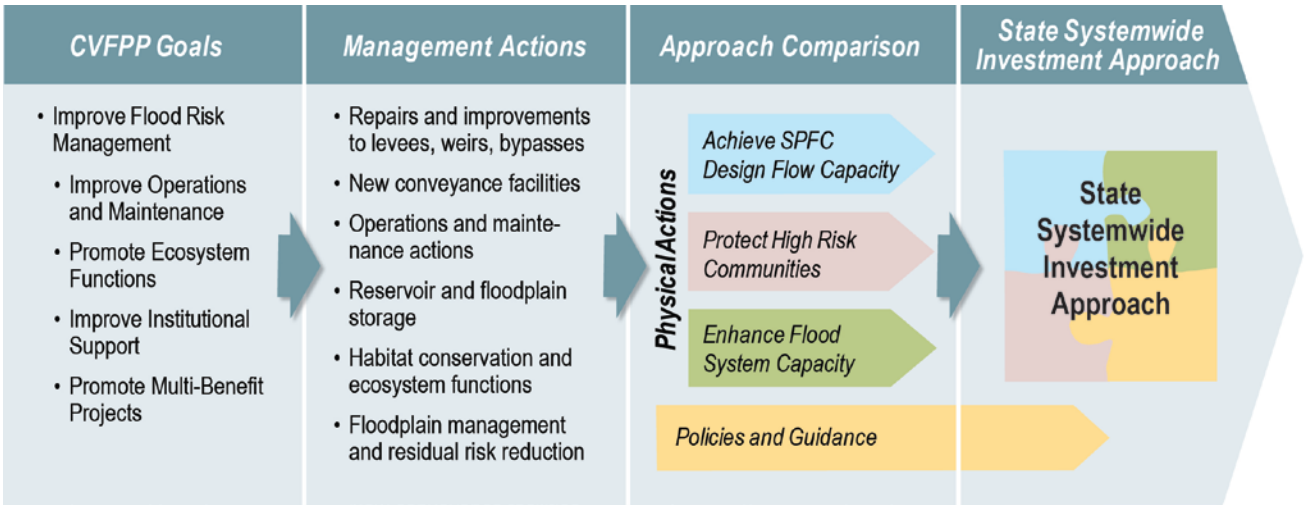


Figure 1-2. Formulation Process for State Systemwide Investment Approach

1.2 Integration of Flood and Ecosystem Improvements

The State is committed to protecting public safety while improving the status and trends of biological resources within the Central Valley flood management system. This commitment is consistent with and supportive of legislative, administrative, and interagency direction. Legislative direction is based in the ecological objectives of the Central Valley Flood Protection Act of 2008. Administrative direction comes from the ecosystem goals of CVFPP and FloodSAFE California Initiative (FloodSAFE), as well as the DWR Environmental Stewardship Policy (2010a) and other related DWR policies. The February 27, 2009, *California Central Valley Flood System Improvement Framework* developed by the California Levees Roundtable contains some interagency direction. Environmental stewardship can reduce flood project regulatory delays, lower long-term operation and repair costs, provide greater public benefits, and strengthen public support.

> Environmental stewardship is a concept of, and commitment to, responsibly manage and protect natural resources (water, air, land, plants, and animals) and ecosystems in a sustainable manner that ensures they are available for future generations.

For the CVFPP, the State's preferred approach is to improve both flood management and ecological conditions on a systemwide basis, using integrated policies, programs, and projects. This approach builds on recent efforts and successes to incorporate environmental benefits into flood management projects, and improves on these efforts by considering systemwide measures that can be taken to improve and recover ecosystem processes that are key to environmental health. These recent efforts and successes are described in greater detail in Section 4.1. Further, by integrating environmental stewardship early into policy and project planning, development, funding, and implementation, this approach will move beyond traditional project-by-project compensatory mitigation. This approach also creates the opportunity to develop flood management projects that may be more sustainable and cost effective and can provide ecological benefits while protecting water supply and public safety.

In addition to pursuing an approach that integrates flood protection and ecological improvements, the State recognizes that efforts to improve flood protection and associated ecological conditions will take place on, near, or affect Central Valley farmland and rural communities. The State acknowledges that jointly developed solutions deliver a variety of benefits to agricultural, flood protection, and conservation interests. The State is as committed to working with stakeholders from each of these sectors to further develop and implement the Conservation Framework and develop

the long-term Conservation Strategy, as it has in the development of the primary document, the CVFPP.

1.3 Conservation Framework Purpose and Phasing

This Conservation Framework serves two purposes. The first purpose of the Conservation Framework is to be an environmental guide for flood project planning in the 2012 CVFPP. The second purpose is to present a broad outline and preview of a longer term Conservation Strategy to be completed by 2017.

The Conservation Framework describes how environmental stewardship is integrated into flood management activities, directs the reader to relevant environmental elements in the CVFPP, and gives additional detail on environmental planning elements, including regulatory compliance. Supporting documentation for the Conservation Framework includes detailed technical attachments containing further information on the following: regional advance mitigation planning (RAMP), status and trends of environmental resources, an assessment of fish passage needs, vegetation mapping, conservation objectives from other plans, restoration opportunities analysis, and regional environmental permitting.

The longer term Conservation Strategy will provide a comprehensive approach for the State, consistent with the Conservation Framework, to (1) achieve the environmental goals and objectives of the Central Valley Flood Protection Act, FloodSAFE, and the CVFPP, and (2) implement the DWR environmental stewardship policy within the flood management system. The long-term vision of this Conservation Strategy is a sustainable system of managing Central Valley floodways that includes multiple environmental objectives during project planning and design and that achieves the following:

- Embodies environmental and agricultural stewardship as an integral part of flood management
- Results in a healthy and robust ecosystem
- Reduces long-term maintenance and management costs
- Uses solid scientific foundations, local expertise, and broad-based contexts for informing decisions

- Nurtures productive partnerships, both within State agencies and with external groups

- Promotes local agency and public support for sustainable practices that further the goals and objectives of this framework

- Promotes development and implementation of projects that provide multiple benefits, including recreation, conservation, agriculture, water supply, and other values

The Conservation Strategy is being developed in several phases, with this Conservation Framework representing the first phase. Concurrent with development of this document, conservation activities have been initiated that will continue during implementation of the 2012 CVFPP. In the second phase, the Conservation Strategy will be completed as part of the 2017 CVFPP update and will inform both the State feasibility studies and the federal U.S. Army Corps of Engineers (USACE) CVIFMS feasibility studies. The Conservation Strategy will refine this long-term vision and Conservation Framework goals, contain more information about key factors that influence achievement of those goals, describe how applying specific management actions can work effectively at achieving those goals, and set conservation priorities among management actions and regions. The Conservation Strategy will expand on and replace the current Conservation Framework, and it will be updated along with the CVFPP every 5 years. A timeline for the next steps in Conservation Strategy development is shown in Section 7, Next Steps.

The Conservation Framework supports the content of the CVFPP through the following:

- Describing the broad flood ecosystem; its various components, stressors, and management responses to these stressors; the importance of ecosystem processes to sustaining habitat and species, and the historical, current, and expected future status and trends of this ecosystem

- Providing conservation goals (see Section 3, Conservation Goals) based on environmental supporting goals in the Central Valley Flood Protection Act related to ecosystem processes, habitats, and species

- Giving greater detail about key planning principles that helps the State achieve conservation goals more efficiently and effectively

- Describing how flood managers have integrated environmental stewardship into past projects and how DWR can work with ongoing planning efforts to continue and expand on these approaches
- Showing how the CVFPP's integrated flood management actions and policies support achieving conservation goals

1.4 Conservation Framework Development

The Conservation Framework was developed iteratively in conjunction with the CVFPP. In addition to the directives of the Central Valley Flood Protection Act of 2008, a primary driving element in the development of the Conservation Framework is the DWR Environmental Stewardship Policy. Environmental stewardship is a concept of and commitment to responsibly manage and protect natural resources (water, air, land, plants, and animals) and ecosystems in a sustainable manner that ensures they are available for future generations. In September 2010, DWR formally adopted its Environmental Stewardship Policy, which applies to water and flood management projects and activities throughout DWR.

The Conservation Framework incorporates this Environmental Stewardship Policy as a State preferred policy in the CVFPP. However, subject to various technical, economic, and policy constraints, implementation of conservation-related policies will be influenced by the following factors:

- Opportunities present during flood project planning
- Specific mitigation measures required by regulatory agencies before project approval
- Opportunities for development of large-scale advance mitigation programs
- Opportunities for specific projects that target ecosystem benefits
- Opportunities for integration with other conservation and land-use planning efforts
- Opportunities for integration with agricultural land-use and production systems
- Needs for achieving other CVFPP goals

- Plan for onsite environmental education and public access for recreation

Early in the CVFPP development process an Environmental Stewardship Scope Definition Work Group (ESSDWG) was chartered to provide input on the scope of environmental stewardship to be addressed in the 2012 CVFPP. Comprising members representing a broad range of interests and perspectives, ESSDWG provided the following input:

- Description of the major environmental challenges, categorized into priority groups, that the CVFPP should address
- Description of major opportunities that the CVFPP should consider for addressing the major challenges, including recommendations for improving upon past efforts and coordinating with current efforts
- List of the key principles for guiding the development, integration, and implementation of environmental stewardship features of the CVFPP
- List of the major environmental goals that should be included in the CVFPP

DWR Environmental Stewardship Policy Highlights

DWR shall work towards the sustainability of public trust resources related to water resources projects and the environment. The goal of an environmental stewardship ethic is to create human systems consistent with natural systems, where each is ultimately sustainable. Systems of water supply and flood protection are more successful when they accommodate and sustain ecosystem functions. Sustainable systems are also more economical over time. DWR fosters the environmental stewardship ethic by embracing broad concepts of impact avoidance and protection of natural resources, minimization, mitigation and restoration, and enhancement of natural functions and values.

DWR will incorporate ecosystem restoration as an objective in water and flood management projects, including partnering with restoration efforts of others, to achieve net environmental benefit. Ecosystem restoration is the process of reestablishing, to the extent possible, the structure, function, and composition of the natural environment.

DWR will use science to understand the functions of natural biological and physical systems, so as to help plan and design water supply storage and conveyance systems and flood control systems that also benefit native plants, and fish and wildlife resources.

DWR managers will embrace environmental stewardship as part of their responsibilities. As managers develop and deliver reliable water supplies and provide for flood protection for the State's residents, they can incorporate environmental stewardship in several ways:

- Integrate ecosystem protection and restoration into water storage and conveyance and flood control/management planning
- Include environmental stewardship and ecosystem protection and restoration as criteria in project funding decisions for all DWR programs
- Plan for conservation, restoration, and maintenance of the biological diversity and natural physical processes of aquatic and related terrestrial ecosystems.
- Plan and implement projects that contribute to the recovery of aquatic and riparian species listed under the federal and State Endangered Species Acts and other laws, as well as other at-risk species.

- Description of approaches or measures to evaluate the CVFPP's effective integration and implementation of environmental stewardship elements

- Recommendations for important documents that should be used as reference materials related to environmental stewardship. These references were used in developing both the CVFPP and Conservation Framework

The ESSDWG prepared a summary to record the outcome of the group's efforts, The *Environmental Stewardship Scope Definition Work Group Summary Report* (DWR, 2009).

An Agricultural Stewardship Scope Definition Joint Subcommittee was also chartered during Phase 1 of the CVFPP planning process. The role of this group was to describe major agricultural contributions, challenges, and opportunities and receive input from the agricultural community. Subcommittee members and observers composed a geographically broad group that included perspectives from local municipalities, conservation, and different levels of agriculture.

The subcommittee provided the following input:

- Definition of key goals by region and priority group, providing additional details about existing conditions and future challenges specific to agriculture

- Key principles for guiding the development and implementation of agricultural stewardship features into the CVFPP and description of approaches for evaluating the effective integration of those elements

- List of agriculturally focused problems and opportunities and criteria for assessing the incorporation of agricultural interests into the CVFPP

- Goals for the development of tiered design standards that recognize the differences among urban, rural, and agricultural levees and provide equitable funding for urban and rural flood protection systems

- List of suggested actions, with both general statements addressing policy and public safety issues and specific recommendations for proposed funding, State programs, and pre-identified flood relief areas

- Process Guide Checklist to help ensure that agricultural concerns are addressed throughout the development of the 2012 CVFPP

The subcommittee developed a framework, included in the draft report, *Important Considerations for the Central Valley Flood Protection Plan Related to Sacramento-San Joaquin Valley Agriculture* (DWR, 2010b), that (1) aims to balance habitat and ecosystem goals with agricultural preservation, and (2) identifies agricultural stewardship opportunities consistent with the goals of the CVFPP. The report highlights the need to ensure understanding of how flood system improvements may affect potential financing opportunities, and identifies principles for promoting crop diversity, sustainable farm operation and production, and continued growth. Although the report identified a variety of issues related to flooding in an agricultural landscape (e.g., finance/insurance, consequences of flooding, post-flood recovery, and emergency communication), this Conservation Framework focuses on those agricultural issues related to environmental stewardship on agricultural land.

The items from the ESSDWG and Agricultural Stewardship Scope Definition Subcommittee were integral in providing guidance and content for much of the Conservation Framework. As the Conservation Strategy is developed, DWR will pursue opportunities to integrate ecosystem and agricultural interests.

1.5 Report Organization

Organization of this document is as follows:

- Section 1 introduces and describes the purpose of this report.
- Section 2 summarizes floodway ecosystem conditions and trends.
- Section 3 contains conservation goals of the Conservation Framework.
- Section 4 describes the integration of conservation elements into the CVFPP.
- Section 5 summarizes implementation actions.
- Section 6 reviews indicators of success for integrating conservation elements into the CVFPP.
- Section 7 describes next steps for the Conservation Strategy.
- Section 8 contains references for the sources cited in this document.
- Section 9 lists abbreviations and acronyms used in this document.

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2.0 Floodway Ecosystem Conditions and Trends

The Systemwide Planning Area contains most river channels and floodplains of the Sacramento and San Joaquin rivers and their major tributaries. The riverine and riparian ecosystems of these river channels and floodplains are among the most important natural resources of the Sacramento and San Joaquin valleys, and provide habitats of critical importance to numerous native aquatic and terrestrial species.

> The riverine and riparian ecosystems in the river channels and floodplains of the Systemwide Planning Area are among the most important natural resources of the Sacramento and San Joaquin valleys.

This section describes key fluvial, geomorphic, and ecological interactions in the flood management system; historical pressures and changes to ecological processes and habitats; current conditions and trends; conservation improvements and progress; and continuing stressors.

A preliminary analysis of the status and trends of hydrologic and geomorphic processes, habitats, and key wildlife and fish species was performed and is provided in Attachment 9B: Status and Trends of the Riparian and Riverine Ecosystems of the Systemwide Planning Area. This section is based on that analysis, which shows that modification of hydrologic and geomorphic processes has reduced their ability to support important ecosystem functions.

2.1 Fluvial, Geomorphic, and Ecological Interactions

In a general sense, the ecological systems of the Central Valley consist of uplands, riverine environments, and lower lying adjacent flood basins. Uplands are generally located around the rim of the valley and in areas between waterways that are elevated above river levels. These areas, along with the broader watershed, capture precipitation and provide runoff to the riverine and flood basin areas. The Conservation Framework does not focus on these areas, but recognizes their important influence on the other parts of the system.

The flow of water through the system, and the associated hydrologic, geomorphic, and ecological processes, are influenced by a variety of natural factors (such as topography and soils) and human influences. The diagram in Figure 2-1 shows the major natural and human factors

influencing the ecological processes and condition of riverine ecosystems in the Sacramento and San Joaquin valleys.

This figure diagrams several major premises underlying much of the Conservation Framework:

- Species, particularly endangered species, within the riverine system depend on the quality, quantity, and dynamic nature of habitat along waterways. These habitat features, in turn, depend upon functional hydrologic and geomorphic processes, such as sediment erosion, transport, and deposition. Thus, maintaining and improving these processes is critical to maintaining and recovering river-dependent species.

- Human activities (including flood management activities) have been adversely affecting these ecological processes.

- Reducing the adverse influences of human activities on these ecological processes is necessary for effective conservation of riverine and riparian ecosystems in the Sacramento and San Joaquin valleys.

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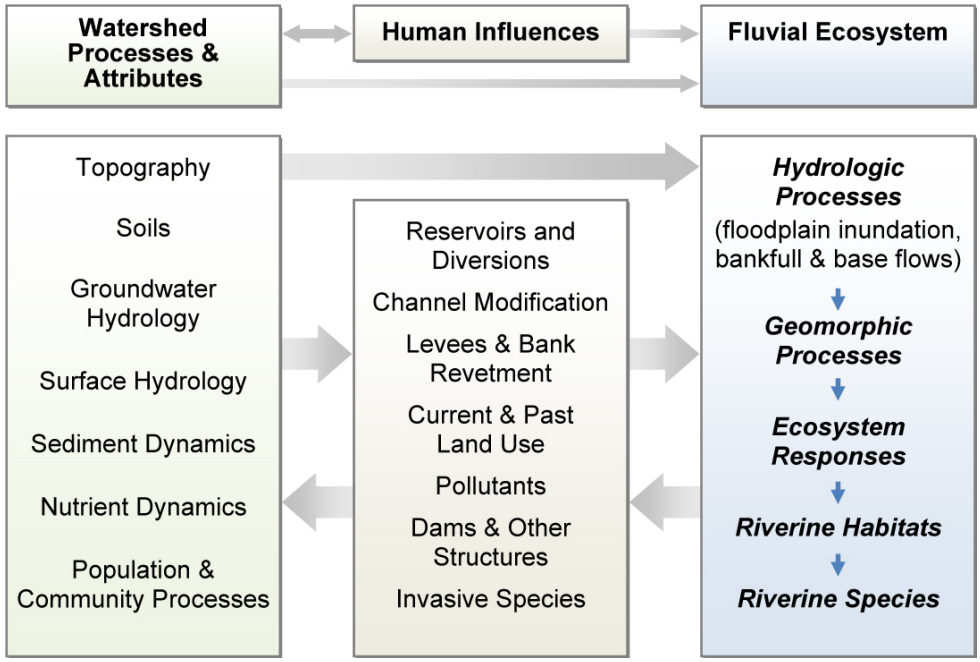


Figure 2-1. General Relationships of Natural Processes, Human Influences, and the Fluvial Ecosystem

2.1.1 Riverine ecosystem

The riverine ecosystem depends on a variety of different flow levels, each providing unique hydrological, geomorphic, and ecological processes. Three ecologically significant categories of river flows are:

- **Floodplain inundation flows** typically occur less frequently than once every 2 years. These flows are responsible for sediment deposition onto a floodplain, provide seasonal floodplain habitat for aquatic species, supply nutrients to floodplain vegetation, and disperse seeds onto the floodplain.

- **Bankfull flows**, occurring on average once every 1.5 to 2 years, represent the maximum flow that can be contained within the active river channel. These flows are responsible for most of the force that alters the channel and bed of a river.

- **Base flows** are typically the annual minimum flows that occur in summer and fall.

Floodplain inundation flows and bankfull flows are particularly important in initiating geomorphic processes that sustain habitat and species. Along alluvial floodplain rivers, the erosion, transport (both suspended in the water column and along the river bed (i.e., bedload)), and deposition of sediment causes channels to migrate, be cut off, and split and rejoin downstream.

These fundamental geomorphic processes influence the formation of floodplain topography, soils, and other floodplain dynamics to create a diverse mosaic of floodplain landforms of different ages that support different age classes of riparian vegetation. These geomorphic processes also are important drivers of in-stream habitat quality for fish and other aquatic life, and form off-channel habitats such as side channels and oxbow lakes that provide important fish and wildlife habitat. Figure 2-2 provides an example of a constrained river reach on the upper Sacramento River downstream from Colusa, and Figure 2-3 depicts a river reach (upper Sacramento River, upstream from Colusa) with an active floodplain.

Figure 2-2. Constrained Reach of Sacramento River Upstream from Colusa

Figure 2-3. River – Active Floodplain

Each of the three categories of flows (floodplain inundation, bankfull, and base flows) drives different geomorphic and ecological processes, which collectively maintain a healthy ecosystem and a diversity of habitat types. These effects are summarized in Table 2-1.

Table 2-1. Effects of Different Categories of Flows on Geomorphic and Ecological Processes and Species

	Floodplain Inundation Flow	Bankfull Flow	Base Flow
Geomorphic processes	• Causes major changes in channel morphology (scouring, erosion, channel cutoffs, new side channels) • Mobilizes coarse to fine sediments	• Causes ongoing scouring and erosion of banks, formation of point bars, lateral channel migration, and mosaic of different-aged floodplain surfaces • Mobilizes moderate to fine sediments	• Causes deposition in channel • Mobilizes fine sediments only
Ecosystem processes	• Increases large woody material in river • Increases dissolved oxygen in water • Increases aquatic structural diversity and exposes gravels for spawning • Enables establishment of early successional vegetation (willows and cottonwoods) • Provides nutrients, sediment, and plant seeds to floodplain from upstream • Increases primary aquatic productivity	• Increases large woody material in river • Increases dissolved oxygen in water • Increases aquatic structural diversity and exposes gravels for spawning • Creates mosaic of riparian vegetation (pioneer to mature) with time • Provides nutrients, sediment, and plant seeds to riverbank from upstream • No major effect	• Provides perennial flow for fish, birds, and other species and maintains vegetation growth • Reduces dissolved oxygen in water • Decreases aquatic structural diversity • Allows mature vegetation to outcompete early successional species if base flow is prolonged • No major effect • Allows accumulation of organic materials, as well as contaminants
Species	• Provides floodplain habitat to outmigrating salmonids and spawning splittail and increases early successional habitat for plants and animals, potential to strand or isolate fish species	• Provides instream fish habitat to channel and maintains diversity of early to late successional habitat for plants and animals	• Provides summer channel habitat for fish; causes silts to cover spawning gravels; and facilitates invasion of less- flood-tolerant species, including nonriparian and nonnative species

The riverine and riparian ecosystem historically supported a wide variety of fish and wildlife. Many of these species evolved life history strategies that allowed them to exploit the temporal and spatial variability associated with the region's Mediterranean climate and variable hydrologic and geomorphic processes.

2.1.2 Flood Basins

Lower reaches of the Sacramento and San Joaquin valleys are elevated above lower-lying adjacent lands known as flood basins. These include, for example, the Yolo Basin, the American River Basin, and Sutter Basin. This reverse topography is due to geological changes over millennia. The most

highly subsided lands, extending below sea level in places, are found in the Delta "islands," where human-induced subsidence is a more recent development. Before the development of the flood management system, these flood basins regularly flooded during winter storms and historically were collectively called the 'inland sea" during major flood events. These lands supported extensive tule marshes, seasonal wetlands and grasslands.

In the flood basins of the Sacramento and San Joaquin valleys, geomorphic processes, such as sediment erosion and transport, played a less significant role in habitat maintenance, as compared to the riverine environment. The role of these processes in maintaining habitats and species gradually decreases as distance from river channels increases. However, species such as migratory salmonids depend on periodic and shallow inundation of these basins to replenish soil and food web productivity.

Although flood basins in the Central Valley have been converted to agricultural uses, these agricultural lands provide habitat for several wildlife species. For example, rice fields and canals provide habitat for giant garter snakes (*Thamnophis gigas*) and resident and migratory birds; irrigated pastures and field crops provide forage for songbirds, raptors, small rodents, and waterfowl; orchards can provide roosting habitat for bats; and row crops provide foraging habitat for raptors.

2.2 Historical Pressures and Changes

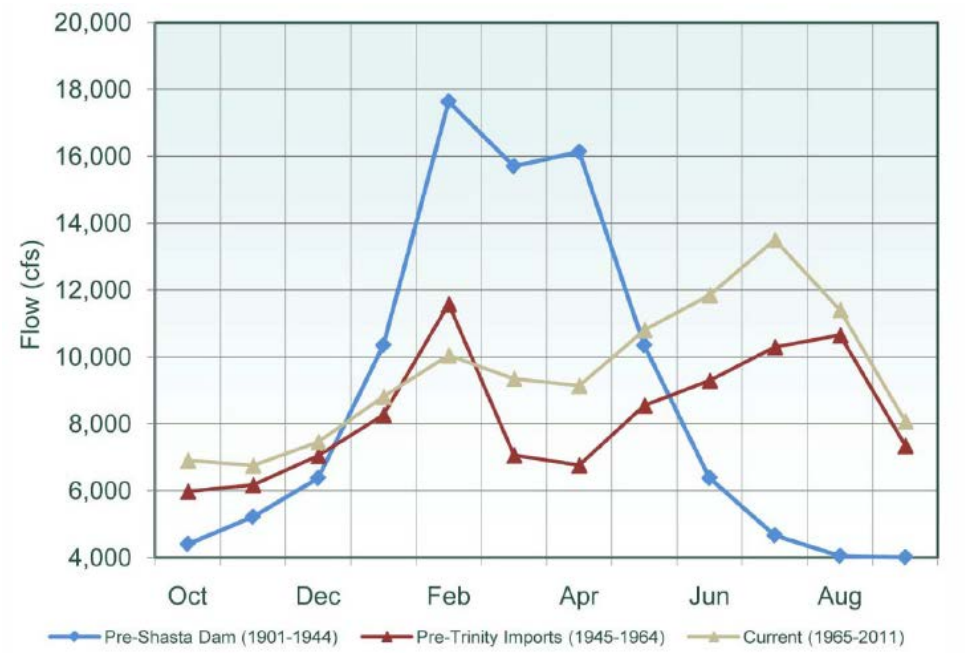
Relative to historic conditions, riverine ecosystems and flood basins have been adversely affected by a variety of stressors, including human settlement, historic and current land use, construction O&M of the SPFC, species invasions, water diversions, and other modifications to the landscape that characterized the watersheds of the Sacramento and San Joaquin valleys before widespread European settlement. The combined effect of these stressors has eliminated extensive areas of wetland and riparian habitat; reduced the diversity, abundance, and distribution of numerous plant and animal species (many to the endangered level); and increased stressors such as invasive species and pollutants that are degrading the remaining habitat, driving many species to the point of being critically endangered.

2.2.1 Changes to Flows and Hydrologic Processes

Central Valley river flows and hydrologic processes have been substantially altered in the past 100 years. Analysis of hydrologic data collected downstream from Shasta Dam on the Sacramento River and downstream from Friant Dam on the San Joaquin River shows that the presence of the dams has substantially changed annual median flows.

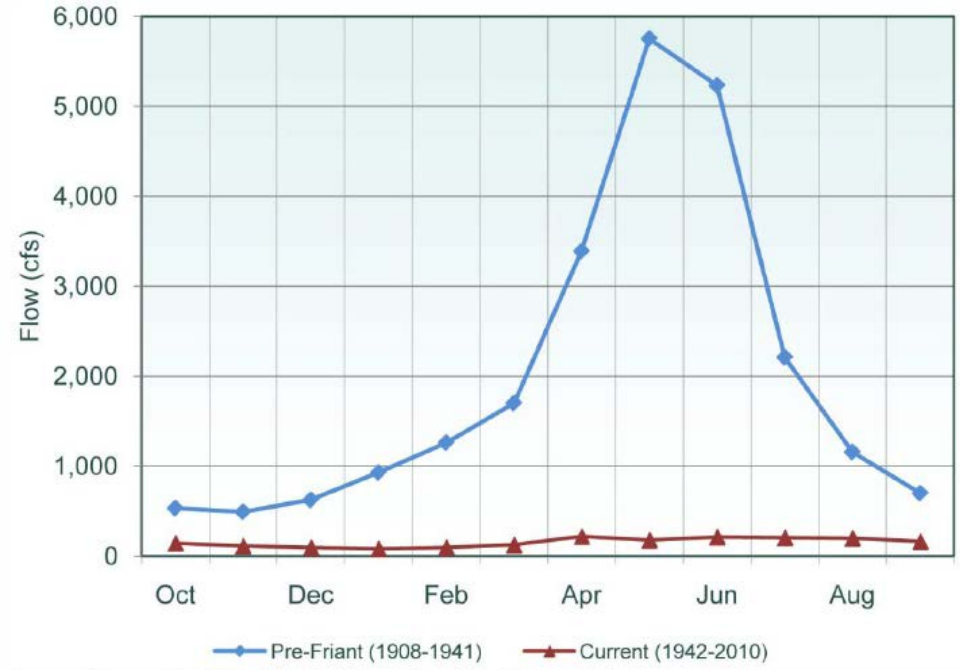
In the Sacramento River, Shasta Dam has reduced monthly median flows in winter and spring, and summer and fall flows have been increased, even after importing water from the Trinity River (Figure 2-4), and the variability in median spring flows has been greatly reduced.

In the San Joaquin River, Friant Dam has had an even greater effect on hydrology. Before the recent implementation of the San Joaquin River Restoration Program (SJRRP), most San Joaquin River flows from above Friant Dam, were diverted at the dam into two major irrigation canals (Madera and Friant-Kern canals), and thus did not continue downstream in the river. The magnitude of the effect of these diversions is indicated by the change in median monthly flows (Figure 2-5). Larger events that would inundate floodplains are also reduced by Friant Dam and downstream by routing into the flood bypass system.



Source: Prepared by AECOM in 2011 based on USGS gauge data

Figure 2-4. Monthly Median Flows in Sacramento River at Bend Bridge (USGS Gage 11377100)



Source: Prepared by AECOM in 2011 based on USGS gauge data

Figure 2-5. Monthly Median Flows in San Joaquin River at Friant (USGS Gage 11251000)

Beyond monthly median flows, the frequency and duration of ecologically significant flows has also changed. The frequency of floodplain inundation flows (2 to 10 years) and the average duration of these flows have increased in the Sacramento River Basin since construction of reservoirs for flood control. This increase in duration reflects typical flood control operations under which larger flood event peaks are stored and subsequently released at lower flow rates following the peak of a flood event. In the San Joaquin River Basin, the frequency and average duration of floodplain inundation flows have greatly decreased because of retention of flows behind dams and diversion of flows into the bypass system.

The frequency of bankfull flows has been greatly reduced in both the Sacramento and San Joaquin rivers, and the duration of these flows has been increased as a result of reservoir operations.

With the current system of reservoirs and water diversions in the Sacramento and San Joaquin valleys, base flows are elevated for irrigation purposes above historical conditions on the Sacramento River and its tributaries and greatly reduced on major portions of the San Joaquin River and its tributaries. Consequently, riparian tree seedlings may drown during the summer along the Sacramento River, but they may desiccate along portions of the San Joaquin River.

2.2.2 Changes in Geomorphic Processes and Channel and Floodplain Dynamics

In the Sacramento River, Shasta Dam has interrupted and greatly reduced sediment transport, and dams on major tributaries (e.g., the Feather River) also have disrupted sediment transport. The geomorphic processes along the Sacramento River between Red Bluff and Colusa, a reach where the river still actively meanders, have been affected by these changes in hydrology and sediment transport, and they have also been affected by land-use changes (loss of riparian forest), increased bank revetment, and construction of levees. The result has been that total river length, area of floodplain reworked by the river, and variability of the age of floodplain surfaces have all been reduced.

Active floodplain at the confluence of Thomes Creek and Sacramento River

In the San Joaquin River, Friant Dam, the Delta-Mendota Canal, and dams on all major tributaries have greatly modified the hydrology of the river. The geomorphic consequences of these modifications have not been studied as extensively for the San Joaquin River as they have for the Sacramento River. The San Joaquin River upstream from the confluence with the Merced River is part of a multi-channeled system, where channel positions have not changed much over time. Some reaches of the river (e.g., upstream from the Mendota Pool, upstream from its confluence with the Merced River) historically were meandering. However, Friant Dam has greatly reduced the frequency of scouring flows, resulting in less bank erosion, reduced area of river wash (gravel and sand bars), and less input of large woody material into the river channel. These effects of Friant Dam and the effects of bank revetment and levee construction have generally stopped the meandering that historically occurred. In the foothill portions of the San Joaquin River and its major tributaries, pits created by aggregate mining have been captured by the streams, causing major changes in channel form and degradation of aquatic habitats.

2.2.3 Reductions in Habitats and Species

The riverine and flood basin habitats of today have been greatly modified from pre-1850 conditions. The flood basins have been largely converted to agricultural or urban uses. Wide bypasses in the Sacramento Valley still provide seasonal habitat for native fish species (Sommer et al., 2003);

however, the extent, frequency, and duration of inundation important for juvenile fish rearing is substantially less, compared to conditions before 1850.

Approximately 95 percent of historical wetlands and riparian areas no longer exist in the Central Valley, based on an analysis by The Bay Institute (1998) using 1993 California Department of Fish and Game (DFG) vegetation data (Figure 2-6). Most of the remaining wetlands are seasonal wetlands managed as waterfowl habitat and are located in federal and State wildlife areas and on private duck clubs; they are not directly connected to rivers. Much of remaining 56,000 acres of riparian habitat is highly fragmented or occurs as narrow strips along waterways.

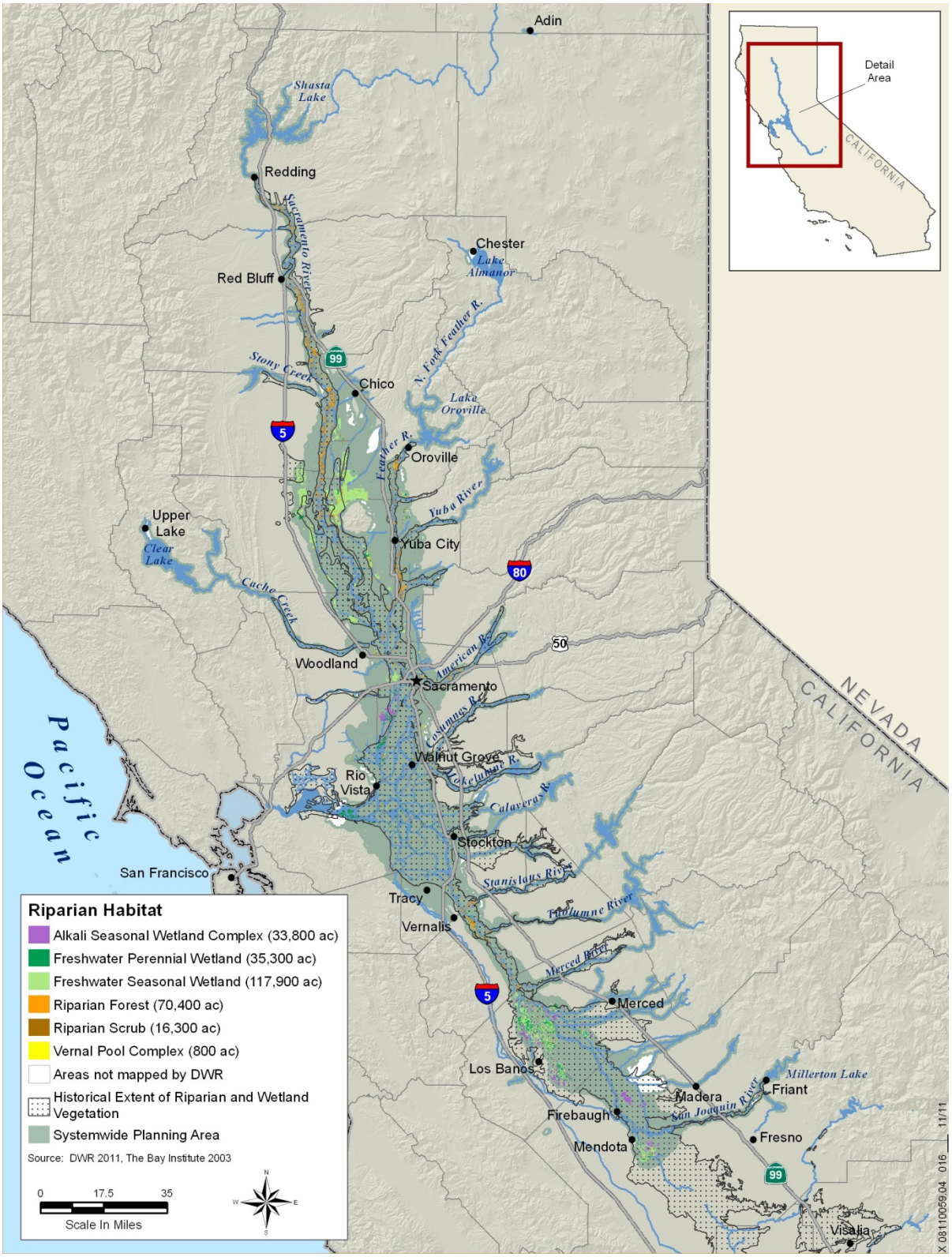


Figure 2-6. Riparian and Wetland Vegetation Potential/Historical and Current Distribution

The reduction in overall area of wetlands and riparian forest has reduced the abundance of terrestrial wildlife species supported by these habitats. Although many of these species still occur today, their population sizes and spatial distributions have generally been greatly reduced, relative to historical conditions. Tables 2-2 and 2-3 identify 20 species that are currently listed under either the California Endangered Species Act (CESA) or the federal ESA, as well as 33 other species that are considered sensitive species.

Aquatic habitats for salmonids and other native fishes have been greatly reduced or degraded by changes in hydrologic and geomorphic processes. These changes are due to many factors, including dams, diversions, revetment, and levees. Dams have prevented upstream passage of salmonids, many miles of spawning habitat no longer accessible to Chinook salmon (Figure 2-7) and steelhead. Isolation of rivers from their once-extensive floodplains has cut off frequent flooding, reducing the cyclical replenishing of food web productivity in important rearing habitat.

The natural fluvial disturbance patterns that maintain the complex mosaic of riverine habitats and that support native species abundance and diversity have been altered due to less frequent overbank and bankfull flows and longer durations of base flows. River channels have been straightened in many areas, and 150 miles of the Sacramento River bank are lined with riprap (The Bay Institute, 1998). River water tends to be deeper and of more uniform depth than it was before 1850, when aquatic habitats were much more diverse.

Table 2-2. Representative Sensitive Plant Species of Riverine, Wetland, and Riparian Habitats in Sacramento and San Joaquin Valleys and Delta

Species		Status			Habitat		
Common Name	**Scientific Name**	**Federal[a]**	**State[b]**	**CRPR[c]**	**Riverine-Lacustrine**	**Wetland**	**Riparian Forest-Scrub**
Bristly sedge	*Carex comosa*	–	–	2.1		•	
Bolander's water-hemlock	*Cicuta maculata var. bolanderi*	–	–	2.1		•	
Slough thistle	*Cirsium crassicaule*	–	–	1B.1		•	•
Silky cryptantha	*Cryptantha crinita*	–	–	1B.2			•
Delta button-celery	*Eryngium racemosum*	–	E	1B.1			•
Bogg's Lake hedge-hyssop	*Gratiola heterosepala*	–	E	1B.2		•	
Woolly rose-mallow	*Hibiscus lasiocarpus var. occidentalis*	–	–	2.2		•	
California satintail	*Imperata brevifolia*	–	–	2.1			
Delta tule pea	*Lathyrus jepsonii var. jepsonii*	–	–	1B.2		•	•
Mason's lilaeopsis	*Lilaeopsis masonii*	–	R	1B.1		•	
Delta mudwort	*Limosella subulata*	–	–	2.1		•	
Slender-leaved pondweed	*Potamogeton filiformis*	–	–	2.2	•		
Eel-grass pondweed	*Potamogeton zosteriformis*	–	–	2.2	•		
Sanford's arrowhead	*Sagittaria sanfordii*	–	–	1B.2		•	
Marsh skullcap	*Scutellaria galericulata*	–	–	2.2		•	
Side-flowering skullcap	*Scutellaria lateriflora*	–	–	2.2		•	
Suisun Marsh aster	*Symphyotrichum lentum*	–	–	1B.2		•	•
Wright's trichocoronis	*Trichocoronis wrightii var. wrightii*	–	–	2.1		•	•

Table 2-2. Representative Sensitive Plant Species of Riverine, Wetland, and Riparian Habitats in Sacramento and San Joaquin Valleys and Delta (contd.)

Species		Status			Habitat		
Common Name	Scientific Name	Federal[a]	State[b]	CRPR[c]	Riverine-Lacustrine	Wetland	Riparian Forest-Scrub
Brazilian watermeal	*Wolffia brasiliensis*	–	–	2.3	•		

Sources: CNDDB 2010; CNPS 2010

Notes:

[a] U.S. Fish and Wildlife Service — Federal Listing Categories:
T = Threatened
E = Endangered
– = No status

[b] California Department of Fish and Game — State Listing Categories:
R = Rare
E = Endangered
– = No status

[c] California Department of Fish and Game — California Rare Plant Ranks:
1A = Presumed extinct
1B = Plants rare, threatened, or endangered in California and elsewhere
2 = Plants rare, threatened, or endangered in California, but more common elsewhere

Extensions:
1 = Seriously endangered in California (> 80 percent of occurrences are threatened and/or high degree and immediacy of threat)
2 = Fairly endangered in California (20 – 80 percent of occurrences are threatened)
3 = Not very endangered in California (< 20 percent of occurrences are threatened or no current threats are known)

Key:
CRPR = California Rare Plant Rank
Delta = Sacramento-Delta–Suisun Marsh
State = State of California

Table 2-3. Representative Sensitive Wildlife Species of Riverine, Wetland, Riparian, and Agricultural Communities in the Sacramento and San Joaquin Valleys and Delta

Species		Status[a]	Habitat(s)			
Common Name	**Scientific Name**	**USFWS/DFG**	**Riverine-Lacustrine**	**Wetland**	**Riparian Forest-Scrub**	**Agricultural**
Invertebrates						
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/–			•	
Fish						
Central Valley fall/late-fall-run Chinook salmon	*Oncorhyncus tshawytscha*	FSC/CSC	•			
Central Valley spring-run Chinook salmon	*Oncorhyncus tshawytscha*	FT/CT	•			
Sacramento River winter-run Chinook salmon	*Oncorhyncus tshawytscha*	FE/CE	•			
Central Valley steelhead	*Oncorhyncus mykiss*	FT/–	•			
Southern Distinct Population of the North American green sturgeon	*Acipenser medirostris*	FT/–	•			
Delta smelt	*Hypomesus transpacificus*	FT/–	•			
Longfin smelt	*Spirinchus thaleichthys*	–/CT	•			
Sacramento splittail	*Pogonichthys macrolepidotus*	–/CSC	•			
Hardhead	*Mylopharodon conocephalus*	–/CSC	•			
River lamprey	*Lampetra ayresii*	–/CSC	•			
Amphibians						
Foothill yellow-legged frog	*Rana boylii*	–/CSC	•			
California red-legged frog	*Rana draytonii*	FT/CSC	•	•	•	
Northern leopard frog	*Rana pipiens*	–/CSC	•	•		
Reptiles						
Western pond turtle	*Actinemys marmorata*	–/CSC	•	•		
Giant garter snake	*Thamnophis gigas*	FT/CT		•		•
Birds						
Tricolored blackbird	*Agelaius tricolor*	–/CSC		•		•
Swainson's hawk	*Buteo swainsoni*	–/CT			•	•
Northern harrier	*Circus cyaneus*	–/CSC		•		•
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FC/CE			•	

Table 2-3. Representative Sensitive Wildlife Species of Riverine, Wetland, Riparian, and Agricultural Communities in the Sacramento and San Joaquin Valleys and Delta (contd.)

Species		Status[a]	Habitat(s)			
Common Name	**Scientific Name**	**USFWS/DFG**	**Riverine-Lacustrine**	**Wetland**	**Riparian Forest-Scrub**	**Agricultural**
Yellow warbler	*Dendroica petechia brewsteri*	–/CSC			•	
White-tailed kite	*Elanus leucurus*	FP/CSC		•	•	•
Greater sandhill crane	*Grus canadensis tabida*	CT/FP		•		•
Bald eagle	*Haliaeetus leucocephalus*	CE/FP	•			
Yellow-breasted chat	*Icteria virens*	–/CSC			•	
California black rail	*Laterallus jamaicensis coturniculus*	–/CT, FP		•		
Suisun song sparrow	*Melospiza melodia maxillaries*	–/CSC		•		
Bank swallow	*Riparia riparia*	–/CT	•			
Least Bell's vireo	*Vireo bellii pusillus*	FE/CE			•	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	–/CSC		•		
Mammals						
Pallid bat	*Antrozous pallidus*	–/CSC	•			•
Western mastiff bat	*Eumops perotis*	–/CSC	•			•
Western red bat	*Lasiurus blossevillii*	–/CSC	•			•
Riparian (=San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	FE/CSC			•	
Salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE/CE, FP		•		
Riparian brush rabbit	*Sylvilagus bachmani riparius*	FE/CE			•	

Sources: CNDDB 2011; DFG 2010
Note:
[a] Status definitions:
CE = California listed as endangered
CSC = California species of special concern
CT = California listed as threatened
FC = federal candidate for listing
FE = federally listed as endangered
FP = California fully protected
FSC = NMFS species of concern
FT = federally listed as threatened
Key:
– = no legal status
Delta = Sacramento-San Joaquin Delta
DFG = California Department of Fish and Game
NMFS = National Marine Fisheries Service
USFWS = U.S. Fish and Wildlife Service

Figure 2-7. Fall-Run Chinook Salmon Historical and Current Distribution in Sacramento and San Joaquin Valleys

The altering of geomorphic processes as a result of construction of dams, diversions, revetment, levees, and other stressors has resulted in a substantial reduction in the extent of riparian vegetation along the Sacramento and San Joaquin rivers and their tributaries. Two important habitat components for salmonids, large woody material in river channels and shaded riverine aquatic (SRA) cover along channels, have been dramatically reduced from historical conditions.

SRA habitat with overhead vegetation, in-water cover, and natural, often eroding, bank

Large woody material consists of logs, typically more than 4 inches in diameter and more than 6 feet long, lying in river or stream channels. This material provides valuable cover and resting habitat for fish.

SRA habitat has three main attributes: (1) overhead vegetation, (2) in-water cover, and (3) natural, often eroding, bank (USFWS, 1992). Federal, State, and private application of bank protection has displaced much of the high-value SRA cover on the Sacramento River system. Current data shows that high-quality SRA, which includes all three of these attributes as defined by the USFWS, along the banks of the Sacramento River between Red Bluff and Verona has been substantially reduced from historic conditions (as described in Attachment 9G, Regional Permitting Options).

The USFWS identifies SRA as a Resource Category 1 habitat under its Mitigation Policy on the Sacramento River system. Resource Category 1 habitats are habitats “of high value for evaluation species” and are “unique and irreplaceable on a national basis or in the ecoregion section.” The USFWS mitigation goal for such habitats is “no loss of existing habitat value” (USFWS, 1981). Agricultural habitats of historical floodplains and flood basins have been affected by urbanization, availability of water supplies, technological changes, and construction of weirs, bypasses, and other flood control structures. Conversion to nonagricultural uses has been reducing the extent and quality of these agricultural habitats, as well as reducing the distribution and abundance of associated species, for several decades. Agricultural acreage peaked around 1959, and has since gradually declined as urban areas have expanded into the floodplains of the Sacramento and San Joaquin rivers. From 1990 to 2004, approximately 95,000 acres of agricultural lands were converted to nonagricultural uses in the Sacramento and San Joaquin valleys (excluding the Tulare Lake Basin) (American Farmland Trust, 2007).

Table 2-3 lists sensitive wildlife species representative of riverine, wetland, riparian, and agricultural habitats of the Sacramento and San Joaquin valleys and Delta, and the legal status of those species.

2.3 Conservation Improvements and Progress

Upper Sacramento River Restoration near Kopta Slough

Although the historical trend has been a widespread decline in wetland and riparian habitats, recent restoration efforts have started to reverse this trend in parts of the Sacramento and San Joaquin valleys. However, most habitat restoration efforts to date have involved planting riparian vegetation or creating wetlands rather than restoring fluvial and geomorphic processes that would promote natural habitat regeneration. Areas of riparian and wetland habitat that still exist, including areas of restored habitat, are primarily found between levees or within historical flood basins that serve as flood bypasses or are protected as wildlife refuges by State or federal agencies.

State, federal, and local governments and private organizations have responded to environmental degradation of riparian and riverine ecosystems in the Sacramento and San Joaquin valleys by developing and implementing numerous restoration projects and programs, and by establishing wildlife refuges and other protected areas throughout the flood management system. Examples of these protected areas include Graylodge Wildlife Area in the Butte Basin, Sutter National Wildlife Refuge in the Sutter Bypass, Vic Fazio Yolo Wildlife Area in the Yolo Bypass, and the San Joaquin River National Wildlife Refuge.

Several ongoing regional planning efforts in the CVFPP Systemwide Planning Area address specific conservation needs (see Attachment 9E: Existing Conservation Objectives from Other Plans). Examples include the SJRRP, CALFED Bay-Delta Program (CALFED) Ecosystem Restoration Program, Sacramento River Conservation Area Forum, Bay-Delta Conservation Plan (BDCP), various county-based NCCPs, and several species-focused recovery plans.

Many restoration and other conservation projects have been completed, or are currently in progress, along rivers and streams in the Central Valley. Collectively, these projects involve many State and federal agencies (including DWR, the Board, DFG, USFWS, National Marine Fisheries Service (NMFS), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and USACE), conservation organizations, and local government agencies. Some of these projects are primarily targeted at habitat improvements, while others use habitat to solve flood problems (see Section 4.1, Progress in Flood and Ecosystem Integration, for examples). The following are additional examples of completed or in-progress conservation improvements:

> Coordinating with other planning efforts may increase economy and efficiency and can provide greater opportunities for effective, integrated, landscape-level conservation, including improving habitat connectivity and increasing the size of habitat preserves.

- Local districts have been involved in flood control efforts that have integrated flood and conservation improvements on the Feather and Bear rivers and the lower American River. On the Feather and Bear rivers, the Three Rivers Levee Improvement Authority (TRLIA) led a collaborative effort to set back levees from the main river, resulting in greatly reduced levee lengths needing maintenance and several thousand acres of new connected floodplains. Section 5.6.3, Corridor Management Strategy, describes a developing concept for coordinated planning for flood management and conservation, and its application to the lower Feather River. On the lower American River, the Sacramento Area Flood Control Agency (SAFCA) has collaborated with other agencies to develop bank protection sites that integrated riparian and in-water habitat into the design.

- Local Reclamation Districts (RD) in the Delta, with DWR local assistance funding, maintains and improves levees while also providing a net increase in habitat as required by Assembly Bill 360.

- Central Valley Project (CVP) habitat conservation programs, which consist of the Central Valley Project Conservation Program and Central Valley Project Improvement Act (CVPIA) Habitat Restoration Program. These programs are managed cooperatively by Reclamation and USFWS, in coordination with DFG, and they fund acquisition, restoration, and other projects to improve Central Valley riparian habitat, wetlands, and other habitats.

- The Riparian Habitat Joint Venture and the Central Valley Joint Venture, each of which are collaborative efforts among many public agencies and private organizations, conserve riparian and wetland habitats in the Central Valley.

- The Cosumnes River Preserve project integrates wildlife and compatible agriculture in an active floodplain. Key participants in this effort are the U.S. Bureau of Land Management, DFG, and The Nature Conservancy (TNC). Agricultural lands are farmed to produce crops during the dry season, while also providing valuable foraging habitat for Swainson's hawks (*Buteo swainsonii*). Inundation of the floodplain during the winter benefits wintering migratory waterbirds and sandhill cranes (*Grus canadensis tabida*).

2.4 Continuing Stressors

This section describes the role of ongoing human modifications to the riverine and riparian ecosystem that could be most affected by the flood management system and its operations. These human modifications include levees and bank revetment, reservoir operation, water diversions, invasive species, and fish passage barriers. This section also discusses institutional challenges to habitat conservation.

2.4.1 Levees and Bank Revetment

In selected areas of the Sacramento and San Joaquin rivers, as in many places throughout the world, the use of levees and riprap has virtually halted natural river processes that create and maintain the complexity of aquatic and riparian ecosystems, such as river channel meander migration and creation of meander cutoffs (Naiman et al., 1993; Lytle and Poff, 2004).

Bank revetment along the Sacramento River

High O&M costs are driven in part by the current footprint of the levee system, which at many locations is at odds with natural geomorphic processes. The Flood Control System Status Report (DWR, 2011) documents many historical erosion distresses and levee slope instability locations throughout the system, as well as current river reaches with high hazard levels for seepage, erosion, and slope stability.

Levees disconnect channels from the floodplain, and thus eliminate or reduce overbank flows. Overbank flows provide access by native fish to the floodplain, and water, sediment, nutrients, and seeds to the floodplain, and thus, maintain floodplain ecosystems.

Bank revetment and levees also reduce the potential for channel migration. Two important aspects of habitat for salmonids and other native fish

species are affected by a reduction in channel migration: (1) SRA cover (Fris and DeHaven, 1993), and (2) large woody material.

2.4.2 Dams

The most important impacts of dams on the hydrology of downstream river reaches are (1) decreases in flow peak frequency, magnitude, and duration, and (2) increases in the frequency, magnitude, and duration of low flows (Singer, 2007). These effects are discussed in Section 2.2.1, River Flow and Hydrologic Processes.

Dams trap bedload that would normally be deposited downstream; larger dams also trap most suspended sediment. In addition, larger dams change the magnitude and frequency of flows, affecting sediment transport in the lower river below. Over time, the channel degrades due to the loss of sediment and bedload input and becomes entrenched and static. With the loss of sediment input, channel riffles that provide seasonal habitat for salmonid spawning, develop a coarser surface layer with gravel particles too large for most flows to move and, as a result, may no longer provide usable spawning habitat for salmonids. As channel and existing floodplain conditions between the levees become relatively static, these floodplain substrates cease to be reworked by the stream flows and vegetation remains unchanged, gradually becoming a mature riparian forest without succession, regeneration, and regrowth (Jones & Stokes, 1998; Friedman et al., 1998).

2.4.3 Diversions

Various agricultural landowners and municipal water districts have constructed numerous water diversions that pump water directly out of the Sacramento and San Joaquin rivers and their tributaries. For example, an inventory of water diversions estimated that 722 such diversions are present along the Sacramento River and in the San Joaquin River Basin (Herren and Kawasaki, 2001). Many of these diversions are greater than 250 inches in diameter (Moyle and White, 2002).

In the San Joaquin River downstream from Friant Dam, the magnitude of diversion of water from the river channel into the Friant-Kern and Madera canals and the bypass system (bypasses only have substantial flows during floods) has eliminated flows to the San Joaquin River, effectively eliminating salmonid populations upstream from the confluence of the San Joaquin River with the Merced River.

2.4.4 Invasive Species

Invasive plant species can alter hydrology and sedimentation rates in riparian and aquatic systems (Cal-IPC, 2011a) and provide substantially

lower wildlife habitat value. Dense stands of invasive species can alter channel morphology by increasing the hydraulic roughness of a channel and capturing and retaining sediments. This restricts flows and reduces flood conveyance (Hunter and Platenkamp, 2003; Bossard et al., 2000). For example, saltcedar (*Tamarix* spp.) and giant reed (*Arundo donax*) trap and stabilize alluvial sediments, resulting in the narrowing of stream channels and more frequent flooding (Bossard et al., 2000). Invasive species can also quickly colonize recently disturbed areas, outcompeting and preventing native riparian vegetation from establishing. Nonnative fish species can prey on young native fish species and aquatic invasive invertebrates can displace more nutritious prey species.

Giant reed (*Arundo donax*) infestation along the Sacramento River

2.4.5 Fish Passage Barriers

Fish passage barriers, such as dams, weirs, and water diversions for agricultural and municipal uses, have greatly reduced the amount of salmonid habitat in the Sacramento and San Joaquin River basins, and many diversions also cause the direct mortality of fish. The effects of passage barriers on salmonids differ by species and race, as described below. Most species and runs of salmonids have been adversely affected by the construction of dams and similar passage barriers in the Sacramento and San Joaquin River basins. Figure 2-7 illustrates the loss of habitat for fall-run Chinook salmon (*Oncorhyncus tshawytscha*). However, spring-run Chinook salmon and steelhead (*Oncorhyncus mykiss*) have likely been the most seriously affected, in terms of direct habitat loss, by construction of passage barriers. Steelhead spawning habitat loss from construction of passage barriers has been estimated at 80 percent (Lindley et al., 2006). Construction of passage barriers has also been a stressor on winter-run Chinook. Construction of Shasta Dam has almost completely eliminated historical holding and spawning grounds for winter-run Chinook salmon. Attachment 9C: Fish Passage Assessment contains greater detail on fish passage barriers in the Systemwide Planning Area.

Examples of Barriers to Fish Passage

Dams
Road Crossings
Diversions
Flood Control Channels
Weirs
Culverts
Pumping Plants
Flow Measurement Weirs

2.4.6 Institutional and Other Challenges

In addition to the above physical stressors, habitat conservation within the flood management system has faced a variety of institutional challenges. As with many systems of this magnitude, one of the more significant challenges has been the continual need for adequate funding and broad public understanding and support for conservation. As a result, projects for a variety of different purposes (such as flood management, water supply, land use, transportation, recreation, and ecosystem conservation) have often been planned in a piecemeal manner, resulting in conflicts, inefficiencies, and missed opportunities for cost-sharing on common goals.

In recent years, public agencies have been developing more integrated regional planning approaches that are overcoming these challenges. Attachment 9E: Existing Conservation Objectives from Other Plans provides examples of such existing regional conservation planning efforts in the Sacramento and San Joaquin valleys.

Insufficient scientific and planning data is another challenge for making informed decisions related to habitat conservation efforts in the flood management system. Gaps in this knowledge include high-quality and detailed regional data sets on vegetation, public land ownership, locations of sensitive species, understanding of key species conservation needs, shared information about the importance and benefits of active floodplains, and modeling of flood and ecosystem interactions. A variety of agency programs and regional planning efforts are making progress to fill these gaps, but more work is still needed.

2.5 Increasing Stress Resulting from Rapidly Changing Climate

Rapid climate change resulting from human activities is expected to have profound effects on the riparian and riverine ecosystems of the Sacramento and San Joaquin rivers and their tributaries. This section describes these effects and consequences for flood management and ecosystem restoration, and is largely based on *Managing an Uncertain Future: Climate Change Adaptation for California's Water* (DWR, 2008).

The main direct and indirect effects on California water resources would likely include higher temperatures, a reduced Sierra Nevada snowpack, more intense and more frequent droughts, more frequent high flood flows, more frequent and more intense wildfires, more erosion and sedimentation throughout watersheds, increased agricultural and municipal water demand, reduced water quality, and sea-level rise.

Although each of these effects can be considered a stressor, the potential effects of climate change most directly affecting Sacramento and San Joaquin riparian and riverine ecosystems, such as increased temperatures and droughts, increased flood frequency, and sea-level rise, have affected natural ecosystems for thousands of years. Thus, natural adaptation of ecosystems and native species could be expected under natural conditions.

However, the climate is not known to have changed as rapidly as is happening now. In addition, riparian and riverine ecosystems are already being subjected to a number of other human-induced stressors that reduce their ability to adapt to climate change. Examples of current stressors that reduce the ability for species and ecosystems to respond to climate change include fragmentation of contiguous habitat corridors, flow alteration and/or vegetation loss that results in increased water temperatures, reduced connectivity between channels and floodplains, lack of space for tidal marshes to accommodate sea-level rise, continued land subsidence, and loss of upper watershed forest and meadow systems. Providing additional capacity in the system would allow for more flexibility to support a changing hydrograph and reduce risk of levee erosion, while accommodating ecosystem functions.

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3.0 Conservation Goals

As mentioned in Section 1, Introduction, the CVFPP has one primary goal and four supporting goals:

- **Primary Goal**
  - Improve Flood Risk Management
- **Supporting Goals**
  - Improve O&M
  - Promote Ecosystem Functions
  - Improve Institutional Support
  - Promote Multi-Benefit Projects

The Conservation Framework is supportive of these goals and provides more specific conservation goals to better articulate and guide the integration of conservation and flood management policies, programs, and actions.

The following conservation goals are based on environmental objectives in the Central Valley Flood Protection Act of 2008:[1]

- **Improve and enhance natural dynamic hydrologic (flow) and geomorphic processes in the flood management system** – These ecosystem processes are critical for maintaining habitats and species. Natural hydrologic processes provide the diversity of flows necessary to sustain fisheries and riverine habitats. These flows, in turn, sustain geomorphic processes that are essential for maintaining a variety of habitats on which species depend.

- **Increase and improve the quantity, diversity, quality, and connectivity of riverine habitats including the agricultural and ecological values of these lands** – These include aquatic, riparian,

Central Valley Flood Protection Act of 2008 California Water Code Section 9616 (a).

Environmental Objectives

- Promote natural dynamic hydrologic and geomorphic processes.
- Increase and improve the quantity, diversity, and connectivity of riparian, wetland, floodplain, and shaded riverine aquatic habitats, including the agricultural and ecological values of these lands.
- Promote the recovery and stability of native species populations and overall biotic community diversity.

[1] California Water Code Section 9616 (a).

wetland, floodplain, and SRA habitats, as well as agricultural lands that provide important wildlife values.

Inundated floodplain

- **Contribute to the recovery and stability of native species populations and overall biotic community diversity** – These include species whose long-term viability is at risk. Although the above two goals are the foundation for species conservation, this goal also includes contributing to species recovery goals, avoiding and minimizing adverse effects on sensitive species, and developing offsite compensatory habitat.

The Conservation Framework has three additional conservation goals that contribute to conservation success:

- Reduce stressors related to the development and operation of the flood management system that negatively affect important species (e.g., loss and degradation of ecosystem functions and habitat, invasive species, impairments to in-stream water quality and flows, fish passage barriers)

- Increase support and collaboration among flood managers, regulatory agencies, local NCCP and HCP planning staff, environmental nongovernmental organizations (NGO), and agricultural interests for multi-benefit flood projects by achieving the following:

  - Increasing the use of collaborative regional planning and sustainable long-term approaches that provide multiple benefits (flood risk reduction, water supply, habitat, agricultural stewardship, recreational opportunities, and others)

  - Improving environmental benefits from all flood projects

  - Reducing long-term costs for O&M and repair in flood-prone areas

  - Improving efficiency and effectiveness of flood project environmental approval

- Increase the quality of environmental information and tools for informing flood management and conservation activities

Consistent with the level of detail of the current planning phase, more specific and measurable objectives for these goals have not yet been developed. Such objectives require more extensive discussions with interested organizations so that they are achievable and reasonable.

However, readers may be interested in reviewing measurable biological objectives from other conservation plans that overlap with the CVFPP Planning Area (see Attachment 9E: Existing Conservation Objectives from Other Plans). These give an indication of the types and magnitude of objectives being used by other agencies and organizations.

Ideally, objectives are clearly articulated descriptions of a measurable standard, desired state, threshold value, amount of change, or trend to be achieved. They help planners to evaluate more carefully the desired future conditions, what it might take to achieve those conditions, and what to monitor to track progress and successes. They contain information about the indicator being measured (types, specific attributes, desired values) as well as the geographic extent and time frame over which this will be achieved.

Some examples of potential indicators to consider for objectives are listed in Section 6, Indicators of Success. The Conservation Strategy, as described above, will be more specific about these objectives.

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4.0 Integration of Conservation and Flood Management

This section provides information about how environmental stewardship can be integrated with other flood management actions and describes the conservation aspects of the SSIA. The SSIA is described more fully in Chapters 3 and 4 of the CVFPP. Readers will understand the context of this section more fully by reading relevant sections of the CVFPP.

Integrated Flood Management

An approach to dealing with flood risk that recognizes the:

- Interconnection of flood management actions within broader water resources management, ecosystems, and land use planning
- Value of coordinating across geographic and agency boundaries
- Need to evaluate opportunities and potential impacts from a system perspective
- Importance of environmental stewardship and sustainability
- Value of rural farms and communities

Integrated flood management is an approach to dealing with flood risk that recognizes the interconnection of flood management actions within broader water resources management and land-use planning; the need to consider existing land use; the value of coordinating across geographic and agency boundaries; the need to evaluate opportunities and potential impacts from a system perspective; the importance of environmental stewardship and sustainability; and the value of rural farms and communities. Ways of using integrated flood management to simultaneously address flood and ecological challenges are presented in Section 4.1, Progress in Flood and Ecosystem Integration.

Improvements in habitats and populations of sensitive species will help deliver flood projects more efficiently and effectively and facilitate regulatory approval. When included as part of project design, ecosystem restoration and recreational benefits can help justify project funding where traditional benefit-cost ratios are low. As described in the CVFPP, more flexibility in the regulatory framework would allow the flood management system to be managed in a more integrated fashion that concurrently and efficiently achieves flood management and environmental goals. For example, some of the challenges include complex processes for developing management agreements, safe harbor agreements, and permits under multiple environmental laws; constraints imposed by regulated work windows; and potential increases in maintenance costs to accommodate improvements in habitat. As part of the development of the Conservation Strategy, DWR will work with local maintaining agencies and regulatory and resource agencies to address the integration of planning and

management of the flood control system. In addition, the State is interested in coordinating and forming partnerships with the agricultural community, consistent with many of the findings of the Agricultural Stewardship Scope Definition Subcommittee.

Monkeyflower (*Mimulus guttatus*) blooming along the Sacramento River

The SSIA reflects the State's vision for modernizing the SPFC to address current challenges and future trends and to meet CVFPP goals.The SSIA includes a broad range of physical and institutional flood damage reduction actions to improve public safety and achieve economic, environmental, and social sustainability. The SSIA will entail modifying and/or clarifying current flood management policies, authority, roles, and responsibilities for State, federal, and local partners.

The SSIA will guide future State participation in projects and programs for integrated flood management in the Central Valley. The Conservation Framework is an integral part of the SSIA. Concepts for including conservation elements into flood management actions systemwide, as well as region-specific actions, are integrated into the SSIA. All levels of CVFPP project planning and development will consider opportunities to integrate ecosystem enhancements with flood damage reduction projects.

Building on the CVFPP's description of major physical elements, this section describes ways in which those elements can be implemented to provide environmental benefits. It provides some key principles for improving integration of environmental stewardship and flood management and illustrates (Section 4.1, Progress in Flood And Ecosystem Integration) how flood management has already been using environmental approaches to solve flood management problems.

Section 4.2, Improvements Applicable to All Planning Areas, provides more information about how the CVFPP's physical improvement elements can be implemented to provide environmental benefits and solve flood management challenges. Section 4.3, Conservation Opportunities by Planning Area, provides more regional specificity about opportunities for integrating flood safety and ecosystem improvements. These physical improvement elements require further detailed analyses to refine how elements may complement each other and to develop appropriate justification for selected on-the-ground projects. Since the SSIA reflects a broad vision for SPFC modernization, element refinements, additions, and deletions can be expected as a result of future feasibility studies. Chapter

4.4 of the CVFPP provides more information about how DWR will refine this planning during the next phase.

To successfully carry out integration of conservation and flood management, the State's preferred approach as it evolves will be guided by the following principles:

- Focus on restoring and maintaining hydrologic, geomorphic, and ecological processes that are critical to meeting conservation goals. This requires an understanding of the basic causes of environmental degradation and their contribution to the current ecosystem status.

- Keep long-term success, not short-term gains, as the objective. This will require long-term management and monitoring of ecological conditions and trends at the regional and project scales, and incorporating adaptive management (see Section 5.8, Adaptive Management, for a thorough discussion of adaptive management). Using self-sustaining solutions that require minimal maintenance also will be important.

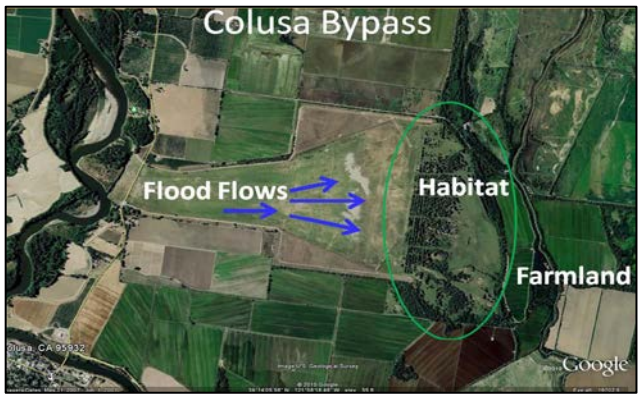
- Implement restoration projects in locations that can achieve the greatest ecological and other benefits for the investment, in the context of reducing broad regional or systemwide stressors, while minimizing the impacts to agricultural practices vital to the subsistence of the rural community.

- Collaborate with local agencies and experts in flood management, ecosystem restoration and enhancement, and farming to demonstrate integrated planning and implementation.

- Take actions that accommodate multiple interests and build public support for conservation actions. Successful use of this principle includes understanding the needs of, and coordinating with potential partners (including agricultural landowners and environmental interests) early in the process. This would promote the design of projects that enhance opportunities for cost-sharing among collaborators and solutions that optimize benefits to various stakeholders while meeting CVFPP goals.

4.1 Progress in Flood and Ecosystem Integration

Flood managers in the Central Valley have a history of using environmental approaches to solve flood management problems, and they continue to do so. This section illustrates that history and current activity



Colusa Bypass, demonstrating integrated flood management

by describing several examples of environmental approaches that achieve effective and environmentally beneficial flood management. These include (1) use of vegetation for flow and erosion management, (2) construction of setback levees to accommodate floodflows and geomorphic processes, and (3) construction of wide bypasses with native vegetation and agricultural crops that serve as floodplains.

Vegetation has been used to improve flood management for decades in the Central Valley, while also providing habitat. In-channel vegetation helps to accomplish the following: reduce the velocity of flood-flows, reduce deposition of coarse sediments on agricultural lands, filter out water contaminants, and reduce levee erosion. The riparian forest at the mouth of the Butte Basin (known as the Butte Slough Reclamation Board Forest) was initially established in the 1940s, and still functions as designed to prevent rapid drainage of the Butte Basin, which would overwhelm the Sutter Bypass downstream. Likewise, the forest at the mouth of the Colusa Bypass has helped slow the velocity of floodwaters coming over the Colusa Weir, thereby allowing gravels to deposit among the trees, rather than on the valuable agricultural lands downstream.

Example of Vegetation Reducing Erosion Potential

The Yolo Causeway, which crosses the Yolo Bypass, has a raised foundation (similar in nature to levees) that is exposed to strong southerly winds during major storm events. When this bypass is deeply flooded, as it is in wet years such as 2011, these winds generate large whitecapped waves, with high erosive potential, against the south-facing causeway foundation. Tule marshes immediately adjacent to this foundation dramatically absorb this wave energy and erosion potential, resulting in relatively calm water between the tule marshes and the causeway.

In addition to its role in reducing the velocity of flood-flows throughout the system, waterside vegetation along levees reduces erosion. Since 1955, the USACE Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project has recommended retaining brush and small trees, where desirable, specifically for this purpose. Vegetation planted on levees on the Sacramento River and the American River is used in places to provide riparian and wetland habitat, improve levee resistance to erosion, and reduce the prevalence of burrowing mammals.

Setback levees have been constructed throughout the Central Valley over the last 100 years that allow for an increase in the conveyance capacity, reduce levee costs, and provide a variety of additional benefits. Compared to reaches where levees closely line river channels, reaches with setback levees have greater floodway capacity, and provide some additional transitory storage of floodwaters. Levees that are farther away from the river result in less erosional forces directed on the levees.

Bear River Levee Setback Project constructed by TRLIA in 2005-06

Floodwaters are spread out over the floodplain between the levees, which reduces flood velocities and levee erosion, potentially reducing the frequency and cost of maintenance and repair. With greater room to meander in wider floodways, rivers can maintain geomorphic processes (as described in Section 2.2.2, Geomorphic Processes and Channel and Floodplain Dynamics) and more effectively transport sediment and flows. Some river reaches with setback levees currently support flood-compatible agriculture on the floodplain, as well as SRA, riparian, and other habitats.

Long reaches with setback levees occur on the upper Sacramento River, the lower Feather River, and the lower San Joaquin River. Shorter reaches with setback levees occur throughout the system, including the lower Sacramento River and the Delta. Recognizing the multiple benefits of setback levees, flood agencies have reconstructed levees farther from river channels in several places, such as at the mouth of the Bear River and along the lower Feather River. In the Delta, small levee setbacks were constructed on Sherman and Twitchell islands to create SRA, riparian, and tidal marsh habitats while significantly decreasing erosion and stabilizing levees. A setback levee constructed on Liberty Island and Cache Slough created shallow water habitat that is prime delta smelt (*Hypomesus transpacificus*) habitat.

Wide bypasses, such as the Yolo and Sutter bypasses, do not support the geomorphic processes of rivers, but shallow flooding is very productive for rearing juvenile fish (Sommer et al., 2003). In these bypasses, a variety of row and field crops are grown on productive agricultural land. These agricultural lands provide valuable habitat for special-status species. For example, rice fields are used by giant garter snakes, grain fields are used by greater sandhill cranes, and a variety of row and field crops are used by Swainson's hawks.

Two other long-term efforts help illustrate flood and ecosystem integration. For many years, the DWR Delta Levees Program has been successfully integrating flood and ecosystem restoration. The Sherman Island and Twitchell Island setback levee and habitat enhancement projects are excellent examples of improving and maintaining levee integrity and stability, while implementing habitat development that augments the existing riparian vegetation and provides habitat for native species. DWR administers this program in close coordination with DFG staff and local RDs. The program supplies local assistance funds to more than 60 RDs in the Delta and Suisun Marsh to maintain and improve the flood control system in the legal Delta. The authorizing legislation mandates that all habitat impacts associated with levee improvements be mitigated and result in long-term net habitat improvement.

Along the Cosumnes River, State, federal, and local governments have been working closely with conservation organizations, local landowners, and water and flood control agencies as part of the Cosumnes River Preserve for several decades. The project encompasses the entire watershed of the river, and it is a broad-based effort to restore and protect the integrity of the river and associated landscapes, including Central Valley habitats and wildlife. The preserve serves several purposes, including protecting riparian forests and habitat for wintering and migratory birds, accommodating natural flooding patterns and floodplain processes, protecting important agricultural land use and providing valuable open space.

In addition to these long-standing integrated efforts, other ongoing efforts integrate flood management and ecosystem restoration. In the Delta, on McCormack-Williamson Tract, such integration is a primary component of the proposed North Delta Flood Control and Ecosystem Restoration Project. The purpose of the project is to achieve flood control, ecosystem restoration, and recreational benefits in the area of the North Delta where the Mokelumne River, Cosumnes River, Dry Creek, and Morrison Creek converge. The actions proposed on McCormack-Williamson Tract also will benefit surrounding agricultural lands by providing additional flood protection. This includes the degradation of the northeast levee to act as a fixed weir, attenuating the peak flow during high-water events.

4.2 Improvements Applicable to All Planning Areas

This section describes how CVFPP’s physical improvements can be implemented and integrated to provide environmental benefits while also reducing the risk of damaging floods, lowering long-term O&M costs, and

improving institutional support while minimizing any adverse impacts to flood flow conveyance. Physical improvements could also provide other benefits, including improved water quality, groundwater recharge, and open space benefits; and some actions would conserve agricultural land.

These improvements, more fully described in the CVFPP, are applicable to all of the planning areas, although their site-specific implementation depends on more detailed assessment and planning. Their potential application will be refined and further developed through regional and local planning efforts. The specific project features that are ultimately implemented will depend on many factors that cannot be determined or evaluated at a programmatic level for the 2012 CVFPP. These factors include detailed project designs and costs; environmental benefits and impacts; interaction with other local projects and system improvements; participation by State, local, and federal agencies in project implementation; and changing natural and institutional conditions.

Broadly applicable improvements include the following:

- Corridor management planning (Section 4.2.1)
- Ecological restoration (Section 4.2.2)
- Fish passage (Section 4.2.3)
- Easements (Section 4.2.4)
- Landowner incentive programs (Section 4.2.5)
- Levee maintenance and repair (Section 4.2.6)
- Floodway management (Section 4.2.7)
- Levee construction, reconstruction, and improvement (Section 4.2.8)
- Setback levees (Section 4.2.9)
- SPFC facilities removal (Section 4.2.10)
- Flood control structures (Section 4.2.11)
- Floodwater storage and reservoir forecasting, operations, and coordination (Section 4.2.12)
- Land-use coordination to reduce peak runoff (Section 4.2.13)

- Regional environmental permitting (Section 4.2.14)
- Bypass expansion and construction (Section 4.2.15)
- Recreation opportunities (Section 4.2.16)

Table 4-1 shows how these improvements can be used to address the major flood and ecological challenges that confront the flood management system in the Central Valley.

Table 4-1. Potential Improvements Related to Key Problems

Problem[1]	Potential Improvements[2]	
Risk/Likelihood of Uncontrolled Flooding		
Channels do not have sufficient capacity for current or future expected flows	• Setback levees, bypass expansion and/or construction: both can expand capacity	• Floodway management: can expand capacity by well-planned lowering of floodway elevations
Obstacles are present to flow in channels, choke points (bridges, vegetation, sediment load)	• Setback levees, bypass expansion and/or construction: both can expand capacity	• Floodway management: can provide habitat where it does not significantly impede flows
Levee structural integrity is compromised; levees are subject to failure; continual repairs are made to levees	• Setback levees: can reduce erosive forces on levees	• Levee maintenance and repair, floodway management: vegetation on waterside of levees can help reduce erosion
Reservoir flood storage is inadequate for major storm events; high flows threaten levee stability	• Floodwater storage and operations: can moderate flows • Setback levees, bypass expansion and construction: can expand capacity and reduce intensity of flows	• Land use coordination: can reduce runoff by improving vegetative cover, water retention, and absorption in uplands and watersheds
Ongoing expensive repairs are needed	• Setback levees: can reduce repair costs by reducing erosive forces on levees	• Levee maintenance and repair, floodway management: vegetation on waterside of levees can help reduce erosion
Consequences and Damages from Flooding		
Development behind levees that are not designed to protect valuable land use or infrastructure	• Easements: can reduce development pressure and risk of serious consequences from flooding	• Land-use coordination: can help keep development and major infrastructure out of flood-prone areas
Project delays due to environmental permitting processes	• Corridor management strategy: can provide early integrated environmental planning as part of project design	• Ecological restoration, fish passage improvements: can reduce need for compensatory mitigation if part of flood project design • Regional environmental permitting: can provide mitigation in advance of flood project development.
Reduced water quality due to flooding and runoff from agricultural/urban lands; mobilization of hazardous materials or contaminants	• Ecological restoration: wetlands can filter nutrients and impurities from runoff, process organic wastes, capture high sediment loads	• Land-use coordination: can reduce runoff by improving vegetative cover, water retention, and absorption in uplands and watersheds

Table 4-1. Potential Improvements Related to Key Problems (contd.)

Problem[1]	Potential Improvements[2]	
Sediment deposition and flooding of private agricultural lands	• Flood control structures: vegetation can increase sediment deposition near river (such as Colusa Bypass)	• Setback levees, bypass expansion and construction: can expand capacity to accommodate greater flood events within floodway
Ecological Challenges		
Loss of ecosystem processes	• Ecosystem processes can be improved with: • Floodway management • Setback levees • SPFC facilities removal • Flood control structure modification	• Floodwater storage and operations • Ecological restoration • Fish passage
Alteration of natural flow regime	• Natural flow regimes can be improved with: • Setback levees • SPFC facilities removal	• Floodwater storage and operations • Ecological restoration • Fish passage • Flood control structure modification
Loss and degradation of habitat	• Habitat quantity and quality can be improved with: • Levee and floodway management • Setback levees • Expanded or new bypasses • Easements • SPFC facilities removal	• Ecological restoration • Fish passage • Land-use coordination
Loss of floodplain food web productivity	• Floodplain food web productivity can be improved with: • Levee and floodway management • Setback levees • Expanded or new bypasses	• SPFC facilities removal • Ecological restoration
Potential conflicts between vegetation and flood risk reduction	• Conflicts can be reduced with: • Levee and floodway management • Setback levees	• Expanded or new bypasses • Corridor management strategies • Land-use coordination
Fish passage barriers	• Fish passage can be improved with: • Floodway management • Flood control structure modification • Floodwater storage and operations	• Ecological restoration • Fish passage

Key:
[1] Identified in CVFPP Interim Progress Report #1
[2] See additional descriptions of these improvements common to all planning areas in following sections.

4.2.1 Corridor Management Strategy

Corridor Management Strategy (CMS) is a developing concept for improving flood management and ecological conditions at scales that are both manageable and flexible to meet multiple needs. The geographic scope needs to be local enough to foster strong field-based partnerships, and still broad enough for multiple projects to collectively meet multiple needs. The CMS concept has substantial promise for meeting many CVFPP goals. This concept is being applied on the lower Feather River where DWR is developing the Lower Feather River Corridor Management Plan (CMP) to establish a vision for future management, restoration, and maintenance of flood control facilities, conveyance channels, agricultural lands, and floodplain and related habitat. The CMP will implement the new collaborative concept for planning, designing, and implementing projects within and adjacent to flood control features that DWR is responsible for maintaining and repairing. The experience from this effort will inform the development and use of the CMS in other parts of the flood management system. Further details are provided in Section 5.6.3, Corridor Management Strategy.

Feather River

4.2.2 Ecological Restoration

As described in Section 2, Floodway Ecosystem Status and Trends, improving species populations and habitat in the flood system depends on improving hydrologic and geomorphic processes. When these processes function well, efforts for species and habitat conservation are easier, less costly, and have higher long-term viability.

Restoration and maintenance of these ecosystem processes, habitats, and species populations are needed throughout the entire system, particularly where large gaps in connectivity exist. DWR will particularly be working collaboratively with other organizations to connect riparian habitat from the Delta to Red Bluff and Oroville. In an initial analysis of the physical potential to reconnect floodplains (connected floodplains were defined as nonurban areas having a 50 percent annual exceedence probability (AEP) of being inundated at least 1 foot under the current flow regime), there are potentially more than 320,000 acres of hydraulically connected floodplain within the Systemwide Planning Area (see Attachment 9F: Floodplain Restoration Opportunity Analysis). Sixty percent of this floodplain acreage is currently disconnected from the river system by levees.

Through implementation of the CVFPP, the State will more fully integrate ecosystem restoration into the project design. One of the primary means of accomplishing this is by leveraging flood system improvements to create habitat through levee setbacks and the extension and expansion of bypass systems. Although setting back levees and expanding bypasses is the primary means to restore floodplain habitat, other opportunities to integrate ecosystem restoration will include controlling invasive species, planting SRA, and removing barriers to fish migration.

New plantings within the Bear River Levee Setback Area

In addition to ecological restoration efforts, impacts to the environment must be avoided, minimized, and compensated through mitigation, consistent with State laws, such as California Environmental Quality Act (CEQA), CESA and California Fish and Game Code Section 1600. The most preferable, and often most cost-effective approach, is to incorporate ecosystem improvements into project design. A plan that fully integrates flood protection and ecosystem stewardship would facilitate plan implementation and ongoing O&M. Where impacts cannot be avoided, mitigation will be required. Mitigation is preferable onsite, but if not feasible, off-site mitigation is required. The State will also develop projects that improve and restore ecosystem processes and habitat where important restoration opportunities exist. Opportunities will be sought to collaborate and cost-share with other existing conservation efforts, such as those described in Attachment 9E: Existing Conservation Objectives from Other Plans.

In addition to project-by-project mitigation, the State is developing regional or programmatic mitigation approaches. Two examples are the Delta Levees Program and RAMP. In the Delta Levees Program, DWR and DFG are moving toward programmatic mitigation to accomplish legislative mandates in the legal Delta (CWC Section 12220) and provide better service to the RDs and increase public safety. The goal of programmatic mitigation would be to identify sites in the best locations for each type of habitat typically needed to offset unavoidable habitat damage associated with levee improvement projects and protect them in advance of the impacts. Programmatic mitigation is being developed to create mitigation credits for the local maintaining agencies that participate in the Delta Levees Program. Habitat enhancement/improvement, above and beyond required mitigation, is being developed separately. Funding and staff are already being dedicated to moving this effort forward and could complement restoration work undertaken within the Conservation Strategy.

Similarly, DWR has joined with several State and federal agencies to promote the creation of advance mitigation and conservation sites throughout the State under a program called RAMP (see Section 5.6.5, Regional Advance Mitigation Planning). The RAMP initiative is identifying tools that can help identify potential mitigation and conservation sites that meet multiple objectives, and are finding innovative ways to leverage multiple funding sources that allows for larger sites than could be accomplished using project-by-project funding. The first pilot project in the upper Sacramento River watershed will directly support potential work on SPFC facilities.

The State plans to develop methods to track habitat conservation and restoration efforts to inform resource agencies and the public about system improvements (see Section 6, Indicators of Success).

The State will take advantage of opportunities within the SPFC to improve aquatic habitat by restoring river flows and ecosystem processes, removing fish passage barriers, and enhancing suitable river gravels for fish spawning below major dams and in other creeks and streams where suitable spawning gravels are limited.

4.2.3 Fish Passage

Fish passage in Central Valley rivers and streams is impaired by a variety of obstacles, only some of which are related to flood management facilities and operations. Attachment 9C: Fish Passage Assessment identifies fish passage barriers within the CVFPP Systemwide Planning Area and highlights those that are part of the SPFC and are most ecologically important to remove.

Improving fish passage is an important system improvement, but it can be complex and costly. Current flood management funding is limited to making improvements related to, or beneficial to, SPFC facilities. However, Attachment 9C: Fish Passage Assessment provides a broader assessment of systemwide passage improvement projects to provide context for developing future flood management funding with potentially broader scopes. Attachment 9C: Fish Passage Assessment also provides context for flood managers about other passage improvement projects that other DWR programs and agencies are currently engaged in planning or funding. Flood managers can coordinate with these other programs and seek opportunities to develop passage improvement projects that meet the needs of multiple programs.

DWR will work with other organizations to improve fish passage at flood diversions, flashboard dams, flood management structures, and pumping stations. This includes connecting fishery habitat along the main-stem

rivers, tributaries, and bypasses. Fish passage projects, when successful, can increase recreational opportunities, so they should incorporate appropriate recreational facilities.

Fish Passage Constraints at Fremont Weir

Passage is also blocked at major dams within the Systemwide Planning Area. However, improving fish passage around these dams is complex and challenging. Formal direction from NMFS, in the form of a biological opinion for the Operations Criteria and Plan (NMFS, 2008), directs Reclamation to develop a step-wise process to evaluate the improvement of passage around several major dams, including Shasta, Folsom, and New Melones. Attachment 9C: Fish Passage Assessment, describes many different technologies currently in use in other parts of the country that could be employed to solve fish passage problems in California.

4.2.4 Easements

Purchasing easements can be valuable for a variety of purposes, including reducing the risk of future major flood consequences by retaining rural land uses, maintaining viable agricultural productivity, and creating important habitat. Individual easements can be developed to achieve multiple purposes, but the combination of these on any individual parcel needs to be carefully evaluated to ensure quality results and to avoid unintentional conflicts. To be most useful for environmental purposes, these easements, where applicable, would allow for the following:

- Periodic inundation and soil saturation important for the ecological functioning of floodplains (i.e., increasing aquatic ecosystem productivity, allowing sediment deposition on floodplains, and supplying large woody materials to aquatic ecosystems)
- Allowing natural riverine processes to occur thereby allowing more natural flows, and erosion and deposition of sediment
- Expansion of existing conservation lands and management compatible with those lands
- Preservation of existing riparian habitat, restoration of priority habitats, (e.g., riparian, SRA, and wetlands), and support of agricultural practices that benefit wildlife

4.2.5 Landowner Incentive Programs

Some landowners with conservation interests may be more attracted to participating in incentive programs than to selling easements. The State and federal governments offer a variety of incentives, including legal and statutory incentives; market-oriented institutions; financial incentives; public tax incentives; and educational, technical assistance, administrative, and recognition incentives. A national review of these programs (Casey et al., 2006) provides a useful economic and policy assessment of these incentive mechanisms. Some specific example programs are those managed by the U.S. Department of Agriculture's Natural Resources Conservation Service and Farm Service Agency (such as the Wetlands Reserve Program and the Conservation Reserve Program) and the DFG Landowner Incentive Program.

Three programs (DFG's Voluntary Local Program and Safe Harbor Agreement Program and the USFWS Safe Harbor Agreement Program) encourage landowners to enhance habitat for threatened and endangered wildlife, while maintaining viable agricultural operations. These programs allow landowners to remove the habitat enhancements with no penalties. These programs provide flexibility for landowners and flood managers but do not provide assurances of long-term habitat conservation.

The State will pursue opportunities to work with interested landowners and these incentive programs to improve program accessibility and usefulness to private landowners in the flood system.

4.2.6 Levee Maintenance and Repair

Levee damage during a storm

Current O&M levee maintenance and repair activities include manual and mechanical controling vegetation (terrestrial and aquatic), mowing, dragging and grading, burning, livestock grazing, removing trees, applying rodenticide and herbicide, filling or grouting rodent burrows and other penetration gaps, and placing fill or rock slope. These activities have been done in ways that have maintained levee reliability and reduced environmental impacts. DWR is working to improve environmental benefits associated with maintenance, including increasing the use of native plants in revegetation and reducing the spread of invasive plants.

In general, the Conservation Framework will attempt to reduce impacts associated with project-level repairs through "holistic" strategies for implementing large-scale, integrated flood management efforts, such as

Levee repair on lower Sacramento River

corridor management plans (Section 5.6.3). Regional permitting (Section 5.6.4), and regional advance mitigation programs (Section 5.6.5) can support these integrated management efforts, which will be designed to support larger scale and cost-effective facilities management practices and policies that address public safety needs and advance statewide and regional environmental goals. These strategies integrate O&M with other planning efforts, increase permitting efficiencies, have the potential to maximize the use of regionally important habitat for mitigation and habitat improvements, and can reduce O&M costs.

DWR is also developing permitting approaches to increase the effectiveness of maintenance and repair activities for providing levee reliability and environmental benefits. The Small Erosion Repair Program (SERP), being developed by a work group of the Interagency Flood Management Collaborative Program, is one example of this for small levee repair sites. Targeted to begin in 2013, the program provides that DWR maintenance staff will provide an annual list of their anticipated repairs to regulatory agencies for the upcoming year. Long-term regulatory approval will be secured in advance, thereby making the process efficient, cost effective, and consistent throughout the system. In addition, efficient repairs of small sites can prevent continuing erosion, which otherwise might become a more extensive and costly repair project with greater environmental damage.

One of the best ways to reduce long-term maintenance efforts and cost is to proactively consider long-term maintenance during the project design process. Doing so can result in reduced maintenance and features that are of greater overall benefit to biological resources. With an enhanced project design, focused on minimal or reduced maintenance, the overall level of environmental disturbance would be reduced. Considering maintenance earlier is often more costly initially. However, over time, incorporation of cost-effective design elements, such as providing adequate capacity for vegetation, should reduce maintenance and associated costs.

Planting native grass seeds on the Natomas levee

Further efforts to coordinate O&M activities include using sustainable practices such as developing a target vegetative community and focusing management efforts on attaining that target (e.g., replacing a broadleaf weed species community with one dominated by

native perennial grasses). There are a number of inherent benefits to establishing native perennial grasses on levees. First, native perennial grasses have dense, fibrous root systems that are very effective at soil stabilization and surface erosion control. An established sod cover of perennial grasses is substantially more resistant than annual grassland or bare soil to rill and gully erosion during a levee overtopping event. In contrast, typical weedy annual (nonperennial) grassland found on most levees is shallow-rooted, dries in mid- to early summer, creating a fire hazard, and produces a large volume of seed that attracts ground squirrels.

Compared to typical annual levee grassland management, levee maintenance requirements and costs over time should be less because of the reduction in herbicide application, reduced need for soil repairs due to rill erosion, and less frequent mowing requirements. The SAFCA has determined the cost effectiveness of this practice and has begun to implement it on levees associated with its Natomas Levee Improvement Program project.

4.2.7 Floodway Management

Current floodway[2] maintenance activities are similar to levee maintenance, but also include removing sediment, debris, and other flow obstructions. These activities have been implemented to maintain floodwater conveyance and environmental benefits (e.g., maintaining large trees in the Yolo Bypass following regular sediment removal). The State is also working to improve environmental benefits within channels, without compromising public safety, such as restoring habitat along the Feather River as part of the Lower Feather River CMP.

Other potential floodway management improvements that will be implemented, where suitable, include the following:

- Lowering floodway elevations for more frequent and sustained inundation of lower floodplain surfaces. Floodplain inundation and associated habitat values have been reduced where the main river channel has become incised below the floodway, river flows have been reduced, or both. In these areas, lowering floodplain surfaces or creating floodplain swales would allow more frequent and sustained inundation, restoring habitat values. This action would also help increase local floodway capacity. Projects along the lower Feather and Bear rivers help illustrate the potential of this approach

- Modifying the floodway for greater topographic and hydrologic diversity, while also eliminating features (such as isolated gravel pits or

[2] Land between levees, including river channel

deep borrow pits) that strand fish. This action can include creating, or opening up, secondary channels and overflow swales that would add riverine and floodplain habitat values, including resting or rearing areas for fish migrating downstream

- Supporting agriculture that is compatible with wildlife
- Incorporating access, drainage, and other infrastructure sufficient to support agricultural use and management of natural vegetation. Agriculture and management of natural vegetation require access roads, drainage ditches, and (for agriculture) groundwater pumps or surface water supply canals. Incorporating this infrastructure allows continued agricultural use and a greater range of restoration and conservation activities

4.2.8 Levee Construction, Reconstruction, and Improvement

Construction of new levees and reconstruction of or improvements to existing levees will be needed to achieve various flood management objectives. Where new levees need to be constructed, they should be located to reduce long-term maintenance and repair costs, restore geomorphic processes, improve floodwater capacity, provide recreational opportunities, accommodate expected hydrological changes due to climate change, and be compatible with local planning and land management.

New levee construction at Natomas

Consistent with the DWR levee vegetation management strategy, described in Section 5.4, where setback levees cannot be constructed, new or newly reconstructed levees should incorporate trees and other woody vegetation on the lower waterside slope and riverbank or berm, specifically designed for waterside planting. This planting berm, or the entire levee when necessary, should represent an over-built section with respect to minimum geometries, and be of sufficient size and configuration to mitigate any potential negative impacts to levee safety.

Where in-place reconstruction is the most feasible option for solving long-term flood management needs, designs should include environmental benefits by measures such as the following, where appropriate:

- **Incorporating biotechnical bank protection along existing levees to reduce river erosion and wave energy** – Biotechnical bank protection is the combined use of plants with other materials to stabilize streambanks and levees. This can increase bank resistance to erosion. Vegetation (e.g., tules) can also attenuate wave energy, which reduces erosive forces. Thus, biotechnical bank protection can complement or reduce the need for revetment. Biotechnical bank protection should be incorporated, where appropriate, during design or repair of facilities. It generally entails planting cuttings and container plants in shallow water adjacent to banks, in exposed soil along banks, or in revetment. If incorporated into revetment, some localized modification of revetment (such as incorporating uncompacted soil) may be necessary.

Biotechnical erosion control and in-stream fish habitat

- **Controlling the spread of invasive plants** – Infestations of invasive plants not only degrade habitat values locally, but can serve as sources of propagules that establish additional infestations (particularly downstream) and increase maintenance costs, and the costs of controlling these invasive species in general. Practices to reduce the introduction and spread of invasive species may include preconstruction surveys and mechanical and/or chemical control measures, washing of equipment entering and leaving a site, and restrictions on plant materials used for revegetation (particularly adjacent to river channels). Also, areas dominated by nonnative invasive plants can be revegetated with native plants.

- **Incorporating SRA vegetation into in-place repairs** – Waterside plants shading the adjacent water surface is an important component of SRA habitat. Requirements for incorporating these plants are similar to those for biotechnical bank protection, and in some cases incorporated SRA could also provide bank protection benefits.

- **Using excess channel sediment for levee material, if suitable** – This may expand channel capacity and may improve riverine habitats, particularly in partially isolated secondary channels, or increase the frequency, duration, and extent of the inundation of lower floodplain surfaces.

- **Applying levee design criteria that promote compatibility with existing and potential floodway habitats** – Determination of the design capacity for conveying floodwaters will include riparian vegetation (and associated roughness) in areas throughout the floodway. This allows for future changes in floodway land use and management, increasing the flexibility of the system and potential future environmental benefits.

4.2.9 Setback Levees

Setting back levees from rivers is an important approach for solving a variety of flood management and ecosystem problems, while still supporting productive agriculture within expanded floodways. Increasing the distance of levees from the main river channel reduces the erosive force of floodwaters on the levees, which can improve their reliability and reduce repair costs. This shift in levee location increases the overall capacity of the local floodway, which can reduce the velocity of floodwaters, create transitory floodplain storage, and reduce flood stage. In reaches where levees closely follow sinuous river channels, setback levees provide opportunities for significantly reducing overall levee length, which may reduce overall maintenance costs.

Setback levee at Butte City

Setback levees also generate opportunities for improving ecosystem function and increasing habitat extent, quality, and connectivity. The expanded floodway creates space for river meandering, sediment erosion and deposition, natural ecosystem disturbance processes, and a healthy diversity of riverine habitat.

Major physical differences in different regions of the Central Valley provide opportunities or constrain the use of setback levees to improve riverine geomorphic processes. The upper valley floor reaches of the Sacramento and San Joaquin rivers already have long reaches with levees that are located at relatively greater distances from active river channels, compared to lower reaches of these rivers. These reaches provide the most opportunities using setback levees for restoring riverine geomorphic processes. Such opportunities are more limited in the lower reaches, where

rivers are elevated above surrounding lower lands and more constrained by adjacent land uses. However, smaller, localized setback levees in these reaches can still provide valuable waterside habitat and provide other flood benefits. Replacing winding levees where they closely follow tight river bends with straighter levees that cut off those bends can reduce long-term levee maintenance and repair costs.

Setback levees will be designed to accommodate riparian vegetation within an expanded floodway, while still meeting conveyance and levee safety needs. Where a river channel is incised and/or flows have been substantially altered, setback levees alone may be insufficient to considerably improve ecosystem processes and habitats. Thus, in some cases, lowering the floodplain elevation (e.g. construction of swales, side channels) may also be important to allow the frequent, sustained inundation needed for aquatic productivity and other ecological processes.

When considering locations for setback levees along rivers, given the engineering (capacity and structural) feasibility is met, levees will be designed with the following features, as appropriate:

- Prioritize locations where floodplain functions and values could be restored. Elevations within the setback levee should be considered to provide for frequently inundated floodplains and therefore support riparian and wetland habitats and species. Vegetation on the new floodplain will replace any losses on the levee prism as with new levees, vegetation removal is required for access, visibility for inspections, and consistency with design standards.

- Design and model setback levee location to maximize roughness in the channel, thereby reducing long-term maintenance and conflicts with vegetation.

- Consider impacts to valuable agricultural land and practices to minimize adverse effects to these resources.

- Where permanent structures (e.g., bridges, roadways) need to be located in the floodplain, design them to minimize effects on floodplain processes (such as the need to protect structures thereby inhibiting channel migration). Remove, relocate, or modify permanent structures in the setback area to reduce impacts on floodplain processes. Minor and major infrastructure (e.g., road crossings) can impede channel migration, sediment deposition, and other geomorphic processes. Removing, relocating, or otherwise modifying this infrastructure in conjunction with levee setbacks can reduce or eliminate these effects.

4.2.10 SPFC Facilities Removal

Some SPFC levees and revetment provide minimal local and systemwide flood management benefits. Administrative or physical removal of these facilities provides the opportunity to improve hydrologic and geomorphic processes that are important for sustaining riverine and floodplain habitats. Removing levees and/or revetment from the SPFC will only be considered where it would (1) have a positive or neutral effect on flood risk, and (2) provide ecosystem benefits. On the upper Sacramento River, for example, county governments have requested removal of rock revetment that does not serve an essential flood management purpose, primarily as a way to reduce costs for maintenance and repair. For example, many entities are advocating for breaching the levee at Three Amigos (RDs 2099, 2100, and 2102), a site in Stanislaus County within the San Joaquin River National Wildlife Refuge. To date, USFWS and DWR have been unable to move forward with the Three Amigos project due to lack of established USACE precedure for removal of the levees.

Removing a facility from the SPFC may consist of physical and administrative actions, or only administrative actions. Physically removing any facility is subject to a case-by-case evaluation. For a facility to be considered for removal from the SPFC, it must be demonstrated that such action would not cause unacceptable impacts to other flood management features or nonflood management purposes. If removal of a specific facility would cause potential undesirable or unacceptable effects, mitigation measures would be implemented to offset potential adverse effects before the facility was removed.

4.2.11 Flood Control Structures

Some flood control structures, such as weirs, gates, and channel diversions, will need physical improvements under the CVFPP to more effectively manage floodwaters while reducing their impact on biological resources. Of particular concern are effects on fish passage. For example, the Fremont Weir is a significant fish passage barrier (and stranding site) for fish moving between the Sacramento River and the Yolo Bypass. Shallow water depth, high water velocity, and physical barriers all may impede salmonid passage. In general, more than 1 foot of water is needed to allow passage of adult and juvenile Chinook salmon and steelhead. Also, high water velocity impeding passage may occur at flood control structures, road crossings, and culverts. In addition to adequate depth and appropriate velocity, vertical drops that exceed the leaping abilities of Chinook salmon and steelhead also may impede passage. The ability to jump vertical drops is greatly affected by staging pool depth, jump angle, and the horizontal distance of the leap.

At flood control structures, upstream and downstream passage may be improved through adequate flow, and avoiding or modifying of problematic depth, velocity, and vertical drop conditions to be consistent with DFG, USFWS, and NMFS passage criteria. Resolving problematic conditions at potential physical barriers may require installation of fish ladders and facility modification. Attachment 9C: Fish Passage Assessment identifies important fish barriers in the CVFPP Systemwide Planning Area.

4.2.12 Floodwater Storage and Reservoir Forecasting, Operations, and Coordination

Storage of floodwater, whether in foothill reservoirs or in floodplains and historic overflow basins, and coordination of reservoir releases are valuable tools for managing flood risk. They also generate opportunities to integrate and benefit water supply (including groundwater recharge and conjunctive use), water quality, ecosystem conservation and restoration, agricultural conservation, and recreation. Opportunities for further floodwater storage evaluation and analysis, in coordination with other ongoing programs and efforts of the State, include modifications to flood operation at existing reservoirs, coordinating the flood operation of multiple reservoirs, expanding flood storage in existing reservoirs, conjunctive groundwater management, and floodplain storage.

Modification and coordination of flood operations can provide a diversity of flow releases, as described in Section 2, Floodway Ecosystem Conditions and Trends, to benefit riverine ecosystems and associated species. For example, potential Friant Dam releases could be coordinated to benefit downstream upper San Joaquin River flows to support the goals of the SJRRP. Such flows can improve aquatic habitat conditions, sustain riverine habitats, reduce fish stranding and passage barriers, and generate other environmental benefits.

4.2.13 Land- and Water-Use Coordination to Reduce Peak Runoff

Peak runoff from upper watersheds occurs during larger precipitation events. As recognized by the State's California Water Plan, land-use planning has an important role in reducing this runoff. Integrated planning with local land-use authorities and major public land managers in watersheds can help reduce the intensity of flooding event, by designating land uses (e.g., native vegetation and agricultural crops) that absorb floodwaters and increase percolation into groundwater reservoirs.

Integrated watershed and water planning has become a useful tool in California for addressing a variety of water quality, water supply, and land management issues. Major public land management agencies, such as the

U.S. Forest Service and the U.S. Bureau of Land Management, as well as local resource conservation districts and other interest groups, have established a variety of working partnerships in the watersheds of the Central Valley. Support for these groups, and for establishing new groups, can be a cost-effective way of leveraging funds to help manage runoff, while creating a broad base of organizational and public support. DWR using voter-approved bond funds, is providing grants for local groups to develop Integrated Regional Water Plans. These plans are designed to integrate planning at the regional and local level for water supply, flood management, ecosystem restoration, and other important values. DWR will work to improve coordination between such plans and regional flood management planning efforts. DWR also will be working to ensure that CVFPP and the California Water Plan are well coordinated and supportive of each other.

From an environmental perspective, important actions to manage runoff include improving cover of native vegetation and agricultural crops and expanding the extent of seasonal or perennial wetlands in upland areas.

4.2.14 Regional Environmental Permitting

Beyond seeking project-specific permits, DWR will work with regulatory agencies to develop regional strategies for environmental permitting, which may include NCCPs, HCPs, or programmatic ESA Section 7 consultations (see Section 5.6.4, Regional Permitting). This will improve flood project delivery while also improving ecological conditions. RAMP (see Section 5.6.5, Regional Advance Mitigation Planning) is an innovative approach for providing advance mitigation on a regional scale, and it is currently being tested for infrastructure projects. Several current conservation plans (see Section 5.6.2, Collaborating with Existing Regional Conservation Plans) present opportunities for coordinating such permitting.

4.2.15 Bypass Expansion and Construction

To improve system flexibility and reduce peak flood discharges, the State will evaluate options and work to expand existing bypasses and to build new bypasses. These flood improvements will be designed to accommodate viable agriculture and include environmental benefits, as described above in Section 4.2.2, Ecological Restoration; Section 4.2.3, Fish Passage; 4.2.6 Levee Maintenance and Repair; Section 4.2.8, Levee Construction, Reconstruction, and Improvement; Section 4.2.9, Setback Levees; and Section 4.2.12, Flood Control Structures.

In addition, the State proposes to investigate modifying the operation of weirs that spill flood water to the bypasses. The concept is to physically lower crests of overflow weirs and modify operations so bypasses carry

flows earlier and longer during high river stages. The more frequently activated floodplain in the bypasses would help the ecosystem restoration within the bypasses and provide for more sustainable and quality habitat. Depending on the changes in flow regime, the more frequent flooding may also contribute to food web productivity and fish rearing habitat.

4.2.16 Recreation Opportunities

In 2006, the California Department of Parks and Recreation (DPR) conducted an extensive public outreach effort, holding town-hall-style meetings across the Central Valley, to identify priority recreation areas, which resulted in the Central Valley Vision (CVV) report. In 2007, the governor approved Assembly Bill 1426, which directed DPR to develop a detailed implementation plan for the CVV. This CVV implementation plan's objectives included improving recreational opportunities at existing State parks and other public lands and acquiring other lands important for recreation (particularly along water corridors). Many of the recommendations in this CVV implementation plan were prepared anticipating opportunities to incorporate recreational improvements into flood damage reduction projects.

One example of linking recreation and flood management, DWR and DPR developed an Interagency Agreement that supports multi-benefit project for the Colusa Sacramento River State Recreation Area. This effort is designed to provide recreation and public access compatible with wildlife habitat conservation.

DWR will evaluate other opportunities to assist DPR in implementing the CVV and pursue such opportunities as part of developing integrated flood projects as feasible.

4.3 Conservation Opportunities by Planning Area

Regional conservation opportunities are physical actions or projects that can be applied, where appropriate, to achieve local, regional, and systemwide benefits. They will be refined and further developed through regional and local planning efforts. The specific project features that are ultimately implemented will depend on many factors that cannot be determined or evaluated at a programmatic level for the 2012 CVFPP.

At the broad scale, different regions of the Central Valley have major physical differences that either provide opportunities or constrain the type of possible ecosystem improvements. The upper valley floor reaches of the

Sacramento and San Joaquin rivers, with their longer reaches of broader floodways, provide the most opportunities for restoring riverine geomorphic processes. Such opportunities are more limited in the lower reaches, where rivers are elevated above surrounding lower lands and more constrained by adjacent land uses (see Figure 2-2). These lower reaches still provide opportunities for maintaining and improving food web productivity (such as in the broad Yolo and Sutter bypasses) and for improving habitat. Habitat improvements in these more constrained reaches are likely to be more limited in extent and unlikely to contribute significantly to improving riverine geomorphic processes. However, they can be important to provide continual SRA habitat for migrating fish, habitat for endangered species, and important breeding and migratory stopovers for waterfowl and songbirds. The opportunities to improve habitat are likely to be most constrained in urban areas, but even small improvements in these areas are possible and could be strategically very valuable.

At the more project-specific level, additional factors need to be considered, such as detailed project designs and costs; environmental benefits and impacts; interaction with other local projects and system improvements; participation by State, local, and federal agencies in project implementation; and changing natural and institutional conditions. Successful programmatic or regional permitting of projects will require adequate funding, measurable goals, implementation timelines, timely mitigation, and long-term management and monitoring. Because the costs and benefits of these conservation opportunities are very sensitive to on-the-ground conditions, they are presented as options to be considered in future regional flood management planning.

Regional conservation opportunities are described for five planning areas within the Systemwide Planning Area. These planning areas encompass larger areas than the CVFPP Implementation Zones to provide broader context for conservation planning to support CVFPP actions:

- Upper Sacramento River Planning Area, including the Sacramento River and tributaries from Red Bluff to Fremont Weir
- Feather River Planning Area, including the Yuba and Bear rivers and other tributaries
- Lower Sacramento River Planning Area, including the Sacramento River and tributaries from Fremont Weir to Isleton
- Upper San Joaquin River Planning Area, including the San Joaquin River and tributaries from Friant Dam to Merced River

- Lower San Joaquin River Planning Area, including the San Joaquin River and tributaries from the Merced River to Stockton

A sixth planning area, encompassing the Delta outside the SPFC, is also addressed in this section.

Some of these conservation opportunities may be implemented in the short term and others are long-term projects requiring further study and analysis before implementation. Many of the conservation opportunities were identified during stakeholder meetings conducted as part of the Floodplain Restoration Opportunities Analysis (FROA), which is described in greater detail in Section 5.6.1, Restoration Opportunities Analysis, and Attachment 9F: Floodplain Restoration Opportunity Analysis, or were conservation opportunities recommended by prior studies such as the *Sacramento-San Joaquin River Basins Comprehensive Study* (USACE, 2002a), *Sutter Basin Feasibility Study* (USACE, 2010a), SJRRP, CALFED, and similar regional water resources planning programs. Projects identified through the FROA or by prior studies were only included if the project scope and conservation opportunities were sufficiently defined; projects that were largely conceptual in nature were not included. Projects that may not be part of SPFC facilities, but are within the Systemwide Planning Area, were included because they may have the potential to become part of the SPFC, benefit operation of the SPFC, or may provide habitat to reduce the need for mitigation for future SPFC improvements. Additionally, their inclusion provides context for developing future flood management funding sources.

4.3.1 Upper Sacramento River Planning Area

Riparian and other native habitats exist within the flood management system primarily along river corridors and between levees, and occur on both private lands and a variety of conservation lands managed by State, federal, and local agencies, and private organizations, including portions of lands associated with the Sacramento National Wildlife Refuge. Public agencies (including DWR) and nonprofit organizations have invested substantially in restoring ecosystem processes and habitat in this planning area, particularly north of Colusa.

Beyond other broadly applicable types of improvement (see box), specific conservation opportunities to consider within this planning area include a combination of the following potential projects:

Broadly applicable improvements that apply to the Upper Sacramento River Planning Area

- 4.2.1 Corridor Management Strategy
- 4.2.2 Ecological Restoration – Key habitats in this planning area include wetlands, floodplains, riparian (especially SRA), eroding banks, and spawning gravel beds.
- 4.2.3 Fish Passage
- 4.2.4 Easements
- 4.2.5 Landowner Incentive Programs
- 4.2.6 Levee Maintenance and Repair
- 4.2.7 Floodway Management.
- 4.2.8 Levee Construction, Reconstruction, and Improvements
- 4.2.9 Setback levees
- 4.2.10 SPFC Facilities Removal
- 4.2.11 Flood Control Structure Modification
- 4.2.12 Floodwater Storage and Operations
- 4.2.14 Regional Environmental Permitting

- Purchase easements adjacent to the Sutter Bypass to preserve land uses compatible with periodic flooding and generate opportunities for seasonal and/or permanent habitat conservation and restoration.

- Improve fish passage at flood control structures in and around Chico (Big Chico Creek, Lindo Channel, and Butte Creek).

- Screen fish from entering the Colusa Drain.

- Increase the current capacity of the Sutter Bypass to convey large flood events, including modifying the Colusa, Moulton, and Tisdale weirs, if applicable. This element will be designed to accommodate ecosystem restoration features, improve fish passage, and include conserving and restoring aquatic and floodplain habitats and/or agricultural land uses within the bypass.

- Collaborate with others on planning and implementing the River Sanctuary restoration project, which includes riparian habitat restoration and side channel excavation to improve fish and wildlife habitat along the Sacramento River.

- Collaborate with DFG, USFWS, and TNC on a variety of habitat restoration and flood damage reduction projects within the Chico Landing subreach of the Sacramento River. These projects primarily involve converting agricultural lands subject to frequent flooding and damage to riparian habitat and removing nonessential bank revetment.

- Collaborate with others investigating the feasibility of China Bend, Cecil Lake, and similar projects along the Sacramento River. These projects would potentially involve constructing setback levees, reconnecting side channels to the river, restoring riparian and wetland habitat, and reducing floodway maintenance.

- Evaluate potential expansion of floodway capacity near the town of Princeton to accommodate riparian and floodplain restoration and to reduce the need for ongoing floodway maintenance.

- Collaborate with USFWS, DFG, and TNC on a variety of habitat restoration and flood damage reduction projects between Colusa and Princeton. These projects would primarily involve restoring riparian and floodplain habitats, reducing floodway maintenance, and removing nonessential bank revetment.

- Collaborate with others to construct a setback levee at Hamilton City. The levee would be constructed to accommodate riparian and floodplain restoration, protect agricultural land, and to reduce the need for ongoing floodway maintenance.

Mature riparian forest

- Collaborate with others on the lower Deer Creek Flood Control Project. This project would potentially include constructing setback levees, restoring floodplain and riparian habitat, improving fish passage, protecting agricultural lands, and reducing floodway maintenance.

- Collaborate with DFG, USACE, California State Parks, agricultural interests, and others on the Kopta Slough project. This project would potentially include removing nonessential bank revetment, restoring floodplain and riparian habitat, and reducing floodway maintenance.

- Collaborate with California State Parks to integrate recreational facilities at Woodson Bridge State Recreation Area, Bidwell-Sacramento River State Park, Colusa Sacramento State Recreation Area and a proposed Elkhorn recreation area at the upstream end of the Yolo Bypass with those available in restored habitat areas.

- Collaborate with Sacramento River Conservation Area Forum to develop restoration planning and project designs that address local and regional concerns.

Bank swallow habitat along the Feather River

4.3.2 Feather River Planning Area

The Feather River retains a significant remnant of the Central Valley's riparian forests and passes through the Oroville Wildlife Area and several other DFG-managed properties. The most significant levee setback constructed to date within the SPFC (the TRLIA levee setback) is found within this reach and presents an opportunity for riparian and floodplain habitat restoration.

Broadly applicable improvements that apply to the Feather River Planning Area

- 4.2.1 Corridor Management Strategy
- 4.2.2 Ecological Restoration – Key habitats in this planning area include wetlands, floodplains, riparian (especially SRA), eroding banks, and spawning gravel beds.
- 4.2.3 Fish Passage
- 4.2.4 Easements
- 4.2.5 Landowner Incentive Programs
- 4.2.6 Levee Maintenance and Repair
- 4.2.7 Floodway Management.
- 4.2.8 Levee Construction, Reconstruction, and Improvements
- 4.2.9 Setback levees
- 4.2.10 SPFC Facilities Removal
- 4.2.11 Flood Control Structure Modification
- 4.2.12 Floodwater Storage and Operations
- 4.2.14 Regional Environmental Permitting
- 4.2.15 Bypass Expansion and Construction

Beyond other broadly applicable types of improvement (see box), specific conservation opportunities within this planning area include the following potential projects:

- Collaborate with others on the planning and implementation of the Federal Energy Regulatory Commission (FERC) license and settlement agreement at Oroville Reservoir to potentially provide river flows that produce enhanced environmental benefits such as frequently inundated floodplains or improved spawning habitat conditions.
- Collaborate with Yuba County Water Agency, USACE, and NMFS to improve fish passage around the Daguerre Point Dam to increase spawning habitat availability within the upper portion of the lower Yuba River below Englebright Reservoir.
- Design and operate any new potential Feather River Bypass from the Feather River to Butte to accommodate ecosystem restoration features and benefits, including conservation and restoration of aquatic and floodplain habitats and continued compatible agricultural land uses within the bypass.
- Collaborate with others on the planning and implementation of the FERC license and settlement agreement for Oroville Reservoir to enhance spawning gravel within the low-flow section of the Feather River.

- Implement habitat restoration projects within the Oroville Wildlife Area, including projects to restore floodplain and riparian habitat and to enhance spawning habitat.

- Implement habitat restoration projects within the Feather River Wildlife Area, including the Abbott Lakes, O'Connor Lakes, and Nelson Slough projects, which would restore floodplain and riparian habitats and, potentially, reduce floodway maintenance.

- Restore habitat within the TRLIA levee setback area, including restoring riparian, wetland, and floodplain habitats and reducing floodway maintenance.

- Collaborate with others to investigate a variety of projects described in the *Sutter Basin Feasibility Study* (USACE, 2010a). These projects would potentially involve restoring riparian, wetland, and floodplain habitat, excavating floodplains, enhancing spawning habitat, and reducing floodway maintenance.

4.3.3 Lower Sacramento River Planning Area

In this planning area, the riparian corridor and SRA habitat have been reduced to disconnected remnants along the river confined by narrowly spaced levees. The Yolo Bypass, although not providing geomorphic processes, provides important rearing habitat for juvenile fish.

Broadly applicable improvements that apply to the Lower Sacramento River Planning Area

- 4.2.1 Corridor Management Strategy
- 4.2.2 Ecological Restoration – Key habitats in this planning area include wetlands, floodplains, riparian (especially SRA), eroding banks, and spawning gravel beds.
- 4.2.3 Fish Passage
- 4.2.4 Easements
- 4.2.5 Landowner Incentive Programs
- 4.2.6 Levee Maintenance and Repair
- 4.2.7 Floodway Management.
- 4.2.8 Levee Construction, Reconstruction, and Improvements
- 4.2.9 Setback levees
- 4.2.10 SPFC Facilities Removal
- 4.2.11 Flood Control Structure Modification
- 4.2.14 Regional Environmental Permitting
- 4.2.15 Bypass Expansion and Construction

Beyond other broadly applicable types of improvement (see box), specific conservation opportunities identified within this planning area include the following potential projects:

- Collaborate with Reclamation, resource agencies, and local organizations to improve fish passage at the Fremont Weir and in Putah Creek and Cache Creek.

- Collaborate with Reclamation, resource agencies, and local organizations to increase capacity and inundation frequency for the Yolo Bypass to increase the extent and duration of floodplain habitat for fish, while also planning for conservation of other species.

- Collaborate with others to implement the Knaggs Ranch project to enhance riparian habitat and restore wetland and woodland habitat along the Sacramento River and Yolo Bypass, south of Fremont Weir.

Broadly applicable improvements that apply to the Upper San Joaquin River Planning Area

- 4.2.1 Corridor Management Strategy
- 4.2.2 Ecological Restoration – Key habitats in this planning area include wetlands, floodplains, riparian (especially SRA), eroding banks, and spawning gravel beds.
- 4.2.3 Fish Passage
- 4.2.4 Easements
- 4.2.5 Landowner Incentive Programs
- 4.2.6 Levee Maintenance and Repair
- 4.2.7 Floodway Management.
- 4.2.8 Levee Construction, Reconstruction, and Improvements
- 4.2.9 Setback levees
- 4.2.10 SPFC Facilities Removal
- 4.2.11 Flood Control Structure Modification
- 4.2.12 Floodwater Storage and Operations
- 4.2.14 Regional Environmental Permitting
- 4.2.15 Bypass Expansion and Construction

- Collaborate with others to support habitat restoration in Cache Slough, southern Yolo Bypass, Dutch Slough, McCormack/Williamson, and other parts of Delta.

4.3.4 Upper San Joaquin River – Friant Dam to Merced River

Numerous opportunities exist on the upper San Joaquin River to restore ecosystem functions, particularly as flow impediments are removed and as flows that are more representative of the river's natural hydrograph are initiated as part of the SJRRP. Within this planning area, the CVFPP will focus on coordinating with other entities, as needed, on implementing the SJRRP. DWR is working closely with the SJRRP to foster compatibility between SJRRP goals and FloodSAFE principles. The State's involvement in the SJRRP is primarily funded through Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal protection Bond Act of 2006.

Beyond other broadly applicable types of improvement (see box), specific conservation opportunities within this planning area include the following potential projects:

- Collaborate with Reclamation to improve fish passage between Friant Dam and Gravelly Ford and at the Sand Slough Control Structure, Stevenson Weir, Helm Canal, Sack Dam, and the Chowchilla Bypass Bifurcation Structure.
- Improve flood protection for small communities through reconstructing and improving existing levees or, potentially, constructing setback levees with habitat enhancement and restoration measures incorporated, wherever possible.
- Collaborate with Reclamation and other agencies to improve fish passage at Friant and Goodwin dams.

- Collaborate with the San Joaquin River Conservancy on projects involving habitat restoration, invasive species removal, isolation and/or filling of gravel pits, and other channel and floodplain restoration within the upper San Joaquin River above State Route 99.

- Collaborate with the SJRRP to modify levees and floodways to convey mandated flows and provide floodplain habitat, including constructing setback levees between Gravelly Ford and Mendota Pool and in the Mendota Pool Bypass, and modifying the San Joaquin River Headgate Structure.

- Collaborate with the San Joaquin River Partnership to integrate recreational facilities along the San Joaquin River in accordance with the San Joaquin River Blueway Vision.

Upper San Joaquin River

4.3.5 Lower San Joaquin River – Merced River to Stockton

The Lower San Joaquin River Planning Area encompasses the San Joaquin River from the Merced River to, and including, the Stockton Metropolitan Area. SPFC facilities generally include intermittent levees along the San Joaquin River and levees along the lower reaches of various tributaries and Delta distributaries. Major reservoirs with flood management functions tributary to the planning area include New Hogan Reservoir, Farmington Flood Control Basin, New Melones Lake, New Don Pedro Reservoir, and Lake McClure.

The San Joaquin River is actively meandering in portions of this planning area, and the river corridor includes floodplain with complex topography such as oxbows, swales, and other products of channel migration. This planning area contains portions of the San Joaquin River National Wildlife Refuge.

As described above for the Upper San Joaquin Planning Area, opportunities exist on the lower San Joaquin River to restore ecosystem functions, particularly as flow impediments are removed and as flows that are more representative of the river's natural hydrograph are initiated as part of the SJRRP. Within this planning area, the CVFPP will focus on coordinating with other entities, as needed, on implementing the SJRRP. DWR is working closely with the SJRRP to foster compatibility between SJRRP goals and FloodSAFE principles.

Beyond other broadly applicable types of improvement (see box), specific conservation opportunities that have been previously identified within this planning area include the following potential projects:

Broadly applicable improvements that apply to the Lower San Joaquin River Planning Area

- 4.2.1 Corridor Management Strategy
- 4.2.2 Ecological Restoration - Key habitats in this planning area include wetlands, floodplains, riparian (especially SRA), eroding banks, and spawning gravel beds.
- 4.2.4 Easements
- 4.2.5 Landowner Incentive Programs
- 4.2.6 Levee Maintenance and Repair
- 4.2.7 Floodway Management.
- 4.2.8 Levee Construction, Reconstruction, and Improvements
- 4.2.9 Setback levees
- 4.2.10 SPFC Facilities Removal
- 4.2.11 Flood Control Structure Modification
- 4.2.12 Floodwater Storage and Operations
- 4.2.14 Regional Environmental Permitting
- 4.2.15 Bypass Expansion and Construction

- Reconstruct and improve existing levees around Stockton with vegetated berms and similar measures incorporated, where possible, to increase habitat values.

- Design, construct, and operate any new potential bypass in the South Delta, including or in combination with expansion of Paradise Cut and/or other South Delta waterways, to accommodate ecosystem restoration features and benefits, including conservation and restoration of aquatic and floodplain habitats and continued compatible agricultural land uses within the bypass.

- Purchase easements in southern Delta for purposes of floodwater storage, ecosystem restoration, and preservation of land uses compatible with periodic flooding.

- Collaborate with others to implement several projects within this planning area. These projects would include restoring riparian, wetland, and floodplain habitat, removing nonessential bank revetment and levees, removing invasive species, reducing floodway maintenance, and creating connections to historical river channels and sloughs.

- Coordinate flood management actions with State Water Resources Control Board's (SWRCB) efforts to develop and implement flow objectives for the southern Delta and the San Joaquin River.

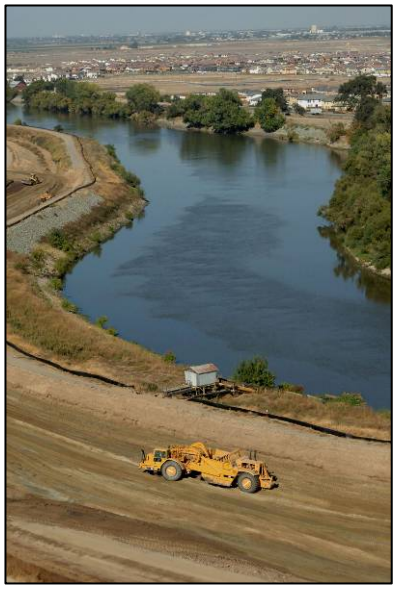
- Collaborate with others to implement several projects (e.g., Grayson Bypass, Merced River Reaches Mi, M2, and M3) within tributaries to this reach of the San Joaquin River. These projects would include restoring riparian, wetland, and floodplain habitat, removing nonessential bank revetment and levees, removing invasive species, reducing floodway maintenance, and enhancing spawning habitat.

- Collaborate with others to reconnect historical sloughs and oxbows, restore riparian habitat, remove invasive species, and restore floodplains to San Joaquin River roughly between River Mile (RM) 57 and RM 118.

- Collaborate with USACE and others on the Three Amigos project to restore wetland, riparian, and floodplain habitat, remove nonessential levees, reduce floodway maintenance, and remove invasive species.

- Work with affected federal and conservation land managers to reduce or stop maintaining levees in the vicinity of Mariposa Bypass, Deep Slough, and adjacent parts of the San Joaquin River to restore riparian, wetland, and floodplain habitat and reduce floodway maintenance.

- Improve fish passage at pumping stations for water diversions, including those pumping stations on the Calaveras and Mokelumne rivers, Stockton Diversion Canal, and Mormon Slough.



Levee near Lathrop on the San Joaquin River

- Collaborate with the San Joaquin River Partnership to integrate recreational facilities along the San Joaquin River in accordance with the San Joaquin River Blueway Vision.

- Collaborate with California State Parks to integrate recreational facilities, including boating trails, in the South Delta, Dos Rios sites, and along San Joaquin River at Mossdale/Vernalis with those available in restored habitat areas.

4.3.6 Sacramento-San Joaquin Delta Areas Not Protected by State Plan of Flood Control

The Delta is contained within the Systemwide Planning Area for the CVFPP. Areas within the Delta that contain or receive flood protection from the SPFC are included in the Lower Sacramento River and Lower San Joaquin River planning areas. Areas of the Delta outside the SPFC include the Sacramento River and its distributaries generally located to the south and the east of Isleton, and the San Joaquin River and its distributaries generally located to the west of Stockton.

Restoring ecosystem functions and aquatic habitats in the Delta has been, and continues to be, the focus of various State, federal, and local efforts in this area. These include the Delta Stewardship Council's Delta Plan, Delta Vision's Strategic Plan, and the BDCP. Local agencies are responsible for

flood management in these areas, supported by the State's Delta Levee Program.

The focus of the CVFPP in Delta areas not protected by the SPFC will continue to emphasize the Delta Levee Program, which includes Subventions and Special Projects. These programs are required to not only fully mitigate environmental impacts, but to also provide a net increase in fish and wildlife habitat. With the net increase goal embedded in the enabling statutory authority, this program provides an excellent example of integrating environmental stewardship into flood management at all decision levels. The Delta Levee Program also exemplifies collaboration with other State (e.g., BDCP, Delta Plan), federal (e.g., Delta Islands and Levees Feasibility Study), and local (e.g., McCormack/Williamson, Cosumnes Preserve) planning efforts and programs. The State will continue to support Delta flood management and environmental improvements through existing programs.

5.0 Implementation

Implementation of the Conservation Framework and subsequent Conservation Strategy is the State's preferred approach to providing ecosystem benefits within the Systemwide Planning Area. This section restates the link with the SSIA, describes broad approaches related to funding and systemwide benefits, outlines the CVFPP approach to managing vegetation in the flood management system, and describes other important implementation steps.

The State understands and acknowledges that successful implementation of both the Conservation Framework and Conservation Strategy will involve the continued engagement of diverse (e.g., environmental, agricultural, recreational, rural, and urban) interests and stakeholders, and the generation of mutual benefits among these diverse interests. Chapter 4 of the CVFPP presents further information on overall CVFPP implementation.

5.1 State Systemwide Investment Approach Implementation

The SSIA is outlined in Chapters 3 and 4 of the CVFPP, and incorporated conservation actions are contained in Section 4 of this document, Integration of Conservation and Flood Management. The SSIA is an integrated set of programs, policies, principles, guidance, and on-the-ground regional elements that will require more than 20 years to implement. While the SSIA is a broad approach for how system improvements could fit together, not all elements, including some conservation elements, have been developed to a level of detail necessary for near-term implementation. Some elements have already been completed, others will be accomplished before the first update of the CVFPP in 2017, and many will require additional time to fully develop and implement. Ongoing planning, feasibility studies, designs, funding, and partnering are required to better define and incrementally implement these elements over time.

As part of the SSIA, investment in actions to carry out the Conservation Framework will be made with funding available for flood management improvements, funding specifically earmarked for ecosystem projects, and through partnering with other entities that have an interest in projects that benefit habitats and species associated with the flood management system.

All levels of CVFPP project planning and development will consider opportunities to integrate ecosystem enhancements with flood damage reduction projects.

5.2 Funding Approach

The CVFPP provides a broader discussion of funding flood system improvements. This section builds on that discussion by identifying environmentally related funding issues.

As a general rule, flood management projects that produce benefits for multiple project objectives (e.g., flood risk management and ecosystem restoration) are likely to have a higher level of federal interest in sharing the cost of implementation. For those projects in which the federal government has an interest, cost-sharing between State and federal flood management agencies is established in State and federal law. The USACE *Trade-Off Analysis Planning and Procedures Guidebook* (2002b) contains details on what types of projects USACE shares costs in, and lays out a framework on how to allocate those costs to different project objectives.

For those flood management projects in the Central Valley for which a federal interest is not established, project costs are often allocated among the State and local partners. In accordance with legislation enacted in 2007 (Assembly Bill 5, Chapter 366, Section 26 (codified at CWC Section 9625)), DWR developed cost-sharing formulas for the Early Implementation Projects program using funds made available by Proposition 1E and Proposition 84, which has funded numerous flood management projects in advance of adoption of the CVFPP. However, it is recognized that these formulas for State-funded flood management projects may not fully account for the lesser ability of rural areas to pay for flood projects.

Additionally, the formulas may need to be strengthened to sufficiently account for non-flood-risk-reduction benefits, such as enhancing ecological processes and habitats that are fundamental to sustainable flood management. Therefore, an effort is underway to reevaluate existing cost-share formulas to better address ecosystem restoration and conservation associated with flood management. Broad policy issues are expected to figure in the revision of cost-share formulas and, more broadly, into case-by-case determinations of how costs for multipurpose projects could be allocated to beneficiaries on a regional or systemwide scale. In some cases, it may be in the State's interest to fund 100 percent of project costs, with additional incentives to local agencies to create projects that generate more than traditional flood-risk-reduction benefits.

In the specific case of creating new habitat areas within a setback levee, local agencies or other entities may be interested in receiving “credits” associated with the creation of that habitat. This could be in the form of an advance mitigation bank in which an agency could use that habitat to offset mitigation requirements of nonroutine O&M, or it could hold the option of selling habitat credits to other entities that are striving to meet their own regulatory mitigation obligations. Such incentives will have to be developed creatively in consultation with State, federal, and local agencies at the individual project level, and their application will have to consider whether a project is economically feasible (not just lowest in cost).

Beyond the upfront initial costs of land acquisition, restoration planning, site construction, and habitat restoration, mitigation projects need continued funding for long-term monitoring and management. Ongoing management issues often involve activities such as controlling invasive species, trash and dumping cleanup, maintaining equipment and facilities, and maintaining water control operations.

In summary, individual projects will need to be carefully evaluated to identify potential benefits, beneficiaries of those benefits, and how much the beneficiaries are willing to pay for benefits. DWR’s Environmental Stewardship Policy includes a provision for DWR to include environmental stewardship and ecosystem protection and restoration as a criterion in project funding decisions for all DWR programs.

5.3 Systemwide Benefits

The Central Valley Flood Protection Act of 2008, as codified by CWC Section 9616, requires the CVFPP to describe structural and nonstructural means for improving the performance and eliminating deficiencies of the flood control system and to meet multiple objectives. Among these objectives are several environmentally related objectives, as described in Section 3. Properly implemented, the same objectives should increase the safety and sustainability of the flood management system, and also present opportunities for supporting habitat needs for fish and wildlife.

Section 4.3, Conservation Opportunities by Planning Area, describes the primary flood management actions that the State will consider. Prominent among these are setback levees, new and expanded floodwater bypasses, and easements to preserve land uses compatible with periodic flooding.

These actions present opportunities to reduce flood damages, increase the sustainability of the flood management system, reduce levee maintenance costs, and generate additional habitat for fish and wildlife. The risk of flood

damage to property is likely to decline because the levees will be safer, be able to accommodate higher peak floodflows, be subject to less erosion, be properly engineered to current standards, and be less vulnerable to catastrophic failure. The flood management system would become more financially sustainable with less need for costly repairs and emergency actions. Such costs can be reduced by consolidating meandering levees into shorter setback lengths and distancing levees from the river's main erosive flows. The system's ecological sustainability would also improve with improvements in floodplain processes, habitat quality, quantity, and connectivity.

Although these actions should contribute to achieving multiple systemwide benefits, additional efforts are needed to achieve the environmental objectives of the Central Valley Flood Protection Act and State and federal law. Established DWR policy is to "incorporate ecosystem restoration as an objective in water and flood management projects, including partnering with restoration efforts of others, to achieve net environmental benefit" (see Section 1.4, Conservation Framework Development). To achieve the environmental objectives of the Central Valley Flood Protection Act of 2008, designs and budgets for flood projects should include actions that provide ecosystem benefits. DWR will also collaborate with others to restore habitat and ecosystem processes throughout the system.

5.4 Levee Vegetation Management Strategy

The following section describes the State's strategy for managing vegetation on levees within the SPFC. The section describes the background and risk assessment that provides the rationale for the development and implementation of a flexible and adaptive levee vegetation management strategy that would achieve public safety goals and protect and improve habitat within the SPFC. Implementation of the State's strategy for levee vegetation management will be adaptive and responsive to (1) the results of ongoing and future research, and (2) knowledge gained from levee performance during high water events. Background of the strategy pertaining to retention of Public Law 84-99 Disaster Recovery eligibility is discussed in Chapter 3 of the CVFPP, and investment challenges are presented Chapter 4 of the CVFPP.

5.4.1 Risk-Informed Context for Levee Vegetation Management

DWR has implemented the FloodSAFE California initiative, a comprehensive flood risk reduction program that includes the concurrent planning, design, and construction of flood risk reduction projects that

integrate habitat protection and improvements. This program is prioritized by targeting projects or actions that result in the greatest public safety and ecosystem improvements with early financial investments. Prioritization is necessary because of resource limitations. These early investments target, but are not exclusive to, high consequence systems (urban areas) most vulnerable to deep flooding. Agencies with flood management responsibility generally agree that levee sites posing the highest risk (with "risk" defined as the cumulative product of the probability of failure and the consequence of those failures) should be corrected at the earliest opportunity.

Woody and non-woody growth along base of levee

DWR appreciates the need for, and benefits of, broad nationwide guidance from USACE to meet a variety of objectives, including guidance for vegetation management on flood protection levees. However, DWR also believes there is a clear need for such nationwide guidance to be flexible and adaptable to regional conditions to serve the highest priority of public safety. A flexible strategy recognizes the pitfalls of one-size-fits-all approaches to protecting public safety, and improves the efficiency of local solutions to address local risks. Both DWR and USACE agree on public safety as the highest priority, and, as such, it has been identified as the primary goal of the CVFPP. To this end, the Levee Vegetation Management Strategy for the CVFPP described below characterizes vegetation management within the context of risk prioritization in order to make judicious investments of public funds.

DWR recognizes that woody vegetation on levees must be adaptively managed, including appropriate clearing and thinning of "legacy levee vegetation" for visibility (inspections) and accessibility (maintenance and flood fight activities). DWR defines "legacy levee vegetation" as vegetation that was inspected by USACE and for which there is no documentation that the nonfederal sponsor was notified before 2007 that the vegetation needed to be removed. This includes vegetation present on State-federal project levees at the time the project was turned over by USACE during the 1950s, vegetation that was planted for mitigation as part of a cost-shared USACE project, and vegetation that has been allowed by USACE to remain to meet ESA or other requirements.

Levee failure mechanisms (or risk factors) such as underseepage, through-seepage, slope and structural instability, erosion, and deep rodent burrows indisputably have negative impacts on levee integrity and public safety.

Legacy levee vegetation does not fall into such a grouping of unequivocal failure mechanisms. However, because currently accepted methods of analysis cannot fully take into account the effects of woody vegetation, the USACE Engineering Technical Letter (ETL) 1110-2-571, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams and Appurtenant Structures* (2009), treats vegetation as introducing unacceptable uncertainties, which must be remediated through removal or engineering works. Given that USACE Engineer Research and Development Center's (ERDC) research report (July 2011) shows that woody vegetation has the potential to increase or reduce risk, depending on a variety of factors, DWR believes it is appropriate to characterize woody vegetation as only a "potential risk factor" that should be considered in relation to the unequivocal risk factors and to site-specific conditions. One of the findings of DWR's *Flood Control System Status Report* (DWR, 2011) was that while risk factors such as seepage, stability, and erosion were rated as medium-to-high relative threats, levee vegetation was rated as a low threat to levee integrity, consistent with the fact that no documented levee failures in California have been attributed to vegetation.

Another important consideration is that a rigidly conservative and precautionary approach that calls for removal of levee vegetation runs at odds with State and federal environmental requirements. State and federal resource agencies find that the ETL itself, and the potential impacts of widespread vegetation removal due to strict enforcement of that regulation, poses a major threat to protected species and their recovery. Similarly, local agencies are concerned about negative impacts to public safety from rigid ETL compliance due to redirection of limited financial resources to lower priority risks. For this reason, widespread vegetation removal is unlikely to be a feasible management action for many of California's levees.

5.4.2 Lower Waterside Vegetation Benefits and Risk Assessment

The levees that confine river systems in California support the last remnants of once great riparian forest ecosystems. This is especially true in the Central Valley, where more than 95 percent of the riparian habitat has been lost. Many of California's native fish and wildlife resources evolved in this complex and dynamic natural community and many are now State listed and/or federally listed as threatened or endangered species largely because of the cumulative loss of habitat along riparian corridors. Woody vegetation found on Central Valley levees is a significant portion of the remaining riparian habitat that provides nesting, foraging, and cover habitat for migratory birds (including neotropical migrants, raptors, and others); vegetation on the lower waterside slope of the levee provides overhead cover and shade that moderates water temperatures and energy input to

river productivity at all trophic levels. The lower waterside slope is defined as the portion of the waterside slope that is below the vegetation management zone (which is typically 20 feet, but may be less on short levees).

From a flood threat perspective, lower waterside slope vegetation rarely presents an unacceptable threat to levee integrity. However, lower waterside slope vegetation more typically provides beneficial functions such as slowing near-shore water velocities and holding soil in place to reduce erosion; and in the case of larger vegetation, providing an additional stabilizing force on the levee itself. The USACE ERDC report titled *Initial Research into the Effects of Woody Vegetation on Levees* (July 2011) included a finding that trees can increase or decrease levee safety, depending on their location on levees; modeling of trees at the levee toe observed a reinforcing effect due to the tree acting as an anchor and counterweight to sliding. While ERDC called for additional research, its report did not characterize levee vegetation – particularly on the lower waterside – as a major risk factor.

Lower waterside slope vegetation is generally considered to be beneficial, or in the worst case, to pose a low threat to levee integrity:

- Due to its position on the levee, it does not interfere with flood fight, inspection, and access. It is at the greatest distance from the landside levee slope, which reduces concerns about (1) erosion that might occur should a tree fall and expose erodible levee soils, and (2) seepage that might travel along rotten tree roots.

- California Levee Vegetation Research Program (CLVRP) research shows that in some cases, vegetation may impede seepage, and was unable to confirm the theory that rotten roots promote piping.

- University of California, Davis, tree root architecture research study shows that roots of the two predominant native tree species growing on levee slopes in California, valley oak (*Quercus lobata*) and cottonwood (*Populus* sect. *Aigeiros*), do not penetrate all the way through levees. Exceptional roots of large cottonwoods may grow some distance into the levee, following beneath the watereside slope surface, or following soil lenses, but roots do not go from water to landside.

- Woody vegetation may have beneficial functions, such as holding soil in place to avoid erosion, recruiting sediment, and aiding slope stability.

Public funds expenditures need to be well justified. When addressing multiple risks in a major levee system using limited public funds, a rational strategy is to prioritize the investment based on the risk and public benefit. In making prioritized investments solely based on risk, the highest risks are addressed first and the lowest risks are addressed last. In consideration of the low potential threat to public safety and high potential impact to State and federally protected species, the CVFPP considers removal of lower waterside vegetation, or levee improvements designed for the specific purpose of mitigating lower waterside vegetation, to be among the lowest priorities for use of public flood risk reduction funding. However, because of the limited extent of this waterside vegetation, the CVFPP considers projects that enhance (go beyond mitigation) the lower waterside vegetation, or levee improvements designed to address public safety and significantly increase the lower waterside vegetation, to be among the highest priorities for the use of public funding.

Lower waterside vegetation

From an ecosystem perspective, widespread removal of waterside vegetation (particularly, SRA habitat – critically important in protection and recovery efforts for special status species along California's riparian corridors and its adjacent waterways) would result in ecological impacts that would be considered essentially "unmitigable." To be effective, mitigation would need to be placed in the same aquatic ecosystem from which the vegetation is removed. Additionally, loss of habitat for some species cannot be mitigated with off-channel or offsite locations; specific location is essential for many species that use this ecosystem for all or part of their life cycle. California currently has over 400 species listed under CESA and ESA. A number of these species are wholly or partially dependent on riparian habitat for their life requisites. The risk is to the ecosystem as a whole, not just listed species within the ecosystem. If there are locations where vegetation has been determined as the highest flood management and levee threat, direct and indirect riparian ecosystem impacts will be evaluated in consultation with appropriate resource agencies.

5.4.3 Vegetation Management Strategy

The State will implement a comprehensive, integrated management strategy that meets both public safety goals and protects and enhances sensitive habitats within the Sacramento and San Joaquin valleys. The State's strategy to levee vegetation management will be adaptive and responsive to (1) the results of ongoing and future research, and (2) knowledge gained from levee performance during high-water events. The strategy is built on concepts embodied in *California's Central Valley Flood System Improvement Framework* (Framework Agreement), signed in 2009 by California Levees Roundtable participants, and includes a systemwide risk-informed process to address the requirements of USACE national vegetation policy within the context of multiple levee risk factors. Policies and implementation of these policies regarding removing trees and other woody vegetation on levees are evolving and will be informed by ongoing and future research.

Management of vegetation on Central Valley levees is at the heart of the disagreement between the USACE vegetation policy and resource agency recovery efforts for river corridors. Long-term management of vegetation will generally be accomplished through adaptive management of vegetation on the levee – both within the vegetation management zone and on the lower waterside slope (outside of the vegetation management zone). This strategy allows existing "legacy" trees and other woody vegetation to live out their normal life cycles unless they pose an unacceptable threat, while maintaining visibility for inspection and access for maintenance and floodfight. This strategy allows for the retention of lower waterside vegetation (below the vegetation management zone).

Vegetation Management Zone

The Vegetation Management Zone is the area on and near a levee in which vegetation is managed for visibility and accessibility using a life-cycle management strategy.

The vegetation management zone includes the entire landside levee slope plus 15 feet beyond the landside toe (or less if the existing easement is less than 15 feet), the levee crown, and the top 20 feet (slope length) of the waterside levee slope.

For levees that have a waterside slope of less than 20 feet, the vegetation management zone includes the entire waterside slope plus the extent of berm within 20 feet of the crown as measured along the ground surface.

For levees that have a short waterside slope above the water surface elevation that submerges the lower waterside slope frequently enough to prevent long-term tree establishment, the lower 5 feet (slope distance) of the waterside slope immediately above that water surface elevation is not included in the vegetation management zone and should remain unmanaged.

For levees with a landside berm, the vegetation management zone is determined by using the projected landside levee slope instead of the actual landside levee slope.

The vegetation management zone is illustrated on Figures 5-1 and 5-2.

Adaptive Levee Vegetation Management

Implementation of the State's strategy to levee vegetation management will be adaptive and responsive to (1) the results of ongoing and future research, and (2) knowledge gained from levee performance during high-water events. The strategies outlined below for the lower waterside slope and for the vegetation management zone provide a path forward for CVFPP implementation.

Lower Waterside Slope

In order to sustain critical habitat, the CVFPP levee management strategy retains lower waterside vegetation (below the vegetation management zone). Vegetation would be removed (in coordination with resource agencies) only when it presents an unacceptable threat.

Vegetation Management Zone: Life Cycle Management (LCM)

LCM achieves "visibility and accessibility" criteria while progressing gradually (over many decades) toward the current USACE vegetation policy goal of eventually eliminating woody vegetation from the vegetation management zone on the landside slope, crown, and upper waterside slope of levees.

LCM addresses resource agency objectives to protect and improve riparian habitat by largely preserving in the near term existing vegetation within the vegetation management zone that does not impair visibility and accessibility, while developing additional habitat under the Conservation Strategy to offset gradual die-off of existing trees and the removal of trees that pose an unacceptable threat to levee integrity. For the long term, it is anticipated that continued scientific research, potential system modifications, and evolving vegetation policy will support preservation and restoration of sustainable riparian habitat within the levee system.

The vegetation management strategy within the SPFC planning area is focused on improving public safety by providing for levee integrity, and visibility and accessibility for inspections, maintenance, and flood fight operations, while at the same time protecting and enhancing important and critical environmental resources, such as SRA. For the systemwide scale of the CVFPP, it is not practical to assess each levee segment individually to determine relative risk factors and to prioritize integrated system improvements. An expectation of "site by site" or "tree by tree" assessments would create an unreasonable administrative burden for project proponents and agency staff of all project partners. However, through routine inspections, levees will be inspected multiple times each year for a wide variety of potential problems, including trees that may pose an unacceptable threat to levee integrity. Such trees would be removed in coordination with the resource agencies.

This strategy affords maintaining agencies with flexibility and encourages them to retain existing trees and other woody vegetation. Because of the importance of these critical vegetation resources, it is anticipated that implementing this vegetation policy will result in retaining, in the near term, the vast majority of existing trees and other woody vegetation that provide important and critical habitat. In the long term, it is anticipated that the vast majority of trees and other woody vegetation on the lower waterside levee slope would be left to continue to grow with little or no management.

Vegetation Management Procedures

The following summarizes DWR's vegetation management procedures in support of the 2012 CVFPP to manage vegetation on levees protecting

urban, urbanizing, and non urban levees in the Sacramento-San Joaquin valleys. Specific vegetation management procedures implemented will be dependent on whether a levee is (1) a new or legacy levee, or (2) directly adjacent to the river or set back from the channel. This is an adaptive levee vegetation management strategy and, based on the results of ongoing and future research or knowledge gained on levee performance during high water events, revisions to this strategy may be made in future 5-year updates to the CVFPP.

Measuring plantings on levee

Waterside Vegetation

Flood management actions will protect existing, and promote the development of, appropriate vegetation for erosion control on the waterside slope, outside of the vegetation management zone. Brush, snags, and tree growth, especially on the lower portions of the levees in the natural banks or waterside levee slope, often have beneficial effects, including stabilizing levee materials, reducing erosive forces on levee embankments by slowing near-bank flows and dissipating wave action, which in turn encourages local deposition of sediment. USACE regulations, 33 Code of Federal Regulations, Part 208, recognize that vegetation can improve public safety by reducing the potential for levee erosion based upon the following language taken from a USACE "vegetation variance letter" dated August 3, 1949: "Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees." The 1949 letter also stated that "brush and small trees may be retained on the waterward slope where desirable for the prevention of erosion and wave wash."

Waterside vegetation below the vegetation management zone, usually the top 20 feet (slope length), should remain in place, unless through an engineering evaluation it is determined that it poses an unacceptable risk to levee integrity, in which case it would be removed. However, the removal of vegetation will need to comply with environmental regulations, including obtaining necessary permits and mitigation requirements.

As described in Section 5.4.2, mitigating for environmental impacts due to wholesale removal of waterside levee vegetation would be nearly impossible to achieve because the availability of in-kind mitigation is, at best, questionable. However, in isolated instances where lower waterside vegetation is removed because it poses an unacceptable threat, mitigation may be possible by planting vegetation where it does not currently exist. For example, locations where there is no existing riparian vegetation or

SRA habitat may be suitable for planting and should be used to the fullest extent possible. Planting additional riparian habitat will increase connectivity along the riparian corridor, an ecosystem improvement objective included in the SSIA, and will help meet objectives in the *Central Valley Salmon and Steelhead Recovery Plan* (NMFS, 2009), which identifies enhancing riparian and floodplain corridors throughout the Central Valley flood system. Planted areas may need to be monitored, managed, and protected for the long term pursuant to CESA and ESA.

Setback Levees

Improvements to the Central Valley State-federal levee system will strive to achieve multiple objectives through use of setback levees, where practical, to separate the flood control system from the riverbanks and their attendant riparian vegetation. Setback levees can increase channel capacity and reduce water surface elevations at flood stage locally, while avoiding loss of important riparian and SRA habitat and improving floodplain area. This can result in flood system and habitat improvements. Engineering requirements for new setback levees are the same as for new levees. The expanded floodways provided by setting levees back will be designed to accommodate vegetation, while still meeting channel conveyance and ETL requirements for the new levees.

Newly Constructed Levees

The State proposes adherence to USACE guidance for new levee construction, which typically would be new setback, bypass, or ring levees located away from the river channel. These standards limit vegetation to native grass species on levee crowns and slopes and within 15 feet of the levee toe (or less, if the existing easement is less than 15 feet).

To minimize impacts to SRA, new levees along the river should be designed and constructed to include a specially designed waterside planting berm to accommodate trees and other woody vegetation to sustain continuous SRA habitat along the river, as described in the SSIA, and still meet the requirements of the ETL. Such berm designs are not only intended to offset impacts of vegetation removal required for project construction, but also to provide opportunities for improving connectivity of SRA habitat. This planting berm must represent an overbuilt section with respect to minimum geometries. The planting berm also must be of sufficient size and configuration to mitigate potential negative impacts to levee safety with respect to seepage, stability, and erosion criteria should either windfall or root decay occur.

Levee Repair or Improvement

For levee repair or improvement, vegetation can be removed to meet the objectives of a specific project. Any vegetation removed as part of direct

construction activities would likely not be replaced at that location, but would require off site, in-kind mitigation, to be determined in consultation with the appropriate resource agencies. However, vegetation on other sections of the levee, not affected by construction activity, should remain in place.

Note that in many locations where levees are repaired, waterside trees and other woody vegetation should remain in place, particularly on the lower waterside slope and channel bank, because of environmental and engineering benefits that include erosion protection, soil reinforcement, and sediment recruitment. If removed for the purposes of the repair, lower waterside woody vegetation (below the typical 20-foot vegetation management zone) should be allowed to reestablish, and may be restored (subject to regulatory approval). Root mitigation alternatives, such as described below, may be included as part of any levee improvement program:

- The overall width of the levee would be widened landward by at least 15 feet beyond the standard minimum levee dimensions, where feasible, or

- An effective root or seepage barrier would be installed within the upper 10 to 15 feet of the levee crown to mitigate potential impacts by tree roots.

This is consistent with the *Sacramento River Bank Protection Project Programmatic Biological Opinion* (USFWS, 2008), which states that "existing riparian vegetation will be protected on site to the maximum extent possible where it does not affect flood system safety."

Levees with Preexisting "Legacy Levee Vegetation"

DWR does not believe that the presence of properly maintained woody vegetation on "legacy levees" constitutes a degree of risk that necessarily requires removal of vegetation or constructing engineered works to address the perceived risk. Instead, such previously defined "legacy levee vegetation" needs to be considered in a balanced recognition of its role to the ecosystem and to the levee's integrity.

A critical limitation of the USACE ETL is that it is written strictly in terms of new levee construction, and fails to recognize and address the unique engineering and environmental attributes presented by well-established "legacy vegetation" as an integral aspect of many SPFC levees. Taking all the above factors into consideration, the CVFPP builds on the 2009 Framework Agreement by proposing to adhere to the USACE guidance for new levee construction (typically setback, bypass, or ring levees located

away from the river channel). For "legacy levee vegetation," however, the CVFPP vegetation management strategy has been developed to be adaptable to achieve compatibility with implementation of USACE national vegetation policy. The State suggests that the USACE national vegetation policy needs flexibility to recognize and accommodate regional differences – something that could be achieved through a collaboratively developed variance policy that provides such regional flexibility.

Levee with preexisting vegetation

Levees with preexisting vegetation are to be maintained according to the levee vegetation inspection criteria described below. DWR's levee inspection program first developed "interim criteria" for use in the fall 2007 levee inspections, which were later described as "interim criteria for visibility and accessibility" in the Framework Agreement. The criteria have been implemented by maintaining agencies since 2008 and have been successful in achieving visibility and accessibility along the levee system to meet public safety goals.

The inspection criteria establish a vegetation management zone in which trees are trimmed up to 5 feet above the ground (12-foot clearance above the crown road) and thinned for visibility and access. Brush, weeds, or other such vegetation over 12 inches high are to be removed in an authorized manner. The vegetation management zone includes the entire landside levee slope plus 15 feet beyond the landside toe (or less, if the existing easement is less than 15 feet), the levee crown, and the top 20 feet (slope length) of the waterside levee slope.

For levees that have a waterside slope of less than 20 feet, the vegetation management zone includes the entire waterside slope plus the extent of berm within 20 feet of the crown, as measured along the ground surface. For levees with a short waterside slope above the water surface elevation that submerges the lower waterside slope frequently enough to prevent long-term tree establishment, the lower 5 feet (slope distance) of the waterside slope immediately above that water surface elevation is not included in the vegetation management zone and should remain unmanaged. For levees with a landside berm, the vegetation management zone is determined by using the projected landside levee slope instead of the actual landside levee slope (see Figures 5-1 and 5-2).

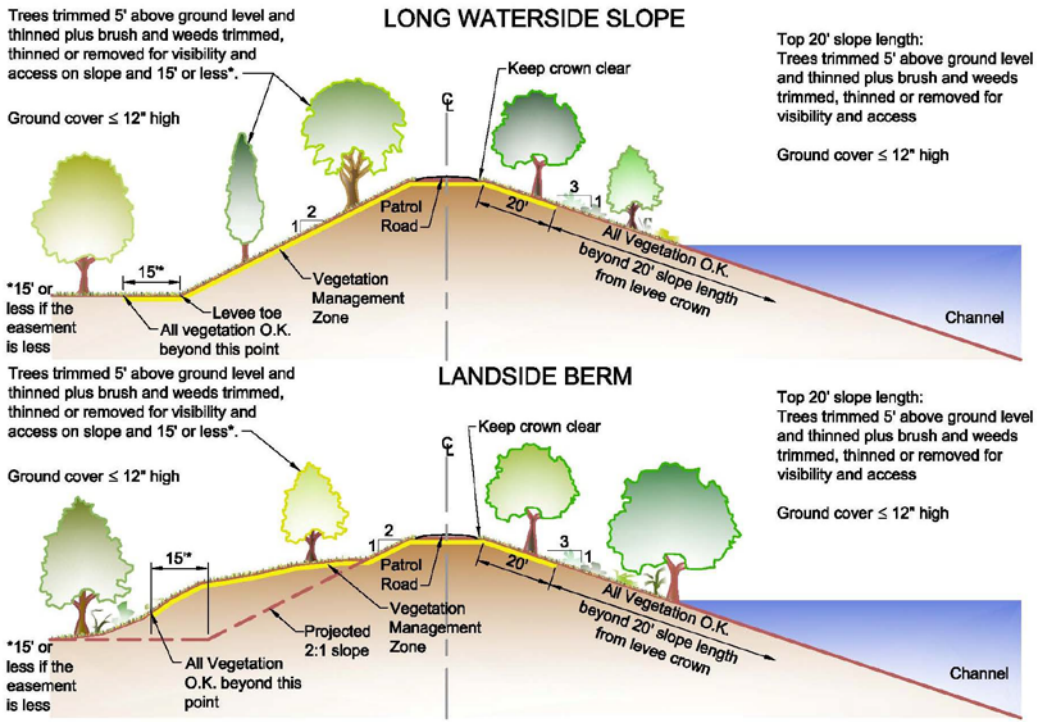


Figure 5-1. DWR Vegetation Inspection Criteria for Standard Levees –Long Waterside Slope and Landside Berm

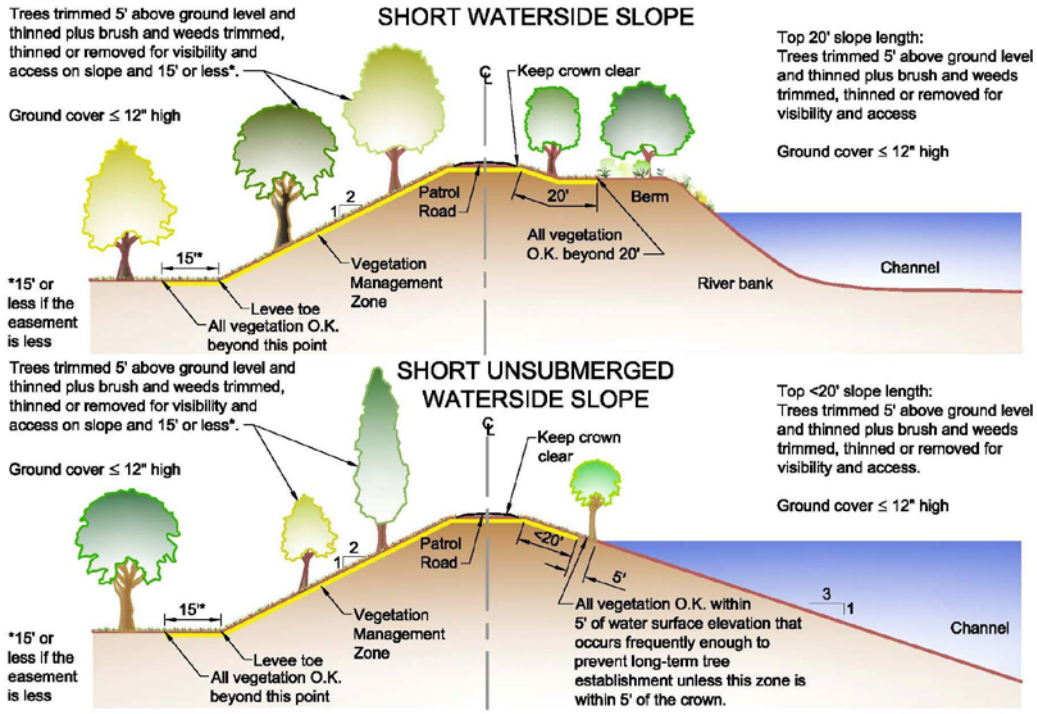


Figure 5-2. DWR Vegetation Inspection Criteria for Standard Levees – Short Waterside Slope and Short Unsubmerged Waterside Slope

Waterside vegetation below the vegetation management zone should remain in place without trimming or thinning, unless it poses an unacceptable threat to levee integrity.

Vegetation that was introduced, allowed, required as mitigation, or endorsed by a previous USACE action as necessary to comply with environmental requirements, and/or was present when the levee system was transferred from the USACE to a non-federal sponsor, will not be removed (unless changed conditions cause such vegetation to pose an unacceptable threat or it creates a visibility problem within the vegetation management zone).

Life-Cycle Vegetation Management and Early Establishment of Riparian Forests

DWR will implement and encourage maintaining agencies to implement a long-term adaptive vegetation life-cycle management (LCM) plan that will lead to the eventual elimination of trees and other woody vegetation through removal of immature trees and woody vegetation. LCM will be implemented in the vegetation management zone, as described above.

This plan will allow existing “legacy” trees and other woody vegetation beyond a certain size to live out their normal life cycles on the levee, unless they pose an unacceptable threat. Removal would be accomplished in consultation with appropriate resource agencies.

Under the LCM plan, removing immature trees and woody vegetation less than 4 inches in diameter at breast height will be conducted in consultation with the appropriate resources agencies.

Because implementing the LCM plan will result in loss of important habitat throughout the State and federal project levee system, LCM includes early establishment of riparian forest corridors to compensate for the potential eventual loss of this habitat. The intention is that these riparian forest corridors will be established adjacent to existing and new levees such that the net effect will be to maintain and improve riparian corridor function for wildlife habitat. This approach will allow replacement habitat to develop and mature over time while the existing trees within the vegetation management zone are allowed to live out their normal life cycles on the levee slopes.

To address concerns about habitat lost under LCM, trees will be planted concurrently during this period. The goal is to plant vegetation within the floodway, but site limitations or regulatory constraints (Board restrictions) may require that trees be planted on the landside (outside the current levee easement). A site protection mechanism (such as a conservation easement),

long-term funding strategy, and monitoring and management plan for the planted riparian areas will be developed.

Levee vegetation subject to removal through the LCM plan will be quantified, using best available information. Specific rates for replanting and other details of implementation of the LCM plan will be determined through collaboration with the appropriate agencies as part of Conservation Strategy development.

As described in the draft *Urban Levee Design Criteria* (DWR, 2012), before any tree removal, an engineering inspection and evaluation should be conducted to identify trees and woody vegetation (alive or dead) that pose an unacceptable threat to the integrity of the levee. These engineering evaluations should be based on best available science and state-of-practice, and should be commensurate with risk. It is expected that future research will build upon current draft guidance to better address how to determine (in advance of and during high-water events) when a tree poses an unacceptable threat. These inspections should address both the hazards and benefits of vegetation with respect to potential failure mechanisms. The analysis may also include a risk assessment of all factors that adversely affect levee safety. Mitigation will likely be required for any trees removed because of an unacceptable threat determination. Appropriate compensation and/or mitigation for the loss of habitat will be addressed in consultation with the resource agencies and in the development of the Conservation Strategy.

Blue elderberry (*Sambucus nigra ssp. caerulea*)

Endangered Species Act Compliance

Levee vegetation management actions in the Central Valley have the potential to adversely impact listed anadromous fishes and terrestrial species, and their critical habitat, under the ESA and CESA, such as the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), riparian brush rabbit(*Sylvilagus bachmani riparius*), least Bell's vireo (*Vireo bellii pusillus*), and southwestern willow flycatcher (*Empidonax traillii extimus*). The draft Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead highlights riparian corridor protection and enhancement as high priorities for recovery of these species. In addition, levee vegetation management actions in the Central Valley could adversely affect Essential Fish Habitat of Pacific salmon, as designated by the Magnuson-Stevens Fishery Conservation and Management Act. The Conservation Framework anticipates that habitat

replacement plans will be negotiated with the appropriate resource agencies in conjunction with, or in advance of, implementing management actions that propose to remove vegetation. Future projects proposing to remove vegetation that is considered essential to the protection and recovery of listed species will likely need to be compensated for on site and in-kind.

As part of the Conservation Strategy, DWR and the maintaining agencies will work collaboratively with the appropriate resource agencies to fill information gaps on threatened and endangered species and other species of concern. Relevant information from other planning efforts will be used, as appropriate. For example, an inventory of elderberry shrub distribution within and adjacent to the State-federal project levee system has not been completed. This knowledge is essential for valley elderberry longhorn beetle habitat enhancement projects.

The Conservation Strategy may include establishing conservation banks, compensation site protection mechanisms (such as conservation easements), and will require a dedicated long-term funding strategy for maintenance, management and monitoring of areas used for this purpose. DWR and maintaining agencies will work with the appropriate resource agencies on future vegetation management activities with the goal of preventing adverse effects on State and federally listed species, and federally designated critical habitat, and impacts to riparian habitat or the species that depend on it.

Through the development of the Conservation Strategy, mitigation for environmental effects of flood system improvements and habitat enhancements implemented as part of multi-objective projects will be part of environmental considerations for the entire levee system.

Update Maintenance Agreements

DWR and maintaining agencies must obtain all required permits to carry out maintenance activities. Without such permits, DWR and the maintaining agencies cannot lawfully proceed. Maintaining agencies will need to work with the appropriate resource agencies (DFG/NMFS/USFWS) to obtain and update routine maintenance agreements under which vegetation management and appropriate minimization and mitigation can occur on a regular basis. This should be accomplished through development of a more efficient regulatory mechanism.

A process for assisting maintaining agencies to achieve environmental compliance and for obtaining necessary permits is expected to be addressed as part of near-term initiatives included in the SSIA. Support for this activity will be included in the Conservation Strategy. Attachment 9G:

Regional Permitting Options provides a preliminary review of permitting options to consider.

Continue and Expand Research

Currently, State and local agency-sponsored research by the CLVRP, along with USACE-sponsored research by ERDC, is addressing information gaps surrounding levee performance through applied research and an ongoing synthesis of historical information. Findings of these research programs are informing current policy development, and will continue to do so for future CVFPP updates. In addition, further research will follow-up on recent research into the effects of woody vegetation on levees, and to address other data gaps. Some of the initial CVLRP research included developing a checklist of monitoring requirements during implementation of LCM. A further goal is to develop more detailed guidance for local maintainers to use for recognition of "unacceptable threat" thresholds.

In addition to future research focusing on levee integrity, research will include evaluating effects to riparian ecosystem function from eliminating natural recruitment under LCM. This research may include a monitoring program to determine if LCM affects species composition, recruitment, and the survival of lower waterside vegetation.

Alternate Variance Procedure and Shared Responsibility

The ETL essentially established a woody vegetation-free zone on all levees and the adjoining ground within 15 feet of the levee on both sides (April 10, 2009), which is at odds with DWR's independent assessment described above. As an implementation directive for the ETL, the USACE subsequently issued a draft Policy Guidance Letter (PGL), *Variance from Vegetation Standards for Levees and Floodwalls* (February 9, 2010). Congress, through the Water Resources Development Act of 1996, Section 202 (g), had mandated that USACE "address regional variations in levee management and resource needs" – but the February 2010 draft PGL did not address regional variations. Before and following release of the draft PGL, DWR has repeatedly encouraged USACE to collaborate in the formulation of a variance process that is workable on a systemwide scale, and allows for consideration of the geotechnical, hydraulic, environmental, and economic factors that DWR believes are important in formulating and prioritizing levee repairs and improvements.

Because the February 2010 draft PGL was not workable from DWR's perspective, in May 2010, DWR proposed an alternative variance procedure for USACE consideration. Although the USACE has not accepted DWR's proposal to collaboratively develop a variance policy that recognizes and accommodates regional differences, DWR remains hopeful

that USACE will issue a final vegetation variance PGL which will complement and be consistent with the CVFPP.

A further complication is the question of shared responsibility for activities to address woody vegetation. The USACE ETL and associated draft PGL fail to recognize that legacy vegetation exists for a wide variety of reasons (in many cases because USACE itself placed it or encouraged its placement or retention), and instead treats all legacy vegetation as if it were "deferred maintenance" and solely a non-federal responsibility. Consequently, USACE asserts through the ETL and draft PGL that all of the administrative and financial burdens for ETL compliance, or for obtaining a variance, should be placed on its non-federal partners. The State encourages USACE to accept shared responsibility for addressing levee vegetation issues as appropriate – which would also facilitate USACE plan formulation as a partner in cost-shared flood risk reduction projects.

It is important to note that DWR's purpose in advocating for shared responsibility is not to commit federal funds toward the enormous cost of removing vegetation to achieve ETL compliance. Rather, DWR is advocating that such inordinate costs be avoided by having USACE participate with DWR as true partners in addressing legacy levee vegetation issues, jointly considering the environmental and risk reduction implications of vegetation remediation within the context of prudent expenditure of limited public funds. DWR will continue dialog with USACE on plan formulation concepts that recognize shared responsibility for addressing vegetation issues (in parallel with traditional levee risk factors) within a systemwide risk-informed context that is intended to enable critical cost-shared flood system improvements to move forward.

5.5 Environmental Improvement Projects

The State is making a variety of physical improvements in the flood system and is working to integrate ecological benefits into those improvements. In addition, the State has funding to strategically initiate new restoration projects, collaborating and cost-sharing with others.

The State has developed draft guidelines for allocating available funding to projects that meet the intent of the Conservation Framework, and anticipates the first cycle of projects will be funded during 2012. The funding allocated to capital projects is targeted at two distinct purposes: (1) to acquire, protect, or restore properties that would provide advance mitigation solutions for activities undertaken for SPFC facilities, and (2) and to implement projects that incorporate environmental stewardship and sustainability principles into flood management activities. Projects that

meet the intent of the Conservation Framework will be evaluated and funded, in accordance with the State's guidelines, based on the significance (size and connectivity) of ecological improvements, technical and political feasibility, and cost reasonableness/cost-sharing opportunity. Identifying multi-benefit projects that can be supported by diverse interests is an important overall goal.

5.6 Regional Conservation Planning

To provide faster and better delivery of flood management projects, DWR is considering regional planning options, including regional flood management planning; collaborating with other regional conservation plans; developing regional permits and plans (such as NCCPs, HCPs, programmatic ESA Section 7 consultations, or Regional General Permits); CMS; regional vegetation management planning; watershed planning; and RAMP. More detailed descriptions of RAMP and other regional permitting efforts and plans are located in Attachment 9A: Regional Advance Mitigation Planning, Attachment 9E: Existing Conservation Objectives from Other Plans, and Attachment 9G: Regional Permitting Options.

Because of the degraded status of riverine and floodplain ecosystems in the Systemwide Planning Area, attaining the ecological goals of this Conservation Framework depends in part on restoring riverine and floodplain functions. Consequently, the CVFPP includes management actions related to restoring ecosystems, and in particular to restoring physical processes that sustain riverine and floodplain habitats. Future CVFPP regional flood management planning will need to address ecosystem restoration opportunities.

5.6.1 Floodplain Restoration Opportunity Analysis

The State has conducted an initial analysis of potential restoration opportunity areas (see Attachment 9F: Floodplain Restoration Opportunity Analysis) to help guide restoration actions. This analysis identifies areas where floodplain functions could be restored within the Systemwide Planning Area by considering physical suitability; opportunities and constraints related to existing land cover and land uses, road and railroad locations, and conservation status of land; and locations that stakeholders are interested in restoring. Physical suitability was evaluated using the concept of floodplain inundation potential. This analysis identifies floodplain areas, both directly connected to the river and disconnected from the river (e.g., behind natural or built levees or other flow obstructions) that could be inundated by biologicially meaningful floodplain flows.

This type of analysis will continue to be improved to evaluate restoration opportunities based on their potential ecological, flood management, and other benefits (e.g., reduced maintenance); potential effects on other species; cost; and regulatory, institutional, technological, and operational feasibility.

5.6.2 Collaborating with Existing Regional Conservation Plans

Implementation of the Conservation Strategy will occur in an environment with many other ongoing overlapping conservation efforts. The State is already conducting regional planning in coordination with other public agencies and ongoing collaborative efforts. This collaboration will continue for areas of common interest and on projects with mutual objectives. DWR needs to communicate with planners of these other efforts to identify common goals, assess opportunities to work together and reduce unintentional conflicts, and seek ways to collaborate and share funding on projects of common interest.

Existing regional conservation plans are generally NCCPs, HCPs, and species recovery plans. More than 30 plans have been identified to date, and are detailed in Attachment 9E: Existing Conservations Objectives from Other Plans; examples are as follows:

- **Yolo County Natural Heritage Program** – The Yolo County Natural Heritage Program is a comprehensive, county-wide plan designed for long-term conservation and management of sensitive and at-risk species and the habitats on which they depend, while accommodating other important uses of the land. The plan serves as an HCP and NCCP; the plan area includes 653,820 acres (Yolo County HCP/NCCP Joint Powers Agency et al., 2004).

- **San Joaquin County Multi-Species Habitat Conservation Plan and Open Space Plan (OSP)** – The goal of the HCP/OSP is to create 100,841 acres of preserves, predominantly located on productive agricultural lands throughout the county. The HCP/OSP requires that 600 acres of preserves be established to offset incidental take or accidental loss on neighboring lands of limited numbers of California tiger salamander (*Ambystoma californiense*), red-legged frog (*Rana draytonii*), valley elderberry longhorn beetle, giant garter snake, western pond turtle (*Actinemys marmorata*), northern harrier (*Circus cyaneus*), and California horned lark (*Eremophila alpestris acti*) (San Joaquin Council of Governments, 2000).

- **Bay-Delta Conservation Plan** – The “overarching goals of the BDCP are to advance the restoration of the ecological functions and

productivity in the Delta and improve the reliability of water supplies provided by the SWP and the CVP…" (BDCP 2010). The plan's list of proposed covered species includes 5 species of anadromous salmonids (Central Valley steelhead; Sacramento River winter-run Chinook salmon; and Central Valley spring-, fall-, and late fall-run Chinook salmon); 5 other fish species, such as delta smelt and North American green sturgeon (*Acipenser medirostris*); 6 species of mammals, including the San Joaquin kit fox (*Vulpes macrotis mutic*) and the riparian woodrat (*Neotoma fucipes riparia*); 12 bird species; and 5 species of reptiles and amphibians (BDCP, 2010).

Many of these regional conservation plans are still in progress, potentially allowing for cross-plan collaboration during development.

There are also opportunities to collaborate with regional recreational planning efforts such as the San Joaquin Blueway Vision, California State Parks' Central Valley Vision, and California State Parks' Recreation Proposal for the Sacramento and Joaquin Delta and Suisun Marsh.

The Corridor Management Strategy process involves developing a vision, strategy, and plan (Corridor Management Plan) for managing a corridor that integrates flood risk management, improved ecosystem function and integrated water management over a long-term (greater than 30 years) planning horizon.

5.6.3 Corridor Management Strategy

Implementation of integrated flood management can be effectively accomplished at the corridor scale, where participants can more readily interact, understand different perspectives, and work on a series of individual projects that collectively contribute to a broad set of goals and find ways to integrate, to the extent possible, multi-sector interests.

The CMS process involves developing a vision, strategy, and plan (CMP) for managing a corridor that integrates flood risk management, improved ecosystem function and integrated water management over a long-term (greater than 30 years) planning horizon. A CMP includes a strategy for managing flood protection facilities, conveyance channels, floodplains, and associated uplands; a maintenance plan; a restoration plan; and identifies policies for compatible land uses such as agriculture and recreation within the corridor. In addition to addressing habitat restoration and flood facility maintenance, CMPs are a foundation for securing programmatic regulatory agency approvals for ongoing maintenance activities and habitat restoration. CMPs rely on coordination, collaboration, and cooperative working relationships with interested parties and stakeholders, including State, federal, and local agencies, NGOs, maintenance districts, agricultural interests, and landowners. The State has initiated development of a CMP on a 20-mile long reach of the lower Feather River (from Yuba City to the Sutter Bypass). The CMP process will be a key method for working with

local stakeholders including agricultural communities in a coordinated approach to implementing the Conservation Strategy.

CMP development involves assessing the current biological and physical conditions of the proposed management plan coverage area. This may include reviewing existing reports, maps, and aerial photography, hydraulic modeling, and reconnaissance-level biological resources surveys. The information collected is used to create a mapped inventory of existing vegetation, hydrology, land uses, public land ownership and other relevant resource information. This baseline information is then used to identify localized facility maintenance needs, assess the probability of occurrence of special-status plants, fish, terrestrial wildlife and habitats, and identify restoration opportunities in the study area. Additional hydraulic modeling is often necessary to determine channel conveyance and sediment transport patterns, hydraulic impacts, channel and flow constrictions; and to identify opportunities to improve capacity and transitory storage in the system through the construction of setback levees, sediment removal, or other methods.

An inclusive planning process engages stakeholders, regulatory agency staff, and other interested parties early to identify goals and objectives, and facilitate development of a comprehensive and coordinated CMP. Under this framework, flood management agencies, maintenance districts, and resource and regulatory agencies participate in the project design process. Collaborating with biologists, hydrologists, and hydraulic modelers, the planning team can determine an appropriate spatial arrangement of habitat types to be created and restored within a corridor in a manner that meets flood conveyance needs; considers adjacent land uses, hydraulic, hydrologic, regulatory and other constraints; minimizes ongoing maintenance needs; and maximizes habitat values.

By addressing what are often competing resource issues and stakeholder concerns on a regional basis, CMPs help meet regulatory mandates requiring maximum avoidance and minimization of project effects to sensitive resources. Additionally, CMPs may identify target areas for providing onsite compensatory mitigation for unavoidable impacts to sensitive resources such as wetlands and State-listed and federally listed species. CMPs thereby set the stage for programmatic approvals by State, federal, and local agencies, and provide the foundation for integrated, streamlined permitting processes.

CMP strategies are means of restructuring existing flood management practices and policies implemented within a given management area to benefit and enhance the environment without compromising actions required by practices and policies. CMPs effectively support the objectives

of the CVFPP in establishing an integrated management plan to reduce flood risk, improve ecosystem function, and create a more sustainable flood management system that allows for ongoing O&M of flood management facilities.

5.6.4 Regional Permitting

As described in Section 1, Introduction, the State is pursuing a new approach to go beyond traditional compensatory mitigation, with a goal of improving ecological conditions and trends. Within the realm of regulatory permitting; however, the State will take advantage of new strategies that improve the efficiency and effectiveness of permitting and associated conservation.

Traditional project-by-project environmental permitting has resulted in several shortcomings, both for project proponents and conservation interests. These shortcomings can include time-consuming negotiations for each project to identify, where required, suitable offsite mitigation areas as compensation for habitat losses, project delays, establishment of small, isolated restoration areas that are difficult to manage, and temporary losses in habitat while compensation sites are restored.

Several new regional permitting methods have been developed in the past 20 years to solve these permitting and conservation challenges, and local governments in California have been using these approaches to both permit land development and maintain healthy ecosystems. These methods include regional HCPs, NCCPs, programmatic ESA Section 7 consultations, and Regional General Permits. New methods are under development, including CMS (see Section 5.6.3) and RAMP (see Section 5.6.5).

Regional permitting methods are being used, or can be used, to collectively meet permitting needs for multiple projects, over longer planning horizons, while also consolidating mitigation and conservation efforts into larger, more viable conservation areas. Attachment 9G: Regional Permitting Options, provides more detailed information about the following:

- Types of flood management activities that could potentially be covered under regional permitting
- Description and evaluation of several options for developing regional permits for the flood management system
- Summary of other important environmental regulations that apply to flood management projects

The State still needs to evaluate how existing regional conservation plans can help meet its flood management permitting needs and to identify suitable tools that can be used where no efforts are ongoing. Several conservation planning efforts that overlap with the CVFPP Statewide Planning Area are listed in Attachment 9E: Existing Conservation Objectives from Other Plans.

5.6.5 Regional Advance Mitigation Planning

RAMP (see Attachment 9A: Regional Advance Mitigation Planning) has been in preparation by a multiagency work group since 2008. RAMP is focused on developing mitigation processes that integrate project-specific mitigation with regional and statewide conservation priorities, and that offset unavoidable impacts of planned infrastructure projects before the prospects are constructed. To develop advance mitigation in the Systemwide Planning Area, the State would work with regulatory agencies to estimate the range of mitigation needs early in the timelines of multiple projects. This process minimizes permitting and regulatory delays and reduces mitigation costs by securing and conserving valuable natural resources at an economically efficient scale and before potential mitigation lands are converted to incompatible land uses. Having RAMP-sponsored mitigation sites in strategic locations throughout the Systemwide Planning Area could speed approvals for the State's infrastructure agencies when the agencies seek permits for "take" of endangered species, fill of wetlands, or disturbance to streambeds and their banks. Adopting a strategic, forward-looking, and regional approach, in which natural resources agencies are encouraged to identify mitigation needs early, can provide a vehicle for identifying solutions that address conservation priorities in ways that are coordinated and take into account agricultural communities and land uses.

RAMP Work Group has identified the following benefits that could result from implementing a RAMP program, a more detailed description of these potential benefits can be found in Attachment 9A: Regional Advance Mitigation Planning:

- Lower mitigation costs and simplified permitting for the infrastructure funding agency
- Fewer permitting or regulatory delays resulting from the need to find mitigation solutions
- Greater ecological and financial predictability
- Mitigation site planning, management, and monitoring efficiencies

- The ability to focus on large-scale conservation to benefit sensitive species through higher quality habitat, improved connectivity between habitat areas, and better long-term protection

- The ability to leverage and assist ongoing conservation efforts

The RAMP Work Group has developed a Statewide Framework document (2011a) that describes the goals, benefits, and operational framework of a statewide RAMP initiative. This group is also working on other documents, including a Regional Assessment that includes a preliminary test of RAMP for a pilot region in the Sacramento Valley and a RAMP Manual, which will serve as a comprehensive guidance document for planning and implementing regional advance mitigation throughout California. The RAMP Manual will incorporate lessons learned during development and completion of the Regional Assessment. More information about RAMP can be found in Attachment 9A: Regional Advance Mitigation Planning and at the RAMP Work Group Web site, https://rampcalifornia.water.ca.gov (2011b).

Riparian brush rabbit (Sylvilagus bachmani riparius)

5.6.6 Targeted Conservation Planning

This Conservation Framework focuses on restoring ecosystem processes as a primary strategy for restoring habitat and populations of species at risk. In many cases, this strategy will cover the important conservation needs of many species, particularly those that rely on the condition, structure, and function of single habitats. For some species at risk, however, an ecosystem process or single-habitat focus alone does not adequately address important conservation needs. For these species, more targeted species-focused conservation planning can be useful, particularly where no recovery plans exist. Such planning can more systematically and efficiently address species conservation needs and demonstrate how individual flood projects can incrementally contribute to species recovery.

These more targeted species-focused conservation plans can help develop and maintain partnerships among flood managers, State and federal fish and wildlife agencies, NGOs, agricultural interests, and the general public. These plans can also provide a solid foundation for long-term regulatory authorizations under State and federal endangered species laws for the operation of the flood system by providing information about:

- Critical life history elements and sensitivities
- Distribution, both rangewide and within Central Valley flood management system
- Status and trends historical, current, and future expectations
- Conservation goals and measurable objectives
- Strategic conservation and restoration opportunities

Examples of species in the Central Valley that are suitable for this more targeted conservation planning include the following:

- Swainson's hawk
- Giant garter snake
- Greater sandhill crane
- Tricolored blackbird (*Agelaius tricolor*)
- Bank swallow (*Riparia riparia*)
- Riparian brush rabbit

Such plans will be developed as opportunities arise to work collaboratively with wildlife agencies on species of common priority. DWR will also collaborate with resource agencies to implement existing recovery plans (such as NMFS Central Valley Anadromous Fish Recovery Plan) within the flood management system.

5.7 Science and Conservation Planning Information

Attaining this Conservation Framework's ecological goals requires a large number of science-based decisions during development of policies and capital projects, and during conservation planning. The State will inform those decisions with several types of scientific and technical activities:

- **Inventory** – Data on existing conditions are integral to implementing the Conservation Framework and avoiding and minimizing impacts, and are basis in part for modeling and other analyses, and for identifying potential conservation areas. Conservation-related

inventories include mapping resources and other documentation of existing physical and biological conditions. Inventorying can also entail compiling information on infrastructure (e.g., permitted flow capacity of water diversions in the Systemwide Planning Area).

- **Analyze and model** – Estimates and simulations of existing and future ecosystem conditions and of the consequences of alternative actions are integral to the processes of project design, policy evaluation, alternatives analysis, and conservation planning. Conservation-related analyses and modeling include actions as varied as estimating the regional demand for mitigation land to support RAMP; evaluating existing hydrology data to better understand ecosystem status and trends; hydraulic modeling to identify potential ecological benefits and impacts of proposed flood management actions; and formulating conceptual models to create a framework for communication.

Fish sampling along the Sacramento River

- **Monitor** – Documentation of actions and ecosystem conditions is required to comply with terms and conditions of permits, necessary to determine the effectiveness of actions, and integral to adaptive management. Conservation-related monitoring ranges from documenting actions to monitoring ecological indicators of overall success of the Conservation Strategy.

- **Conduct management-oriented research** – Reducing key uncertainties can substantially improve the scientific basis and effectiveness of flood management and conservation-specific policies, projects, and planning efforts. Generally, management-oriented research is related to uncertainties affecting a policy or multiple projects and planning efforts (e.g., vegetation benefits to levee stability or management effects on species that are conservation targets). Management-oriented research often can consist of analyses based on inventory or monitoring actions that also serve other purposes.

- **Manage and access information** – Results of inventories, analyses, and modeling, monitoring, and management-oriented research are often broadly applicable to flood management and conservation-specific actions within the Systemwide Planning Area. Thus, the management and distribution of this information improves the scientific and technical basis of flood management and conservation-specific

decisions, and is a primary means of scientific and technical collaboration with other conservation efforts. Information management and access entails developing documentation and tools for archiving and disseminating information (e.g., databases, Web sites).

During development of the 2012 CVFPP and this Conservation Framework, conservation science and planning activities have included medium and fine-scale mapping of vegetation, evaluation of ecosystem status and trends, and the FROA. Specific future needs for conservation science and planning information are being identified and will be met in collaboration with others during development and implementation of policies related to conservation, capital projects, and development of the 2017 Conservation Strategy.

5.8 Adaptive Management

The Central Valley flood management system is complex and dynamic, and the State must balance multiple competing objectives to improve the status and trends of biological resources within the system. These trends will unfold over decades, and understanding of the complexities of the system will change during that period. A robust and scientifically sound adaptive management program must be in place for future projects to achieve their stated goals. Adaptive management is a systematic and iterative process that generates feedback between monitoring and management actions. The feedback mechanism is engaged when monitoring data are analyzed and results are used to adjust project management, or future project design, in a manner that optimizes achieving project goals. Adaptive management employs a structured approach, yet it is also a flexible tool that can adjust to a dynamic environment and evolving projects. Adaptive management can thereby keep a project “on track” toward meeting its goals and objectives, despite the variability inherent in dynamic, natural systems over varying spatial and temporal scales.

The State is committed to using an adaptive management approach in its Conservation Strategy. Two key elements of an adaptive management program to be developed include (1) a description of the organizational structure for the participants to implement the adaptive management process, and (2) a conceptual model of the adaptive management process itself.

The State anticipates developing an organizational structure that allows for input from technical representatives of various interests, including agricultural and environmental interests, and regulatory and resource agencies. Once an organizational structure is in place, an adaptive

management program will develop the initial monitoring activities proposed to evaluate project progress toward meeting goals and objectives. It is therefore important to also develop conceptual models of the biological systems in question so that ecosystem functions can be linked to quantitative monitoring elements. The program must then establish the triggers (or thresholds) that would initiate a management response and describe the range of potential adaptive management actions. Management triggers define the specific point, or a range of values, where monitoring data indicate that a project may be developing along an unexpected or unfavorable trajectory, and where management actions may be necessary so that the project meets habitat and regulatory performance goals.

Once project monitoring determines that a management trigger has been "activated," there are three possible response pathways:

1. Determine that more data are required and continue (or modify) monitoring.

2. Identify and implement a remedial action.

3. Modify project goals and objectives (this option would only be considered as a last resort and after careful consideration).

Multiple possible management actions may activate a particular trigger, depending on a variety of factors such as how far the project is from achieving a specific goal, or whether the situation is an imminent threat to local infrastructure, ecosystem services/functions, or site stability, etc. Adaptive management is flexible because it allows a wide range of management actions but, just as importantly, it imposes a structured process because management actions must derive from monitoring results. This process is shown on Figure 5-3.

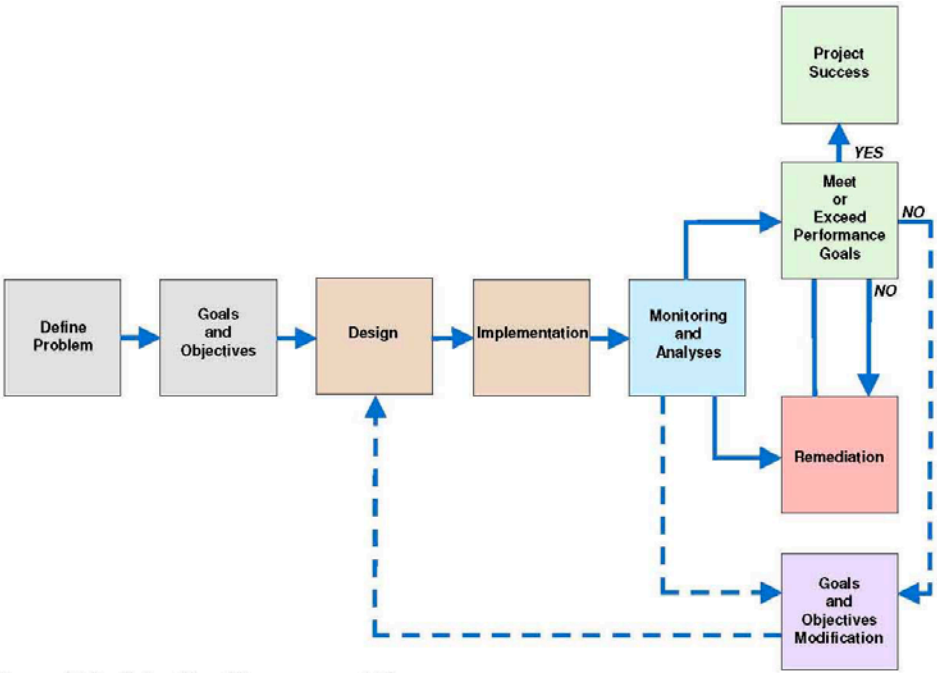


Figure 5-3. Adaptive Management Process

Technical expertise is critical to understanding potential linkages between goals and proposed actions. Therefore, DWR will identify a lead scientist who can identify and prioritize technical issues and develop an outside technical review team for peer review of methods, data, and interpretation and application of results. Applying scientific rigor to adaptive management will be critical for the long-term success, and political and public support, of any proposed projects.

Adaptive management is a simple and logical process, but often difficult to implement. One of the most challenging aspects of developing an adaptive management program is defining the problem. This includes not only technical details of the problem, but also the temporal and geographic scale. A good adaptive management program will clearly state goals and objectives that are linked to performance criteria. However, setting thresholds and triggers for specific future management actions can often be difficult and controversial. Common technical questions include verifying adequacy of baseline information and/or reference sites to make meaningful comparisons; establishing the structure and time frame for decisions based on monitoring results; adequately managing data to handle the amount generated from multiple projects over many years; and confirming the willingness of stakeholders to be flexible in light of new information.

Given the complexity and depth of issues facing the State, adaptive management is a powerful tool to efficiently and effectively communicate

the trajectory of the CVFPP and the natural resources it affects and, ultimately, result in successful flood management and ecosystem restoration projects.

5.9 Outreach, Engagement, and Education

Leading up to the 2017 CVFPP, DWR will refine the CVFPP and develop the associated Conservation Strategy. This process is described more fully in Chapter 4.4 of the CVFPP and in Section 7, Next Steps, below.

Achieving CVFPP goals will require public support and effective partnerships. To facilitate constructive exchanges and garner support, the State will pursue multiple approaches to engage a variety of interests in developing and updating the Conservation Strategy. Outreach and engagement will incorporate input from the public, agricultural and conservation communities, maintaining agencies, and regulatory and resource agencies. Educational programs will be built on components of the State's existing science education framework. The State is interested in coordinating and forming partnerships with the agricultural community, consistent with many of the findings of the Agricultural Stewardship Scope Definition Subcommittee.

Public outreach and engagement for the Conservation Strategy is aligned, in a parallel structure, to the five planning areas within the Systemwide Planning Area, with a designated individual assigned to public meetings and workshops for each planning area. This individual is the point of contact for the public and coordinates outreach activities within a planning area. The State will develop a Conservation Strategy Web site, educational materials, presentations, and workshops as part of public outreach and engagement. In addition, an effort will be made to engage agricultural communities in developing the Conservation Strategy.

To promote a strong working relationship with resource and regulatory agencies, DWR has established an Interagency Advisory Committee to provide guidance on development and content of the Conservation Strategy and associated environmental regulatory compliance. Participants currently include the Board, USACE, USFWS, DFG, NMFS, and SWRCB. A parallel effort will be formulated to engage agricultural and conservation communities with a strong interest in the future of the Central Valley's flood management system. DWR will use the committee to accomplish the following:

- Solicit advice on policy and technical conservation topics.

- Identify critical issues and discuss options for resolving these issues.
- Identify key opportunities for collaboration with other programs and efforts.
- Expand partnerships for improving conservation in the Central Valley flood management system.

A parallel effort will be formulated to engage agricultural, rural and conservation groups, and local governments with a strong interest in the future of the Central Valley's flood management system in the development of the Conservation Strategy. Outreach on RAMP is being coordinated by the RAMP Work Group.

To help achieve the State's goals for improving educational materials about flood system conservation, DWR is working with the San Joaquin County Office of Science and Special Projects and Project Water Education for Teachers to organize a Floodplain and Delta Ecology Teacher Institute. This effort is designed to create meaningful activities for the classroom and interactive content learning for fourth- through eighth-grade teachers focused around the ecological significance of the Delta and Central Valley floodplains. The model framework created for the Floodplain and Delta Ecology Teacher Institute is adaptable and can be easily expanded to address more grade levels, and more teachers, and include more comprehensive information about the CVFPP and Conservation Strategy.

6.0 Indicators of Success

Progress toward the ecological and planning goals of this Conservation Framework can be measured using several types of indicators. In general, indicators should be readily understandable, quantifiable, possible, and affordable. The indicators should be able to be repeated to show trends, and should be sensitive to management actions. Furthermore, for a long-term program, they should yield useful information despite the major ecological, institutional, scientific, and technological changes that are likely during long time spans.

The following two sections discuss potential indicators for the Conservation Framework ecological and planning goals, respectively. The process to develop the 2017 Conservation Strategy will identify a more refined set of indicators of conservation-related progress. In the interim, the State is committed to developing baseline information that will be used to develop and track possible ways that progress toward achieving conservation goals can be measured, as detailed below.

6.1 Ecological Indicators

Improvements in ecological conditions and trends need to be monitored for ecosystem processes, habitats, and species. Monitoring needs to be capable of indicating changes at the project, reach, and systemwide geographic scales. Information related to the following potential indicators will be developed at multiple geographic scales, and individual projects can use these indicators to measure their contribution to systemwide improvements. Possible metrics include the following:

Bank Swallows (Riparia riparia)

- **Ecosystem Processes**
  - **River meandering (sinuosity)** – Meander migration is a key process for many important ecosystem functions, including riparian vegetation establishment, floodplain creation, habitat creation (e.g., bank erosion for swallow habitat), and creation of off-channel habitats (e.g., oxbow lakes, side channels, sloughs) by progressive migration and cutoff processes. Possible metrics include the following:

    - Number of unnatural hard points within and along channels (over time, the goal would be a reduction in riprap and other channel-controlling features along a river)
    - River overall length and length of river with natural floodplain disturbance patterns
    - Channel depth, width, and slope by reach
    - Area of floodplain reworked through sediment erosion, transport, and deposition
    - Point bar characteristics, such as area, slope, and texture
  - **Floodplain activation flows**
    - Timing, depth, duration, and extent of flooding that activates ecological processes (such as germination and aquatic food web production)
- **Habitat**
  - **Habitat connectivity**
    - Extent of floodplain subject to regular flooding (floodplain-to-river connectivity)
    - Landscape-level habitat fragmentation and connectivity indices (connectivity between patches of same habitat type, connectivity among habitat types)
    - Number and influence of fish passage barriers
  - **Habitat quantity** (extent and distribution) and diversity
    - Total extent and distribution of natural habitat and agricultural lands that provide important wildlife values
    - Total extent and distribution of riparian habitat in diverse age classes
    - Total extent and distribution of major habitat types (including SRA, riparian forest, wetlands, spawning gravels, eroding banks, and floodplain fish-rearing habitat)
  - **Habitat quality**

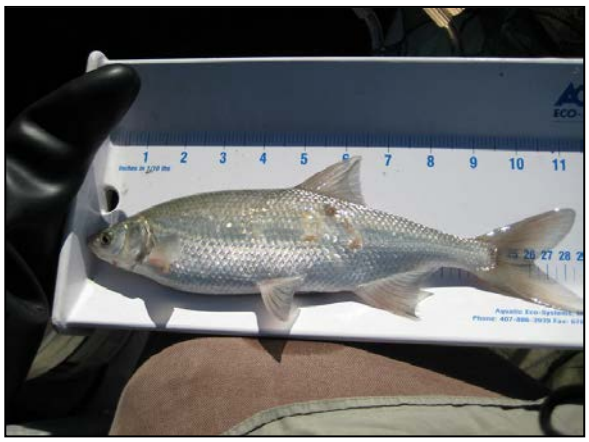
- Extent of habitats with invasive plant or animal species (over time, the goal would be a reduction in invasive species)
- Abundance and use by species that are sensitive to changes in habitat quality

Riparian vegetation monitoring

- **Species**
  - Abundance, diversity, and distribution of species that are sensitive to flood system management actions
  - Incidences of fish stranding at or associated with flood control facilities

6.2 Planning Indicators

In addition to ecological indicators, organizational and institutional indicators are also necessary to assess the success of the CVFPP Conservation Framework and Conservation Strategy. Success will therefore be determined not only by the ecological benefits, but also by the changes to the way the State carries out its mission. Successful conservation depends on such features as strong collaborative partnerships, broad support, strategic planning, and high-quality information. Progress in developing and maintaining these key features could be measured by the following:


Hitch (*Lavinia exilicauda*) measured during DWR monitoring at levee repair sites along the Sacramento River

- **Collaborative partnerships and broad support**
  - Portion of rivers within the Systemwide Planning Area covered by CMPs
  - Number of projects being collaboratively developed with existing NCCPs, recovery planning, joint ventures, or other conservation planning efforts
  - Support among flood managers, regulatory agencies, agricultural interests and environmental NGOs for multi-benefit flood projects

- **High quality information**
  - Portion of Systemwide Planning Area with fine-scale, high-quality vegetation mapping and high-quality data set of sensitive species locations (the results of the recently conducted medium-scale vegetation mapping effort are presented in Attachment 9D: Improving Vegetation Data)
  - Number and quality of broadly supported conceptual ecological models for priority habitats and species
- **Strategic planning**
  - Number of RAMP projects that have been approved by the Mitigation Banking Interagency Review Team and are available for transferring habitat credits for flood projects
  - Number of integrated flood projects that expand flood capacity in specific river corridors and systemwide, and that contribute to the above ecological goals
  - Average time required per flood project for environmental approval
  - Cost reductions for O&M and repair in flood areas (e.g., levee reaches, bypasses, channels)

The above indicators are likely examples of indicators that would be tracked to demonstrate a trajectory of increasing ecological values and institutional progress. Specific elements may be eliminated or added per the needs and goals of a specific project. DWR will establish a database to receive and track data from individual projects. These data will help demonstrate cumulative progress. While no specific targets are given for individual monitoring elements, each project must maximize these improvements in these indictors (or justify their exclusion), and show an overall trajectory toward achieving CVFPP goals.

6.3 Indicators from CVFPP Scope Definition Work Groups

As mentioned in Section 1.4, DWR convened several groups of stakeholders early in the CVFPP planning process to identify the potential scope for the 2012 CVFPP. As part of their summary reports, the ESSDWG and the Agricultural Stewardship Scope Definition Joint

Subcommittee recommended indicators for use in evaluating the success of integrating environmental and agricultural issues into the CVFPP.

Recommended indicators from the ESSDWG (DWR, 2009) for successful integration of environmental stewardship into the CVFPP are shown in Table 6-1. These indicators show a range of potential content for defining successful, partially successful, and no integration with 12 key attributes (i.e., key features) related to environmental stewardship.

The Agricultural Stewardship Scope Definition Joint Subcommittee provided a similar set of indicators to evaluate successful integration of agricultural issues into the CVFFP (DWR, 2010). While these indicators are most appropriately addressed within the CVFPP, they are important reference points for developing a holistic approach that acknowledges the importance of rural areas to integration of conservation and flood management.

Table 6-1. Environmental Stewardship Scope Definition Indicators of Successful Integration of Environmental Stewardship into CVFPP

Key Action Measured	Description	Evaluating Content Quality		
		Successful Integration	Partially Successful Integration	Not Successful Integration
Identify and Describe Existing Conditions for Processes and Habitat	Identify, describe, and quantify (1) physical and ecological processes, and (2) key species and their habitat that are affected by the flood management system in the Sacramento-San Joaquin valleys and Delta.	The plan identifies and describes important physical and ecological processes, habitats and key species and their relationship to the flood management system. It describes cause-and-effect conceptual relationships for many species and ecosystems, and provides GIS-based maps to identify where the processes, species, and habitats are affected by the flood management system.	The plan identifies and describes important physical and ecological processes, habitats, and key species and their relationship to the flood management system. The plan inadequately describes cause-and-effect conceptual relationships. GIS-based maps are not included, or are insufficient.	The plan does not identify or describe important physical and ecological processes, habitats, and key species.
Build on Existing Data and Lessons Learned	Identify and build on previous conservation planning efforts in the Sacramento-San Joaquin valleys and Delta (both written and GIS-based datasets), incorporate lessons learned, and avoid duplicate efforts.	The plan provides a comprehensive summary of other relevant large-scale conservation planning efforts, including a description of key lessons learned by each effort). The plan builds on these efforts and incorporates lessons learned.	The plan provides a comprehensive summary of other relevant large-scale conservation planning efforts, but does not incorporate the lessons learned from these efforts.	The plan does not make an attempt to build on other relevant conservation planning efforts.

Table 6-1. Environmental Stewardship Scope Definition Indicators of Successful Integration of Environmental Stewardship into CVFPP (contd.)

Key Action Measured	Description	Evaluating Content Quality		
		Successful Integration	Partially Successful Integration	Not Successful Integration
Identify Key Data Gaps, Assumptions, and Areas of Uncertainty	Identify key data gaps, assumptions, and areas of uncertainty affecting integration of environmental stewardship into the 2012 CVFPP, and recommend a stepwise approach to the development or refinement of additional models, data, tools, and other resources that could enhance future integration of environmental stewardship into the flood management planning process.	The plan identifies a comprehensive set of key data gaps, assumptions, and areas of uncertainty, and provides recommendations, including specific steps to take, for closing each data gap, validating assumptions, and reducing uncertainty.	The plan identifies key data gaps, assumptions, and areas of uncertainty, but it does not provide recommendations to close these gaps.	The plan does not identify any data gaps, assumptions, and areas of uncertainty and/or recommendations for closing data gaps.
Rehabilitate and Sustain Physical and Ecological Processes	Develop SMART[1] objectives and management actions to rehabilitate and sustain key physical processes and ecological functions, including (1) floodwater conveyance, groundwater recharge, and other hydrologic functions; (2) sediment transport and retention and geomorphic processes, including channel meander; (3) nutrient cycling, and the retention, removal, and degradation of pollutants; and (4) growth, reproduction, and dispersal of terrestrial and aquatic organisms.	The plan contains SMART objectives and management actions that will enhance and sustain (in the context of climate change) each of the listed set of functions.	The plan contains SMART objectives and management actions that will enhance and sustain (in the context of climate change) some of the listed functions.	The plan does not contain SMART objectives and management actions that will enhance and sustain any of the listed functions.

Table 6-1. Environmental Stewardship Scope Definition Indicators of Successful Integration of Environmental Stewardship into CVFPP (contd.)

Key Action Measured	Description	Evaluating Content Quality		
		Successful Integration	Partially Successful Integration	Not Successful Integration
Restore and Enhance Aquatic, Wetland, and Riparian Ecosystems	Develop SMART objectives and management actions to increase and improve the (1) quantity, (2) diversity, and (3) connectivity of (A) riparian, (B) wetland, (C) shallow floodplain, and (D) shaded riverine aquatic habitats within the flood management system, linking these objectives and management actions to key species identified in No. 1 and processes identified in No. 4. Provide GIS maps depicting potential locations for restoration.	The plan contains SMART objectives and management actions that will result in a net increase in the three listed attributes for each of the four listed ecosystems and provides a GIS map to depict potential locations for restoration. The objectives and management actions for habitat improvements are linked to key species and their habitat requirements.	The plan contains SMART objectives and management actions for some of the attributes for some of the communities. OR, the plan contains objectives and management actions for all of the attributes and communities, but the objectives and management actions are not tied to key species habitat requirements.	The plan does not contain SMART objectives and management actions that will result in a net increase in and/or improved habitat conditions.
Reduce Conflicts Between Flood Conveyance and Other Ecosystem Functions and Values	Identify existing or potential conflicts between flood conveyance and other functions and values, including (1) water supply, (2) fish and wildlife habitat, (3) recreation, (4) agriculture, and (5) cultural heritage sites and provide solution sets to reduce the conflicts.	The plan identifies conflicts between flood conveyance and each of the five listed functions and values, and includes actions to reduce identified conflicts with each of the five listed functions and values.	The plan includes actions to reduce conflicts for some listed functions and values.	The plan does not include actions to reduce conflicts for any of the listed functions and values in the plan.

Table 6-1. Environmental Stewardship Scope Definition Indicators of Successful Integration of Environmental Stewardship into CVFPP (contd.)

Key Action Measured	Description	Evaluating Content Quality		
		Successful Integration	Partially Successful Integration	Not Successful Integration
Support the Recovery of Threatened and Endangered Species	Describe actions that support the recovery of threatened and endangered species associated with the flood management system.	The plan includes actions that contribute to the recovery of all sensitive, threatened, and endangered species associated with the flood management system.	The plan includes actions that contribute to the recovery of some threatened and endangered species associated with the flood management system.	The plan does not include actions that contribute to recovery of threatened and endangered species associated with the flood management system.
Encourage Compatible Multiple Uses of Flood Management System	Describe actions that encourage compatible multiple uses of the flood management system, including (1) public education, (2) public access, (3) recreation, and (4) Native American communal activities in the flood management system.	The plan includes actions that address all four of these uses.	The plan includes actions that address one to three of these uses.	The plan does not include actions that address any of these uses.
Control and Reduce Invasive Species	Describe comprehensive guidance, including management actions to (1) discourage the establishment of new invasive species, (2) prevent the spread of existing infestations, and (3) reduce the extent of existing infestations within the flood management system.	The plan includes management actions that address all three of these invasive species issues for all of the major invasive species in the flood management system.	The plan includes management actions that only partially address all three of these invasive species issues; or only addresses them for a small set of invasive species.	The plan does not address any of these three issues.

Table 6-1. Environmental Stewardship Scope Definition Indicators of Successful Integration of Environmental Stewardship into CVFPP (contd.)

Key Action Measured	Description	Evaluating Content Quality		
		Successful Integration	Partially Successful Integration	Not Successful Integration
Support the Conservation of Agricultural Lands for Environmental Stewardship	Describe actions that improve the effectiveness of agricultural landscapes to, in turn, improve water quality and conserve habitat. Provide specific management actions that will maintain and increase the value of agricultural land for water quality and habitat.	Includes management actions for agricultural lands that provide mutual benefits to agriculture, water quality, and wildlife within the flood management system.	Agricultural landscapes are considered in some solution sets related to water quality and habitat. The plan does not describe wildlife-friendly and water quality best management practices.	The plan does not consider the benefits of agricultural landscapes in solution sets.
Minimize Environmental Effects of Maintaining Flood Management System	Ensure that all CVFPP actions strive to minimize, and compensate for, the negative environmental effects to (1) natural processes, (2) water quality, (3) special-status species, and (4) native vegetation and wildlife species associated with ongoing maintenance of the flood management system while maintaining flood conveyance.	The plan contains a comprehensive set of actions to minimize, and compensate for, the negative environmental effects of maintenance activities to all four components identified.	The plan contains actions to minimize, and compensate for, negative effects, but it is not a comprehensive set and does not address all four components.	The plan does not include minimization or compensatory actions.
Improve Efficiency and Effectiveness of Environmental Compliance	Describe actions that improve efficiency and effectiveness of compliance with environmental regulations by the flood management system.	The plan includes actions to improve efficiency and effectiveness of complying with each major environmental regulatory process.	The plan includes actions for more efficient compliance with some, but not all, of the major environmental regulatory processes.	The plan does not include actions for more efficient compliance with any of the major environmental regulatory processes.

Note:
[1] SMART – Specific, Measurable, Achievable, Relevant and Timed
Key:
CVFPP = Central Valley Flood Protection Plan
Delta = Sacramento-San Joaquin Delta
GIS = geographical information system
SMART = specific, measureable, attainable, relevant, time-bound

7.0 Next Steps

As mentioned in Section 1, Introduction, the State will use this Conservation Framework to guide conservation actions associated with the CVFPP until the Conservation Framework is replaced by the 2017 Conservation Strategy. During the next 5 years, the State will continue to develop environmental components for the 2017 CVFPP update and Conservation Strategy.

Anticipated outcomes for the 2017 Conservation Strategy are guidance on streamlined permitting processes for CVFPP-related projects; inclusion of environmental stewardship into flood risk reduction projects; decrease in need for continued maintenance through a more sustainable flood management system; contribution to the recovery of listed and/or special status species and habitats, leading to the potential of decreased mitigation requirements in the future; and ensuring that the citizens of California are better protected from loss of life and property by flood through a more naturally functioning floodplain ecosystem.

Development of the 2017 Conservation Strategy continues in close coordination with, and supports development of, 5-year updates to the CVFPP. This collaborative development provides environmental planning, policy, and technical support to develop public outreach and engagement; to identify opportunities to solve flood problems with environmental approaches; and to provide a solid scientific foundation for improving environmental conditions and trends. In addition to collaboration with the CVFPP, the Conservation Strategy will be developed through engagement with the Board, environmental, recreational, and agricultural interests. This collaboration between the CVFPP and the Conservation Strategy includes the following items:

- **Developing measurable objectives for the Conservation Strategy, consistent with goals of the CVFPP and this Conservation Framework and by engaging interested organizations.**

- **Initiating or partnering with others on ecosystem restoration projects and plans to achieve Conservation Framework goals** – Involvement in capital projects includes strategic use of conservation-specific funding.

- **Conducting regional conservation planning, in coordination with other State programs and ongoing collaborative efforts, including NCCP/HCPs, programmatic ESA Section 7 consultations, and**

Integrated Regional Water Plans – Conservation planning includes identifying restoration opportunities; conducting targeted, species-focused conservation planning; and developing corridor management strategies, regional advanced mitigation, and regional permitting strategies that improve flood project delivery.

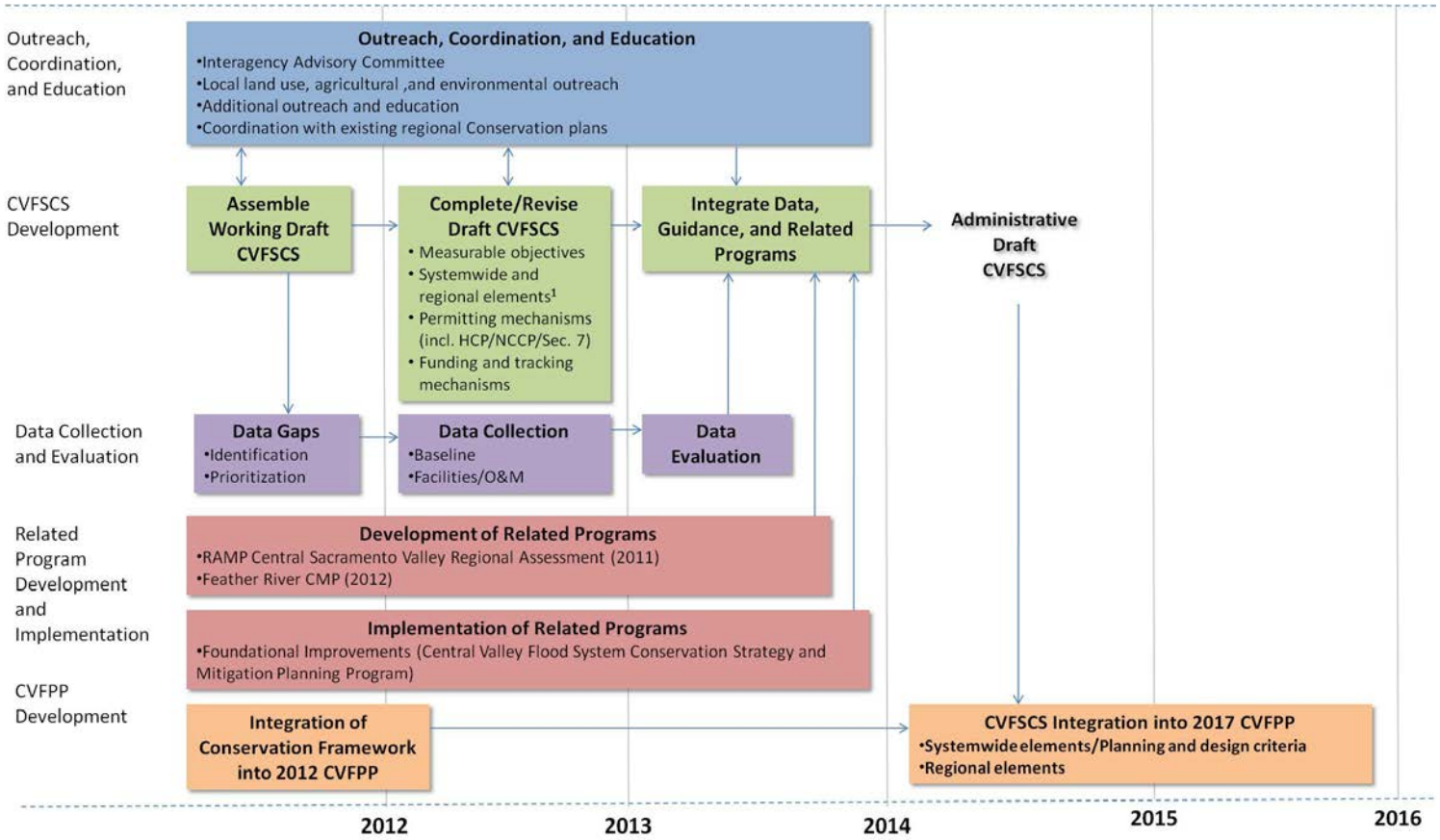
- **Participating in development and implementation of relevant policies** – Relevant policies include those regarding vegetation management, O&M, and other issues related to flood management; environmental river flows; and the State's environmental stewardship policy.

- **Improving environmental scientific and technical basis for informing flood management decisions** – Improvements are made through inventory, analysis and modeling, monitoring, management oriented-research, and information management and access.

- **Developing more effective partnerships with others and improving public outreach and engagement** – This partnering, outreach, and engagement occurs through sharing information and recommendations with interagency committees, independent science advisers, flood managers, and stakeholders (e.g., regulatory, transportation, and land managing agencies, NGOs, agricultural interests, private landowners) and interested members of the public.

- **Developing a funding strategy for ecosystem improvement and project mitigation, including identifying the source of ongoing funds for longer term management and monitoring of mitigation lands.**

These activities are described in greater detail in Section 5, Implementation. Figure 7-1 shows the work plan and timeline for developing the Conservation Strategy.



Note:
[1] – Systemwide elements = integrated into other flood management actions throughout the system (e.g., O&M practices, planning and design criteria); Regional elements = region-specific actions to be implemented or further evaluated (e.g., modification of a specific structure)
Key:
CMP = Corridor Management Plan
CVFSCS = Central Valley Flood System Conservation Strategy
CVFPP = Central Valley Flood Protection Plan
HCP/NCCP = Habitat Conservation Plan/Natural Communities Conservation Plan
O&M = Operations and Maintenance
RAMP = Regional Advance Mitigation Planning
State = State of California

Figure 7-1. Overview of Conservation Strategy Work Plan and Timeline

DWR has established an Interagency Advisory Committee to engage State and federal natural resource and regulatory agencies in developing, improving, and implementing the 2017 Conservation Strategy.

Taken together, the Conservation Framework and ensuing Conservation Strategy incorporate meaningful avoidance, minimization, mitigation, and enhancement measures into the CVFPP to benefit ecosystems and species that rely on the aquatic and terrestrial habitats of the flood management system, while simultaneously improving the performance of the flood management system. Through development of multibenefit projects, the Conservation Framework and Conservation Strategy will provide to the

flood management planning process information, tools, and techniques appropriate to realize the ecosystem goals of the Central Valley Flood Protection Act of 2008. Appropriate policies, funding formulas, and benefit evaluations will allow the Conservation Framework and Conservation Strategy to be implemented concurrent with flood management improvements throughout the Systemwide Planning Area.

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9.0 Acronyms and Abbreviations

AEP ..... annual exceedence probability

BDCP ..... Bay-Delta Conservation Plan

Board ..... Central Valley Flood Protection Board

CALFED ..... CALFED Bay-Delta Program

CEQA ..... California Environmental Quality Act

CESA ..... California Endangered Species Act

CLVRP ..... California Levee Vegetation Research Program

CMP ..... Corridor Management Planning

CMS ..... Corridor Management Strategy

Conservation Strategy Central Valley Flood System Conservation Strategy

CVFPP ..... Central Valley Flood Protection Plan

CVIFMS ..... Central Valley Integrated Flood Management Study

CVP ..... Central Valley Project

CVPIA ..... Central Valley Project Improvement Act

CVV ..... Central Valley Vision

CWC ..... California Water Code

Delta ..... Sacramento-San Joaquin Delta

DFG ..... California Department of Fish and Game

DPR ..... California Department of Parks and Recreation

DWR ..... California Department of Water Resources

ERDC ..... Engineer Research and Development Center

ESA ..... Federal Endangered Species Act

ESSDWG ..... Environmental Stewardship Scope Definition Work Group

ETL ..... Engineering Technical Letter

FERC ..... Federal Energy Regulatory Commission

FloodSAFE ..... FloodSAFE California Initiativee

FROA ..... Floodplain Restoration Opportunities Analysis

GIS ..... Geographic Information System

HCP .....Habitat Conservation Plan

LCM .....life-cycle management

NCCP.....Natural Community Conservation Plans

NGO .....nongovernmental organizations

NMFS.....National Marine Fisheries Service

O&M .....operations and maintenance

OSP .....Open Space Plan

PGL .....Policy Guidance Letter

RAMP .....regional advance mitigation planning

RD .....Reclamation District

Reclamation.....U.S. Department of the Interior, Bureau of Reclamation

RM .....River Mile

ROA.....Restoration Opportunities Analysis

SAFCA.....Sacramento Area Flood Control Agency

SERP.....Small Erosion Repair Program

SJRRP.....San Joaquin River Restoration Program

SPFC .....State Plan of Flood Control

SRA .....shaded riverine aquatic

SSIA .....State Systemwide Investment Approach

State .....State of California

SWRCB .....State Water Resources Control Board

TNC .....The Nature Conservancy

TRLIA .....Three Rivers Levee improvement Authority

USACE .....U.S. Army Corps of Engineers

USFWS.....U.S. Fish and Wildlife Service

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

Attachment 3
Documents Incorporated by Reference

CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

Public Draft

2012 Central Valley Flood Protection Plan

Attachment 3: Documents Incorporated by Reference

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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1.0 Documents Incorporated by Reference

The 2012 Central Valley Flood Protection Plan (CVFPP) incorporates information by reference from several documents that are either linked with CVFPP through legislative requirements or related management policies that adoption of the CVFPP will trigger. This includes *State Plan of Flood Control Descriptive Document* (DWR, 2010a), *Flood Control System Status Report* (DWR, 2011), *Criteria for Demonstrating Urban Level of Flood Protection* (DWR, 2012), and *Urban Levee Design Criteria* (DWR, 2012). A summary of each document is provided in this attachment.

1.1 Summary: State Plan of Flood Control Descriptive Document

The State Plan of Flood Control (SPFC) Descriptive Document (DWR, 2010a) provides an inventory and description of the flood control projects and works (facilities), lands, programs, plans, conditions, and mode of operations and maintenance (O&M) for the State-federal flood protection system in the Sacramento River and San Joaquin River watersheds of California, and facilities identified in California Water Code Section 8361.

Section 9110 (f) of the California Water Code defines the SPFC as follows:

> *"State Plan of Flood Control" means the state and federal flood control works, lands, programs, plans, conditions, and mode of maintenance and operations of the Sacramento River Flood Control Project described in Section 8350, and of flood control projects in the Sacramento River and San Joaquin River watersheds authorized pursuant to Article 2 (commencing with Section 12648) of Chapter 2 of Part 6 of Division 6 for which the board or the department has provided the assurances of nonfederal cooperation to the United States, and those facilities identified in Section 8361.*

The State-federal flood protection system comprises federally and State-of-California (State) authorized projects for which the Central Valley Flood Protection Board (Board), formerly The Reclamation Board, or the California Department of Water Resources (DWR) of the State, has

provided assurances of cooperation[1] to the United States federal government. These Board- or DWR-provided assurances, coupled with State authorization, are an important distinction for what constitutes the State-federal flood protection system.[2] Other flood protection facilities in the Sacramento River and San Joaquin River watersheds that are not covered by assurances to the federal government from the Board or DWR are not part of the State-federal flood protection system or SPFC, but are included in the Sacramento-San Joaquin River Flood Management System defined in the California Water Code Section 9611.

The *SPFC Control Descriptive Document* includes details for the following components:

- SPFC Facilities
  - Approximately 1,600 miles of levees
  - Five major weirs spilling floodwaters from the Sacramento River to bypass channels
  - Four dams
  - Two flood relief structures and one natural overflow area from the Sacramento River into the Butte Basin
  - Five control structures directing flow in bypass channels along the San Joaquin River
  - Six major pumping plants
  - Channels
  - Bypasses and sediment basins
  - Environmental mitigation areas
  - Associated facilities, such as bank protection, stream gages, and drainage facilities
- SPFC Lands

[1] At a minimum, the assurances include that the Board or DWR provide without cost to the United States, all lands, easements, and rights-of-way necessary for completion of a project; bear the expense of necessary highway, railroad, and bridge alterations; hold and save the United States free from claims for damages resulting from construction of the works (facilities); and maintain and operate all works (facilities) after they are completed.

[2] SPFC facilities also include other features identified in Section 8361 of the California Water Code.

- Property rights for SPFC lands are held by the Sacramento-San Joaquin Drainage District (SSJDD), under control of the Board

- SPFC Mode of O&M
  - Mode of O&M for completed facilities of the SPFC that the U.S. Army Corps of Engineers (USACE) has turned over to the Board include O&M manuals, and inspections and maintenance of SPFC facilities by maintaining agencies and flood operations
  - DWR depends on 81 maintaining agencies to keep SPFC levees in good condition; in addition, DWR maintains structures, channels, and levees in specific sections of the Sacramento River Flood Control Project as specified in California Water Code Section 8361 and through State maintenance areas

- SPFC Conditions
  - Assurances of cooperation (as specified in assurance agreements the California Water Code, and agreements) (USACE and Board, 1953)
  - Flood Control Regulations, Section 208.10, 33 Code of Federal Regulations
  - Requirements of standard and unit-specific O&M manuals
  - Design profiles (USACE, 1955 and USACE, 1957)
  - State-adopted conditions, such as the Board Designated Floodway Program

- Programs and Plans Related to SPFC (historical and ongoing)
  - Federal legislation authorizing specific projects and setting partnership requirements for project development with USACE
  - State legislation establishing the roles and responsibilities of the Board, DWR and local agencies regarding flood control
  - State legislation authorizing specific projects and establishing requirements for partnering with the federal government and local entities for project development
  - Partnership agreements with USACE and maintaining agencies
  - As-constructed project documents

- O&M manuals
- *Master Plan for Flood Control in the Butte Basin* (1964)
- *Interim Plan of Flood Control for the Sacramento River from the Butte County Line to Chico Landing* (1984) and *Butte Basin Plan of Flood Control* (1986)
- The ongoing FloodSAFE California (FloodSAFE) Initiative, California Levees Roundtable (Roundtable), *Flood Control System Status Report* (FCSSR), and Central Valley Flood Protection Plan Ongoing projects that have been federally authorized and State-authorized as plans related to the SPFC
- The E*arly Implementation Program* and Section 221 of the Flood Control Act of 1970 as ongoing programs related to the SPFC

This *SPFC Descriptive Document* includes a description of what the SPFC is at the time it is produced; it is not a plan for future modifications. However, as the ongoing FloodSAFE Initiative makes changes in the SPFC, updates to the *SPFC Descriptive Document* will be necessary. DWR will prepare future updates when requested by the Board.

1.2 Summary: Flood Control System Status Report

The Flood Control System Status Report (FCSSR) (DWR, 2011) describes the current status (physical condition) of SPFC facilities at a systemwide level. DWR prepared the FCSSR to meet the legislative requirements of California Water Code Section 9120, and to contribute to development of the CVFPP. California Water Code Section 9120 requires the following:

> *(a) The department shall prepare and the board shall adopt a flood control system status report for the State Plan of Flood Control. This status report shall be updated periodically, as determined by the board. For the purpose of preparing the report, the department shall inspect the project levees and review available information to ascertain whether there are evident deficiencies.*
>
> *(b) The status report shall include identification and description of each facility, an estimate of the risk of levee failure, a discussion of the inspection and review undertaken pursuant to subdivision (a), and appropriate recommendations regarding the levees and future work activities.*

To evaluate SPFC conditions, DWR is considering a wide variety of factors that could influence the performance of SPFC levees, channels, and flood control structures. Information from DWR's inspection and evaluation activities are considered as high-level indicators of physical conditions relative to specified standards. For some factors, DWR's approach may differ from an approach that USACE or other agencies would use for other evaluations or purposes. In these cases, the difference is acknowledged, although only DWR's approach is used as the basis for results presented in the FCSSR.

The DWR Levee Evaluations Program, including its Urban Levee Evaluations (ULE) and Non-Urban Levee Evaluations (NULE) projects, is the primary source of information to evaluate the condition of SPFC levees. ULE and NULE both assess geotechnical conditions of levees, but urban levees are undergoing a more comprehensive evaluation because of public safety considerations for densely populated areas. Levee conditions reported in the FCSSR also rely on information from DWR's annual inspections and other available data to supplement the results of the DWR Levee Evaluations Program.

In general, channel conveyance conditions were determined by evaluating whether channels have the ability to pass design capacities presented in O&M manuals and design profiles based on the most recent available hydraulic modeling. Channel conditions reported also include DWR's annual inspections for vegetation and sedimentation. Flood management structure conditions reported are based on DWR's annual inspections.

The FCSSR reflects existing facility conditions (including past performance) at the time the FCSSR was prepared, and some results represent initial findings of ongoing evaluations. Many ongoing inspections, geotechnical evaluations, and hydraulic evaluations will yield additional information on facility conditions. Supplemental investigations are also underway for addressing potential inconsistent findings from other sources, including locally initiated investigations. In addition, subsequent facility improvements, repairs, and reconstruction would likely affect facility conditions reported in the FCSSR. Where applicable, any changes in findings will be reflected in future updates to the FCSSR.

The flood management system has provided tremendous benefits to public safety and property in the Central Valley – it has prevented many billions of dollars in flood damages since facilities were originally constructed. However, when evaluated against modern engineering and safety criteria, some SFPC facilities face a higher chance for failure during a flood event than other facilities. Table 1-1 lists factors that influence facility

performance, findings related to each factor, and the relative threat posed by the factor.

The relative threat posed by each factor is a subjective representation of (1) the prevalence of the factor and (2) to what degree presence of the factor would contribute to a potential facility failure. Factors identified as a "high" relative threat to SPFC facilities generally are the most prevalent and/or would greatly contribute to potential facility failure. Those identified as a "low" relative threat to SPFC facilities generally are the least prevalent and/or would contribute less to potential facility failure. Likewise, factors identified as a "medium" relative threat to SPFC facilities are moderately prevalent and/or would contribute moderately to potential facility failure.

Table 1-1. Summary of Flood Control System Status Report Findings

	Factors	Findings	Relative Threat Posed by Factor[1]
Levees	**Overall Levee Condition (multiple factors)**	• Approximately half of SPFC urban levees do not meet current levee freeboard, stability, or seepage design criteria at the design water surface elevation. • Approximately three-fifths of SPFC nonurban levees have a high potential for levee failure from under-seepage, through-seepage, structural instability, and/or erosion at the assessment water surface elevation.	See Figure ES-1 in FCSSR
	Levee Geometry Check	• Approximately one-third of SPFC urban levees deviate from current standard levee design prism criteria. • Levee geometry deviates significantly from the standard levee design prism criteria for some nonurban SPFC levees.	Medium
	Seepage	• Approximately one-third of urban levees do not meet current seepage design criteria. • Almost half of SPFC nonurban levees have a high potential for levee failure from under-seepage. • Approximately one-quarter of SPFC nonurban levees have a high potential for levee failure from through-seepage.	High
	Structural Instability	• Approximately one-fifth of SPFC urban levees do not meet current structural stability design criteria. • Approximately one-seventh of SPFC nonurban levees evaluated in the Sacramento River watershed and 1 percent in the San Joaquin River watershed have a high potential for levee failure from structural instability.	Medium

Table 1-1. Summary of Flood Control System Status Report Findings (contd.)

	Factors	Findings	Relative Threat Posed by Factor[1]
Levees	**Erosion**	• Erosion assessments for urban levees are underway, and results are not available at this time. • Almost one-sixth of SPFC nonurban levees have a high potential for levee failure from erosion.	Medium
	Settlement	• Four known localized levee locations have settlement (localized depressions) that endangers the integrity of SPFC levees.	Low
	Penetrations[2]	• More than 6,000 penetration sites are documented in SPFC levees, and many more remain undocumented.	Medium
	Levee Vegetation	• About 15 miles of SPFC levees are noncompliant with *Interim Levee Vegetation Criteria(*DWR, 2007).[3 5]	Low
	Rodent Damage	• More than one-third of the 1,459 miles of SPFC levees studied had at least eight reported occurrences of burrowing activity over a 21-year study span.	Medium
	Encroachments[4]	• 1,223 encroachment sites were identified as partially or completely obstructing visibility and access to the levee and/or were within 10 feet of the landside toe.[5]	Medium
Channels	**Inadequate Conveyance Capacity**	• Approximately half of the 1,016 miles of SPFC channels evaluated are potentially inadequate to convey design flows, and require additional evaluation to confirm conditions. • Approximately one-quarter of channel design capacities reported in O&M manuals do not agree with flows specified in the design profiles.	Medium
	Channel Vegetation	• Of 186 miles of SPFC channels inspected by DWR, 1 location was rated Unacceptable and 54 locations were rated Minimally Acceptable because of vegetation and obstructions.[5]	Low
	Channel Sedimentation	• Of 186 miles of SPFC channels inspected by DWR, 1 location was rated Unacceptable and 23 locations were rated Minimally Acceptable because of shoaling/sedimentation.[5]	Low
Structures	**Inadequate Hydraulic Structures**	• Of 32 SPFC hydraulic structures inspected by DWR, no structures were rated Unacceptable because of structural, vegetation/obstruction, encroachment, or erosion/sedimentation issues.[5]	Low
	Inadequate Pumping Plants	• Of 11 SPFC pumping plants inspected by DWR, none were rated Unacceptable.[5]	Low
	Inadequate Bridges	• Of 10 SPFC bridges inspected by DWR,2 were in need of repairs.[5]	Low

Table 1-1. Summary of Flood Control System Status Report Findings (contd.)

Notes:
[1]The relative threats listed in Table 1-1 were generated based on professional experience of technical staff from DWR and partner agencies.
[2]Penetrations include man-made objects that cross through or under a levee or floodwall and have the potential to provide a preferential seepage path or hydraulic connection with the waterside. Typically, a penetration is a pipe or transportation structure, such as a roadway or rail line.
[3] This finding is based on *Interim Levee Vegetation Criteria* (DWR 2007) and not on USACE levee vegetation criteria. Comparison with USACE levee vegetation criteria would show more SPFC levees as noncompliant.
[4]Encroachments are any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or caused by any other means, for any purpose, into a flood control project, waterway area of the flood control project, or area covered by an adopted plan of flood control (California Code of Regulations Title 23 Chapter 1 Article 2 Section 4 (m)). Encroachments include boat docks, ramps, bridges, sand and gravel mining, placement of fill, fences, retaining walls, pump stations, residential structures, and irrigation and landscaping materials/facilities.
[5] Inspection results reported are from DWR's 2009 Inspections.

Key:
DWR = California Department of Water Resources
FCSSR = Flood Control System Status Report
SPFC = State Plan of Flood Control
USACE = U.S. Army Corps of Engineers

The overall condition of urban levees, nonurban levees, channels, and flood control structures of the SPFC can be summarized as follows:

- **Urban levees** – Approximately half of about 300 miles[3] of SPFC urban levees evaluated do not meet current levee freeboard, stability, or seepage design criteria[4] at the design water surface elevation.

- **Nonurban levees** – Approximately three-fifths of about 1,200 miles of SPFC nonurban levees evaluated have a high potential for failure from under-seepage, through-seepage, structural instability, and/or erosion at the assessment water surface elevation.[5] Nonurban levees were evaluated based on systematic, consistent, repeatable analyses that correlated geotechnical data with levee performance history, not relative to any current design criteria.[6]

- **SPFC channels** – Approximately half of the 1,016 miles of channels evaluated in the SPFC have a potentially inadequate capacity to convey design flows, and require additional evaluation to confirm conditions.

---

[3] Additional 10 miles of SPFC urban levees are being evaluated, and results will be included in future updates.
[4] Design criteria used were based on the *Design and Construction of Levees Engineering Manual 1110-2-1913 (USACE, 2000)* and *Interim Levee Design Criteria for Urban and Urbanizing Areas in the Sacramento Valley, Version 4* (DWR, 2010c).
[5] Where available, 1955/57 design water surface elevations were used as the assessment water surface elevation. In the absence of 1955/57 design water surface elevations, the assessment water surface elevation was based on freeboard requirements for each levee segment (i.e., generally 3 feet below the levee crest).
[6] This approach was selected because the extent of the NULE Project is significantly greater than the ULE Project, making it difficult to conduct the same level of field explorations and geotechnical data collection performed for ULE levees.

- **SPFC flood control structures** – None of the 32 hydraulic structures or 11 pumping plants inspected by DWR for the SPFC were rated Unacceptable during the 2009 inspections. Of the 10 SPFC bridges inspected by DWR in 2009, 2 were in need of repairs.

Lastly, the FCSSR includes recommendations regarding the levees and future work activities, including next steps for Board adoption of the FCSSR findings, and future periodic updates, as requested by the Board.

1.3 Summary: Criteria for Demonstrating Urban Level of Flood Protection

As part of the flood management legislation passed in 2007, all cities and counties within the Sacramento-San Joaquin Valley will be required to make findings related to the urban (200-year) level of flood protection before entering into a development agreement for a property, approving a discretionary permit or entitlement for any property development or use, or approving a ministerial permit that would result in construction of a new residence, or approving a tentative map/parcel map for a subdivision (see California Government Code Sections 65865.5, 65962, and 66474.5). This requirement applies to urban and urbanizing areas, as defined by California Government Code Section 65007, Paragraphs (j) and (k).

After the Board's adoption of the CVFPP in 2012, cities and counties within the Sacramento-San Joaquin Valley have up to 24 months to amend local general plans, and 36 months to amend local zoning ordinances to be consistent with the CVFPP. Subsequently, by approximately 2015, cities and counties will be required to make findings regarding an urban level of flood protection when considering decisions about entering into a development agreement for a property, approving a discretionary permit or entitlement for any property development or use, or approving a ministerial permit that would result in construction of a new residence, or approving a tentative map/parcel map for a subdivision.

The draft criteria are being developed through a collaborative process, with input from engineering and planning experts from cities and counties and other organizations. Pertinent engineering criteria (such as methods to compute flood depths, and technical standards for levees and floodwalls), are contained in the *Urban Levee Design Criteria* (ULDC) (DWR, 2012) and are incorporated by reference into the policy-level criteria contained in the *Criteria for Demonstrating Urban Level of Flood Protection* (DWR, 2012).

The purpose of the *Criteria for Demonstrating Urban Level of Flood Protection* (DWR, 2012) is to provide criteria and a systematic approach that assists cities and counties in making findings about whether an urban level of flood protection is required and exists or will exist for prospective development of properties, projects, or subdivisions under their authority.

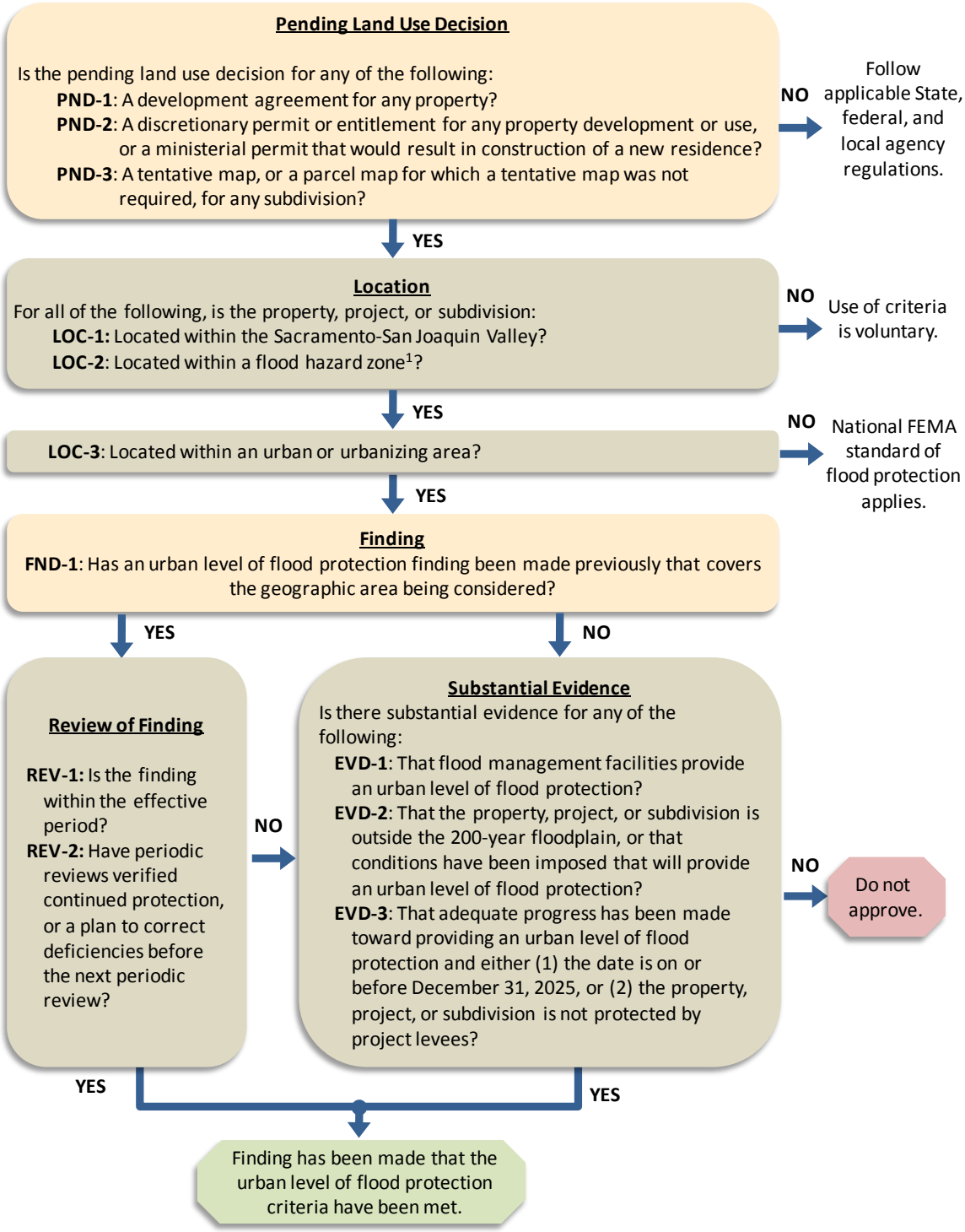
Draft criteria are provided for the following:

- To determine if the type of land use decision is affected by the urban level of flood protection requirements.
- To determine if a property, project, or subdivision is subject to the urban level of flood protection requirements based on its location within the Sacramento-San Joaquin Valley.
- To develop substantial evidence to support a finding or, if a previous finding exists, to determine its continued validity.

Using these criteria, a city or county may then make a finding and approve the land use decision.

The criteria are designed to be evaluated in a conditional sequence, as illustrated in Figure 1-1. The conclusion reached when evaluating one criterion affects, which, if any, subsequent criteria should be considered.

While cities and counties located outside the Sacramento-San Joaquin Valley are not required to make findings related to an urban level of flood protection, these criteria can help inform engineering and local land use decisions for areas at risk of flooding. The *Criteria for Demonstrating Urban Level of Flood Protection* contains procedural criteria for peer review by an independent expert panel, exceptions to the criteria, periodic reviews, and for establishing substantial evidence in the record to support a finding.



1. "Flood hazard zone" means an area subject to flooding that is delineated as either a special hazard area or an area of moderate hazard on an official flood insurance rate map issued by the Federal Emergency Management Agency (California Government Code Section 65007(d)).

Figure 1-1. Flowchart for Making Findings Related to Urban Level of Flood Protection

1.4 Summary: Urban Levee Design Criteria

The Urban Levee Design Criteria (ULDC) (DWR, 2012) is intended to provide criteria and guidance for the design, evaluation, and O&M of levees and floodwalls that provide an urban level of flood protection in California. Other topics beyond design and evaluation (e.g., O&M, inspection, monitoring, and remediation of poor performance) are presented in the ULDC to provide reasonable assurance that once a levee is found to provide an urban level of flood protection, it will continue to do so.

The ULDC was developed through a collaborative process with stakeholders and subject matter experts. The purpose of the ULDC is to provide interim analytical and procedural criteria to civil engineers, cities, and counties in the Sacramento-San Joaquin Valley to help them meet the requirements of California Government Code Sections 65865.5, 65962, and 66474.5, which require those entities to make a finding that levees and floodwalls provide protection against a flood that has a 1-in-200 chance of occurring in any given year. In addition, the ULDC is designed to provide guidance to engineers, cities, and counties throughout California. The ULDC will serve as guidance until regulations are adopted in the California Code of Regulations (CCR) on this topic. The ULDC is summarized below.

1.4.1 Design Criteria Summary

The ULDC provides design criteria for two types of levees: intermittently-loaded and frequently-loaded. A frequently-loaded levee is defined as a levee that experiences a water surface elevation of 1foot or higher above the elevation of the landside levee toe at least once a day for more than 36 days per year, on average.

Design criteria are summarized in Tables 1-2 and 1-3 for each type of levee. In Table 1-2, Options 1 and 2 represent two options for calculating the design water surface elevation (DWSE): the Federal Emergency Management Agency (FEMA) approach, and the U.S. Army Corps of Engineers (Corps) approach. Criteria in Table 1-3 are additions or exceptions to the criteria in Table 1-3 to include more stringent requirements for design of frequently-loaded levees.

Table 1-2. Levee Design Criteria Summary for Intermittently-Loaded Levees

Parameter	Criteria			
DWSE (Option 1)	Median 200-year WSE			
DWSE (Option 2)	90% assurance 200-year WSE			
MTOL (Option 1)	Median 200-year WSE + higher of (1) 3 feet, or (2) height for wind setup and wave runup			
MTOL (Option 2)	Lower of A or B, where: • A is the higher of (1) 90% assurance 200-year WSE, (2) median 200-year WSE plus 3feet, or (3) median 200-year WSE plus height for wind setup and wave runup • B is the higher of (1) 95% assurance 200-year WSE, (2) median 200-year WSE plus 2feet, or (3) median 200-year WSE plus height for wind setup and wave runup			
HTOL (Option 1)	Lower of (1) median 200-year WSE plus 3feet, or (2) median 500-year WSE			
HTOL (Option 2)	Lower of (1) median 200-year WSE plus 3feet, (2) median 500-year WSE, or (3) MTOL (Option 2) – but no lower than the DWSE.			
Seepage – Exit Gradient at Levee Toe	For DWSE		For HTOL	
	$\gamma \geq 112$ pcf	$\gamma < 112$ pcf	$\gamma \geq 112$ pcf	$\gamma < 112$ pcf
	$i \leq 0.5$	FS ≥ 1.6	$i \leq 0.6$	FS ≥ 1.3
Seepage – Exit Gradient at Seepage Berm Toe	$i \leq 0.8$	FS ≥ 1.0	<20% FS degradation for berms less than 100 feet	<10% FS degradation for berms less than 100 feet
Steady State Slope Stability	FS ≥ 1.4		FS ≥ 1.2	
Seismic Vulnerability	Restore grade and dimensions for at least 10-year WSE plus 3feet of freeboard or higher for wind setup and wave runup within 8 weeks			
Levee Geometry	For new or extensive reconstruction on a major stream, minimum 20-foot-wide crown, 3h:1v waterside and landside slopes for all levees except bypass levees (4h:1v waterside slope)			

Note: The median 200-year WSE, the 90 percent assurance 200-year WSE, and the 95 percent assurance 200-year WSE in this table are assumed to have been increased appropriately to account for the potential of new, updated hydrology to yield higher flows.

Key:
DWSE = design water surface elevation
FS = factor of safety
HTOL = hydraulic top of levee
i = exit gradient
MTOL =minimum top of levee
Option 1 = FEMA Approach
Option 2 = Corps Approach
pcf = pounds per cubic foot
WSE = water surface elevation
γ = unit weight of soil

Table 1-3. Levee Design Criteria Summary for Frequently-Loaded Levees

Parameter	Criteria	
	For DWSE	For HTOL
Steady State Slope Stability	FS ≥ 1.5	FS ≥ 1.3
Minimum Allowable Rapid Drawdown Slope Stability	FS ≥ 1.2	
Frequent, Large Tidal Fluctuations Rapid Drawdown Slope Stability	FS ≥ 1.4*	
Seismic Vulnerability	No significant deformation, usually limited to 3feet maximum with 1foot of vertical settlement.	

Notes:
These criteria are additions or exceptions to the criteria presented for intermittently-loaded levees.
*Applies for the range of tidal fluctuation, not the DWSE
Key:
DWSE = design water surface elevation
FS = factor of safety
HTOL = hydraulic top of levee

1.4.2 Operations, Maintenance, Inspection, Monitoring, and Remediation of Poor Performance

At a minimum, the following O&M – related requirements apply to provide reasonable assurance that once a levee is found to provide an urban level of flood protection, it will continue to do so:

- The levee system must have an O&M manual consistent with USACE requirements (except as may be appropriate to add to those requirements to meet the purpose of the ULDC).

- All facilities necessary for providing an urban level of flood protection must be operated and maintained by an identified public agency with the authority and resources to do so. Where the levee system has more than one agency with O&M responsibilities, they will need to coordinate the responsibilities.

- Corps standard inspection requirements for project levees are applicable for all levees and floodwalls considered to provide an urban level of flood protection, including that a public agency (or agencies) routinely operates and maintains the levee system and inspects the entire levee system at least every 90 days and after every high water event. Damage and maintenance inadequacies identified from these inspections should be prioritized and repaired in a timely manner.

- With regard to waiting for the periodic review process to take action, it is almost never practical or possible to completely know all of the

engineering properties of levees and their foundations. Consequently, there will almost always be some degree of uncertainty that justifies both robust regular inspections and flood stage monitoring programs for levees and floodwalls protecting urban and urbanizing areas, with all of the attendant appurtenances and features.

- The levee system must have an emergency safety plan.
- The levee system must have a levee security plan.

Other requirements, such as for a post-earthquake remediation plan or a levee relief cut plan, may also apply, depending on the situation.

1.4.3 Procedural Criteria Summary

The ULDC will rely upon procedures contained in the *Criteria for Demonstrating Urban Level of Flood Protection* for making and maintaining a finding that a levee or floodwall provides an urban level of flood protection.

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2.0 Abbreviations and Acronyms

Board ..... Central Valley Flood Protection Board
CCR ..... California Code of Regulations
CVFMP ..... Central Valley Flood Management Planning
CVFPP ..... Central Valley Flood Protection Plan
Delta ..... Sacramento-San Joaquin Delta
DWR ..... California Department of Water Resources
DWSE ..... Design Water Surface Elevation
FCSSR ..... Flood Control System Status Report
FEMA ..... Federal Emergency Management Agency
FloodSAFE ..... FloodSAFE California
FS ..... factor of safety
HTOL ..... hydraulic top of levee
MOU ..... Memorandums of Agreement
MTOL ..... minimum top of levee
NULE ..... Non-Urban Levee Evaluations
O&M ..... operations and maintenance
pcf ..... pounds per cubic foot
State ..... State-of-California
SPFC ..... State Plan of Flood Control
SSJDD ..... Sacramento-San Joaquin Drainage District
USACE ..... U.S. Army Corps of Engineers
ULDC ..... Urban Levee Design Criteria
ULE ..... Urban Levee Evaluations
WSE ..... water surface elevation

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STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

Attachment 4
Glossary

CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

Public Draft

2012 Central Valley Flood Protection Plan

Attachment 4: Glossary

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Glossary

100-year flood event	The flood having a 1-in-100 (1 percent) chance of being equaled or exceeded in any given year. A structure located within a special flood hazard area shown on a National Flood Insurance Program map has a 26% chance of suffering flood damage during the term of a 30 year mortgage. *Federal Emergency Management Agency, http://www.fema.gov/, accessed June 2009*
200-year floodplain	An area that has a 1-in-200 (0.5 percent) chance of flooding in any given year, based on hydrological modeling and other engineering criteria accepted by the Department of Water Resources. *California Government Code Section 65300.2(a)*
200-year flood event	A flood having a 1-in-200 (0.5 percent) chance of being equaled or exceeded in any given year.
500-year floodplain	An area that has a 1-in-500 (0.2 percent) chance of flooding in any given year, based on hydrological modeling and other engineering criteria accepted by the California Department of Water Resources.
500-year flood event	A flood having a 1-in-500 (0.2 percent) chance of being equaled or exceeded in any given year.
agricultural stewardship	A public and private commitment to manage and preserve the resources and the conditions necessary for a robust and sustainable agricultural industry in California.
adaptive management	A scientific approach to resource management that rigorously combines management, monitoring and research to effectively manage complex ecosystems in the face of uncertainty. Adaptive management tackles uncertainty about the system head-on by identifying clear objectives, developing conceptual models of the system, identifying areas of uncertainty and alternative hypotheses, testing critical assumptions, monitoring to provide feedback about the system and actions, learning from the system as actions are taken to manage it, and incorporating what is learned into future actions. *U.S. Geological Survey* *Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans*

anadromous fish	Fish that spend a part of their life cycle in the sea and return to freshwater to spawn.
annual pass rate	The percentage (on an annual basis) of levees that pass inspections according to Federal and State levee standards (e.g., maintenance, encroachment).
beneficiary	Partners, interested parties, and the general public who receive benefit from a flood management project.
Central Valley Flood Protection Board	The Central Valley Flood Protection Board (formerly The Reclamation Board) was created by the California Legislature in 1911 to carry out a comprehensive flood control plan for the Sacramento and San Joaquin rivers. The Board has jurisdiction throughout the Sacramento-San Joaquin Valley, which is synonymous with the drainage basins of the Central Valley and includes the Sacramento-San Joaquin Drainage District.
Central Valley Flood Management Planning (CVFMP) Program	The CVFMP Program falls under FloodSAFE California, a multiyear initiative led and managed by the California Department of Water Resources. Primary products of the CVFMP Program are the *State Plan of Flood Control Descriptive Document*, the *Flood Control System Status Report*, and the *Central Valley Flood Protection Plan*.
Central Valley Flood Protection Plan (CVFPP)	The CVFPP is a State plan that will describe the challenges, opportunities, and vision for improving integrated flood management in the Central Valley. The CVFPP will document current and future risks associated with flooding and recommend improvements to the State-federal flood protection system to reduce the occurrence of major flooding and the consequences of flood damage that could result. The plan will be submitted to the Central Valley Flood Protection Board by January 1, 2012, for adoption by the following July, and will be updated every 5 years.
Central Valley Floodplain Evaluation and Delineation (CVFED) Program	The CVFED Program falls under FloodSAFE California, a multiyear initiative led and managed by the California Department of Water Resources. The purpose of the CVFED Program is to provide standards, methodologies, and tools needed for floodplain assessments for FloodSAFE programs, consistent with U.S. Army Corps of Engineers and Federal Emergency Management Agency assessment needs. Primary products of the CVFED Program are the topography, hydraulic models, and multiple floodplain delineations associated with the State Plan of Flood Control.
conveyance capacity	The maximum rate of flowing water, usually expressed in cubic feet per second (cfs), that a river, canal, or bypass can carry without exceeding a threshold value such as flood discharge, or without using the freeboard distance from the top of a levee.

CVFMP Forum	Valley-wide or regional conference-style public meetings with presentations, workshops, panel discussions, and information booths. These forums are the primary venue for engaging a wide array of interests in discussing draft plan content and gauging agreement, and fostering information-sharing about regional and systemwide flood management challenges and potential solutions. Related FloodSAFE projects and programs will also use CVFMP Forums to engage interested parties efficiently.
CVFPP work group	Place-based (e.g., regional) and subject-based (e.g., topic) work groups chartered to develop content and content recommendations for the CVFPP. Work groups are integral to developing a broadly supported CVFPP that reflects the State, federal, tribal, local, and regional perspectives and subject-matter expertise.
design discharge (flow)	The rate of flowing water, usually measured in cubic feet per second (cfs), associated with the water surface profile or water level for which a flood management project was designed.
design flood	Means the selected flood against which protection is provided, or eventually will be provided, by means of flood protective or control works. When a federal survey has been authorized the design flood will be determined by the appropriate federal agency and in all other cases it will be determined by the responsible local agency. It is the basis for design and operation of a particular project after full consideration of flood characteristics, frequencies, and potentials and economic and other practical considerations. *California Water Code Section 8402(e)*
design standard	Minimum acceptable requirements for designed construction of flood management facilities (e.g., levees, control structures) when a facility was constructed. Design standards can change over time because of the improved understanding of risk factors; additions and changes in regulations and law; and social values and benefit considerations. In some cases, design standards today are different than when many of the SPFC facilities were constructed.
designated floodway	Means the channel of a stream and that portion of the adjoining flood plain required to reasonably provide for the construction of a project for passage of the design flood including the lands necessary for construction of project levees. *California Water Code Section 8402(f)*

developed area

An area of a community that is:

A. A primarily urbanized, built-up area that is a minimum of 20 contiguous acres, has basic urban infrastructure, including roads, utilities, communications, and public facilities, to sustain industrial, residential, and commercial activities, and
    1. Within which 75 percent or more of the parcels, tracts, or lots contain commercial, industrial, or residential structures or uses; or
    2. Is a single parcel, tract, or lot in which 75 percent of the area contains existing commercial or industrial structures or uses; or
    3. Is a subdivision developed at a density of at least two residential structures per acre within which 75 percent or more of the lots contain existing residential structures at the time the designation is adopted.
B. Undeveloped parcels, tracts, or lots, the combination of which is less than 20 acres and contiguous on at least 3 sides to areas meeting the criteria of paragraph (A) at the time the designation is adopted.
C. A subdivision that is a minimum of 20 contiguous acres that has obtained all necessary government approvals, provided that the actual "start of construction" of structures has occurred on at least 10 percent of the lots or remaining lots of a subdivision or 10 percent of the maximum building coverage or remaining building coverage allowed for a single lot subdivision at the time the designation is adopted and construction of structures is underway. Residential subdivisions must meet the density criteria in paragraph (A)(3). (Section 59.1 of Title 44 of the Code of Federal regulations)

California Government Code Section 65007 (c)

ecosystem

An ecosystem consists of all the organisms in a given area interacting with the physical environment. The biotic and physical components in an ecosystem are interdependent, frequently with complex feedback loops. The physical components that sustain the biota of an ecosystem include, but may not be limited to, the soil or substrate, topographic relief and aspect, atmosphere, weather and climate, hydrology, geomorphic processes, nutrient regime, and salinity regime.

ecosystem rehabilitation

A process where an ecosystem that has been degraded or disturbed is changed to an improved state that is not necessarily the pre-action "natural" state but is defined by providing the basic physical and ecological processes that support a functioning ecosystem.

ecosystem restoration

A process where an ecosystem, that has been degraded or disturbed is restored to mimic, as closely as possible through the restoration of critical natural processes, conditions which would naturally occur in an area.

ecosystem services	Ecosystem services emanate from a functioning ecosystem and are the beneficial outcomes for the natural environment or for people that result from ecosystem functions. Some examples of ecosystem services are support of the food chain, harvesting of animals or plants, clean water, or scenic views. In order for an ecosystem to provide services to humans, some interaction with, or at least some appreciation by, humans is required. *California Department of Fish and Game, California Wildlife Action Plan, 2004*
encroachment	Any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by whatever means for any purpose, into any of the following: (1) any flood control project works; (2) the waterway area of the project; (3) the area covered by an adopted plan of flood control; or (4) any area outside the above limits, if the encroachment could affect any of the above." *California Code of Regulations Title 23: Section 12899(b)*
environmental conservation	The maintenance, enhancement, and restoration of populations, communities, and ecosystem functions to sustain the services, benefits, and values of public trust resources.
environmental stewardship	A concept and commitment of responsibility to manage and protect natural resources (water, air, land, plants and animals) and ecosystems in a sustainable manner that ensures they are available for future generations *California Department of Water Resources, Environmental Stewardship Policy Effective October 2010*
essential public facilities	Essential public facilities include, but not limited to, hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities. *California Government Code Section 65302*
feasible	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. *California Water Code Section 8307*

flood	Per the Federal Emergency Management Agency, a flood is defined as: A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is the policyholder's property) from: • Overflow of inland or tidal waters; or • Unusual and rapid accumulation or runoff of surface waters from any source; or • Mudflow; or • Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above. *http://www.fema.gov/business/nfip/19def2.shtm*
flood basin	A bowl-shaped, natural landform that historically or presently receives and retains floodwaters, or an engineered floodwater detention basin, excavated below grade or surrounded by levees.
flood bypass	An engineered wide and shallow channel or confined floodplain, usually flanked by levees, that receives floodwaters to reduce the amount of flow in a river or stream.
flood corridor	A passageway for floodflows, including, but not limited to, bypass systems, channels, levee systems, floodplain easements, culverts, floodwalls, or a combination thereof.
Flood Control System Status Report (FCSSR)	A report that will provide an assessment of the physical condition of facilities included in the State Plan of Flood Control and make recommendations regarding future California Departments of Water Resources work activities to address adverse conditions. This report will be revised periodically, as requested by the Central Valley Flood Protection Board.
flood damages	All damages caused by a flood including loss of life, physical damage, and economic damage. *California Department of Water Resources, Draft FloodSAFE Strategic Plan, June 2008*
flood hazard zone	An area subject to flooding that is delineated as either a special hazard area or an area of moderate hazard on an official flood insurance rate map issued by the Federal Emergency Management Agency. The identification of flood hazard zones does not imply that areas outside the flood hazard zones, or uses permitted within flood hazard zones, will be free from flooding or flood damage. *California Government Code Section 65007(d)*

flood management	The use of comprehensive methods to manage floodflows, providing multiple benefits in addition to protecting people and property. *DWR, Draft FloodSAFE Strategic Plan, June 2008*
flood management system	Refers to the structural elements employed to convey floodflows within the CVFPP planning area, including facilities of the State Plan of Flood Control, flood control reservoirs, and nonproject levees.
flood-prone areas	Areas subject to flooding.
flood protection	Methods or structural measures used to mitigate flooding or reduce flooding hazards and risks. *Delta Protection Commission, Management Plan Update Compiled Draft Management Plan Glossary November 2009*
flood risk	The probability of flooding combined with negative outcomes that could result when flooding occurs.
floodplain	An area adjacent to a stream or river that experiences occasional or periodic flooding. *California Department of Water Resources, Draft FloodSAFE Strategic Plan, June 2008*
floodplain management	A decision-making process whose goal is to achieve appropriate use of the nation's floodplains. Appropriate use is any activity or set of activities that is compatible with the risk to natural resources and human resources. The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to watershed management, emergency preparedness plans, flood control works, and floodplain management regulations. *A Blueprint for Change, Sharing the Challenge: Floodplain Management Into the 21st Century, Report of the Interagency Floodplain Management Review Committee to the Administration Floodplain Management Task Force, Washington, D.C., June 1994*
floodway, State-designated	The channel of a stream and that portion of the adjoining floodplain required to reasonably provide for construction of a project for passage of the design flood, including the lands necessary for construction of project levee that are regulated by the Central Valley Flood Protection Board.

freeboard	A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed. *http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/freeboard.shtm*
geomorphology, fluvial	Geomorphology is the study of the characteristics, origins, and development of landforms. Fluvial geomorphology is the study of landforms and channel types created by flowing water and the transport of rocks and sediment by water flow.
goals	In the planning process for the CVFPP, goals describe “what” the CVFPP will accomplish. Goals are the broad and enduring values, and direction or desired conditions we want to achieve, without prescribing or suggesting specific actions to achieve them. *Central Valley Flood Protection Plan Interim Progress Summary No. 1 April 2010*
headcut erosion	A headcut is the sudden change in elevation or knickpoint at the leading edge of a gully. *U.S. Department of Agriculture, Agricultural Research Service*
improvement/ improvement project	An act/action may be performed by the U.S. Army Corps of Engineers to State Plan of Flood Control facilities (federal only) in partnership with the Board to increase the authorized project performance beyond what has been authorized for the existing project. Improvement projects are cost shared in accordance with their authorization (e.g., American River Common Features Project). *U.S. Army Corps of Engineers*
integrated flood management	An approach to dealing with flood risk that recognizes the interconnection of flood management actions within broader water resources management and land use planning; the value of coordinating across geographic and agency boundaries; the need to evaluate opportunities and potential impacts from a system perspective; and the importance of environmental stewardship and sustainability. *California Department of Water Resources, Draft FloodSAFE Strategic Plan, June 2008*
interest-based group	A collection of individuals and/or organizations with common interests in the activities and actions anticipated by the CVFPP.
local jurisdiction	Means a city, city and county, or county.
legacy community	A rural community registered as a historic district by either a state or federal entity.

Levee Flood Protection Zone	An area that is protected, as determined by the Central Valley Flood Protection Board or the Department of Water Resources, by a levee that is part of the facilities of the State Plan of Flood Control, as defined under Section 5096.805 of the Public Resources Code. *California Government Code Section 65300.2(b)*
maintaining agency	Maintaining agency means any city, county, district or other political subdivision of the State that is authorized to maintain levees. The California Department of Water Resources maintains levees pursuant to California Water Code Sections 8361 and 12878, but is not considered a maintaining agency.
maintenance	An act/action taken other than during high water that is necessary to insure the serviceability of SPFC facilities in times of floods. Maintenance of facilities is a non-federal responsibility. The facilities of the SPFC are maintained by either DWR or MAs, as described by laws and other various legally binding documents. The costs of maintenance are funded by the maintainers. (Example: vegetation removal). *U.S. Army Corps of Engineers*
moderate flood hazard area	Flood hazard area, as identified on the Flood Insurance Rate Map (FIRM), labeled Zone B or Zone X (shaded), are the areas between the limits of the base flood and the 0.2% annual chance or a 500-year flood. *Federal Emergency Management Agency, http://www.fema.gov/, accessed June 2009*
modification/ alteration	An act/action that may be undertaken to change a facility to perform a new purpose(s), increase the authorized purpose(s) beyond that intended at the time of construction, increase the authorized project performance, or extend services to new beneficiaries. Modification/alteration by the maintainers of SPFC may proceed upon the Board issuance of an encroachment permit. (Example TRLIA) The Board, prior to issuing any permits, must secure a USACE permit under 33 U.S. C. 408. Congressionally authorized project modifications are performed by USACE in partnership with the Board or others. (Example: Yolo Basin Wetlands Project). *U.S. Army Corps of Engineers*
natural floodplain processes	Processes in a floodplain existing in or produced by nature (rather than by the intent of human beings) (e.g., periodic flooding and accompanying deposition of sediment in a floodplain).
natural processes	Processes existing in or produced by nature (rather than by the intent of human beings) (e.g., dynamic hydrologic, geomorphic, and biological processes).

neotropical migratory bird	Migratory birds from the neotropic ecozone that includes the Mexican lowlands, Central and South America, Caribbean islands, and southern Florida.
nonproject levee	Any levee that is not part of the State Plan of Flood Control (CWC 9602(c)) or other State-federal or local-federal flood protection facilities. Nonproject levees are typically privately owned or under the authority of a local levee district.[1]
non-SPFC levee	Any levee that is not part of the State Plan of Flood Control (CWC 9602(c)). This includes State-federal levees outside the Sacramento and San Joaquin river watersheds and levees within the Sacramento and San Joaquin river watersheds that do not have documented State assurances of nonfederal cooperation to the federal government or State responsibility identified in CWC Section 8361.
nonstructural improvement	Projects that are intended to reduce or eliminate susceptibility to flooding by preserving or increasing the flood-carrying capacity of floodways, and include such measures as levees, setback levees, floodproofing structures, and zoning, designating or acquiring flood prone areas. *California Water Code Section 79068(a)*
nonurbanized area	A developed area or an area outside a developed area in which there are fewer than 10,000 residents. *California Government Code 65007(e)*
objective	Collectively, objectives are intended to define the overall accomplishments of the 2012 CVFPP. The objectives are not specific actions to achieve the goals, but rather quantitative overall measures of success of the plan. *CVFPP Interim Progress Summary No. 1* *April 2010*
objective flow	Pertains to flows in specific reaches of a river based on local conditions, and are established through coordination with local entities. An objective flow is intended to reflect non-damaging conditions. These conditions may include levee stability and seepage, riparian growth, and adjacent land uses. *Post-Flood Assessment* *Sacramento and San Joaquin River Basins Comprehensive Study* *May 2004, U.S. Army Corps of Engineers*

objective release	The maximum allowable, non-flood damaging outflow from a dam as specified in the facility's Water Control Plan. Operators manage releases to maintain flood management space at the same time considering downstream conditions. These considerations may include levee seepage, erosion, and/or strength, and channel capacity. Additionally, the operators consider the impact of flow fluctuations on fish spawning habitat. *Post-Flood Assessment* *Sacramento and San Joaquin River Basins Comprehensive Study* *U.S. Army Corps of Engineers, May 2004*
operation	An act/action taken during high water that is necessary to maintain functionality of State Plan of Flood Control facilities. Operation of facilities is a nonfederal responsibility. The facilities of the State Plan of Flood Control are operated by either the California Department of Water Resources or MAs, as described by laws and various legally binding documents. The costs of operation are funded by the operators (Example: Sandbagging). *U.S. Army Corps of Engineers*
operations and maintenance	Refers to the effort that must be expended to keep project facilities in good working condition so they continue to operate as designed - wear and tear on facilities that are not adequately maintained can reduce their capacity or make them more vulnerable to failure - and the management of adjustable features to achieve the desired conditions (e.g., flow rate, stage, reservoir storage).
penetration	A man-made object that crosses through or under a levee or floodwall and has the potential to be a preferential seepage path or hydraulic connection with the waterside. Typically, a penetration is a pipe or transportation structure, such as a roadway or rail line.
project levee	Any levee that is a facility of the State Plan of Flood Control.[1] *California Water Code 9602 (c)*
partner	Individuals, organizations, and/or agencies with direct responsibilities for activities and actions anticipated by the CVFPP.
planning principle	While goals provide direction on "what" the CVFPP will accomplish, planning principles provide guidance on "how" the CVFPP will be developed and implemented, consistent with the FloodSAFE guiding principles. Central Valley Flood Protection Plan Interim Progress Summary No. 1 April 2010

[1] Disclaimer: It is important for the reader to understand that a broader definition is often used to describe a project levee as any levee that has been implemented as part of a Federal project. For use with respect to the CVFPP, "project levee" is as defined in the Water Code.

public agency	Any city, city and county, county, or district organized, existing, and acting pursuant to the laws of this state. *California Water Code Section 8402(d)*
public safety	Involves the prevention of and protection from events that could endanger the safety of the general public from significant danger, injury/harm, or damage, such as natural and man-made disasters.
public safety infrastructure	Means public safety infrastructure necessary to respond to a flood emergency, including, but not limited to, street and highway evacuation routes, medical care facilities, and public utilities necessary for public health and safety, including drinking water and wastewater treatment facilities. *California Water Code Section 12646 (d)*
reconstruction/ reconstruction project	An act/action may be performed by the USACE to SPFC facilities(federal only) in partnership with the Board to address impediments that prevent a project from performing as authorized if the impediments are not the result of inadequate maintenance. The causes of impediments are either design and/or construction deficiencies or long-term degradation of facilities that have exceeded their expected service lives. (Example: Sacramento Area Levee Reconstruction Project) *U.S. Army Corps of Engineers*
rehabilitation	To restore a facility or system (either natural or man-made) to its former condition.
rehabilitation (PL84-99)	An act/action undertaken by USACE to SPFC facilities to restore flood damaged flood control works to their pre-disaster condition at 100% federal costs, except for lands, easements, right of way, and relocations. (Example: Linda levee break restoration) Rehabilitation of non-federal facilities is restored at 80% of federal costs. (Example Delta Levee restoration) *U.S. Army Corps of Engineers*
repair	A corrective act/action that is necessary to perform on damaged SPFC facilities to restore them to operable condition. Repair of facilities is the non-federal responsibility. The facilities of the SPFC are repaired by either DWR or LMAs, as described by laws and various legally binding documents. The costs of repairs are funded by the maintainers of the facility. (Example: reshaping levee crown to eliminate ruts.) *U.S. Army Corps of Engineers*

residual risk — Residual risk is the portion of flood risk that remains after a flood control structure or works has been built. Risk remains because the likelihood that the completed works' design could be surpassed by a intensity of a flood event, resulting in structural failure.

Adapted from:
Flood Risk Management: Federal Role in Infrastructure
Congressional Research Service, The Library of Congress
October. 26, 2005

restrictive zone — Means the portion of the natural floodway between the limits of the designated floodway and the limits of the flood plain where inundation may occur but where depths and velocities are generally low.

California Water Code Section 8402(g)

restore/ restoration — The implementation of an action(s) to reestablish, or put back something that once existed but is no longer there, to its original condition.

ring levees — Levees that completely encircle or "ring" an area subject to inundation from all directions.

U.S. Army Corps of Engineers
Design and Construction of Levees, EM 1110-2-1913

riparian area — Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. Riparian areas include portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.

river basin — The entire geographical area drained by a river and its tributaries; an area characterized by all runoff being conveyed to the same outlet.

www.thefreedictionary.com

rural community — A city, town, or settlement outside of urban and urbanizing areas with an expected population of less than 10,000 within the next 10 years.

Sacramento-San Joaquin Drainage (SSJD) District	Comprises more than 1.9 million acres in the Central Valley generally along and adjacent to the Sacramento and San Joaquin rivers. SSJD District was created in 1913 by the California Legislature to allow survey work and the collection of data of the San Joaquin and Sacramento rivers and tributaries to prepare a report to the Central Valley Flood Protection Board to further the Board's plans for controlling the floodwaters of the rivers, improve and preserve navigation, and the reclamation and protection of the lands that are susceptible to overflow from those rivers and their tributaries. The District's management and control is vested in the Central Valley Flood Protection Board, and according to the Statute, the District can "acquire, own, hold, use, and enjoy any and all properties necessary for the purposes of the District." *Central Valley Flood Protection Board, http://www.cvfpb.ca.gov/, accessed June 2009*
Sacramento-San Joaquin River Flood Management System	The Sacramento-San Joaquin River Flood Management System comprises all of the following: (a) The facilities of the State Plan of Flood Control as that plan may be amended by the Central Valley Flood Protection Board; (b) Any existing dam, levee, or other flood management facility that is not part of the State Plan of Flood Control if the board determines, upon recommendation of the department, that the facility does one or more of the following: (1) Provides significant systemwide benefits for managing flood risks within the Sacramento-San Joaquin Valley. (2) Includes project levees that protect a contiguous urban area of 10,000 or more residents within the Sacramento-San Joaquin Valley. *California Water Code Sections 9602 and 9611*
Sacramento-San Joaquin Valley	Lands in the bed or along or near the banks of the Sacramento River or San Joaquin River, or their tributaries or connected therewith, or upon any land adjacent thereto, or within the overflow basins thereof, or upon land susceptible to overflow there from. The Sacramento-San Joaquin Valley does not include lands lying within the Tulare Lake basin, including the Kings River. *California Government Code Section 65007(g)*

Safe Harbor Agreement	An agreement between a landowner and a regulatory agency that provides that if the landowner voluntarily enhances and maintains habitat for listed species on their property, the regulatory agency will not impose additional restrictions. The Safe Harbor Agreement provides assurances that the regulatory agency will not impose additional restrictions because of their voluntary conservation actions. The regulatory agency authorizes incidental-take coverage for routine and ongoing activities on the property. This assures the landowner that they will be able to continue their routine and ongoing activities, despite the presence of listed species. In addition, the regulatory agency authorizes the landowner to return the property to pre-agreement conditions (baseline conditions). In other words, a landowner can create habitat for a listed species, and then remove the created habitat at the end of the Agreement if they choose to do so. Safe Harbor Agreements cannot authorize incidental take for a landowner to go below baseline conditions. *Adapted from:* *U.S. Fish and Wildlife Service, Sacramento Office* *http://www.fws.gov/sacramento/partnerships/safe_harbor.htm*
small community	Developed area with a population of less than 10,000.
shaded riverine aquatic cover	A nearshore aquatic area occurring at the interface between a river (or stream) and adjacent woody riparian habitat.
Special Flood Hazard Area	Flood hazard area identified on the Flood Insurance Rate Map (FIRM) defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. *Federal Emergency Management Agency* *http://www.fema.gov/, accessed June 2009*
State Plan of Flood Control	Means the state and federal flood control works, lands, programs, plans, policies, conditions, and mode of maintenance and operations of the Sacramento River Flood Control Project Described in Section 8350 of the California Water Code (CWC), and of flood control projects in the Sacramento River and San Joaquin River watersheds authorized pursuant to Article 2 (commencing with Section 12648) of Chapter 2 of Part 6 of Division 6 for which the Board or the Department has provided the assurances of nonfederal cooperation to the United States, and those facilities identified in CWC Section 8361. *California Water Code Section 9110 (f)*

State Plan of Flood Control Descriptive Document	The State Plan of Flood Control Descriptive Document is an inventory and description of the flood control projects and works (facilities), lands, programs, plans, conditions, and modes of operations and maintenance for the State-federal flood protection system in the Sacramento River and San Joaquin River watersheds and facilities identified in WC Section 8361. The document fulfills part of the legislative requirement expressed in CWC Section 9120 (a) and (b).
State Plan of Flood Control Planning Area	The State Plan of Flood Control (SPFC) Planning Area is the geographic area that includes the lands currently receiving flood damage reduction benefits from the SPFC. The SPFC Planning Area is completely contained within the Systemwide Planning Area.
structural improvements	Are projects that are intended to modify flood patterns and rely primarily on constructed components and include such measures as levees, floodwalls, and improved channels. *California Water Code Section 79068(b)*
sustainability	A project is "sustainable" when it is socially, environmentally, and financially feasible for an enduring period.
system	Refers to the Sacramento-San Joaquin River Flood Management System, as described in Section 9611 of the California Water Code.
systemwide	Referring to the scale of an entire system (e.g., the flood management system within Sacramento-San Joaquin River Flood Management System).
Systemwide Planning Area	The Systemwide Planning Area is the geographic area that encompasses lands receiving flood damage reduction benefits from the existing facilities and operation of the Sacramento-San Joaquin River Flood Management System.
transitory storage	The temporary and periodic storage of peak floodflows from adjacent rivers or waterways through the modification of certain floodplain areas acquired through easement or fee title.
Tulare Lake Basin	Refers to the Tulare Lake Hydrologic Region as defined in the California Water Plan Update 2009, prepared by the Department of Water Resources pursuant to Chapter 1 (commencing with Section 10004) of Part 1.5 of Division 6 of the Water Code. *California Government Code Section 65007(i)*

upgrade of a project levee	Installing a levee underseepage control system, increasing the height or bulk of a levee, installing a slurry wall or sheet pile into the levee, rebuilding a levee because of internal geotechnical flaws, or adding a stability berm. Notwithstanding the above definition, an upgrade of a project levee does not include any action undertaken on an emergency basis. *California Water Code Section 9651(h)*
urban area[2]	A developed area in which there are 10,000 residents or more. *California Government Code Section 65007 (j)*
urbanizing area	A developed area or an area outside a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years. *California Government Code Section 65007 (k)*
urban levee design criteria	Urban Levee Design Criteria (ULDC) means the levee and floodwall design criteria developed by the California Department of Water Resources for providing the urban level of flood protection. *California Government Code Section 65007(k) and Water Code Section 9602(i)*
urban level of flood protection	Level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the Department of Water Resources. *California Government Code Section 65007(l) and Water Code Section 9602(i)*
watershed	The land area from which water drains into a stream, river, or reservoir. *California Water Plan Update 2009 Glossary*

[2] "Urban Area" is also defined in the California Public Resources Code Section 5096.805 (k) as "any contiguous area in which more than 10,000 residents are protected by project levees." For use with respect to the Central Valley Flood Protection Plan, "project levee" is as defined in California Water Code Section 9602(c).

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STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

Attachment 5
Engagement Record

CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

Public Draft

2012 Central Valley Flood Protection Plan

Attachment 5: Engagement Record

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Appendix A – Central Valley Flood Management Planning Program Questions for Interviews with Partners and Interested Parties

Appendix B – Comprehensive List of Stakeholders

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1.0 Introduction

This document catalogues and describes the approaches and accomplishments of communication and engagement activities to support and complement technical planning processes implemented through the Central Valley Flood Management Planning (CVFMP) Program. The CVFMP Program is an element of the FloodSAFE California (FloodSAFE) initiative. While the document's central focus is on the CVFMP Program's activities to complete the draft 2012 Central Valley Flood Protection Plan (CVFPP) and its key related documents – the *State Plan of Flood Control Descriptive Document* (DWR, 2010a) and the *Flood Control System Status Report* (DWR, 2011a) – it further describes communication and engagement efforts provided to other related FloodSAFE programs and studies.

This document includes a comprehensive list of all events, meetings, and other activities that supporting gaining the input and participation necessary to produce a plan that reflects the needs and desires of those affected by and responsible for managing flood risk in the Sacramento and San Joaquin valleys of California's Central Valley.

Finally, this document summarizes the engagement record and provides a potential framework for the California Department of Water Resources (DWR) to consider as it updates the CVFPP every 5 years.

1.1 Legislative Direction

As authorized by Senate Bill (SB) 5 of 2007, also known as the Central Valley Flood Protection Act of 2008, DWR has prepared a sustainable, integrated flood management plan called the CVFPP by January 1, 2012, for adoption by the Central Valley Flood Protection Board (Board). The 2012 CVFPP provides a systemwide approach to protecting lands currently protected from flooding by the existing State Plan of Flood Control (SPFC) and will be updated every 5 years.

In addition to the direction given above, SB 5 added sections to the California Water Code that further instructed DWR to engage with federal, local, and other public agencies to produce the 2012 CVFPP and achieve other related flood risk management goals. California Water Code Sections 9615 and 9616 note, in part, the following:

> *For the purposes of preparing the plan, the department shall collaborate with the United States Army Corps of Engineers and the owners and operators of flood management facilities… The plan shall…increase the engagement of local agencies willing to participate in improving flood protection, ensuring a better connection between state flood protection decisions and local land use decisions.*

1.2 Commitment to Engagement

The legislation directing development of the CVFPP includes requirements for DWR to actively engage partner agencies and stakeholders in plan formulation. In response to this direction, DWR committed to a broad and comprehensive engagement process that exceeded statute requirements. This additional effort was made because once adopted, the CVFPP will affect not only agencies charged with operating and maintaining SPFC facilities, but also agencies with decision-making authorities over land use, public safety, the environment, and economic development. DWR has previously found that enhanced engagement efforts ultimately result in a wider acceptance of plans and activities. To that end, DWR sought the involvement of Central Valley communities, interest-based groups, tribes and California Native American organizations, and other parties from the beginning of the planning process through final document preparation.

Engaging both technical experts and interested members of the public also contributed to a FloodSAFE goal of helping residents and businesses in the Central Valley to understand the flood risks they may face.

1.3 Report Organization

The organization of this document is as follows:

- Section 1 introduces and describes the purpose of this document and DWR's commitment to engagement.
- Section 2 describes DWR's overall approaches for engaging partners, stakeholders, and the public to produce the 2012 CVFPP and other technical supporting documents. The section also contains a comprehensive list of all outreach and engagement activities and communication tools.
- Section 3 provides a comprehensive list of all outreach and engagement activities and communication tools.

- Section 4 describes the approach, activities and measurements implemented for the four planning phases.
- Section 5 describes the engagement process implemented in support of development of the *State Plan of Flood Control Descriptive Document* (DWR, 2010a) and the *Flood Control System Status Report* (DWR, 2011a).
- Section 6 describes other outreach, engagement and coordination activities that occurred as part of FloodSAFE but also supported development of the 2012 CVFPP.
- Section 7 identifies the many coordination activities implemented with external partners such as USACE, CVFPB, maintaining agencies, local jurisdictions, Native American Tribes and Tribal Organizations, as well as the internal coordination activities through Functional Area Cross Coordination Teams.
- Section 8 lists abbreviations and acronyms used in this document.

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2.0 Communications and Engagement Approaches

Development of the CVFPP, which the California Legislature directed DWR to undertake, represents one of the largest and most complex planning efforts ever led by DWR on behalf of the residents, environment, visitors, and businesses in the State of California (State). Drawing from experiences in prior planning efforts, and the legislative direction, DWR placed major emphasis on developing communication and engagement approaches that would foster and sustain an open, transparent, and inclusive planning environment. Rather than independently defining the components of communication and engagement approaches, DWR conducted extensive research and evaluation of similar planning efforts and consulted with a wide array of experts and flood management stakeholders responsible for improving flood protection and ecosystem preservation, and implementing risk-informed land use decisions.

2.1 Research and Needs

Led by DWR's Central Valley Flood Planning Office (CVFPO), the research sought to meet multiple functions and needs. As mentioned above, research focused on review of similar planning efforts and consultation with numerous stakeholders.

The principal purpose of the research was to identify, measure, and consider the range of communication preferences among stakeholders and related audiences. Preferences were then aligned with researched communication and engagement best practices. Secondary research objectives were to measure stakeholder awareness of flood management issues; identify key flood management topics of interest among stakeholders; and identify additional stakeholders for participation.

As part of this research, DWR evaluated the communication and engagement approaches deployed for the *California Water Plan* (DWR, 2009a), CALFED Bay-Delta Program, Water Forum, *Sacramento and San Joaquin River Basins Comprehensive Study* (USACE, 2002), the San Joaquin River Restoration Program, and other efforts. This review promulgated a list of potential outreach strategies and tactics to be considered for inclusion in a communications and engagement plan. These potential strategies and tactics were elicited as part of in-depth stakeholder research interviews performed by DWR.

2.1.1 Stakeholder Research Interviews

As noted previously, DWR determined that effective outreach would require more substantial stakeholder engagement than minimally required by law. To that end, more than 100 experts and other flood management stakeholders were interviewed over a 30-day period beginning in mid-January 2009. These individuals represented a wide array of organizations and interests directly applicable to the CVFPP and its companion products. Organizations represented during these interviews[1] are listed in Table 2-1. Referral requests for other stakeholders during these interviews expanded the stakeholder audience significantly for the interview process and for subsequent engagement activities.

These interviews provided foundational guidance for identifying, developing, and implementing potential communications and engagement strategies. The survey also brought forth stakeholder issues related to Central Valley flood management. This early stakeholder input assisted the technical team in framing the approach to be used for presenting technical processes in subsequent meetings and briefings.

A team of communications specialists and facilitators conducted 45- to 60-minute phone interviews using a prepared script and predefined questions. All interviewers attended a training session in advance to promote consistency.

Interviews were conducted in a conversational style rather than in a formal poll or market survey. The approach encouraged elaboration by stakeholders. Interviewees were also advised interviews would be reported in the aggregate to allow individual comments to remain confidential unless participants provided permission otherwise. See Attachment 1 for a copy of the interview questionnaire and interviewer script.

The interviews solicited stakeholder responses in four general areas:

- Identify stakeholder participation in prior studies and collaborative efforts and elicit recommended best practices for communication and engagement strategies.

- Elicit input on potential components of communications and engagement approaches for the 2012 CVFPP specifically and identify communications preferences of potential stakeholders.

[1] In certain instances, more than one representative was interviewed in a given organization or interest-based group.

- Measure flood management system awareness and understanding among stakeholders, and identify any initial disconnects between DWR and stakeholders.
- Understand key areas of interest and expected level of participation among stakeholders and solicit their nomination of additional participants.

Table 2-1. Organizations and Interests Interviewed for Communications and Engagement Framework Development

American Rivers	City of Folsom	Landowners, farmers, and other citizens in the Central Valley and Sacramento-San Joaquin Delta
American River Flood Control District	City of Rio Vista	Levee District 1, San Luis Canal
American River Watershed Institute	City of Sacramento	Low Flow Alliance
Building Industry Association	City of Stockton	Lower San Joaquin Levee District
CALFED Bay-Delta Program	City of West Sacramento	Lower Yolo Planning Forum
California Central Valley Flood Control Association	City of Yuba	MBK Engineers
California Chamber of Commerce	Colusa County	Natomas Basin Conservancy
California Department of Boating and Waterways	Delta Protection Commission	Natural Heritage Institute
California Department of Conservation	Ducks Unlimited	Natural Resources Defense Council
California Department of Food and Agriculture	East Bay Municipal Utility District	National Oceanic and Atmospheric Administration Fisheries
California Department of Parks and Recreation	El Dorado County and Georgetown Divide Regional Conservation District	Northern California Water Association
California Department of Transportation	Elliott Homes	Pacific Gas and Electric Company
California Emergency Management Agency	Environmental Justice Coalition for Water	Placer County Flood Control and Water Conservation District
California Farm Bureau Federation	Family Water Alliance	Planning and Conservation League
California Manufacturers and Technology Association	Federal Emergency Management Agency	Reclamation District 1001
California Partnership for the San Joaquin Valley	Floodplain Management Association	Recreational Boaters of California
California Sport Fishing Protection Alliance	Friant Water Users	River Islands

Table 2-1. Organizations and Interests Interviewed for Communications and Engagement Framework Development (contd.)

California State Association of Counties	Solano County	U.S. Department of the Interior, Bureau of Reclamation
California State Water Resources Control Board	Friends of the River	Sacramento Area Council of Governments
California Truckers Association	Glenn County Planning and Public Works	Sacramento Area Flood Control Association
CalTrout	Glenn County Farm Bureau	Sacramento City Council
Central Valley Flood Protection Board	Glenn/Colusa Water District	Sacramento County Board of Supervisors
Central Valley Regional Water Quality Control Board	Great Valley Center	Sacramento County Water Resources
CH2M Hill	Hospital Council of Northern and Central California	Sacramento Metro Chamber of Commerce
Citizen Feather	Kjeldsen, Sinnock, and Neudeck	Sacramento River Conservation Area Forum
Sacramento Valley Landowners Association	Knights Landing Ridge Drainage District	Sacramento River Preservation Trust
San Joaquin County	Stockton East Water District	U.S. Fish and Wildlife Service, Sacramento National Wildlife Refuge Center
San Joaquin County Public Works	Sutter County	U.S. Geological Survey
San Joaquin River Exchange Contractors Water Authority	Sutter County Public Works	Office of U.S. Rep. Doris Matsui
San Joaquin River Parkway and Trust	Tehama Colusa Canal Authority	Yolo Basin Foundation
San Joaquin River Resource Management Coalition	The Nature Conservancy	Yolo County
San Luis Delta	Turlock Irrigation District	Yolo County Farm Bureau
Save the American River Association	U.S. Army Corps of Engineers	Yolo County Flood Control and Water Conservation District
City of Sacramento Public Works		

Key Findings Regarding Communications and Engagement

The industry expert research interviews yielded the findings summarized below:

- Respondents overwhelmingly supported using a combination of valleywide, regional, and topical engagement opportunities, but gave their strongest support to the regional scale for substantive participation.
- Most respondents supported a structure that would include venues of broad geographic scope, regional work groups that would allow more

detailed discussions and direct collaboration with DWR, and technical work groups that would be devoted to specific topics.

- Many respondents requested opportunities for substantive involvement and responsibilities, and also requested some resource support.

- Most respondents recommended that DWR staff, or their representatives vested with authority for decision making and continuity of the process, be present in work group meetings, which should be professionally facilitated to maintain momentum and support openness and accountability.

- Respondents stated that they would like evidence throughout of an open process with no predetermined or preconceived outcomes, and would also like evidence that DWR heard and considered their input.

- Respondents felt that many stakeholders were already engaged in a variety of public planning efforts; thus, it would be important that the engagement process be efficient.

- Many respondents indicated a willingness to share information about the process through their organizations' communications venues.

- Many respondents were confused about the implications of the State's budget problems for development of the CVFPP.

- At least one major group of respondents recommended convening a valleywide, broad-based task force or committee to consider all recommendations from a big-picture perspective, and to provide input to DWR accordingly.

Research Implications for Communications and Engagement

Research implications for determining elements of the approaches to communications and engagement strategies and tactics were as follows:

- The process should include a variety of options for public engagement, such as a venue for broad information sharing; regional work groups offering venues for direct collaboration about regional issues; and technical work groups devoted to specific topics.

- Content development should be collaborative, and there should be two-way interaction between the communications and engagement process and technical and planning work.

- Work groups should each be charged with specific activities within defined time frames, and it should be made clear how feedback obtained in these discussions would be used in planning.
- DWR staff or their designated representatives should be present at topic and regional work groups.
- Professional facilitators should provide continuity, consistency, and structure to public engagement venues.
- The engagement process should have built-in review and feedback mechanisms at regular intervals throughout so that DWR could show clear evidence of listening to input and provide responses.
- The process should proceed along a publicly available timeline, and decision-making processes should be explained to partners and interested parties in advance.
- The communication and engagement approaches should identify existing venues that could play a role in CVFPP development, to maximize the time and energy invested by partners and interested parties.

2.1.2 Communications and Engagement Framework

The results of these interviews were significant contributors in development of the *Communications and Engagement Framework* (Framework) (DWR, 2009b) by DWR. The Framework provides guidance for DWR when working with stakeholders and other interested parties with vested interests in development of a sustainable and integrated flood management plan for areas currently protected by facilities of the SPFC.

DWR adopted the communications and engagement approaches under a "framework" rather than a "plan," recognizing that stakeholders sought to share, receive, and co-create content. This emergent approach resulted in an open, transparent and inclusive planning environment that built on the feedback collected during stakeholder interviews.

This adaptive communications approach was paired with four generalized planning "phases" (see Figure 2-1). Each phase was anticipated to have content developed through iterative planning. In each phase, plan developers informed, consulted, and/or collaborated with diverse interest groups and stakeholders in various engagement settings. The flexible engagement framework supported, rather than directed, plan development and stakeholder participation.

Figure 2-1. Planning Process for 2012 Central Valley Flood Protection Plan Development

A major structural foundation of the Framework is DWR's application of the International Association of Public Participation (IAP2) *Spectrum of Public Participation* (see Figure 2-2) (IAP2, 2007). The IAP2 identifies five basic approaches to public engagement:

1. **Inform** – Agencies distribute information to the public about ongoing activities on a regular basis.

2. **Consult** – Agencies ask the public for input into decisions.

3. **Involve** – Agencies commit to actively consider public input in decisions and, in some instances, present responses to public input in writing.

4. **Collaborate** – Agencies allow the public to participate in decisions as partners, but the agencies retain final decision-making authority.

5. **Empower** – Agencies agree to implement decisions made by the public.

IAP2 Spectrum of Public Participation

International Association for Public Participation

Increasing Level of Public Impact

	Inform	Consult	Involve	Collaborate	Empower
Public participation goal	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example techniques	▪ Fact sheets ▪ Web sites ▪ Open houses	▪ Public comment ▪ Focus groups ▪ Surveys ▪ Public meetings	▪ Workshops ▪ Deliberative polling	▪ Citizen advisory committees ▪ Consensus-building ▪ Participatory decision-making	▪ Citizen juries ▪ Ballots ▪ Delegated decision

© 2007 International Association for Public Participation

Figure 2-2. International Association for Public Participation's "Spectrum of Public Participation"

The CVFPP team blended IAP2 outreach approaches to inform, consult, involve, and collaborate to achieve overall plan development goals and respond to the stakeholders' level of interest. DWR believed that ultimately the level of partnership and collaboration required to implement

the CVFPP was unlikely to occur unless stakeholders played a substantive role in creating the CVFPP.

Outreach methods furthered DWR and the stakeholders' understanding of localized conditions, challenges, and objectives essential to identifying improvements in integrated flood management. The outreach effort also explored the implications flood management actions requiring partnerships and cost-sharing among State, federal and local agencies.

The IAP2 also describes an "empower" approach. However, because of DWR's legal obligation to develop the CVFPP and the Board's legal obligation to adopt the CVFPP, the "empower" quadrant was not suitable for this process.

The application of the IAP2 approaches contributed to developing a variety of engagement venues for CVFPP technical planning processes. Engagement venues were selected based on the ability each offered to achieve the following accomplishments:

- Motivating ongoing participation by local partners and other interested parties.
- Developing common understanding among partners and interested parties about flood risk in the Central Valley.
- Developing common understanding among target audiences about CVFPP goals, guiding principles, and legislative mandates.
- Creating ongoing dialogue between and among agencies, partners, and other interested parties.
- Effectively linking technical planning to public engagement.
- Helping meet the letter and spirit of regulatory and legislative requirements, including consideration of disadvantaged community issues, environmental justice, and engagement with California Native American Tribes.
- Helping foster support for the CVFPP.

2.2 Types of Engagement

2.2.1 Forums

Conference-style forums were major outreach events designed to convene a variety of perspectives at significant milestones in the CVFPP development process. Each event focused on sharing information and promoting interaction with the broader public. DWR implemented two types of public forums during the planning process: (1) a Valleywide Forum when content applied to all locations within the Systemwide Planning Area, and (2) a Regional Forum when content presented was "place-based."

2.2.2 Work Groups

Work groups were convened to engage subject matter experts and community leaders in assisting with developing information and material to inform the CVFPP. The two main types of work groups were Regional and Topic. Regional Work Groups focused on place-based topics, such as assessing water-related and other conditions in the region, while Topic Work Groups focused on category-based topics such as climate change and operations and maintenance. A subset of the work groups was the Joint Subcommittee, which included membership from Regional or Topic work groups, or both. The subcommittees focused on discrete topics that were then shared with their full work groups. Each work group and subcommittee operated from a charter with defined deliverables and a specified time period (typically 2 to 6 months).

2.2.3 Workshops

A number of workshops were conducted to enable the team to receive highly focused, technical feedback on given subjects in a single meeting. These sessions convened multiple subject matter and interest-based groups, as well as the interested public. Workshop topics ranged from review of major planning milestones, to specific issues such as small community protection, floodplain management, and permitting.

2.2.4 Briefings

Periodic, standardized briefings for elected officials and local jurisdictions were conducted to for consistency and coordination of information among key stakeholders. In addition, coordination with specific interest-based groups allowed for focused discussions of content.

2.3 Public Information

2.3.1 Visual Identity

To visually orient stakeholders to a task or activity for the CVFPP, DWR developed a visual identity, or "brand," for the CVFMP Program, which was responsible for developing the CVFPP. This visual cue included a program logo, color palette, report template, PowerPoint template, signage, posters, and other event materials. This visual identity was created to complement and support the FloodSAFE visual identity.

2.3.2 Web Site

A program Web site provided stakeholders access to a variety of static and interactive tools, each designed to provide information and engage visitors in the planning process.

2.3.3 E-Mail Subscriber List

An e-mail subscriber list was created to allow interested parties to choose to receive CVFMP notifications and related information.

2.3.4 Videos and Multimedia

Videos and multimedia activities supported stakeholder recruitment during the planning phase, raised stakeholder and public awareness of flood management issues and opportunities, and functioned as a reference for completed engagement activities. DWR's activities included the following:

- **Videos** were used as outreach tools to help local partners and the public understand the context for development of the CVFPP, including the history of flood management in the Central Valley and the new State requirements enacted in the 2007 flood legislation.

- **Webcasts and webinars** of forums and briefings provided accessibility to a larger number of stakeholders by allowing remote attendance. Copies of the sessions also permitted viewing at a later date.

2.3.5 Publications

Publications supported development of the CVFPP, raised awareness of ongoing efforts and key deliverables, and encouraged stakeholder and public interaction in work groups and workshops. CVFPP publications included the following:

- **Newsletters** periodically provided updates on progress and highlighted opportunities for engagement.

- **Fact sheets** focused on a specific topic or issue to inform readers and raise awareness.
- **Informational flyers** promoted meetings or events in a simple format.
- **Public Notices** are one- to-two page documents used to comply with statutory noticing requirements for a government action.
- **Reader's Guides** assisted stakeholders in reviewing documents and processes.
- **Posters** provided information in a large format at engagement venues.
- **Reports** documented either (1) accomplishments of a planning phase, technical work, and/or next steps, or (2) stakeholder opinions and perceptions of participation in a prior planning phase.

2.3.6 Media Relations

Broadcast, print, and online media served as partners in development of the CVFPP by raising public awareness of flood management goals and objectives. Targeted press releases and other interactions with the media resulted in third party reporting of CVFMP Program accomplishments, and explanations of where and how DWR is investing funding from public-approved bonds. Media relations included a combination of proactive and response activities. Proactive activities included direct contact with the media following a news release, coordinated briefings for reporters, and development of specialized media materials. DWR also responded to inquiries generated by the media.

2.3.7 Advertising

Advertising supported CVFPP planning activities by reinforcing public awareness of flood management issues and the visual identities of FloodSAFE and the CVFMP Program.

2.4 Continuous Improvement

In support of the iterative planning processes for the 2012 CVFPP, DWR conducted continuous improvement activities aimed at evaluating and improving outreach and engagement.

2.4.1 External Assessments

As part of adapting the CVFPP communications and engagement process for future phases of work, process assessments were conducted at the end

of the first two phases of engagement. The goals of these evaluations were to summarize efforts to date, assess outcomes, extract key lessons learned, and provide recommended modifications.

Participant feedback was gathered through meeting discussions, interviews, and surveys. Participants offered constructive suggestions for improvement that were used in designing future public communications and engagement efforts during CVFPP development.

2.4.2 Presentation and Media Training

Two categories of communications training were identified to support technical development processes: presentation and media.

Presentation training sessions enhanced staff skills in displaying and discussing technical information with the public and stakeholders. Such training encouraged positive interaction and improved collaboration during work group and workshop sessions.

Media training fostered effective staff communications that would meet reporters' editorial interests and deadlines, and provided DWR a vehicle for increasing public awareness and understanding of flood management planning.

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3.0 Summary of Engagement Activities

This section describes communications and engagement accomplishments used to help develop the 2012 CVFPP and related documents, as guided by the Framework.

3.1 Record of Engagement Activities

Engagement activities to date are summarized in Table 3-1, and other communication tools used are summarized in Table 3-2.

Table 3-1. Record of Engagement Activities

Activity or Event Types	No. of Events	Phases			CVFPP Companion Effort	FloodSAFE Related Effort	Dates
		1	2	3/4			
Research							
Organization/Interest Interviews	113	Pre-Phases					January 2009 – February 2009
Forums							
Regional Forums	5	X					June 2009
Valleywide Forums	2	X	X				June 2010, December 2010
Work Groups							
Regional Conditions Work Groups							
Upper Sacramento	8	X					August 2009 – April 2010
Lower Sacramento	8	X					August 2009 – May 2010
Upper San Joaquin	8	X					August 2009 – April 2010
Lower San Joaquin	8	X					August 2009 – April 2010
Delta	8	X					August 2009 – May 2010
Regional Management Actions Work Groups							
Upper Sacramento	3		X				July 2010 – November 2010
Lower Sacramento	3		X				June 2010 – November 2010
Upper San Joaquin	3		X				June 2010 – November 2010
Lower San Joaquin	3		X				June 2010 – November 2010
Delta	3		X				June 2010 – November 2010

Table 3-1. Record of Engagement Activities (contd.)

Activity or Event Types	No. of Events	Phases			CVFPP Companion Effort	FloodSAFE Related Effort	Dates
		1	2	3/4			
Topic Work Groups							
Levee Performance Scope Definition	4	X					August 2009 – October 2009
Operations and Maintenance Scope Definition	4	X					August 2009 – October 2009
Climate Change Scope Definition	4	X					August 2009 – October 2009
Environmental Stewardship Scope Definition	4	X					August 2009 – October 2009
Climate Change Threshold Analysis	2		X				August 2010 – August 2010
Interim Levee Design Criteria	9	X	X		X	X	December 2009 – September 2010
Urban Levee Design Criteria	5			X	X	X	March 2011 – July 2011
Urban Level of Flood Protection Criteria	4			X	X	X	May 2011 – October/November 2011
Subcommittees							
Agricultural Stewardship Scope Definition Joint Subcommittee	4	X					October 2009 – April 2010
Regional Management Actions Objectives	7		X				October 2010
Workshops							
Management Actions	15		X				July 2010 – September 2010
Technical Analyses	2			X			June 2011
Interim Levee Design Criteria	1			X	X	X	January 2011
Urban Levee Design Criteria	1			X	X	X	September 2011
Urban Level of Flood Protection Criteria	1			X	X	X	September 2011
2012 Central Valley Flood Protection Plan – Working Draft for Work Group Member Review	1			X	X	X	November 2011
Briefings and Coordination							
In-Person and Phone Briefings to Local Governments	31	X	X		X	X	September 2009 – November 2010
Coordination Meetings	7	X	X				May 2010 – September 2010
Media Briefings	5	X	X				June 2010, August 2010
Regional Work Groups	2			X			May 2011
Legislative Outreach							
Briefings	1	X			X	X	January 2010

Table 3-1. Record of Engagement Activities (contd.)

Activity or Event Types	No. of Events	Phases			CVFPP Companion Effort	FloodSAFE Related Effort	Dates
		1	2	3/4			
California Native American Tribe and Environmental Justice Outreach							
Tribe and Tribal organization briefings	17	X	X	X	X	X	October 2009 – February 2011
Environmental Justice outreach	None[2]	X	X				

Key:
CVFPP = Central Valley Flood Protection Plan
FloodSAFE = FloodSAFE California

Table 3-2. Use of Other Communications Tools

Tool Types	Phases			CVFPP Companion Documents	FloodSAFE Related Documents	Publication Dates
	1	2	3/4			
Publications						
Newsletters						
FloodSAFE Focus, Vol. 1, Issue 1	X				X	May 2010
FloodSAFE Focus, Vol. 1, Issue 2		X			X	July 2010
FloodSAFE Focus, Vol. 1, Issue 3		X			X	August 2010
FloodSAFE Focus, Vol. 1, Issue 4		X			X	October 2010
FloodSAFE Focus, Vol. 1, Issue 5		X			X	December 2010
FloodSAFE Focus, Vol. 2, Issue 1			X		X	March 2011
FloodSAFE Focus, Vol. 2, Issue 2			X		X	April 2011
FloodSAFE Focus, Vol. 2, Issue 3			X		X	July 2011
FloodSAFE Focus, Vol. 2, Issue 4			X		X	October 2011
Fact Sheets						
Central Valley Flood Management Planning Program	X					June 16, 2010
CVFMP Program: How to Get Involved	X					June 16, 2010
Central Valley Floodplain Evaluation and Delineation Program	X				X	June 1, 2009
Improving Flood Management in the Central Valley	X					June 17, 2010
Levee Evaluation Program	X				X	June 1, 2009

[2] Environmental justice organizations deferred briefings in favor of participation in workgroups and workshops.

Table 3-2. Use of Other Communication Tools (contd.)

Tool Types	Phases			CVFPP Companion Documents	FloodSAFE Related Efforts	Publication Dates
	1	2	3/4			
Central Valley Integrated Flood Management Study[1]	X			X		June 1, 2009
Invitation to Tribal Governments and Communities to Be Involved in Development of the Central Valley Flood Protection Plan	X					March 8, 2010
Central Valley Flood Protection Plan Progress Report		X				January 2011
Flyers						
June 2009 Regional Forums	X					May 2009
June 2010 Valleywide Forum	X					May 2010
Management Actions Workshops (Round 1)		X				July 2010
Management Actions Workshops (Round 2)		X				August 2010
Guides						
Reader's Guide to the Interim Progress Summary No. 1 and Regional Conditions Report – A Working Document	X					April 2010
Attendee's Guide to Phase 2 Workshops		X				July 2010 (updated August 2010)
Posters						
Understanding the Challenge: Flood-Related Risks in the Central Valley	X					June 2009
Meeting the Challenge: Building on Existing Information and Developing New Data	X					June 2009
Meeting the Challenge: Central Valley Flood Protection Plan	X					June 2009
Meeting the Challenge: Flood Management Implementation Activities	X					June 2009
Reports						
Communications and Engagement Framework	X					June 2009 (Public Draft)
Operations and Maintenance Scope Definition Work Group Summary Report	X					November 2009 (Draft)
Levee Performance Scope Definition Work Group Summary Report	X					November 2009 (Draft)
Climate Change Scope Definition Work Group Summary Report	X					December 2009 (Draft)

Table 3-2. Use of Other Communication Tools (contd.)

Tool Types	Phases			CVFPP Companion Documents	FloodSAFE Related Efforts	Publication Dates
	1	2	3/4			
Environmental Stewardship Scope Definition Work Group Summary Report	X					December 2009 (Draft)
State Plan of Flood Control Descriptive Document	X			X		January 2010 (Draft), November 2010
Regional Conditions Report – A Working Document	X					March 2010
Interim Progress Summary No. 1	X					April 2010
Important Considerations for the Central Valley Flood Protection Plan Related to Sacramento-San Joaquin Valley Agriculture	X					May 2010 (Draft)
Phase 1 External Communication and Engagement Assessment	X					September 2010
Phase 2 Climate Change Threshold Analysis Work Plan		X				September 2010 (Draft)
Notice of Preparation: Program Environmental Impact Report for the Central Valley Flood Protection Plan		X		X		October 2010
Management Actions Report		X				November 2010 (Draft)
Interim Progress Summary No. 2		X				December 2010
Central Valley Flood Protection Plan Progress Report		X				January 2011
Final Public Scoping Report: 2012 Central Valley Flood Protection Plan Program Environmental Impact Report			X	X		February 2011
Central Valley Flood Protection Plan Summary – Working Draft for Work Group Member Review			X			October 2011
Central Valley Flood Protection Plan – Working Draft for Work Group Member Review			X			October 2011
Public Draft Flood Control System Status Report				X		December 2011
Public Draft 2012 Central Valley Flood Protection Plan			X			December 2011

Table 3-2. Use of Other Communication Tools (contd.)

Tool Types	Phases			CVFPP Companion Documents	FloodSAFE Related Efforts	Publication Dates
	1	2	3/4			
Web Site						
Materials Continue to Be Posted to the Program Web Site	X	X	X	X		Continuous
Multimedia						
Videos						
Flood Risk Notification					X	June 2011
Regional Management Actions Workshops Orientation Video		X				July 2010
Overcoming the Deluge: California's Plan for Managing Floods (27-minute version)			X		X	November 2011
Overcoming the Deluge: California's Plan for Managing Floods (12-minute version)					X	November 2011
Webcasts and Webinars						
Webcast – June 2010 Valleywide Forum	X					June 2010
Webcast – December 2010 Valleywide Forum		X				December 2010
Webinars – 11 Round 1 Management Actions Workshops		X				July 2010
Webinars – Regional Work Group Briefings			X			May 2011
Webinars – 2012 CVFPP Summary Working Draft for Work Group Member Review			X			November 2011
Webinar – 2012 CVFPP Working Draft for Work Group Member Review Workshop			X		X	November 2011

Note:
[1] Content developed by DWR in coordination with the Sacramento District of the U.S. Army Corps of Engineers.

Key:
CVFMP = Central Valley Flood Management Planning Program
CVFPP = Central Valley Flood Protection Plan
FloodSAFE = FloodSAFE California

3.2 Stakeholder Representation

Throughout the communications and engagement process, DWR sought to connect, engage, and interact with a diverse and widely representative group of stakeholders. The communications and engagement activities included agencies at all levels of government, academic experts, local businesses, valley and Delta communities, elected officials, water suppliers, California Native American organizations, nonprofits, agricultural interests and environmental groups within and outside the SPFC. Represented stakeholders provided invaluable input at all levels of the engagement process, and made extensive contributions to development of the 2012 CVFPP. A comprehensive list of stakeholders is documented in Appendix B.

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4.0 Plan Development Support

As described in Section 2, DWR approached development of the 2012 CVFPP via four general planning phases. Each phase was anticipated to have content developed through iterative planning. This planning environment was supported by strategies and tactics identified in the Framework and follow-on coordination with stakeholders.

This approach provided the flexibility many stakeholders expressed as vital for them to identify, analyze, and address the technical, social, economic, and environmental conflicts that have faced Central Valley flood management planning for decades. This approach further accommodated staffing and management changes at DWR that occurred before and after transition of the State's executive administration in January 2011.

4.1 Phased Process

The four planning phases identified for development of the 2012 CVFPP included Regional Conditions (Phase 1), Management Actions (Phase 2), and Systemwide Investment Formulation (Phases 3 and 4). The function and conduct of these planning phases included continuous and direct input and involvement by staff of the Board and U.S. Army Corps of Engineers, Sacramento District (USACE).

4.2 Regional Conditions (Phase 1)

From June 2009 through early June 2010, DWR hosted a variety of engagement activities that included conducting forums and work group sessions, and briefings to legislative staff, interest-based groups and California Native American Tribes. During that time, DWR also released a variety of publications. Following is an overview of stakeholder meetings and outreach activities during Phase 1.

4.2.1 Regional and Valleywide Forums

Five Regional Forums were held in June 2009 to launch Phase 1 and recruit work group members (see Figure 4-1). Locations included Chico, West Sacramento, Walnut Grove, Modesto, and Los Banos.

In June 2010, a Valleywide Forum was held to conclude Phase 1 and launch Phase 2. The location was West Sacramento.

Figure 4-1. Five Central Valley Flood Protection Plan Engagement Regions

4.2.2 Work Groups

Five Regional Conditions Work Groups (RCWG) were chartered to help develop content for the DWR *Regional Conditions Report – A Working Document* (DWR, 2010b). These work groups represented five geographic regions: Upper and Lower Sacramento Valley, Delta, and Upper and Lower San Joaquin Valley. Forty meetings were held.

Four Topic Work Groups were chartered to help define the scope of, and important considerations for, topics relevant to all regions in the areas of climate change, environmental stewardship, levee performance, and operations and maintenance (O&M). Sixteen meetings were held.

An Agricultural Stewardship Scope Definition Joint Subcommittee was convened, with participants from each Phase 1 regional and topic work group, to identify and capture the agricultural community's concerns for integration into the 2012 CVFPP. Four meetings were held.

4.2.3 Workshops

No workshops were held in Phase 1.

4.2.4 Briefings and Coordination

In-person and phone briefings were given to local governmental agencies and their staff. Twenty-three briefings were held (see Table 4-1).

One coordination meeting was held with the California Central Valley Flood Control Association.

In advance of the June 2010 Valleywide Forum, briefings were held with four Central Valley print media outlets:

- Sacramento Bee
- Woodland Daily Democrat
- Capitol Weekly
- Associated Press

Table 4-1. Phase 1 In-Person and Phone Briefings

Colusa County Board of Supervisors	Madera County Water Advisory Commission	Shasta County Public Works Director & Planning Manager
Contra Costa County Board of Supervisors Chair	Madera County Board of Supervisors	Glenn County Board of Supervisors
Solano County Board of Supervisors Chair & Supervisor	Yuba County Board of Supervisors	Yolo County Board of Supervisors Chair
Solano County Board of Supervisors	Merced County Public Works/ Planning Staff	Woodland City Council
Contra Costa Board of Supervisors	Stanislaus County Board of Supervisors	Sutter Butte Flood Control Agency
Fresno County Board of Supervisors Chair	Rio Vista City Council & Staff	Sutter County Board of Supervisors
Fresno County Planning & Public Works Staff	City of Sacramento Staff (2 meetings)	
Madera County Board of Supervisors Chair	Sacramento City Council	

4.2.5 Legislative Outreach

A briefing was given to legislative staff at the State Capitol in January 2010.

4.2.6 California Native American and Environmental Justice Outreach

California Native American Tribes and tribal organizations received FloodSAFE/CVFPP briefings following contact with more than 100 organizations. Eleven briefings were held (see Table 4-2).

A database was developed of nongovernmental organizations with interests in environmental justice. Notices of CVFMP Program events and milestones were e-mailed to these groups with briefing offers.

Table 4-2. Phase 1 Briefings for California Native American Tribes and Tribal Organizations

California Indian Basket Weavers	Cortina Indian Rancheria	Inter-Tribal Council of California, Inc.
Northern Circle Indian Housing Authority	Redding Rancheria	Sacramento Native American Health Center
Hinthil Environmental Resource Consortium	Inter-Tribal Council of California	Bureau of Indian Affairs
North Fork Mono Tribe	California Rural Indian Health Board, Inc.	

4.2.7 Phase 1 Public Information

Publications

Newsletters The CVFPP effort led to development of the *FloodSAFE Focus*, a periodic publication of DWR's Division of Flood Management. This publication is geared to report on the accomplishments of FloodSAFE as they contribute to public safety, environmental stewardship, and economic stability. During Phase 1, one issue of the newsletter was published (DWR, 2010–2011).

Fact Sheets and Flyers Eight fact sheets were developed, including overviews of FloodSAFE, the CVFMP Program and the range of communications and engagement opportunities. DWR also produced a fact sheet designed to encourage California Native American Tribe and tribal organization participation in 2012 CVFPP development. These documents were updated periodically as planning efforts advanced and stakeholders became more acquainted with technical aspects of the CVFPP and related documents. In addition to being used by work groups, fact sheets were distributed at briefings with California Native American Tribes, local land-use agencies, local elected officials, interest-based groups, legislative staff, and policy makers. Electronic copies of these fact sheets were posted on the CVFMP Program Web site and cross-linked to the FloodSAFE program Web site

Informational flyers were developed in support of the Regional and Valleywide forums.

Guides A *Reader's Guide to the Interim Progress Summary No. 1 and Regional Conditions Report – A Working Document* (DWR, 2010c) was developed to serve as a companion document to the DWR *Interim Progress Summary No. 1* (DWR, 2010d) and the *Regional Conditions Report – A Working Document* (DWR, 2010b), and to summarize and describe their structures.

Posters Four large-scale posters were developed for use in the Regional Forums to describe the challenges of the Central Valley flood management system and potential corrective opportunities to be realized through the CVFPP.

Reports Major Phase 1 documents posted to the CVFMP Program Web site included the DWR *Levee Performance Scope Definition Work Group Summary Report* (2009c), the *Operations and Maintenance Scope Definition Work Group Summary Report* (2009d), the *Environmental Stewardship Scope Definition Work Group Summary Report* (DWR, 2009e), the *Climate Change Scope Definition Work Group Summary*

Report (DWR, 2009f), the *State Plan of Flood Control Descriptive Document* (DWR, 2010a), the *CVFPP Regional Conditions Report – A Working Document* (DWR, 2010b), the *Interim Progress Summary No. 1* (DWR, 2010d), and *Important Considerations for the CVFPP Related to Sacramento-San Joaquin Valley Agriculture* (DWR, 2010e).

Web Site and Multimedia

Web Site The CVFMP Program Web site (www.water.ca.gov/cvfmp) was developed to provide access to CVFPP-related information. This site was organized as subordinate to the FloodSAFE Web site (www.water.ca.gov/floodsafe). Links on the CVFMP Program Web site included the following:

- **About the Program** – Describes goals of the CVFMP Program, and links to other related or companion documents to the CVFPP.
- **Calendar** – Draws from DWR's Water Calendar and provides visitors with single-click access to CVFPP-related meetings.
- **Publications** – Contains a repository of program publications.
- **Meetings** – Assists in promoting meetings and distribution of meeting materials, summaries, and charters for visitor reference.
- **Work Group Resources** – Contains background information on various work groups.
- **Partner Registry** – Provides stakeholders with the opportunity to subscribe to the CVFMP Program e-mail lists based on their areas of interest; more than 250 have signed up.
- **Contact** – Includes physical mailing addresses for DWR, as well as an online form that allows a site visitor to contact the CVFMP Program.

Videos No videos were produced in Phase 1.

Webcasts and Webinars The June 2010 Valleywide Forum was broadcast live via Webcast. Stakeholders viewing the event were able to pose questions to panelists and staff. The Webcasts were posted to the Web for follow-on viewing and archived for future viewing.

4.3 Phase 1 External Assessment

To evaluate stakeholder perceptions and opinions regarding the effectiveness of Phase 1 engagement activities, structured meeting discussions, interviews and surveys were conducted to produce the *Phase 1 External Communication and Engagement Assessment* (DWR, 2010f). In addition to evaluating the overall effectiveness of Phase 1 engagement activities, the assessment assisted in guiding the format and function of Phase 2 communications and engagement activities. Of the 192 individuals participating in Phase 1 work groups and subcommittees, 18 responded via an online survey; 24 completed an in-depth interview with a work group facilitator; and nearly all of the approximately 90 RCWG members discussed the topic during a work group meeting. Work group members who never attended a meeting were contacted to learn if they had concerns. The *Phase 1 External Communication and Engagement Assessment* is available on the program Web site and results of the assessment were presented to stakeholders. Research collected through this effort identified the following:

- Most respondents provided favorable comments about DWR's efforts to date but reserved judgment about DWR's commitment to the process until they could view the *Regional Conditions Report – A Working Document* (DWR, 2010b), and they had been briefed on the next phase of work.

- Respondents suggested that DWR more clearly explain why participant-generated information was important, and some respondents expressed concern that some Phase 1 work group efforts might not be incorporated into future work products. Many suggested that a clearer road map (including schedule, work objectives, expected products and their use, and expected level of effort) be provided to the work groups.

- Many RCWG members felt that participation in the process decreased over time because of the extensive number of meetings and because of concerns about the lack of incorporation of feedback into materials to produce the 2012 CVFPP. Many participants also commented that Phase 1 pacing and volume of work were not sustainable, yet they recognized the overall process would be driven by external deadlines.

- Aside from pacing and work volume, most respondents gave positive marks to meeting support and the general process design. Some respondents noted that it was difficult for them to assess the degree to which information generated across all work groups had been integrated into the *Regional Conditions Report – A Working Document* (DWR, 2010b) and other CVFPP materials. Participants also identified

challenges for future CVFPP development, especially in developing management actions. While work group members were aware of outreach to elected officials, key opinion leaders, and others, they suggested that more outreach, more often, would be needed.

Following release of the *Interim Progress Summary No.1* (DWR, 2010d), DWR was contacted by several stakeholder participants with concerns regarding the nature and findings of the document. In general, these stakeholders were dissatisfied because they felt some of the important issues raised during the Phase 1 meetings were not included and they did not agree with the characterization of the "Level of Agreement" section of the document. Several small-group meetings were held with stakeholders in response to these concerns, which were captured and represented in the Phase 1 Assessment and follow-on CVFPP documents. Results of these sessions served as guidance for subsequent plan development activities and coordination with stakeholders during Phase 2.

4.4 Management Actions (Phase 2)

From June 2010 through December 2010, DWR continued hosting forums, work groups, and briefings to interest-based groups and California Native American Tribes. DWR also released of a variety of CVFPP-related publications. During Phase 2, workshops were introduced into the planning process. Following is an overview of stakeholder meetings and outreach activities during Phase 2.

4.4.1 Regional and Valleywide Forums

In December 2010, a Valleywide Forum was held to conclude Phase 2 and launch Phase 3/4. The location was West Sacramento.

No regional forums were held.

4.4.2 Work Groups

Five Regional Management Actions Work Groups (RMAWG) were convened to help frame management action categories and assist with the general approach for incorporating management actions into the CVFPP. These work groups represented the same geographic regions as in Phase 1 RCWGs. Fifteen meetings were held.

Two Climate Change Threshold Approach Work Group meetings were convened as follow-on work to the Phase 1 climate change work. The Phase 2 work surveyed the approaches of ongoing studies to facilitate

development of a consistent climate change analysis process for DWR planning purposes.

A Regional Management Action Objectives subcommittee was convened by each RMAWG to articulate regional objectives related to the primary CVFPP goal of improved flood risk management, then to report back to the main work groups for review and discussion. Seven meetings were held.

4.4.3 Workshops

Fifteen Regional Management Action Workshops were held in Phase 2. The Round 1 workshops reviewed and developed management actions contributing to the 2012 CVFPP goals in 11 categories:

- Policy and Regulations
- Ecosystem Restoration
- Flood Protection System Modification
- Permitting
- Disaster Preparedness and Flood Warning
- Floodfighting, Emergency Response, and Flood Recovery
- Finance and Revenue
- Operations and Maintenance
- Additional Floodplain and Reservoir Storage
- Storage Operations

The Round 2 workshops identified how management actions could be applied in community settings within the CVFPP planning areas, and also identified opportunities to integrate environmental, water supply, and other benefits. The categories of these four workshops were as follows:

- Small Communities Workshop
- Integration Workshop
- Rural/Agricultural Areas Workshop
- Urban Areas Workshop

Total attendance exceeded 450 people. More than 800 written and verbal comments were received.

4.4.4 Briefings and Coordination

Eight in-person and phone briefings were given to local government agencies and their staff (see Table 4-3).

Six coordination meetings were held with organizations whose members spanned large geographic areas (see Table 4-3).

A media availability notice was delivered to Central Valley media in August 2010 to raise awareness of Phase 2 planning activities and remind the media of the State's flood management planning efforts as the anniversary of Hurricane Katrina neared. While follow-up calls were held with print media reporters throughout the Central Valley, no news articles on Phase 2 were published as a result of this outreach.

Table 4-3. Phase 2 In-Person and Phone Briefings and Coordination

In-Person and Phone Briefings		
Madera County Water Advisory Commission	Butte County Planning Department Staff	Sutter Local Agency Formation Commission
Madera County Board of Supervisors	Sacramento County Planning Department Staff	Sutter Butte Flood Control Agency
Contra Costa County Engineering Committee	Water Resources Association of Yolo County	
Coordination Meetings		
San Joaquin Area Flood Control Agency/San Joaquin County	Society of Marketing Professional Services	Lower American River Task Force
San Joaquin County Flood Control Technical Advisory Committee (2 meetings)	Delta Stewardship Council	

4.4.5 Legislative Outreach

No formal legislative staff outreach was performed in Phase 2.

4.4.6 California Native American and Environmental Justice Outreach

California Native American Tribes and one statewide tribal organization received FloodSAFE/CVFPP briefings. Five briefings were held (see Table 4-4).

E-mail notices about CVFPP-related events and milestones were sent to organizations with known interests in environmental justice issues.

Table 4-4. Phase 2 Briefings for California Native American Tribes and Tribal Organizations

Chowchilla Tribe of North Valley Yokuts	Nashville-Eldorado Miwoks Tribe	California Manpower Indian Consortium
Grindstone Rancheria	Wintu Tribe of Northern California	

4.4.7 Phase 2 Public Information

Publications

Newsletters During Phase 2, four issues of the *FloodSAFE Focus* were published (DWR, 2010–2011).

Fact Sheets and Flyers The California Native American Tribe program fact sheet was updated and published.

Public Notice The Notice of Preparation: Program Environmental Impact Report for the CVFPP was published by DWR in October 2010.

Guides An *Attendee's Guide to Phase 2 Workshops* (DWR, 2010g, updated August 2010) was developed to assist and orient workshop participants in their consideration of which workshop to attend and how their input would be applied to the current and subsequent planning phases.

Posters No posters were produced during Phase 2.

Reports Major Phase 2 documents posted to the program Web site included the DWR *Management Actions Report* (DWR, 2010h), the *Interim Progress Summary No. 2* (DWR, 2010i), and the *Phase 2 Climate Change Threshold Analysis Work Plan* (DWR, 2010j), the *State Plan of Flood Control Descriptive Document* (DWR, 2010a), and the *Final Public Scoping Report: 2012 CVFPP Program Environmental Impact Report* (DWR, 2011b).

Web Site and Multimedia

Web Site Materials continued to be posted to the program Web site throughout Phase 2.

Videos A 12-minute *Regional Management Actions Workshops Orientation Video* (DWR, 2010k) was produced and published online in advance of the July 2010 workshops. This video was part of DWR's stakeholder recruitment efforts, and supported stakeholder understanding of the scope and purpose of the scheduled workshops, and how stakeholder participation helped in development of the CVFPP.

Webcasts and Webinars The December 2010 Valleywide Forum was broadcast live via Webcast and stored on the program Web site for future viewing.

All Round 1 Management Actions Workshops were offered via Webinar for those unable to attend in person.

4.5 Phase 2 External Assessment

Following Phase 2 of engagement to produce the 2012 CVFPP, a written survey was created with a mix of 12 quantitative and qualitative questions aimed at obtaining feedback to help improve the engagement process during the next phase of CVFPP development. Topics included stakeholders' levels of satisfaction with the Phase 2 process and work group support staff, understanding of how stakeholder input would feed in into development of the CVFPP, potential future challenges that could arise, and other topics.

The survey was distributed at five RMAWG meetings conducted in early November 2010 and was sent electronically to RMAWG members who did not attend the meetings. Survey participants were offered the opportunity to be interviewed. The Phase 2 External Assessment was based on 52 survey responses received, other input and correspondence provided to the meeting facilitators, and 15 phone interviews conducted by the meeting facilitators across the five work groups. The Phase 2 External Assessment was presented to DWR for internal use to inform the design of subsequent phases of engagement. Findings of the assessment included the following:

- The assessment found overall satisfaction with the engagement process, with more than 80 percent of respondents indicating that they were either "satisfied" or "somewhat satisfied," and no respondents indicating that they were either "unsatisfied" or "very unsatisfied." However, overall satisfaction was highly contingent on next phases and eventual contents of the 2012 CVFPP. Respondents identified several successful elements during Phase 2, including: development of regional objectives in subcommittees, creation of management actions, diversity of work group participation, and support provided by DWR staff and others.

- A significant majority of survey respondents (87 percent) saw the stakeholder engagement process as somewhat to very likely to have a meaningful impact on the content of the 2012 CVFPP. Respondents cited DWR's efforts to engage local perspectives and recruit diverse participation as two key strengths of the engagement process to date.

- Respondents also requested less emphasis on discussing process during meetings, a slower pace of work, and a clearer understanding of how agricultural and environmental values would be integrated into flood

management planning. Respondents cited two key challenges for successfully developing the 2012 CVFPP: (1) the time available to develop the plan, and (2) funding for implementing the plan. Suggestions from participants for future phases of CVFPP development included: focusing on prioritized "recommended actions," using maps and tools to support place-based discussions; and providing specific examples of how work group involvement and engagement would be conducted in subsequent phases.

4.6 Systemwide Investment Formulation (Phase 3/4)

From January 2011 to December 2011, DWR continued hosting workshops and briefings to interest-based groups, and California Native American Tribes. DWR also released a variety of CVFPP-related publications. Following is an overview of stakeholder meetings and outreach activities during Phase 3/4.

4.6.1 Regional and Valleywide Forums

No forums were held in Phase 3/4.

4.6.2 Work Groups

No work groups were formed in Phase 3/4.

4.6.3 Workshops

In January 2011, a workshop was held to release Version 4 of the *Interim Levee Design Criteria* (ILDC) (DWR, 2010l) and solicit comments for consideration in Version 5.

Two CVFPP Technical Analyses Workshops were held in June 2011 to provide an overview of analyses supporting development of the State Systemwide Investment Approach, including evaluation methods and initial findings. The locations included Stockton and West Sacramento.

In October 2011, DWR held two Webinars to present and brief work group members on the availability of the *Central Valley Flood Protection Plan Summary – Working Draft for Work Group Member Review* (DWR, 2011c). These Webinars preceded the October 2011 release of the *Central Valley Flood Protection Plan – Working Draft for Work Group Member Review* (DWR, 2011d). Details of this document were discussed with CVFMP Program work group members during two November 2011 workshops held in Stockton and Sacramento. Following these workshops, a

Webinar was held to receive input from stakeholders who were unable to attend the prior events.

4.6.4 Briefings and Coordination

In May 2011, Regional Work Group participants were invited to participate in two Webinar briefings. These briefings brought attendees up to date with current planning activities and next steps.

4.6.5 Legislative Outreach

No legislative outreach occurred in Phase 3/4.

4.6.6 Native American and Environmental Justice Outreach

During this phase, DWR presented at the February 2011 Region 9 U.S. Environmental Protection Agency Regional Tribal Operations Committee meeting.

4.6.7 Phase 3/4 Public Information

Publications

Newsletter Four issues of *FloodSAFE Focus* were published (DWR, 2010-–2011).

Fact Sheets and Flyers

A package of fact sheets on various topic areas applicable to the CVFPP were developed as part of the public release.

Guides No guides were developed during Phase 3/4.

Posters No posters were developed during Phase 3/4.

Reports The public draft *Urban Levee Design Criteria* was released (DWR, 2011e). The *2012 Central Valley Flood Protection Plan Summary – Working Draft for Work Group Member Review* (DWR, 2011c) and the *2012 Central Valley Flood Protection Plan – Working Draft for Work Group Member Review* (DWR, 2011d) were released in October 2011. The *Public Draft Flood Control System Status Report* (DWR, 2011a) and the *Public Draft 2012 Central Valley Flood Protection Plan* (DWR, 2011f) were released in December 2011.

Web Site and Multimedia

Web Site Materials continued to be posted to the program Web site throughout Phase 3/4.

Videos Two public-awareness-oriented videos were developed during Phase 3/4:

- Titled *Overcoming the Deluge: California's Plan for Managing Floods* (WEF, 2011), the Water Education Foundation (WEF) public education video is a 27-minute documentary-style production geared to inform a lay audience of the history of flood threats in the Central Valley, and the State's efforts to address these challenges. WEF developed the video as a subcontractor to the CVFMP Program. From a content perspective, DWR functioned as a resource for information and interview referrals, and confirmation of data selected by the producer for inclusion in the video. To conform to producer guidelines for the Public Broadcast System (PBS), DWR did not engage in any editorial advocacy or influence over WEF or the producer selected by WEF in the development of the video. Therefore, the video was eligible to be shown on PBS stations in California. The program was broadcast three times during prime time on Sacramento PBS station KVIE in November 2011. Following this airing, the video was distributed to all other California PBS stations via satellite.

- A second, 12-minute video was produced by WEF based on footage and content produced for *Overcoming the Deluge: California's Plan for Managing Floods* (WEF, 2011). While this second video carried the same title, the video was developed to provide an abbreviated overview of the State's efforts to address flood management challenges, threats and potential solutions. To differentiate each video, WEF incorporated video content and interviews into the second video that were not used in the documentary video. The second video was shown during the September 2011 Flood Management Association conference in San Diego.

Webcasts and Webinars In May 2011, the two Regional Work Group briefings were held via Webinar.

In November 2011, two Webinars were held to present and receive comments on DWR's release of the *2012 Central Valley Flood Protection Plan Summary–Working Draft for Work Group Member Review* (DWR, 2011c).

4.7 CVFPP Phase 3/4 Assessment and Stakeholder Assessment Executive Summary

A CVFPP Phase 3/4 Assessment and Stakeholder Assessment Executive Summary is planned for development during the Board's adoption process of the CVFPP. This report will be updated once the assessment and summary is completed.

4.8 CVFPP Adoption Process

The Board, with support by DWR, plans to conduct a series of public meetings and public hearings for adoption of the 2012 CVFPP and the Programmatic Environmental Impact Report (PEIR). This report will be updated during the Board adoption process.

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5.0 Plan Companion Efforts

While DWR used methods such as structured work groups, workshops, and public forums to obtain input and content that would assist in 2012 CVFPP development, efforts to produce two companion documents – the *State Plan of Flood Control Descriptive Document* (DWR, 2010a) and the *Flood Control System Status Report* (DWR, 2011a) – required much different engagement approaches. These content-rich documents relied heavily on extremely localized input, knowledge, and data, and historical knowledge and documentation.

5.1 State Plan of Flood Control Descriptive Document

For the *State Plan of Flood Control Descriptive Document* (DWR, 2010a), released November 2010, DWR worked with individual levee districts, reclamation districts, and other maintaining agencies, the Board, and USACE to obtain materials related to the purpose and origin of the State-federal flood facilities under their management, including original and updated operations and maintenance manuals.

The *State Plan of Flood Control Descriptive Document* (DWR, 2010a) was released for a 1-month public review and comment period in January 2010. Additionally, the Regional Conditions Work Groups were briefed on the *State Plan of Flood Control Descriptive Document* and invited to review it before DWR finalized the document.

The Board provided comments on the draft document and posted the final draft to its Web site for electronic download in November 2010.

5.2 Flood Control System Status Report

To produce the *Flood Control System Status Report* (DWR, 2011a) – publicly released in December 2011 with the CVFPP – DWR engaged State, federal, and local agencies and landowners to gain a thorough understanding of the State-federal flood management system's performance in the Sacramento and San Joaquin valleys. Many of the *Flood Control System Status Report's* technical inputs were derived from on-the-ground inspections of flood management facilities, such as levees, in both urban and nonurban areas. In addition, DWR obtained historical data from State,

federal, and local agencies, and USACE and through interviewing local landowners.

Before the public draft release of the *Flood Control System Status Report* (DWR, 2011a), DWR provided an administrative working draft version to nearly 100 agencies and organizations which have direct operations and maintenance responsibilities over SPFC facilities. This July 2011 release aimed to gather the most up to date information on facility conditions, and elicit detailed feedback on how accurately the draft document characterized the performance of these facilities.

Coordinating with USACE to obtain data used in the *Flood Control System Status Report* (DWR, 2011a) was a critical component of the document development process. USACE also reviewed the report before it was released as a public draft.

6.0 Other Related FloodSAFE Efforts

Although most of the outreach and engagement efforts supported development of the 2012 CVFPP, DWR also conducted outreach for several CVFPP-related programs and projects that are part of the broader FloodSAFE initiative. These activities stem from six legislative bills enacted in October 2007 to address statewide flood problems, including: assessing the capabilities of the Central Valley levee system; developing plans to better manage the flood protection system; and mandating that local planning efforts recognize the risks of flooding. These bills became effective January 2008 and collectively added or amended sections in the California Code, Health and Safety Code, Public Resource Code, and Water Code. Together, these bills outlined a comprehensive approach to improving flood management at the State, regional, and local levels.

6.1 Building Standards Code Amendments

Included in the flood legislation of October 2007 was a California Health & Safety Code requirement for DWR to propose updated requirements to the California Building Standards Code (Code). The requirements proposed for adoption and approval by the California Building Standards Commission (CBSC) are for construction in areas protected by facilities of the CVFPP where flood levels are anticipated to exceed 3 feet for the 200-year flood event. These proposed Code amendments were developed after DWR consulted with the Board, the Division of the State Architect, and the Office of the State Fire Marshal.

To develop and direct the project until its completion, DWR formed a Building Codes Team (BCT) consisting of DWR staff, subject matter experts, and additional technical and facilitation support.

As noted above, DWR was required to consult with specified State agencies. To meet this requirement, the BCT convened a Technical Advisory Committee (TAC) to obtain input from stakeholder groups, including those agencies. The TAC consisted of more than 20 State agencies and organizations from different sectors of the building industry (residential, commercial, industrial, public, and private development). Members were recruited to augment the expertise in the BCT by forming a coalition of broad building code and flood management expertise. TAC members contributed technical expertise and knowledge to assist the BCT

in developing the proposed code changes, and gave advice on strategy for a viable, acceptable rollout plan for proposed Code amendments. TAC members also encouraged to take part in public engagement meetings. The TAC was not chartered with approval authority, nor did it represent a consensus-seeking process.

Public engagement meetings were held in January 2009, and later in the spring, to solicit input for the preliminary results of the investigation and, ultimately, the proposed CBSC update package. Multiple meetings were held in the Central Valley to facilitate broad participation of local agencies, interested parties, and individuals.

The BCT incorporated comments from the TAC, the public, and DWR management and submitted its proposal package to the CBSC in July 2009.

On August 11, 2009, the BCT met with the CBSC's Building, Fire & Other Code Advisory Committee (CAC), a meeting open to the public. The CAC advised DWR on package improvements. DWR incorporated the CAC advice and public review comments and –following protocol – resubmitted a revised proposal package to CBSC in September 2009. The revised package was also provided to the public for a 45-day review period.

During the public review period, comments were received only from the California Building Industry Association (CBIA). These comments, in short, agreed with DWR's proposed changes and requested that DWR clarify if the proposed changes to the California Residential Code were to be made in the code’s appendix. DWR concurred with CBIA and reissued the Express Terms regarding proposed updates to the California Residential Code.

As a result of the transparent and collaborative process, the Building Code amendments were adopted on a unanimous vote.

To prepare for a proposed second round of code amendments, a workshop and Webinar were held. The September 2010 workshop considered code issues that may impact children, seniors, and those with disabilities and focused on special access and functional needs before, during, and after a disaster. To help prepare for the workshop and webinar, outreach was directed to advocates for the access and functional needs community, as well as building industry officials and industry specialists.

As the need for additional Code amendments arises to meet requirements of the CVFPP and applicable sections of the Health and Safety Code or Residential Code, a staged work plan and additional public outreach will be needed to include stakeholder input is included in the amendment process.

6.2 Local Land Use Planning Handbook

In cooperation with the Governor's Office of Planning and Research, California Department of Housing and Community Development, California Emergency Management Agency, Board, and California Geological Survey, DWR prepared a guidance document titled *Implementing California Flood Legislation into Local Land Use Planning: A Handbook for Local Communities* (Handbook) (DWR, 2010m). The Handbook describes how the flood risk management legislation affects city and county responsibilities related to local planning requirements, including general plans, development agreements, zoning ordinances, tentative maps, and other actions.

The focus of the Handbook is identifying how the 2007 flood legislation related to local responsibilities affects cities and counties in implementing planning documents and tools such as general plans, zoning ordinances, development agreements, and subdivision maps, among others. The Handbook presents general guidance, identifies informational resources to help cities and counties develop locally relevant responses through obtaining applicable flood information, and notes appropriate agencies that can offer assistance.

The Handbook does not attempt to define specific policy or other solutions for compliance related to local responsibilities and implementation of the 2007 flood legislation.

Before release, a focus group of stakeholders was provided with an overview and given the opportunity to review and suggest revisions. As a result of this input, key sections were redrafted, and the Handbook was released, reflecting applicable stakeholder suggestions.

Since the release of the award winning Handbook,[3] DWR has provided briefings and more information to local jurisdictions, as requested.

[3] The Handbook has earned a statewide award from the California chapter of the American Planners' Association.

6.3 Flood Risk Notification

In 2010, DWR completed the first annual distribution of more than 275,000 notices to landowners, who collectively own more than 360,000 properties at risk of flooding from SPFC levees. Each flood risk notice identified the sources of potential flooding specific to the property and offered tips for the following:

- Flood emergency planning and preparedness
- Federal Emergency Management Agency's (FEMA) National Flood Insurance Program
- Preventing problems, such as keeping storm drains clear, and elevating, or flood-proofing, buildings

Each notice also includes a thumbnail map of the levee flood protection zones in the Sacramento and San Joaquin valleys and a Web address where property owners can view flood risk by street address and other important information.

These annual notices to property owners are a California Water Code requirement under Assembly Bill (AB) 156, which was passed with SB 5 as part of the 2007 flood legislation.

6.4 Flood Protection Criteria

SB 5 of 2007 (i.e., California Government Code (CGC) Section 65007(l)) (CGC, 2010) defines the urban level of flood protection as the level of flood protection necessary to withstand flooding that has a 1 in 200 chance of occurring in any given year, using criteria consistent with, or developed by, DWR. Passage of the legislation obligates jurisdictions with land use authorities to use flood protection criteria before:

- Entering into a development agreement for a property
- Approving a discretionary permit/discretionary entitlement/ministerial permit that would result in construction of a new residence

- Under certain situations related to other applicable sections of law, approving a tentative map/parcel map for a subdivision in urban and urbanizing areas within flood hazard areas identified by FEMA.[4]

For urban and urbanizing areas within flood hazard zones identified by FEMA, and protected by State-federal project levees in the Sacramento and San Joaquin valleys, the urban level of flood protection will be achieved by 2025. While cities and counties located outside the Sacramento and San Joaquin valleys are not required to make findings related to the urban level of flood protection, these criteria can help inform engineering and local land use decisions for areas at risk of flooding. To assist local governments and pertinent State agencies in complying with legal requirements, DWR initiated a series of work groups and workshops to develop levee design criteria associated with 200-year levels of flood protection and related issues.

6.4.1 Urban Level of Flood Protection Work Group

In July 2011, DWR distributed draft criteria to work group members for demonstrating urban level of flood protection to provide specific criteria associated with the urban level of flood protection, as defined in CGC Section 65007(l) and California Water Code Section 9602(i) (CWC, 2008).

DWR convened a work group consisting primarily of local government planners to obtain feedback on draft criteria and determine whether the criteria were comprehensive, provided a sufficient level of detail, and were implementable. Members were required to have expertise in land use decision making and, while expertise in floodplain management was welcome, it was not required.

In addition to local government representatives, DWR invited representatives from the California State Association of Counties, League of California Cities, California County Planning Directors Association, American Planning Association California Chapter, and Floodplain Management Association to participate in the work group. FEMA, USACE, the Board, California Department of Housing and Community Development, Governor's Office of Planning and Research, and California Emergency Management Agency were also invited to join the work group.

[4] Requirements apply beyond 36 months after the Board's adoption of the CVFPP, SB 5 of 2007, which requires cities and counties in the Sacramento-San Joaquin Valley to either demonstrate the urban level of flood protection, impose conditions that will achieve the urban level of flood protection (e.g., elevate or flood proof structures, construct a levee), or demonstrate adequate progress toward providing the urban level of flood protection.

The work group met in May, June, and August 2011 to review draft criteria, identify major concerns, and provide recommendations for improving the criteria and accessibility of the document.

6.4.2 Interim Levee Design Criteria

As noted above, SB 5 of 2007 (i.e., CGC Section 65007(l)) defines the urban level of flood protection as the level of flood protection necessary to withstand flooding that has a 1 in 200 chance of occurring in any given year, using criteria consistent with, or developed by, DWR.

Since 2007, DWR has developed three versions of the ILDC. For the fourth version, DWR has convened a stakeholder work group in December 2009, through the CVFMP Program, to help refine and supplement initial versions of the criteria. Members consisted primarily of engineers representing levee and reclamation districts throughout the Central Valley, as well as representatives from FEMA, USACE, and the California Emergency Management Agency. This approach allowed DWR to address complex technical and policy issues with representatives of those public agencies responsible for meeting legislative requirements. DWR released a final Version 4 ILDC on December 20, 2010, followed by a public workshop in January 2011 and a public comment deadline of February 4, 2011.

6.4.3 Urban Levee Design Criteria

In March 2011, DWR has reconvened the ILDC Work Group, expanded its membership, and renamed it the Urban Levee of Design Criteria (ULDC) Work Group. Based on recommendations from the California State Association of Counties and the Board, members new to the group included representatives of the San Francisco Bay Area and Los Angeles Basin. Members were charged with completing three tasks:

- Review existing public and work group member comments on previous versions of the ILDC and advise how to best address the comments.
- Provide additional comments and advice on a draft ULDC – including new issues that should be added – and, as appropriate, draft new text for the ULDC.
- Provide comments on selected topics being discussed by the Urban Level of Protection Work Group.

The ULDC Work Group was also asked to comment on urban levee vegetation criteria drafted for consideration by DWR and the California Roundtable for Central Valley Flood Management. The ULDC Work

Group also coordinated its efforts with the Urban Level of Protection Work Group, the CVFMP Program, the DWR Levee Evaluations and Early Implementation Projects programs, and the Board's revisions of Title 23 of the California Code of Regulations, which includes standards for levee construction on specifically identified streams throughout the Central Valley.

The work group met five times between March and July 2011.

6.4.4 Special ULDC Session on Levee Vegetation

In June 2011, DWR hosted a special ULDC session on levee vegetation. As with its ILDC predecessor, the ULDC Work Group helped develop and comment on early drafts of levee design criteria involving levee vegetation. The purpose of the special session was to solicit feedback on specific issues about which DWR had requested detailed discussion. These included environmental mitigation requirements, specifications for root distance, and minimum trunk diameter for trees to be removed or retained, and vegetation management on the waterside slope.

6.5 Urban and Nonurban Levee Evaluations

As part of its process to evaluate the structural integrity and performance of hundreds of miles of urban and nonurban levees in the Central Valley, DWR consulted with USACE, local maintaining agencies, and private landowners.

The levee evaluation process, began in 2007, relies extensively on geotechnical, topographic, bathymetric, and other types of explorations. DWR has worked with numerous State, federal, and local experts to obtain historical records and data, including current levee system conditions and performance data.

Input from local Central Valley stakeholders was particularly important for completing nonurban levee evaluations because there is limited or sparse documentation about the construction history, performance, and subsurface conditions of such structures. As part of the Urban Levee Evaluations (ULE) and Nonurban Levee Evaluations (NULE) projects, local agencies were actively engaged, including participating in interviews with maintenance personnel, meetings presenting initial findings, and meetings to review drafts of the preliminary results. Coordination with local agencies allowed the ULE/NULE teams to access and document extensive local knowledge of urban and nonurban levees. Coordination efforts also provided local stakeholders with an opportunity to provide input on initial ULE/NULE findings. DWR continues to use information obtained from

these efforts to help identify high priority areas for future investigation or remediation.

Urban and nonurban levee evaluation activities provided information used for completing the *Flood Control System Status Report* (DWR, 2011a).

6.6 Vegetation on Levees

The failure of New Orleans levees during Hurricane Katrina due, in part, to engineering design and construction deficiencies spurred a massive reevaluation of national levee policies by USACE. After the reevaluation was completed, with a focus on improving levee standards and increasing public safety, USACE clarified national policy and expanded enforcement actions on existing policy. A key enforcement action was application of a USACE policy that would, if stringently implemented, require substantial removal of vegetation from levees.

The most recent descriptions of USACE vegetation management policy are contained in the Engineer Technical Letter (ETL) 1110-2-571, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures* (USACE, 2009a) (adopted April 10, 2009), and the associated draft Policy Guidance Letter (PGL), *Process for Requesting a Variance from Vegetation Standards for Levees and Floodwalls* (USACE, 2009b) (Federal Register 6364-68).

On April 15, 2010, DWR and the California Department of Fish and Game submitted extensive comments on the above mentioned ETL and PGL. The agencies stated that the USACE vegetation management policy would reduce public safety in California and result in extensive and unnecessary environmental damage if implemented as directed by USACE.

The agencies further noted that noncompliance with the USACE vegetation policies allowed the federal government to withhold its resources to assist State and local maintaining agencies in their efforts to establish the integrity of State/federal levees in California.

California agrees with USACE that public safety is the highest priority for flood management. California further agrees on the importance of appropriate vegetation management on levees. However, despite these shared views, California asserts that USACE's strict enforcement of the ETL and PGL will adversely impact public safety. It is the State's viewpoint that while USACE's prescriptive approach to vegetation management can be applied in certain settings, its universal application is

inconsistent with numerous technical, financial, legal, and institutional factors.

6.6.1 Roundtable

In 2007, the California Levees Roundtable was established. Using a collaborative process that included USACE, the California Levee Roundtable created the *California Central Valley Flood System Improvement Framework* (California Levee Roundtable, 2009). This document provided temporary exemptions from ETL compliance for legacy levees in the Central Valley and committed USACE, the State of California, and DWR to ongoing collaboration on a long-term plan.[5]

This State/federal coordination coincided with USACE strictly enforcing the ETL on existing and new levees nationally, as well as for levee improvement projects in California in 2009. In 2010, USACE proposed an updated draft of its vegetation variance process by issuing a draft PGL (described above and being contested by the State).

6.7 Delta Programs

During the initiation of Regional Work Groups for the CVFPP, Delta stakeholders requested that DWR increase efforts to coordinate with Delta agencies and programs as part of its responsibility to develop a flood management plan for the Central Valley. California Natural Resources Agency Secretary Mike Chrisman distributed a memorandum on October 7, 2009, to participants and stakeholders in the Bay-Delta Conservation Plan (BDCP) and FloodSAFE programs, outlining a series of coordination actions, commitments, and integrated planning principles. Included in the memorandum was a commitment to conduct regular joint public workshops with executive and policy representatives of major related agency initiatives.

Based on the memo, DWR's Division of Flood Management, through FloodSAFE and in conjunction with USACE, contacted agency staff

[5] As noted earlier, the State is engaged in an aggressive 25-year program, the FloodSAFE initiative, to upgrade its flood management system, and the CVFPP will prepare strategies for implementing comprehensive systemwide improvements. Under the framework, USACE allowed California to maintain Public Law 84-991 eligibility for its levees and remain active in the Public Law 84-99 program. This enables the State to continue receiving federal levee rehabilitation assistance in the event of a flood – if the State is demonstrating positive progress and meeting the milestones of achieving the framework's short-term goals and maintenance objectives. This Public Law 84-99 eligibility shall be reviewed annually for renewal in accordance with USACE policy and remain in effect until 2012, at which time the eligibility criteria will be reconsidered based on the contents of the CVFPP.

responsible for implementing a variety of flood, water supply, and ecosystem management programs, projects, plans, and studies. These included the following:

- **DWR** – BDCP and Delta Habitat Conservation and Conveyance Program; CVFMP Program; Delta Emergency Operations Plan; Delta Knowledge Improvement Program; Delta Levees Maintenance Subventions Program; Delta Levees Special Flood Control Projects; and Delta Risk Management Strategy.

- **Delta Stewardship Council** – *Delta Plan* (Delta Stewardship Council, 2011)

- **USACE** – CALFED Bay-Delta Program Levee Stability Program; Central Valley Integrated Flood Management Study; and Delta Islands and Levees Feasibility Study.

Through this outreach, the agencies have exchanged information on the purposes of the activities in the above list. Topics shared during this exchange included program/project-level integrated water management goals; major actions/tools to address the goals; program type and key milestones; and assumed critical dependencies with other programs and their coordination priorities.

7.0 Coordination Activities

Many of the coordination and engagement activities detailed in this document are described in terms of when they occurred during the roughly 4-year period DWR devoted to preparing for and producing the 2012 CVFPP. This section of the report also details coordination to produce the 2012 plan, but is organized by the internal and external partners with whom DWR worked during 2012 CVFPP preparation.

7.1 External Partners

To design and execute its vision for preparing the 2012 CVFPP and related documents, DWR worked with public agencies and elected officials at all levels of government, with local agencies responsible for maintaining the SPFC, and with California Native American Tribes and Tribal organizations, as detailed below.

7.1.1 U.S. Army Corps of Engineers

As noted in Sections 3 and 4, and elsewhere in this report, USACE was one of DWR's key partners, providing input, information, and guidance for the 2012 CVFPP and related documents. USACE's involvement included the following:

- Input to the Framework via participation in stakeholder interviews
- Participation in work groups and workshops
- Attendance at periodic plan development team meetings
- Review of CVFPP management actions
- Input to and review of the *Flood Control System Status Report* (DWR, 2011a) and *State Plan of Flood Control Descriptive Document* (DWR, 2010a).

Additionally, DWR is currently assisting USACE as it undertakes its Central Valley Integrated Flood Management Study (CVIFMS). DWR and the Board will jointly implement the CVIFMS as nonfederal sponsors. Scheduled to be completed in 2017, this program-level feasibility study will complement the CVFPP.

7.1.2 Central Valley Flood Protection Board

Because the Board is the entity ultimately responsible for reviewing and adopting the 2012 CVFPP, DWR sought input from Board often, as is noted elsewhere in this report. As with USACE, communication with Board representatives and staff was open and ongoing throughout the CVFPP development process, but also included the following specific elements:

- Input to the Framework via participation in stakeholder interviews
- Participation in work groups and workshops
- Review of CVFPP management actions, the *Flood Control System Status Report* (DWR, 2011a), and the *State Plan of Flood Control Descriptive Document*. (DWR, 2010a)
- Periodic briefings from DWR management and staff during regular Board meetings or meetings specifically scheduled to review plan development progress

7.1.3 Maintenance Agencies

These local agencies are tasked with on-the-ground maintenance of SPFC facilities. Their feedback and input was critical in helping DWR understand the full range of challenges associated with addressing floods in the Central Valley and identifying specific strategies or projects that may be compatible with their local operations. As noted in the chapters above, this involvement also included elements such as the following:

- Input to the Framework via participation in stakeholder interviews
- Participation in work groups and workshops
- Providing historical documents and data for use in the *Flood Control System Status Report* (DWR, 2011a), and the *State Plan of Flood Control Descriptive Document* (DWR, 2010a)
- Targeted review of the draft *Flood Control System Status Report* (DWR, 2011a)

7.1.4 State and Federal Legislature

The CVFMP Program team worked closely with DWR liaisons to the State Legislature and members of Congress to inform Central Valley members of the California State Legislature and California Congressional Delegation about development of the CVFPP throughout the process.

The following strategies were used to inform elected officials:

- Delivery of CVFPP Progress Reports to appropriate Capitol offices/District offices with a cover memorandum from the Division of Flood Management (DFM).

- E-mail memorandum to each member at the launch of the program and each year following. The e-mail provided an update about the CVFMP Program and invited legislative staff to a DWR-sponsored briefing.

- Two briefings conducted at the State Capitol for staff of the State Legislature. One briefing was held in January 2010, and the second briefing was held in February 2011. The purpose of briefing legislative staff was to inform that each member's office about the progress of the CVFPP development and the extent of engagement by constituents in respective legislative districts in developing the CVFPP. The briefings also were an opportunity for DWR to provide general FloodSAFE updates to the Legislature.

- A briefing is also planned for early 2012 to coincide with the release of the CVFPP to the Board. District staff to California's Congressional Delegation will be invited to join State Legislature staff at the 2012 briefing.

7.1.5 Local Jurisdictions

DWR representatives made regular presentations in 2009 and 2010 about the CVFMP to the boards of supervisors, key city councils, and regional flood planning agencies of Central Valley counties. The purpose of these briefings was to inform jurisdictions about the progress of CVFPP development and the extent of engagement by constituents in developing the CVFPP. A three-step process was used to conduct briefings to local jurisdictions:

1. Meetings were held with city, county, and regional agency flood planning staff in advance of meeting with elected officials.

2. Briefings were offered to the chair of the boards of supervisors and mayors in key cities. In most cases, these briefings were conducted via telephone.

3. Presentations were made at regularly scheduled (public) meetings of the board of supervisors and at a few city council meetings. Presentations included an overview of FloodSAFE, the CVFMP Program, and the status of the CVFPP.

7.1.6 Native American Tribes

California Native American Tribes and Tribal organizations are key potential partners in FloodSAFE, the CVFMP Program, and other related efforts. CVFMP Program efforts to engage California Native American Tribes in planning activities focused on establishing two-way communication channels and cultivating working relationships with Tribes and tribal organizations that have a direct, historical, or cultural interest in the Systemwide Planning Area.

As part of this outreach, DWR developed a comprehensive Tribal Contacts Database of tribes throughout the Central Valley and upper watersheds, and of related Tribal organizations. This area was divided into three geographic sections or "tiers." Tier 1covers lands that receive flood protection from facilities of the SPFC and the Systemwide Planning Area. Tier 2 adds all lands within the watershed. Tier 3 includes lands that extend beyond the watershed. A fourth tier was created for Tribal organizations. The overall Tribal Contacts Database includes more than 160 California Native American Tribes and Tribal organizations.

The division of tribes into "tiers" was intended to identify potential plan development participants based on a direct (i.e., lands subject to Central Valley flooding) or indirect (e.g., historical or cultural) association with flood management planning applicable to the 2012 CVFPP. Tier 1 Tribes were seen as outreach priorities because these Tribes own and occupy lands that receive flood protection from facilities of the SPFC and are within the Systemwide Planning Area. Tier 2 Tribes were notified of planning activity and invited to participate if they had a historical or cultural interest in the Sacramento and San Joaquin rivers, based on their geographic proximity. Tier 3 Tribes were informed of planning progress through e-mail. Ongoing relationships were achieved with more than 40 Tribes and Tribal organizations. Introductory and program update fact sheets were designed specifically for the Native American community and distributed to Tier 1, 2, and 4 contacts in coordination with DWR's Tribal Liaison. This outreach resulted in 17 presentations to Tribal councils and Tribal organizations in Phases 1 and 2 (see Table 7-1) by DWR Regional Coordinators.

This outreach contributed to the participation of four Tribes – Colusa Indian Community Council, Mechoopda Indian Tribe, Upper Lake Rancheria, and the Wintu Tribe – in technical planning activities.

Native American attendees at briefings generally were receptive to and appreciative of the presentations. While some Tribes became active planning participants, others expressed skepticism about flood management planning in California. Native American representatives at the briefings often suggested that State flood management planning efforts would benefit

greatly from coordination with Native American efforts to manage upstream watersheds. Additional key areas of interest included the following:

- Impact of flood management activities on sensitive sites, such as burial grounds, and on water storage levels.
- Role of tribes outside the Systemwide Planning Area.
- Role of the federal government and other jurisdictions.
- Availability of funding support for tribal flood management and planning projects.

Tribal interests not applicable to Central Valley flood management planning – either geographically or by subject matter – were referred to DWR's Tribal Liaison for follow-up.

Table 7-1. CVFMP and CVFPP Briefings for California Native American Tribes and Tribal Organizations

Tribe/Tribal Organization	Briefing Date
Inter-Tribal Council of California	October 31, 2009
California Indian Basket Weavers Association	December 5, 2009
Northern Circle Indian Housing Authority	January 9, 2010
Hinthil Environmental Resources Consortium	January 13, 2010
North Fork Mono Tribe	January 14, 2010
California Rural Indian Health Board, Inc.	January 22, 2010
Cortina Indian Rancheria	March 11, 2010
Inter-Tribal Council of California General Counsel	March 20, 2010
Sacramento Native American Health Coalition	April 7, 2010
Bureau of Indian Affairs	April 13, 2010
Redding Rancheria	May 11, 2010
Chowchilla Tribe of North Valley Yokuts	June 29, 2010
Grindstone Rancheria	July 11, 2010
Nashville-Eldorado Miwok Tribe	July 11, 2010
Wintu Tribe of Northern California	August 26, 2010
California Manpower Indian Consortium	November 6, 2010
U.S. Environmental Protection Agency Region 9 Regional Tribal Operations Committee Meeting	February 9, 2011

Key:
CVFMP = Central Valley Flood Management Planning Program
CVFPP = Central Valley Flood Protection Plan

7.2 Internal Partners

To support successful development of the 2012 CVFPP, the team worked collaboratively with all related DWR divisions. In particular, the FloodSAFE Environmental Stewardship and Statewide Resources Office (FESSRO) Staff, Regional Coordinators, Legal and Legislative Affairs Offices, and Executive Team were essential partners in plan preparation. Participation ranged from regular briefings and joint team meetings to weekly attendance at Plan Development Team sessions.

7.2.1 Intradepartmental

To promote policy and technical consistency and improve coordination among and across all programs, a series of Functional Area Cross Coordination Teams (FAXCT) were developed. These teams meet on a regular basis (with additional meetings scheduled, as required) to support ongoing communication and improve opportunities to leverage the work of all the programs and operations.

Eight FAXCT groups were engaged during the planning cycle with two additional FAXCT groups planned. Following is a summary of the coordination structure.

FAXCT-1: Communication and Engagement
This group is charged with guiding, coordinating, and managing effective and strategic communication and engagement activities for successful implementation of FloodSAFE programs and projects.

FAXCT-2: Emergency Response
This group is responsible for DFM being continuously ready to respond to flood emergencies and to coordinate all information needs.

FAXCT-3: Flood Models Analysis and Dissemination
This group facilitates coordination within FloodSAFE to identify and share information about the different needs and types of hydrologic and hydraulic models being used and developed. The group also oversees a data and model repository that allows information to be distributed to government agencies and public.

FAXCT-4: Flood Management Planning and Conservation Strategy
The group provides overall coordination within FloodSAFE to establish DWR's organizational sponsorship for the CVFPP. Activities include coordinating and allocating resources for CVFPP content development and reviewing CVFPP products. The group also monitors CVFPP development progress and accomplishments for consistency with FloodSAFE implementation strategies and milestones. A key responsibility of this

FAXCT is providing guidance on strategy and policy and facilitating integration of regional projects and activities into the CVFPP systemwide approach and evaluation.

FAXCT-5: Operations and Maintenance and Environmental Stewardship

This group facilitates coordination within FloodSAFE to improve the quality and consistency of inspections and operations and maintenance of flood facilities statewide. This group is also tasked with establishing a sustainable and strategic investment process and facilitating a continuous open and collaborative dialogue with operators and maintainers of SPFC facilities, USACE, the Board and other key stakeholders.

FAXCT-6: Delta Programs

This FAXCT has not been activated yet.

FAXCT-7: Flood Risk Assessment

This group facilitates the development of consistent policies and standardized approaches for conducting flood risk assessments. It also seeks to maximize the usefulness and efficiency of FloodSAFE flood risk assessments, and is tasked with review and comment on proposed and final technical study results.

FAXCT-8: Floodplain Management

This group supports development of consistent plans, programs, principles, and policies for implementing floodplain management practices within FloodSAFE. It also coordinates and communicates DWR floodplain management policies and programs across the FloodSAFE functional areas. An additional task is commenting on proposed and final floodplain management plans and related activities within FloodSAFE implementation plans.

FAXCT-9: Regional Projects

This group creates and implements the process for Flood Risk Reduction projects and programs for urban and rural areas. The group uses a multi objective, systemwide approach. Activities include developing processes for participating or conducting State, federal, and local managed studies, projects, and programs.

FAXCT-10: Flood and Water Management and Statewide Planning

This FAXCT has not yet been activated, but is expected to assist in integrating Statewide Flood Management Program activities into FloodSAFE and DFM programs.

Where appropriate, members of USACE planning teams and Board staff may also participate in the FAXCT meetings.

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9.0 Acronyms and Abbreviations

AB.....Assembly Bill

BCT .....Building Codes Team

BDCP .....Bay Delta Conservation Plan

Board .....Central Valley Flood Protection Board

CAC.....Code Advisory Committee

CBIA.....California Building Industry Association

Code.....California Building Standards Code

CBSC .....California Building Standards Commission

CEQA .....California Environmental Quality Act

CVFMP.....Central Valley Flood Management Planning

CVFPO.....Central Valley Flood Planning Office

CVFPP .....Central Valley Flood Protection Plan

CVIFMS.....Central Valley Integrated Flood Management Study

DFM.....Division of Flood Management

DHCCP.....Delta Habitat Conservation and Conveyance Program

DWR.....California Department of Water Resources

ETL.....Engineer Technical Letter

FAXCT.....Functional Area Cross Coordination Teams

FEMA .....Federal Emergency Management Agency

FESSRO.....FloodSAFE Environmental Stewardship and Statewide Resources Office

FloodSAFE .....FloodSAFE California

Framework .....Communication and Engagement Framework

GC .....Government Code

Handbook .....Implementing California Flood Legislation into Local Land Use Planning: A Handbook for Local Communities

IAP2.....International Association of Public Participation

ILDC .....Interim Levee Design Criteria

NOP.....Notice of Preparation

NULE .....Nonurban Levee Evaluations Project
O&M .....operations and maintenance
PBS .....Public Broadcast System
PEIR .....Program Environmental Impact Report
PGL .....Policy Guidance Letter
RCWG .....Regional Conditions Work Group
RMAWG.....Regional Management Actions Work Group
SB .....Senate Bill
SPFC .....State Plan of Flood Control
State .....State of California
TAC .....Technical Advisory Committee
ULDC.....Urban Levee Design Criteria
ULE.....Urban Levee Evaluations Project
USACE .....U.S. Army Corps of Engineers
WEF.....Water Education Foundation

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Attachment 5: Engagement Record Appendix A – Central Valley Flood Management Planning Program Questions for Interviews with Partners and Interested Parties

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Appendix A

Central Valley Flood Management Planning Program Questions for Interviews with Partners and Interested Parties

DRAFT: January 16, 2009

Interviewer Script

Introduction
Thank you for talking/meeting with me today. First of all, let's take care of some housekeeping issues.

1. You were selected to be interviewed because you represent an organization/agency that has a stake in California flood management, or because you have been personally active in this arena. You are one of approximately 100 people that we are listening to this month to gather input about communication and engagement strategies so that an effective public engagement plan can be developed to support the development of the Central Valley Flood Protection Plan.

2. As I mentioned when we scheduled this call, it will take between 45 minutes and one hour. I'd like to confirm how much time you have available for this discussion. (***Wait for response***. ***Interviewer must moderate the discussion accordingly.)***

3. This interview will be a conversation rather than a strict poll-like survey, so please feel free to respond to my questions accordingly.

4. Your responses will be anonymous unless you specifically state that we can quote you.

5. If you have questions along the way that I'm unable to answer, I will forward them to Chris McCready, the Department of Water Resources FloodSAFE public information coordinator. She will make sure the right person answers the question and I will get the response back to you within a few days. Of course, if you have comments or questions you would like to discuss with Chris, you may contact her directly.

Background

The goal of the Central Valley Flood Management Planning Program is to improve understanding among the Central Valley's public agencies and constituent groups about the objectives related to flood management and our shared flood risk; evaluate and describe the current Central Valley flood management system status; and to identify potential for integrated and sustainable flood management solutions. This will be accomplished in part by receiving substantial input from local and regional public agencies, businesses and other interested parties in a participatory process.

The Central Valley Flood Management Planning Program is a part of FloodSAFE California—a statewide effort supported by voter-approved bonds. The California Department of Water Resources is leading the Program, with active participation by USACE and the Central Valley Flood Protection Board.

The major responsibilities of the Central Valley Flood Management Planning Program include:

- Describing the existing facilities and current performance of the state-federal flood management system in the Central Valley.

- Working with partners and interested parties to prepare a sustainable integrated flood management plan. This plan will inform future state, federal, and local investments in flood management actions and will describe a long-term strategy to help manage flood risk and accomplish other related flood management objectives in the Central Valley.

- Supporting state and local agencies in developing funding mechanisms to finance local flood management responsibilities, and providing assistance for complying with other specific mandates in the water code.

All of these tasks will require active communication and engagement with partners and interested parties throughout the process. This interview is intended to be an initial dialogue in which we hear your thoughts on the best ways for us to structure communication and engagement so that the Central Valley Flood Management Planning Program will be successful.

As I mentioned earlier, the Department of Water Resources will use the information gathered in these interviews to help develop a communications and engagement plan to support the Central Valley Flood Management Planning Program. This communications and engagement plan will be publicly available via the FloodSAFE Web site within a few months.

Question	Intent of Question
What involvement do you currently have in activities relating to water resource management or flood management?	Understand background and relevant experience, and how those experiences may shape their expectations for the CVFMP Program.
How familiar are you with the Central Valley Flood Management Planning Program?	Gather baseline information and help define necessary educational activities.
How would you define success for the effort to describe the state's existing flood management system and make recommendations for future improvements?	Understand whether partner's ideal flood management outcome is consistent with the goals and objectives of the CVFMP Program. Identify any disconnects between what the CVFMP Program is supposed to do and what partners may be expecting it to do.
What would you consider the biggest challenge in flood management in your local area? In the Central Valley?	Understand perception of challenges, without initiating a conversation regarding specific solutions.
Active participation by partners and interested parties is critical to the success of this effort. Here are examples of how this participation could occur: • Regular convening of a valley-wide forum with participation from diverse interests and regions to provide input on the "big picture." • Regular meetings of regional planning groups, for example in the Sacramento, San Joaquin and Delta areas, to provide input on regional issues. • Meetings of interested parties to address specific topics, such as maintaining protection in rural areas, ecosystem health or climate change.	Receive input on key expected components of the Communications and Engagement Plan.
What do you think of the examples for public participation that I just described? How do you see yourself or your organization/agency being involved? *If necessary, prompt with*: Actively involved in developing content during the planning process on a month-to-month basis? As an expert reviewer on key topics? As a reviewer only at key milestones? *If appropriate, prompt with the following:* Can you tell me now who from your organization is likely to participate in this effort? Can I follow up with you later to learn more about you or your organization's interest in participating?	Understand their key area of interest, their expected level of participation and their organization's participation.
Do you have any recommendations about how we can motivate partners and interested parties to remain actively engaged in the process?	Hear from them directly what will help them stay engaged.
Which other organizations or people should be involved in this process? Is there anyone else whom we should interview?	Non-positional way of learning who the partner views as important; gather information to expand the partner and interested parties database.

Question	Intent of Question
How would you like to receive information about the Central Valley Flood Management Planning Program in the future? Will you inform your organization/colleagues that we will provide them information about this effort?	Help ensure smooth communication; determine communications preferences.
Can you suggest any newsletters, Web sites, forums or other existing communication channels that should receive information about this effort?	Expand the CVFMP Program communication channels.
Is there anything else that you'd like us to know?	Gather unsolicited information.
Do you have any questions for me?	Maintain open channels of communication.

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Attachment 5: Engagement Record Appendix B – Comprehensive List of Stakeholders

January 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Appendix B

Table B. Comprehensive List of Stakeholders

Category	Organization
Consulting	AMEC Geomatrix
Flood Management	American River Flood Control District
Recreation	American River Recreation Association
Nonprofit	American River Watershed Institute
Environmental	American Rivers
Agriculture	Amistad Ranches
Consulting	Arcadis
Academic/Scientific	Arizona Water Institute
Environmental	Audubon Society
Environmental	Bay Institute
Environmental	Big Chico Creek Watershed Alliance
Flood Management	Brannan-Andrus Levee Maintenance District
Consulting	Brown and Caldwell
Business	Building Industry Association
Govt. – Federal	Bureau of Reclamation
Business	Burlington-Northern-Santa Fe Railroad
Govt. – Local	Butte County
Govt. – Local	Butte County Environmental Health
Agriculture	Butte County Farm Bureau
Govt. – Local	Butte County Public Works
Govt. – Local	Butte County Resource Conservation District
Environmental	Butte Creek Conservancy
Govt - State	CALFED Bay-Delta Program
Govt - State	CalFire
Govt - State	California Air Resources Board
Flood Management	California Central Valley Flood Control Association
Business	California Chamber of Commerce
Recreation	California Department of Boating and Waterways
Govt - State	California Department of Conservation
Govt - State	California Department of Education

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Govt - State	California Department of Fish and Game
Govt - State	California Department of Food and Agriculture
Govt - State	California Department of Parks and Recreation
Govt - State	California Department of Transportation
Govt - State	California Emergency Management Agency
Academic/Scientific	California Extreme Precipitation Symposium
Agriculture	California Farm Bureau Federation
Tribal	California Indian Basket Weavers
Tribal	California Indian Heritage Council
Tribal	California Manpower Indian Consortium
Business	California Manufacturers and Technology Association
Agriculture	California Partnership for the San Joaquin Valley
Govt. – State	California Regional Water Quality Control Board
Agriculture	California Rice Commission
Govt. – Local	California Riparian Habitat Joint Venture
Tribal	California Rural Indian Health Board, Inc.
Recreation	California Sport Fishing Protection Alliance
Govt. – Local	California State Association of Counties
Govt. – State	California State Coastal Conservancy
Business	California Truckers Association
Academic/Scientific	California Water Institute – California State University Fresno
Recreation	California Waterfowl Association
Agriculture	California Women for Agriculture
Consulting	CBEC Inc.
Water Supply	Central California Irrigation District
Water Supply	Central Delta Water Agency
Govt. – State	Central Valley Flood Protection Board
Govt – Local	Central Valley Habitat Joint Venture
Consulting	CH2M Hill
Tribal	Chowchilla Tribe of North Valley Yokuts
Water Supply	Chowchilla Water District
Govt. – Community	City of Benicia
Govt. – Community	City of Chico
Govt. – Community	City of Colusa
Govt. – Community	City of Elk Grove

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Govt. – Community	City of Firebaugh
Govt. – Community	City of Folsom
Govt. – Community	City of Galt
Govt. – Community	City of Hamilton City
Govt. – Community	City of Isleton
Govt. – Community	City of Lathrop
Govt. – Community	City of Lodi
Govt. – Community	City of Manteca
Govt. – Community	City of Mendota
Govt. – Community	City of Modesto
Govt. – Community	City of Patterson
Govt. – Community	City of Rio Vista
Govt. – Community	City of Ripon
Govt. – Community	City of Sacramento
Govt. – Community	City of Stockton
Govt. – Community	City of Tehama
Govt. – Community	City of West Sacramento
Govt. – Community	City of Woodland
Nonprofit	Climate Central
Flood Management	Colusa Basin Drainage District
Elected	Colusa County Board of Supervisors
Agriculture	Colusa County Farm Bureau
Govt. – Local	Colusa County Planning Department
Environmental	Colusa County Resource Conservation District
Tribal	Colusa Indian Council
Consulting	Conaway Preservation Group LLC
Govt. – Local	Contra Costa County
Elected	Contra Costa County Board of Supervisors
Flood Management	Contra Costa Flood Control District
Tribal	Cortina Indian Rancheria
Consulting	DCC Engineering
Environmental	Deer Creek Conservancy
Govt. – Local	Delta 5 Counties Coalition
Govt. – Local	Delta Protection Commission
Agriculture	Deseret Farms of California
Consulting	Downey Brand LLP
Environmental	Ducks Unlimited

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Govt. – Local	East Bay Municipal Utility District
Agriculture	East San Joaquin Water Quality Coalition
Environmental	El Dorado County and Georgetown Divide Regional Conservation District
Business	Elliott Homes
Consulting	ENGEO
Environmental	Environmental Defense Fund
Environmental	Environmental Justice Coalition for Water
Agriculture	Families Protecting the Valley
Water Supply	Family Water Alliance
Flood Management	Floodplain Management Association
Elected	Fresno County Board of Supervisors
Agriculture	Fresno County Farm Bureau
Govt. – Local	Fresno County Planning & Public Works
Flood Control	Fresno Metropolitan Flood Control District
Recreation	Fresno Trap and Skeet Club
Water Supply	Friant Water Users Authority
Environmental	Friends of the River
Consulting	GEI Consultants
Agriculture	Glenn Colusa Irrigation District
Elected	Glenn County Board of Supervisors
Govt. – Local	Glenn County Department of Agriculture
Flood Control	Glenn County Levee District 1
Flood Control	Glenn County Levee District 2
Govt. – Local	Glenn County Planning & Public Works Agency
Govt. – Local	Glenn County Water Advisory Committee
Tribal	Grindstone Rancheria
Tribal	Habematolel Pomo of Upper Lake
Tribal	Hinthil Environmental Resource Consortium
Nonprofit	Hospital Council of Northern and Central California
Consulting	ICF International
Environmental	Institute for Ecological Health
Tribal	Inter-Tribal Council of California
Consulting	Kimley-Horn and Associates, Inc.
Environmental	Kings River Conservation District
Consulting	Kjeldsen, Sinnock, and Neudeck

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Consulting	Kleinfelder Inc.
Flood Management	Knights Landing Ridge Drainage District
Consulting	KSN Inc.
Water Supply	Lake County Flood Control District
Flood Management	Lake County Water Resources Association
Agriculture	Lang Farm
Agriculture	Larrabee Farms
Water Supply	Lathrop Irrigation District
Nonprofit	League of Women Voters
Environmental	Low Flow Alliance
Flood Management	Lower San Joaquin Levee District
Flood Management	Lower Yolo Bypass Planning Forum
Consulting	Lumos and Associates
Agriculture	M&T Ranch
Elected	Madera County Board of Supervisors
Elected	Madera County Board of Supervisors
Govt. – Local	Madera County Resource Management Agency
Govt. – Local	Madera County Water Advisory Commission
Agriculture	Madera Farm Bureau
Water Supply	Madera-Chowchilla Water & Power Authority
Agriculture	Mapes Ranch
Tribal	Mechoopda Indian Tribe
Agriculture	Merced Council for the Central Valley Farmland Trust
Govt. – Local	Merced County Association of Governments
Govt. – Local	Merced County Public Works
Flood Control	Merced County Streams Group
Water Supply	Merced Irrigation District
Water Supply	Metropolitan Water District of Southern California
Environmental	Mill Creek Conservancy
Tribal	Nashville-Eldorado Miwoks Tribe
Nonprofit	Natural Heritage Institute
Environmental	Natural Resources Defense Council
Environmental	Natural Resources Institute
Consulting	Newfields
Govt. – Federal	NOAA - National Marine Fisheries Service

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Environmental	North Delta CARES
Tribal	North Fork Mono Tribe
Consulting	North Star Engineering
Environmental	Northern California Conservation Planning Partners
Agriculture	Northern California Water Association
Tribal	Northern Circle Indian Housing Authority
Elected	Office of California Assemblyman Logue
Elected	Office of California Assemblyman Yamada
Elected	Office of California Senator Aanestad
Elected	Office of U.S. Representative Cardoza
Elected	Office of U.S. Representative Matsui
Business	Pacific Coast Federation of Fishermen's Associations
Business	Pacific Gas and Electric
Consulting	Phillip Williams & Associates
Flood Management	Placer County Flood
Nonprofit	Planning and Conservation League
Recreation	Point Reyes Bird Observatory Conservation Science
Consulting	Praxis Consulting Group Inc.
Consulting	PWA, Ltd. Environmental Hydrology & Geomorphology
Recreation	Recreational Boaters of California
Tribal	Redding Rancheria
Nonprofit	Restore Americas Estuaries
Environmental	Restore the Delta
Elected	Rio Vista City Council
Environmental	Riparian Habitat Joint Venture
Agriculture	River Garden Farms Co.
Environmental	River Islands
Nonprofit	River Partners
Consulting	Roberts ECP
Nonprofit	S.D. Bechtel, Jr. Foundation
Flood Management	Sacramento Area Flood Control Agency
Elected	Sacramento City Council
Govt. – Local	Sacramento County Department of Water Resources
Govt. – Local	Sacramento County Municipal Services Agency
Business	Sacramento Metropolitan Chamber of Commerce
Tribal	Sacramento Native American Health Center

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Govt. – Local	Sacramento River Conservation Area Forum
Environmental	Sacramento River Preservation Trust
Agriculture	Sacramento River Water Contractors
Flood Management	Sacramento River Westside Levee District
Agriculture	Sacramento Valley Landowner's Association
Flood Management	Sacramento West Side Levee District
Flood Management	San Joaquin Area Flood Control Agency
Govt. – Local	San Joaquin County Advisory Commission
Agriculture	San Joaquin County Farm Bureau
Flood Management	San Joaquin County Flood Management Division
Govt. – Local	San Joaquin County Office of Emergency Services
Govt. – Local	San Joaquin County Public Works
Agriculture	San Joaquin Farm Bureau Federation
Environmental	San Joaquin River Conservancy
Water Supply	San Joaquin River Exchange Contractors Water Authority
Environmental	San Joaquin River Parkway and Trust
Agriculture	San Joaquin River Resource Management Coalition
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Agriculture	San Joaquin Valley Clean Energy organization
Water Supply	San Luis & Delta Mendota Water Authority
Consulting	SAS Strategies
Environmental	Save the American River Association
Consulting	Schaaf and Wheeler
Govt. – Local	Shasta County Public Works
Consulting	Shaw Group
Tribal	Shingle Springs Band of Miwok Indians
Environmental	Sierra Club
Business	Sierra Holdings
Nonprofit	Sierra Nevada Alliance
Recreation	Snug Harbor Marina
Business	Society of Marketing Professional Services
Govt. – Local	Solano County
Elected	Solano County Board of Supervisors
Agriculture	Solano/Yolo Air Resources Control Board
Water Supply	South Delta Water Agency
Academic/Scientific	Stanford University
Elected	Stanislaus County Board of Supervisors
Govt. – Local	Stanislaus County Planning Department

Table B. Comprehensive List of Stakeholders (contd.)

Category	Organization
Agriculture	Stanislaus Farm Bureau
Consulting	Stantec Consulting
Water Supply	Stevinson Irrigation District
Consulting	Stillwater Sciences
Water Supply	Stockton East Water District
Water Supply	Stony Creek Fan Conjunctive Water Management Group
Consulting	Storm Water Consulting
Flood Management	Sutter Butte Flood Control Agency
Elected	Sutter County Board of Supervisors
Environmental	Sutter County Resource Conservation District
Govt. – Local	Sutter Local Agency Formation Commission
Water Supply	Tehama Colusa Canal Authority
Environmental	Tehama County Resource Conservation District
Environmental	The Nature Conservancy
Flood Management	Three Rivers Levee Improvement Authority
Environmental	Trout Unlimited
Environmental	Trust for Public Land
Govt. – Local	Tulare County Redevelopment Agency
Environmental	Tuolumne River Trust
Water Supply	Turlock Irrigation District
Govt. – Federal	U.S. Army Corps of Engineers
Govt. – Federal	U.S. Bureau of Indian Affairs
Govt. – Local	Reclamation District 0001
Govt. – Local	Reclamation District 0003
Govt. – Local	Reclamation District 0010
Govt. – Local	Reclamation District 0017
Govt. – Local	Reclamation District 0070
Govt. – Local	Reclamation District 0108
Govt. – Local	Reclamation District 0150
Govt. – Local	Reclamation District 0307
Govt. – Local	Reclamation District 0317
Govt. – Local	Reclamation District 0341
Govt. – Local	Reclamation District 0348
Govt. – Local	Reclamation District 0349
Govt. – Local	Reclamation District 0369
Govt. – Local	Reclamation District 0404
Govt. – Local	Reclamation District 0407
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Table B. Comprehensive List of Stakeholders (contd.)

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Govt. – Local	Reclamation District 0536
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Govt. – Local	Reclamation District 1601
Govt. – Local	Reclamation District 1602
Govt. – Local	Reclamation District 1660
Govt. – Local	Reclamation District 2031
Govt. – Local	Reclamation District 2035
Govt. – Local	Reclamation District 2058
Govt. – Local	Reclamation District 2060
Govt. – Local	Reclamation District 2062
Govt. – Local	Reclamation District 2063
Govt. – Local	Reclamation District 2064
Govt. – Local	Reclamation District 2067
Govt. – Local	Reclamation District 2068

Table B. Comprehensive List of Stakeholders (contd.)

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Govt. – Local	Reclamation District 2075
Govt. – Local	Reclamation District 2085
Govt. – Local	Reclamation District 2089
Govt. – Local	Reclamation District 2091
Govt. – Local	Reclamation District 2092
Govt. – Local	Reclamation District 2094
Govt. – Local	Reclamation District 2095
Govt. – Local	Reclamation District 2096
Govt. – Local	Reclamation District 2098
Govt. – Local	Reclamation District 2099
Govt. – Local	Reclamation District 2100
Govt. – Local	Reclamation District 2101
Govt. – Local	Reclamation District 2102
Govt. – Local	Reclamation District 2103
Govt. – Local	Reclamation District 2104
Govt. – Local	Reclamation District 2107
Govt. – Local	Reclamation District 2126
Govt. – Federal	U.S. Department of Agriculture
Govt. – Federal	U.S. Federal Emergency Management Agency
Govt. – Federal	U.S. Fish and Wildlife Service
Govt. – Federal	U.S. Forest Service
Academic/Scientific	University of California - Davis
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Environmental	Water Resources Association of Yolo County
Govt. – Local	Water Resources for Tehama County
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Table B. Comprehensive List of Stakeholders (contd.)

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Environmental	Yolo Basin Foundation
Elected	Yolo County Board of Supervisors
Govt. – Local	Yolo County Department of Parks and Resources
Agriculture	Yolo County Farm Bureau
Flood Management	Yolo County Flood Control and Water Conservation District
Govt. – Local	Yolo County Water Resources Agency
Elected	Yuba County Board of Supervisors
Govt. – Local	Yuba County Public Works

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STATE OF CALIFORNIA
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CENTRAL VALLEY
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Public Draft

2012 Central Valley Flood Protection Plan

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Brock, Bryan	California Department of Water Resources
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Brunner, Paul	Three Rivers Levee Improvement Authority
Busath, Bill	City of Sacramento
Cain, John	American Rivers, California Flood Management
Capuchino, S. Leo	City of Mendota
Carlon, John	River Partners
Center, Bill	Planning and Conservation League; CABY (Cosumnes, American, Bear, Yuba) IRWMP; American River Recreation Association

Cherovsky, Regina	Conaway Preservation Group LLC
Churchwell, Roger	San Joaquin Area Flood Control Agency
Clark, Andrea	Three Rivers Levee Improvement Authority
Clyde, Eric	MWH Americas
Coglianese, Marci	BDPAC and Delta Levees & Habitat
Connelly, Mark	San Joaquin County Flood Management Division
Darsie, William	KSN, Inc.
Dell'Osso, Susan	Reclamation District 2062; River Islands at Lathrop
Dietl, Mike	U.S. Army Corps of Engineers
DiFrancesco, Kara	Natural Heritage Institute
Dominguez, Dario	Madera County
Dunn, Randy	City of Colusa
Edell, Stuart	Butte County Public Works
Edgar, William	Sutter Butte Flood Control Agency
Ellis, Tom	Sacramento West Side Levee District, Land owners in the Colusa Basin, Member of the Board of Directors of Colusa County Farm Bureau.
Eto, Jim	California Department of Water Resources
Fairbanks, Ren	Farming, SRWP, BSAGU
Fiack, Linda	Delta Protection Commission
Fua, Dan	Central Valley Flood Protection Board
Fujitani, Wes	City of Lodi
Fujitsubo, Miki	U.S. Army Corps of Engineers
Ghelfi, Pete	Sacramento Area Flood Control Agency
Giezentanner, Tovey	Conaway Preservation Group LLC; Reclamation District 2035; Water Resources Association of Yolo County

Giottonini, Jim	City of Stockton, San Joaquin Area Flood Control Agency
Green, John	Stockton East Water District
Green, Sarge	California Water Institute, CSU Fresno
Hardesty, Mike	Reclamation Districts 2068 and 2098, California Central Valley Flood Control Association
Harmon, Richard	Farmer
Heringer, Les	Sac Valley Landowners Association
Hester, Gary	California Department of Water Resources
Hildebrand, Alex	South Delta Water Agency
Hildebrand, Mary	San Joaquin Farm Bureau, South Delta Water Agency Board, and California Central Valley Flood Association Board
Hill, Reggie	Lower San Joaquin Levee District
Hillaire, Todd	California Department of Water Resources
Inamine, Mike	California Department of Water Resources
Indrieri, Ashley	Family Water Alliance
Jacobs, Kellie	Merced County
Kauffman, Kevin	Stockton East Water District
Khadam, Ibrahim	MWH Americas
Kim, Koosun	City of Manteca
Koehler, Dave	San Joaquin River Parkway and Conservation Trust
Koepele, Patrick	Tuolumne River Trust
Kulakow, Robin	Yolo Basin Foundation
Labrie, Gilbert	Brannan-Andrus Levee Maintenance District, Reclamation Districts 2067, 407, and 317
Lakeman, Jerry	Fresno Metropolitan Flood Control District
LaPlante, Alexa	MWH Americas

Larrabee, Jason	Larrabee Farms, Glenn County, and Butte Creek Watershed Conservancy
Lee, Roger	California Department of Water Resources
Lerner, Noel	California Department of Water Resources
Linhart, John	Glenn County Public Works
Luce, Bill	Friant Water Authority
Luster, Ryan	The Nature Conservancy
Lyons, Amy	California Department of Fish and Game
Martin, Mari	Resource Management Coalition
Massa Jr., Eugene	Colusa Basin Drainage District
McCready, Chris	California Department of Water Resources
McDaniel, Leigh W.	Glenn County BOS, Nor Cal Water Assn, Tehama Colusa Canal Authority, Colusa Basin Drainage District, Farm Bureau
McIver, Julia	Yolo County
McManus, Dan	California Department of Water Resources
Medders, Karen	North Delta CARES
Mierzwa, Michael	California Department of Water Resources
Miner, Scott	U.S. Army Corps of Engineers
Miramontes, Tim	Yolo County Farm Bureau; California Rice Commission; California Farm Bureau Rice Advisory Committee; Yolo County
Moricz, Nancy	Central Valley Flood Protection Board
Mullin, Erin	California Department of Water Resources
Murray, Loren	California Department of Water Resources
Nelson, James H.	Stormwater Consulting
Neudeck, Christopher	California Central Valley Flood Control Association
Ng, Michele	California Department of Water Resources

Nishikawa, Vanessa	MWH Americas
Nordberg, Mark	California Department of Water Resources
O'Brien, Shawn	Butte County Public Works
O'Growney, Jas	Tehama County Resource Conservation District
Ohlin, Ernie	Water Resources for Tehama County
Orr, Michelle	Philip Williams and Associates
Pennock, Ben	GCID, Sacramento River Water Contractors, Glenn County Water Advisory Committee, Stony Creek Fan Conjunctive Water Management Group
Peterson, Dave	Sutter Butte Flood Control Agency, San Joaquin Area Flood Control Agency
Pokrandt, Julia	River Partners
Powderly, John	City of West Sacramento
Putty, Roger	MWH Americas
Ramirez, Jose	City of Firebaugh
Refuerzo, Tony	Stanislaus County Planning Department
Rentner, Julie	River Partners, CNPS
Rice, Merritt	California Department of Water Resources
Rice, Scott	California Department of Water Resources
Robinson, Jerry	San Joaquin Farm Bureau Federation
Rogner , Michael	River Partners, RHJV
Romero, Paul	Flood Plain Management Division
Roseman, Jesse	Tuolumne River Trust
Sakato, Max	Reclamation District No. 1500 and California Central Valley Flood Control Association
Schlenker, Brooke	U.S. Army Corps of Engineers

Schmitt, Monty	Natural Resources Defense Council
Shelton, John	California Department of Fish and Game
Shpak, Dave	City of West Sacramento, West Sacramento Area Flood Control Agency
Slater, John	Madera County, Resource Management Agency
Smith, Brian	California Department of Water Resources
Smythe, Tom	Lake County Department of Public Works
Spinks, Chuck	American Society of Civil Engineers
Stephens, Pierre	California Department of Water Resources
Stork, Ronald	Friends of the River
Stripling, Marty	River Garden Farms Co., Sacramento River Westside Levee District, Reclamation Districts 108 and 787
Sun, Yung-Hsin	MWH Americas
Swagerty, Helen	River Partners
Taylor, Ernie	California Department of Water Resources
Tucker, Scott	Reclamation District No. 1500
Twitchell, Jeffrey	Levee District No. 1 of Sutter County
van Rijn, David	U.S. Army Corps of Engineers
Vick, Jan	City of Rio Vista
Wagner-Tyack, Jane	Restore the Delta , League of Women Voters of San Joaquin County
Wallace, Keith	MWH Americas
Washburn, Tim	Sacramento Area Flood Control Agency
Welch, Douglas	Chowchilla Water District
Westmoreland Pedrozo, Diana	Merced County Farm Bureau
Winkler, Steve	San Joaquin County

Winternitz, Leo	The Nature Conservancy
Woodland, Scott	California Department of Water Resources
Yang, Josh	MWH Americas
Yeadon, Bob	California Department of Water Resources
Zezulak, David	California Department of Fish and Game

Agricultural Stewardship Scope Definition Joint Subcommittee

Anderson, Ray	Retired Farmer
Berry, Julia D.	Madera Farm Bureau
Bishop, Erica	MWH Americas
Bonea, Ryan P.	Sutter County Resource Conservation District; Yuba County Resource Conservation District
Bruce, Todd William	Dutra Group, Yolo Air Resources Control Board
Canevari, Mick	University of California Cooperative Extension
Capuchino, S. Leo	City of Mendota
Carey, Phil	California Department of Water Resources, Sacramento Maintenance Yard
Chang, Joseph	California Department of Water Resources
Ellis, Tom	Sacramento West Side Levee District, Land owners in the Colusa Basin, Board of Directors of Colusa County Farm Bureau.
Fisher, Kari	California Farm Bureau Federation
Fredrickson, Justin	California Farm Bureau Federation
Hildebrand, Mary	San Joaquin Farm Bureau, South Delta Water Agency Board, and California Central Valley Flood Association Board
Lang, Kent	Reclamation Districts 537 and 1000
Martin, Mari	Resource Management Coalition
Medders, Karen	North Delta CARES

Miramontes, Tim	Yolo County Farm Bureau; California Rice Commission; California Farm Bureau Rice Advisory Committee; Yolo County
Moyle, Craig	MWH Americas
Pegos, David	California Department of Food and Agriculture
Perrone, Michael	California Department of Water Resources
Putty, Roger	MWH Americas
Rabone, Geoff	Merced Irrigation District
Richter, David	Sutter Basin grower
Roscoe, Terry	California Department of Fish and Game
Sakato, Max	Reclamation District No. 1500
Scheuring, Chris	California Farm Bureau Federation
Sevelius, Pia	Butte County Resource Conservation District
Sutton, Susan	SAS Strategies, rice farming
Tatayon, Susan	The Nature Conservancy
Taylor, William J.	U.S. Department of the Interior, Bureau of Reclamation
Tollette, Alexandra	MWH Americas
Van Ruiten, Anthony	Van Ruiten Brothers
Wallace Jr., William	Landowner
Westmoreland Pedrozo, Diana	Merced County Farm Bureau, California Women for Agriculture, East San Joaquin Water Quality Coalition, San Joaquin Valley Clean Energy organization, Merced Council for the Central Valley Farmland Trust
Zezulak, David	California Department of Fish and Game

Climate Change Scope Definition

Crooks, Stephen	National Blue Ribbon Panel: Wetlands Restoration Greenhouse Gas Mitigation Emission Offset Protocol
Dettinger, Michael	U.S. Geological Survey
Edwards, David	California Air Resources Board
Filler, Tom	California Department of Water Resources
Patterson, Elizabeth	California Department of Water Resources (Retired)
Raff, David	U.S. Department of the Interior, Bureau of Reclamation
Roscoe, Terry	California Department of Fish and Game
Redmond, Kelly	Western Regional Climate Center
Schwartz, Mark	University of California, Davis
Seavy, Nat	Point Reyes Bird Observatory
Sun, Yung-Hsin	MWH Americas
Tansey, Michael	U.S. Department of the Interior, Bureau of Reclamation
Tatayon, Susan	The Nature Conservancy
Taylor, Tia	National Weather Service Intern
Townsley, Stu	U.S. Army Corps of Engineers
Webb, Robert	National Oceanic and Atmospheric Administration

Environmental Stewardship Scope Definition

Bair, Lewis	Reclamation District No. 108, Sacramento River West Side Levee District, Knights Landing Ridge Drainage District
Bishop, Debra	AECOM
Bowles, Chris	cbec
Briggs, Kelly	California Department of Water Resources
Buck, Peter	Sacramento Area Flood Control Agency
Cain, John	American Rivers

Clemons, Scott	California Riparian Habitat Joint Venture
Cohen, Ellie	Point Reyes Bird Observatory
Cox, Julia	California State Parks
Cumming, Ken	National Marine Fisheries Service
DeSpain, Michael	Mechoopda Indian Tribe
Falzone, Anthony	Trout Unlimited
Frink, Ted	California Department of Water Resources
Gaines, Terri	California Department of Water Resources
Gettleman, Ben	Kearns & West
Ginney, Eric M.	Philip Williams & Associates
Griggs, Tom	River Partners
Hermanson, Lynn	AECOM
Hobbs, Jennifer	U.S. Fish and Wildlife Service
Hopkins, John	Institute for Ecological Health; Northern California Conservation Planning Partners
Hoshovsky, Marc	California Department of Water Resources
Hubert, Elizabeth	California Department of Water Resources
Indrieri, Ashley	Family Water Alliance
Kirby, Ken	Kirby Consulting Group
Korhonen, Clarence	City of Elk Grove
Lorenzato, Stefan	Yolo County Flood Control & Water Conservation District
Matella, Mary	UC Berkeley
Ng, Michele	California Department of Water Resources
Perrone, Michael	California Department of Water Resources
Picker, Michael	Sutter Butte Flood Control Agency

Poncelet, Eric	Kearns & West
Rabone, Geoff	Merced Irrigation District
Rofe, Leon	California Indian Heritage Council, Wintu
Roscoe, Terry	Tuolumne River Trust
Schmitt, Monty	Natural Resources Defense Council
Seavy, Nat	Point Reyes Bird Observatory
Sevelius, Pia	Butte County Resource Conservation District
Stehl, Alex	California State Parks
Sun, Yung-Hsin	MWH Americas
Tatayon, Susan	The Nature Conservancy
Toland, Tanis	U.S. Army Corps of Engineers
Tompkins, Mark	Trout Unlimited
Unkel, Chris	Ducks Unlimited
Weinrich, Doug	U.S. Fish and Wildlife Service
Wilcox, Carl	California Department of Fish and Game
Yonemura, Randy	California Indian Heritage Council
Young, Matt	MWH Americas
Zezulak, Dave	California Department of Fish and Game

Interim Levee Design Criteria

Connelly, Mark	San Joaquin County Public Works
Edell, Stuart	Butte County Public Works
Farley, Greg	Madera County
Ford, David	California Department of Water Resources
Harder, Les	Sacramento Area Flood Control Agency

Heinzen, Ron	San Joaquin Area Flood Control Agency
Jimenez, Mary	MWH Americas
Labrie, Gilbert	Brannan-Andrus Levee Maintenance District
Leep, Ken	California Emergency Management Agency
Lenaburg, Ray	Federal Emergency Management Agency
Perlea, Mary	U.S. Army Corps of Engineers
Peterson, David	Sutter Butte Flood Control Agency
Pyke, Robert	Consulting Engineer
Reinhardt, Ric	California Central Valley Flood Control Association
Roscoe, Terry	California Department of Fish and Game
Ruzich, Ken	Reclamation District 900
Shpak, Dave	City of West Sacramento
Tootle, Joe	Reclamation District 17
Twitchell, Jeff	Levee District No. 1 of Sutter County

Levee Performance Scope Definition

Buck, Peter	Sacramento Area Flood Control Agency
Chainey, Steve	California Department of Water Resources
Edell, Stuart	Butte Co. Public Works; Sutter Butte Flood Control Agency
Harder, Les	Sacramento Area Flood Control Agency
Heinzen, Ron	San Joaquin Area Flood Control Agency
Hill, Reggie	Lower San Joaquin Levee District
Jimenez, Mary	MWH Americas
Labrie, Gilbert	Brannan-Andrus Levee Maintenance District
Neudeck, Chris	Reclamation District 17 and Sherman Island

Perlea, Mary	U.S. Army Corps of Engineers
Twitchell, Jeff	Levee District No. 1 of Sutter County
Yang, Josh	MWH Americas

Operations and Maintenance Scope Definition

Acker, Robert	Merced Irrigation District
Bair, Lewis	Sacramento River West Side Levee District and CVFMA, Interagency Flood Management Collaborative
Basset, John	Sacramento Area Flood Control Agency
Brown, Howard	NOAA Fisheries
Carlon, John	River Partners
Cumming, Kenneth	NOAA Fisheries
Devereux, Paul	Reclamation District 1000, Interagency Flood Management Collaborative
Eckman, Russ	California Department of Water Resources
Ericson, Jon	California Department of Water Resources
Fales, Diane	Reclamation District 1001
Hampton, Bill	Levee District No. 1 of Sutter County
Hill, Reggie	Lower San Joaquin Levee District
Hobgood, Gary	California Department of Fish and Game
Kerr, Tim	American River Flood Control District
Lang, Kent	Reclamation Districts 537 and 1600
Moroney, Kelly	U.S. Fish and Wildlife Service
Morris, Patrick	Water Board
Mraz, Dave	California Department of Water Resources
Ruzich, Ken	Reclamation District 900

Sandner, Jim	U.S. Army Corps of Engineers
Tatayon, Susan	The Nature Conservancy
Wallace, Craig	MWH Americas
Wellman-Barbree, Ilene	California Department of Water Resources
Winkler, Steve	San Joaquin Flood Control and Water Conservation District

Phase 2

Regional Management Actions

Anthony, Randall	Merced Irrigation District
Aramburu, Margit	University of the Pacific
Bair, Lewis	Reclamation District 108, Sacramento River West Side Levee District, Knights Landing Ridge Drainage District
Baldwin, Ronald	Office of Emergency Services
Bishop, Erica	MWH Americas
Borcalli, Francis	FloodSAFE Yolo, Water Resources Association of Yolo County
Bradley, Steve	California Department of Water Resources
Bratcher, Patricia	California Department of Fish and Game
Britton, Paula	Upper Lake Rancheria
Bruce, Todd	The Dutra Group, Hearing Board Member, Solano/Yolo Air Quality Management District
Busath, Bill	City of Sacramento
Cain, John	American Rivers
Capuchino, Leo	City of Mendota
Carlon, John	River Partners
Center, Bill	Planning and Conservation League, CABY (Cosumnes, American, Bear, Yuba) IRWMP, American River Recreation

	Association
Cherovsky, Regina	Conaway Preservation Group LLC, Reclamation District 2035, Water Resources Association of Yolo County
Churchwell, Roger	San Joaquin Area Flood Control Agency
Clark, Andrea	Three Rivers Levee Improvement Authority
Clemons, Scott	Riparian Floodplain Joint Venture
Clyde, Eric	MWH Americas
Coglianese, Marci	Bay-Delta Public Advisory Committee and Delta Levees & Habitat
Connelly, Mark	San Joaquin County Flood Management Division
Darsie, Bill	KSN, Inc.
Dell'Osso, Susan	Reclamation District 2062, River Islands
DiFrancesco, Kara	Natural Heritage Institute
Dudley, Chuck	Yolo County Farm Bureau
Edell, Stuart	Butte County Public Works
Edgar, Bill	Sutter Butte Flood Control Agency
Edwards, Doug	U.S. Army Corps of Engineers
Ellis, Tom	Sacramento West Side Levee District, Colusa Basin landowners, Colusa County Farm Bureau Board of Directors
Encinas, Maria	City of Patterson, Stanislaus County
Fiack, Linda	Delta Protection Commission
Fua, Dan	Central Valley Flood Protection Board
Fujitsubo, Miki	U.S. Army Corps of Engineers
Gau, Tom	San Joaquin County
Ghelfi, Pete	Sacramento Area Flood Control Agency
Ginney, Eric	Phillip Williams and Associates

Greco, Steve	University of California, Davis - Department of Environmental Design
Green, Sarge	California Water Institute, CSU Fresno
Hardesty, Mike	Reclamation Districts 2068 and 2098, California Central Valley Flood Control Association
Heringer, Les	Sacramento Valley Landowners Association
Hildebrand, Mary	San Joaquin Farm Bureau, South Delta Water Agency, California Central Valley Flood Control Association
Hill, Reggie	Lower San Joaquin Levee District
Hobbs, Jennifer	U.S. Fish and Wildlife Service
Hobgood, Gary	California Department of Fish and Game
Indrieri, Ashley	Family Water Alliance
Jacobs, Kellie	Merced County
Karvonen, Tom	U.S. Army Corps of Engineers
Kauffman, Kevin	Stockton East Water District
Khadam, Ibrahim	MWH Americas
Koehler, Dave	San Joaquin River Parkway and Conservation Trust
Kulakow, Robin	Yolo Basin Foundation
Labrie, Gilbert	Brannan-Andrus Levee Maintenance District, Reclamation Districts 2067, 407, and 317
Lakeman, Jerry	Fresno Metropolitan Flood Control District
Larrabee, Jason	Larrabee Farms
Larsen, Eric	UC Davis Dept. of Environmental Design
Lasko, Gena	California Department of Fish and Game
Linhart, John	Glenn County Planning and Public Works Agency
Lloyd, Larry	Sutter County Resource Conservation District, Yuba County Resource Conservation District

Lorenzato, Stefan	Yolo County Flood Control & Water Conservation District
Luce, Bill	Friant Water Authority
Martin, Mari	Resource Management Coalition
Massa, Jr., Eugene	Colusa Basin Drainage District
Matella, Mary	American Rivers
Matsumoto, Sandi	The Nature Conservancy
McIllroy, Sarah	Stantec Consulting
Medders, Karen	North Delta CARES
Moroney, Kelly	U.S. Fish and Wildlife Service
Neudeck, Christopher	KSN, Inc., Sacramento San Joaquin Delta, California Central Valley Flood Control Association, Central Delta Water Agency and South Delta Water Agency, Habitat Advisory Committee to Delta Levee Subventions Program
Nishikawa, Vanessa	MWH Americas
Ohlin, Ernie	Water Resources for Tehama County
Orr, Michelle	Philip Williams & Associates
Peterson, Dave	San Joaquin Area Flood Control Agency
Putty, Roger	MWH Americas
Rentner, Julie	River Partners
Robinson, Jerry	San Joaquin Farm Bureau Federation
Romero, Paul	California Department of Water Resources
Roseman, Jesse	Tuolumne River Trust
Rothert, Steve	American Rivers
Sakato, Max	Reclamation District 1500 and California Central Valley Flood Control Association
Schlinker, Brooke	U.S. Army Corps of Engineers

Serrano, Oscar	Colusa Indian Community Council
Sharideh, Sameer	San Joaquin County Flood Management Division
Shelton, John	California Department of Fish and Game
Shpak, Dave	City of West Sacramento, West Sacramento Area Flood Control Agency
Smythe, Tom	Lake County
Spinks, Chuck	American Society of Civil Engineers
Stadler, Steve	Kings River Conservation District
Stork, Ronald	Friends of the River
Strong, James	Farming, SRWP, BSAGU
Sun, Yung-Hsin	MWH Americas
Swagerty, Helen	River Partners
Tatayon, Susan	The Nature Conservancy
Tompkins, Mark	Newfields
Twitchell, Jeffrey	Levee District No. 1 of Sutter County, urban and rural interests of Yuba City, Sutter Basin
Vick, Jan	City of Rio Vista
Vink, Erik	Trust for Public Land
Wagner-Tyack, Jane	Restore the Delta , League of Women Voters of San Joaquin County
Washburn, Tim	Sacramento Area Flood Control Agency
Werner, Gregg	The Nature Conservancy
Westrup, Warren	Yolo County
Winternitz, Leo	The Nature Conservancy
Zezulak, David	California Department of Fish and Game

Climate Change Threshold Analysis

Clyde, Eric	MWH Americas
Dettinger, Michael	U.S. Geological Survey
Raff, David	U.S. Department of the Interior, Bureau of Reclamation
Ralph, Marty	National Oceanic and Atmospheric Administration
Sun, Yung-Hsin	MWH Americas
Townsley, Stu	U.S. Army Corps of Engineers
Webb, Robert	National Oceanic and Atmospheric Administration
Young, Matthew	MWH Americas

Urban Levee Design Criteria

Banning, Brian	California Emergency Management Agency
Biswas, Deb	Central Valley Flood Protection Board
Cepello, Stacy	California Department of Water Resources
Connelly, Mark	Reclamation District 2062
Costa, Ray	California Department of Water Resources
Ford, David	California Department of Water Resources
Harder, Les	Sacramento Area Flood Control Agency
Heinzen, Ron	San Joaquin Area Flood Control Agency
Inamine, Mike	California Department of Water Resources
Jimenez, Mary	MWH Americas
Kumar, Sree	Los Angeles County Public Works
Labrie, Gilbert	Brannan-Andrus Levee Maintenance District
Lee, Liang	Santa Clara Valley Water District
Lenaburg, Ray	Federal Emergency Management Agency
Maguire, John	San Joaquin County Public Works

Mahnke, Steve	California Department of Water Resources
Mayer, Rod	California Department of Water Resources
Perlea, Mary	U.S. Army Corps of Engineers
Peterson, David	Butte County Dept. of Public Works
Punyamurthula, Sujan	California Department of Water Resources
Reinhardt, Ric	California Central Valley Flood Control Association
Rie, Teri	Central Valley Flood Protection Board
Rodriguez, Vincent	California Department of Water Resources
Shaefer, Kathy	Federal Emergency Management Agency
Tootle, Joe	Reclamation District 17
Twitchell, Jeff	Levee District No. 1 of Sutter County
Zhong, Ke	California Department of Water Resources

Urban Level of Flood Protection

Bergson, Charles	City of Williams
Blackburn, Gregor	Federal Emergency Management Agency, Region 9
Booth, George	County of Sacramento
Busch, Aaron	City of Yuba City
Childress-Byers, Jami	California Emergency Management Agency
Davies, Paul	Caltrans Division of Design
Dean, Bill	City of Tracy
DeCou, Glenn	Caltrans Division of Design
DeVore, Ryan	City of Sacramento
Echiburu, Taro	City of Elk Grove
Elias, Eric	City of Stockton

Fitzgerald, Paula	City of Los Banos
Freitas, Angela	County of Stanislaus
Gebhardt, Glenn	City of Lathrop
Guo, Rebecca	MWH Americas
Hanson, Paul	City of Woodland
Harder, Les	Sacramento Area Flood Control Agency
Hegedus, Pal	Floodplain Management Association
Hightower, J.D.	City of Riverbank
Hodgkins, Butch	Central Valley Flood Protection Board
Jakobs, Gary	Ascent Environmental, Inc. American Planning Association, California Chapter
Kutsuris, Catherine	Contra Costa County
Lindbeck, Steve	City of Roseville
Ludy, Jessica	American Rivers
Ly, Hoa	California Department of Water Resources
Maguire, John	San Joaquin County Public Works, Flood Management Division
Marshall, Will	City of Davis
McDonald, Jim	City of Sacramento
McDougall, Paul	California Department of Housing and Community Development
McDowell, Mike	City of Stockton
McKenzie, Cynthia	Federal Emergency Management Agency, Region 9
Mendez, Michael	City of Sacramento American Planning Association, California Chapter
Morgan, Scott	Governor’s Office of Planning and Research
Nelson, Jim	City of Tracy
Palmer, Dave	City of Rocklin

Pease, Kathy	City of Roseville
Perkins, Connie	City of Sacramento
Peterson, David	Butte County Dept. of Public Works
Powderly, John	City of West Sacramento
Powell, Ellen	League of California Cities
Raney, Tim	City of Wheatland
Ross, Kyra	League of California Cities
Sandmeier, Corinna	County of Sacramento
Sherry, Robert	California County Planning Directors Association
Shpak, Dave	City of West Sacramento
Smith, Brian	California Department of Water Resources
Snellings, Tim	County of Butte
Soutiere, Judy	U.S. Army Corps of Engineers
Stone, Jim	City of Manteca
Sullivan, Kerry	San Joaquin County Public Works, Flood Management Division
Sun, Yung-Hsin	MWH Americas
Taras, Curt	Central Valley Flood Protection Board
Turner, Claire-Marie	U.S. Army Corps of Engineers
Webb, Michael	City of Davis
Williams, Stu	City of Sacramento
Willis, Rebecca	City of Oakley
Wilson, Darren	City of Elk Grove
Wilson, Lisa	County of Sutter

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STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Edmund G. Brown Jr.
Governor
State of California

John Laird
Secretary
The California Natural Resources Agency

Mark W. Cowin
Director
Department of Water Resources

Department of Water Resources
The California Natural Resources Agency
State of California