

# California Levees Roundtable



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Sacramento  
Area Flood  
Control  
Agency



# California's Central Valley Flood System Improvement Framework

## Summary

This document has been collaboratively developed by the California Levees Roundtable, a partnership of federal, State, and local agencies that was formed in August 2007 to address vegetation issues affecting the State-federal levee system in the Central Valley. The Roundtable recognized that vegetation management is only one of many issues that threaten levees and broadened its scope to address many threats to levee integrity. The flood system improvement process requires a comprehensive approach to improve public safety that focuses first on the most critical areas affecting public safety.

### Purpose

The primary purpose of this document is to present a short-term Framework for flood system improvements that are already underway or will be initiated before a comprehensive plan is ready in 2012. The Framework should be viewed as a living document – a work in progress – that provides general guidelines for helping the State, in coordination with federal and local entities, move forward while the comprehensive plan is being developed. The participating agencies recognize that many of the specifics needed for this Framework have to be collaboratively resolved during the next four years and are committed to continue working together during implementation of the Framework. Therefore, details in this document should be viewed as supporting a good-faith effort to make progress in the interest of public safety improvements over time while establishing milestones to track progress toward reaching the goals of the Framework.

### Short-term Framework

California's flood system has over 1,600 miles of State-federal project levees in the Central Valley. Trees and brush grow on most of these levees and provide an important remnant of the riparian forest that once lined the Sacramento and San Joaquin rivers and tributaries. This vegetation may also impair levee performance. Other threats such as inadequate channel capacity, erosion of levees, seepage through and under levees, encroachments on the levee from adjoining properties, structural instability of the levee section, and seismic loadings also contribute to the threat of flooding. California needs to look comprehensively at these threats in its flood management planning.

Ongoing activities in the short-term Framework are focused on addressing these threats in order to improve public safety in flood-prone areas. However, no single threat should be given priority in the short-term. The system improvement process will use scientific data collection and technical analyses to help guide improvement priorities and resource allocation within State, federal, and local funding capabilities.

Elements of the short-term Framework include:

- **Inspections** – The California Department of Water Resources (DWR), the Corps of Engineers (Corps), and local levee maintaining agencies (LMAs) have recently developed improved levee inspection processes and will continue to improve levee inspections.
- **Enforcement** – To ensure that identified levee deficiencies are addressed, DWR, the Central Valley Flood Protection Board (CVFPB) and the Corps will use enforcement actions where necessary.
- **Maintenance** – State and local maintaining agencies will continue to maintain levees in accordance with the Corps' operations and maintenance (O&M) manuals.
- **Early Implementation Projects** – There is an identified need, especially in urban areas in deep floodplains, to proceed with some high priority flood improvement projects before a comprehensive plan is ready for implementation. An element of approval for these projects ensures that they do not eliminate opportunities or prejudice flood risk reduction alternatives that would provide regional or system-wide benefits.
- **Emergency Response** – Emergency response during the short-term will include mapping of flood prone areas and development of emergency response programs along river corridors and in the Delta. Many of the emergency response activities provide for improved flood system operations during floods.
- **Public Outreach** – The State has been actively pursuing a course of public outreach and stakeholder involvement since the inception of the FloodSAFE California initiative, following approval of Propositions 84 and 1E by California voters in November 2006.
- **Data Collection** – Data collection is the key to understanding existing conditions and identifying needed system changes. Much of this data will feed into the Central Valley Flood Protection Plan (CVFPP), the long-term comprehensive plan for the Central Valley flood system.
- **Program Planning** – State, federal, and local partners will continue program planning during the interim period. Much of this work will help to define the detailed, long-term flood management improvement process in the CVFPP.
- **Feasibility Studies** – DWR, the Corps, and local partners will continue to work on site-specific feasibility projects that will ultimately result in construction of critically needed flood risk reduction projects.
- **Ongoing Flood Protection Projects** – DWR, the Corps, and local partners will continue to work on implementation of site-specific projects as they become ready for construction.
- **Research** – Peer reviewed scientific research will be conducted to support development of a technically defensible vegetation management policy in

support of California's FloodSAFE initiative. Research will consider both beneficial and harmful impacts of levee vegetation on Central Valley levees. The State acknowledges that the Corps is not likely to make substantial changes to its national guidance on vegetation standards, but expects that scientific research, as well as long-term evaluation and monitoring of vegetation life cycles with respect to performance of project levees in the Central Valley, will support granting of regional variances to the national standards for the Sacramento and San Joaquin levee systems. In addition, research is expected to identify appropriate engineering actions from a risk perspective to mitigate leaving select vegetation on levees.

- **Environmental Considerations** – Mitigation of environmental effects of flood system improvements as well as habitat enhancements implemented as part of multi-objective projects will be part of the environmental considerations for the system. Development and implementation of a Multi-species and Floodplain Conservation Strategy, including a conservation banking program, will guide this effort.
- **Coordination** – State and federal agencies are working together on several fronts to address levee vegetation management and the broader problems with California's levees.
- **Issues to Resolve** – Many of the specifics needed for this Framework have to be resolved together during the next four years as implementation progresses. Among many issues to resolve, participating agencies need to work on a vision to strategically address the need for environmental protection and public safety at the same time.
- **Implementation Roles** – Implementation of the Framework requires continued work of State, federal, and local agencies. This section summarizes what can be expected of various agencies. DWR, in collaboration with the CVFPB, is taking a leadership role for the majority of actions identified in the Framework, but the Corps will be an active partner throughout the process. DWR and the Corps will coordinate with the environmental resource agencies during planning and project development to determine how to avoid, minimize and mitigate impacts, and to identify opportunities for ecosystem restoration and enhancement as integral components to flood system improvements. LMAs will continue to improve their operation and maintenance activities for levees under their responsibility.

## Measured Progress

The State is currently engaged in an aggressive 25-year program, the FloodSAFE initiative, to upgrade its flood management system. The CVFPB, scheduled for beginning implementation in 2012, will lay out strategies for implementing comprehensive system-wide improvements. It is important to California to maintain Public Law 84-99<sup>1</sup> (PL 84-99) eligibility for its levees while

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<sup>1</sup> PL 84-99 defines federal rehabilitation assistance for flood control works

system improvements are underway. The Corps has agreed that the flood system will be allowed to remain “active” in the PL 84-99 program and will continue to receive federal levee rehabilitation assistance in the event of a flood if the State is demonstrating positive progress and meeting the milestones in achieving the Framework’s short-term goals and maintenance objectives. This PL 84-99 eligibility shall be reviewed annually for renewal in accordance with Corps policy and remain in effect until 2012, at which time the eligibility criteria will be reconsidered based on the contents of the CVFPP.

Positive progress can be measured against many expected dates and other milestones identified for implementation over about the next four years in the short-term Framework. One important milestone is the requirement for LMAs to maintain levee vegetation according to DWR’s Interim Levee Inspection Criteria for Vegetation, first implemented for the Fall 2007 inspections (see adjacent box). The inspection criteria are aimed at improving public safety by providing visibility for inspections, eliminating vegetation conflicts and encroachments that could hamper flood fight activities, and improving access for overall maintenance and flood fights.

The State will require LMAs responsible for maintenance of State-federal project levees in the Central Valley to be in compliance with the interim vegetation requirements by November 1, 2010. The State will further require that LMAs report status of compliance by November 1, 2009, and (for any levees for which the LMAs do not expect full compliance during 2010) to provide levee location, justification for non-compliance, and plans/schedules for complying with the interim requirements. Landscape encroachment vegetation from adjoining properties will be handled as part of the long-term flood improvement plan along with other encroachments. In the event LMAs are not making acceptable progress, and/or the State begins the maintenance area formation process, the Corps will consider this action when evaluating whether to grant extensions relative to PL 84-99 eligibility.

Progress in implementing interim vegetation requirements and other Framework milestones will be reviewed annually by the Corps and DWR to assess progress in complying with the milestones. The review will also address those areas of the system where compliance with the milestones may be delayed due to technical, economic, or environmental factors.

LMAs made significant progress during 2008 – the first “maintenance year” since DWR revised the interim vegetation criteria in the Fall of 2007. It is projected that substantial compliance with interim criteria will be achieved by Fall 2010. There

**DWR’s Interim Levee Vegetation Inspection Criteria (Fall 2007)**

Trees must be trimmed up five feet above the ground (12 feet above the crown road) and thinned enough for visibility and access. Brush, weeds, or other vegetation over 12 inches high blocking visibility and access within these levee areas should be trimmed, thinned, mowed, burned, dragged, or otherwise removed in an allowed manner. These criteria apply on the entire landside slope plus a 10-foot wide easement beyond the landside toe. On the waterside, these criteria apply to vegetation on only the top 20 feet (slope length) of the levee slope.

Note: These visibility and accessibility criteria do not meet federal standards (see box on next page), but do provide for measurable progress in the short-term.

may be levees in some areas where it is not feasible to meet the Corps' vegetation standards and those segments of the flood protection system could lose eligibility for PL 84-99.

The State plans to develop a Multi-Species and Floodplain Conservation Strategy that will allow for levee maintenance and levee improvements while conserving and/or enhancing vital habitat and ecosystems which coexist with the flood protection system. Implementation of any flood improvement actions would be subject to State and federal environmental laws.

In the long-term, the State will seek to conserve and enhance riparian habitat on the waterside of levees and aggressively pursue compliance with the Corps' national levee standards including vegetation standards through the use of improved maintenance inspections, phased vegetation management practices, regional variances, and other management tools that would be consistent with the Multi-Species and Floodplain Conservation Strategy.

New levee sections will comply with the Corps' levee vegetation standards. Major modifications of existing levee sections will comply with the Corps' levee vegetation standards, but may allow vegetation to remain if these projects can demonstrate that the public safety risks posed to levee integrity have been adequately addressed and engineered into project designs. The Corps' levee standards may evolve over time, when appropriate, to incorporate the latest developments in science and engineering.

The State recognizes that the Corps' national standard for levees, as embodied in draft Engineering Technical Letter 1110-2-571, is an appropriately conservative national public safety standard, and is likely achievable for most of the federally authorized levees across the country. Some parts of the State-federal flood protection system in California's Central Valley currently meet the ETL standards for vegetation, and the State will enforce the standards in those areas into the future. New levees being added to the system (such as setback levees, backup levees, and ring levees) will also be designed, constructed, and maintained to ETL Standards. However, as described in this Framework document, the "legacy levees" built immediately adjacent to California's major riverine systems present unique challenges that will likely require regional variances or other engineered alternatives. Vegetation management on levees will be addressed by collaboratively transitioning from interim criteria towards the Corps' national standards within the context of many levee risk factors. This will be accomplished by federal, State and local agencies as part of development of the Central Valley Flood Protection Plan and its implementation after 2012.

**Corps of Engineers Levee  
Vegetation Standards**

Corps Engineering Technical Letter (ETL) 1110-571 and the Levee Owners Manual provide guidelines for landscape plantings and vegetation management on levees, floodwalls, embankments dams and appurtenant structures. These standards limit uncontrolled vegetation growth (brush, weeds, or trees) to smaller than two inches in diameter. However, the guidelines allow for designs or treatments that provide for levee vegetation. In addition, regional variances can allow vegetation on some levees.

## Continued Collaboration

State and local agencies will work closely with the Corps and other federal agencies during the process of developing and implementing California's FloodSAFE initiative. This will include preparation of the system-wide CVFPP and long-term implementation of individual projects and programs to appropriately bring levees into compliance with Corps' standards including vegetation management and resolution of non-permitted encroachments. California expects the federal government and local agencies to partner and actively seek funding to cost share ongoing and future levee improvements.

The participating agencies are committed to broad based stakeholder collaboration to develop flood system improvements that effectively address critical stakeholder needs associated with public safety and the environment. Actions selected for implementation must ensure system operational performance in a time of changing climatic conditions, facilitate annual routine maintenance as well as periodic special maintenance, and protect and enhance the environment. This approach will require improved stakeholder interactions to help implement measurable system improvements.

Since the short-term Framework provides general guidelines, many specifics needed for this Framework have to be resolved during the next four years as implementation progresses. Following is a partial list of recommended actions that will be addressed through interagency collaboration.

- Define standardized maintenance processes and responsibilities of levee maintaining agencies
- Clearly identify all applicable environmental law requirements that must be met when dealing with short- and long-term actions identified in this document
- Work on authorized and unauthorized encroachments, including processes for identification and enforcement
- Define how the State will facilitate opportunities for local agencies to cost-effectively mitigate impacts of their levee maintenance
- Work with local agencies to help them achieve stable and sustainable funding for maintenance activities
- Work on levee certification issues
- Work on a statewide vision to concurrently address the need for environmental protection and public safety
- Clarify CVFPB role in enforcement of maintenance standards and in defining flood system improvement impacts and associated mitigations
- Develop stable funding mechanisms at State, federal, and the local level
- Develop programmatic approaches for environmental compliance

- Clearly define ESA consultation or permitting alternatives and agree on a direction and solution
- Develop and implement the Multi-Species and Floodplain Conservation Strategy
- Implement meaningful mitigation and conservation actions for interim vegetation management actions
- Annually review progress on implementing interim vegetation criteria and other Framework milestones and work on approaches to advance milestones delayed by technical, financial, or economic factors
- Develop the long-term comprehensive flood improvement plan in the CVFPP by 2012

# California's Central Valley Flood System Improvement Framework

	Page
<b>Summary .....</b>	<b>1</b>
<b>Introduction .....</b>	<b>10</b>
Purpose of this Framework .....	10
California's Flood Challenges.....	14
FloodSAFE California.....	15
Unique Character of State Flood System in the Central Valley .....	15
<b>Short-Term Flood Management Improvement Framework .....</b>	<b>18</b>
1. Introduction .....	18
2. Inspections .....	19
State and Corps Roles .....	19
Current and Proposed Inspection Activities.....	20
3. Enforcement.....	25
4. Maintenance.....	26
Maintenance Area Formations .....	26
Levee Maintenance Program .....	27
Channel Maintenance Program.....	27
Rehabilitation of Flood Control Structures Program.....	28
Critical Erosion Repairs.....	30
Environmental Initiatives Program.....	31
5. Early Implementation Projects.....	32
6. Emergency Response .....	35
Mapping .....	35
Flood Emergency Response Programs .....	36
Emergency Response to Delta Catastrophe .....	38
7. Public Outreach.....	39
8. Data Collection .....	41
Hydrology Study of the Sacramento and San Joaquin River Basins.....	41
Urban Levee Evaluations .....	42
California Statewide Levee Database .....	42
Summary of Legislative Requirements and Milestones.....	44
9. Program Planning.....	46
FloodSAFE Strategic Plan.....	46
Implementation Plans.....	47
California Water Plan Update 2009.....	47
Central Valley Flood Protection Plan.....	48

Integrated Regional Water Management Plans.....	48
Funding .....	48
10. Feasibility Studies .....	48
Sutter Basin, California, Feasibility Study.....	48
Lower San Joaquin River Feasibility Investigation .....	49
Lower Cache Creek, Yolo County, Woodland Area General Investigation .....	50
11. Ongoing Flood Protection Projects.....	50
Sacramento River Bank Protection Project .....	50
DWR Delta Levees Flood Protection Program .....	51
Folsom Joint Federal Project.....	51
Mid-Valley Area Levee Reconstruction Project .....	51
South Sacramento County Streams Project.....	52
American River Common Features Project GRR .....	52
West Sacramento Project GRR.....	53
Yuba River Basin Project GRR .....	53
12. Research.....	54
13. Environmental Considerations .....	55
Flood Protection Corridor Program .....	55
Multi-Species and Floodplain Conservation Strategy .....	56
14. Coordination.....	60
California Levees Roundtable .....	60
Interagency Collaborative.....	61
Regional Variance Group.....	61
15. Issues to Resolve .....	62
16. Implementation Roles.....	63
DWR and CVFPB.....	63
Corps .....	64
Environmental Resources Agencies .....	64
Levee Maintaining Agencies .....	65
<b>Long-Term Flood Management Improvement Framework .....</b>	<b>66</b>
1. Introduction .....	66
2. Partnerships .....	67
3. Central Valley Flood Protection Board Responsibility .....	67
4. DWR Responsibility.....	67
5. Central Valley Flood Management Planning Program.....	68
CVFPP .....	68
SPFC .....	69
<b>Key Recommendation .....</b>	<b>75</b>

# Introduction

## Purpose of this Framework

California is currently engaged in an aggressive 25-year program to upgrade its flood management system. During this time, it cannot afford to focus on single issues, but must use comprehensive solutions that address all issues, such as levee erosion, channel capacity, flood stage, seepage, encroachments, land use, levee vegetation, and environmental concerns at the same time. This is particularly true whenever a project or a portion of the system is being modified.

It is important to maintain PL 84-99 eligibility for levees while system improvements are underway. Progress to improve the system will be continuous over the next few decades with emphasis given first to improving the system in a manner that provides the greatest public safety benefits.

In April 2007, the Corps of Engineers (Corps) released a draft white paper, *Treatment of Vegetation within Local Flood Damage Reduction Systems*, that called for the removal of wild growth, trees, and other encroachments which might impair levee integrity or flood-fighting access in order to reduce the risk of flood damage. Guidance on vegetation standards for flood control structures can be found in the Corps ETL 1110-2-571 and EM 1110-2-301. These standards limit uncontrolled vegetation growth (brush, weeds, or trees) to smaller than two inches in diameter. The Corps notified sponsors that levees which fail to meet these

existing standards be rated as unacceptable, with the consequence that they could lose eligibility for federal assistance (PL 84-99) in post-flood levee rehabilitation. This could also lead to loss of accreditation under Federal Emergency Management Agency's (FEMA) National Flood Insurance Program.

Management of levee vegetation and non-permitted encroachments is an important part of flood management, but cannot be considered independently of other important threats to flood safety. Some key points that influenced development of the short-term and long-term Frameworks are shown in the following box.

### **PL 84-99 Rehabilitation Assistance of Flood Control Works**

Federal and non-federal flood control works in the Rehabilitation and Inspection Program (RIP) damaged by floods may be repaired at up to 100% federal cost for federal projects. For non-federal projects, the repairs are cost shared at 80% federal and 20% non-federal sponsor. To be eligible for these repairs, the projects must be in "Active" status and the assistance is limited to restoration of pre-disaster condition and level of protection. Any deferred maintenance is the responsibility of the sponsor. The intent of the program is to ensure that damaged flood control works are operationally effective prior to the next flood season. See ER 500-1-1 and EP 500-1-1 for details.

Eligible projects must have an overall system rating of acceptable or minimally acceptable. A minimally acceptable project must have deficiencies corrected within two years. An unacceptable system is inactive in the RIP, and the status will remain inactive until the sponsor submits proof that all items rated unacceptable have been corrected. Inactive systems are ineligible for rehabilitation assistance.

## **Key Points**

**1. Proper operation and maintenance of levees and management of levee vegetation is only one important factor in California's flood system**

- DWR is engaged in a broad system-wide evaluation that considers levee vegetation along with seepage, flood stage, erosion, levee slope stability, channel capacity, and other important issues associated with flood risk.
- The State has been prioritizing activities towards high risk issues and areas, and has also improved vegetation inspection and maintenance.

**2. Compliance with the Corps vegetation standards and inspection standards will take time and careful implementation**

- Central Valley levee vegetation is extensive in area and in ecosystem importance.
- There are numerous environmental complexities associated with flood control projects and maintenance activities including time consuming permitting requirements and coordination with resource agencies.
- Vegetation along many levees provides critical fishery habitat and is ecologically significant to several listed and protected species.
- Protection and enhancement of the riparian corridor is necessary for survival and recovery of several listed and protected species.
- Elimination of waterside levee vegetation may be difficult to mitigate.
- Full compliance with the Corps levee vegetation standards in the short-term could use all available funding without solving more important flood risk problems.
- Interim vegetation maintenance requirements will be implemented during the short-term.
- Without a more comprehensive plan, strict compliance with the Corps levee vegetation standards in the short-term could actually cause levee damage as roots are grubbed from levee slopes.
- Additional scientific and engineering research will better inform future maintenance practices.

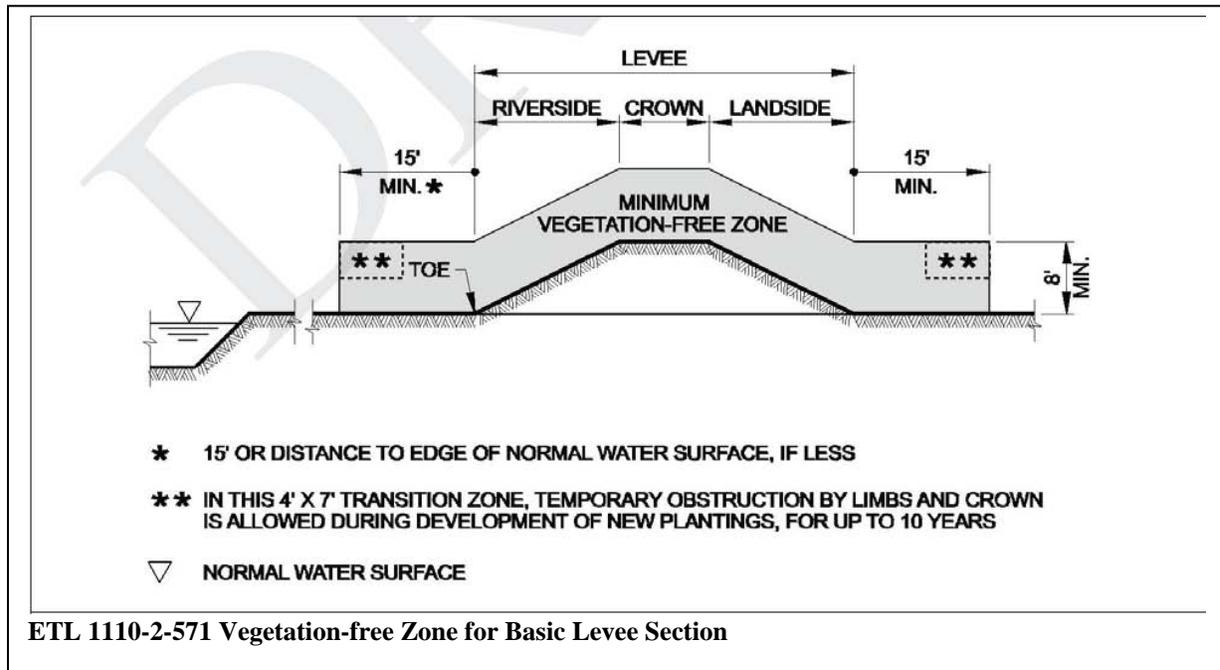
**3. The State is already aggressively leading a comprehensive program to improve the public's flood safety**

- Over the past several years, the State has raised new funding and initiated numerous projects and programs to reduce flood risk. However, only limited funding is available to address maintenance issues.
- Recently passed legislation now requires the State to establish new standards for flood protection and to reduce flood risks by mapping, emergency response preparation, and risk notification efforts.
- The State is aggressively implementing increased inspection and improved maintenance practices, and is addressing maintenance issues.
- DWR is coordinating with maintaining agencies to generate additional local funding through fees and assessments.
- DWR has initiated programs to address environmental and ecosystem benefits including mitigation and restoration.

**4. The federal government is recommencing engagement in the State's comprehensive flood program**

- The Corps initiated a joint comprehensive flood management program over 10 years ago. Congressional authorization and funding is needed to recommence the work and address latent system deficiencies, address system fixes, and advance urban and system projects.
- Continued Corps/federal involvement is needed in the collaborative process to meet comprehensive environmental planning, permitting, and compliance needs.
- The State cannot achieve the level of flood protection that the Central Valley needs without federal technical and funding support.

The following figure illustrates the minimum vegetation-free zone currently required in the Corps' standards for a basic levee section. ETL 1110-2-571 includes several other cross-sections illustrating the minimum vegetation-free zones for different levee configurations and where vegetation can be incorporated into levee designs.



California agrees that levee vegetation and levee maintenance are important factors that must be considered when improving system reliability. In the long-term, the State will seek to conserve and enhance riparian habitat on the waterside of levees and aggressively pursue compliance with the Corps' levee standards including vegetation standards through the use of improved maintenance inspections, phased vegetation management practices, regional variances, and other management tools that would be consistent with the Multi-Species and Floodplain Conservation Strategy (see Section 13). However, simply focusing on the removal of levee vegetation to satisfy the Corps' vegetation standards in the short-term could be counter productive by diverting resources from other important elements of flood management and causing negative impacts to many protected species and habitats. There may be levees in some areas where it is not feasible to meet Corps' vegetation standards and those segments of the flood control system could lose eligibility for PL 84-99.

At the August 2007 vegetation symposium (see sidebar in Section 12) some engineers stated that woody vegetation on the lower waterside slopes of a levee constitutes little risk to the levee structure, and may actually improve levee integrity by making the levee slope more resistant to erosion. Other engineers at the symposium expressed concerns that this vegetation does pose a risk because they believe it may restrict flood fighting, create adverse hydraulic effects, create piping and seepage paths along roots, and (if windthrown) can

create voids in the levee prism. Still, vegetation management cannot wait for long-term solutions – there are many positive actions that the State is taking to address maintenance and levee vegetation issues in the interim period before a comprehensive system improvement plan is ready for implementation.

This document has been collaboratively developed by the California Levees Roundtable, a partnership of federal, State, and local agencies that was formed in August 2007 to address vegetation issues affecting the State’s extensive levee system in the Central Valley. The Roundtable recognized that vegetation management is only one of many issues that threaten levees and broadened its scope to address many threats to levee integrity. The primary purpose of this document is to present a short-term Framework for flood system improvements, including levee vegetation management, that are already underway or will be initiated before a comprehensive plan is ready in 2012. The Framework presents expected dates and other milestones that can be used to track progress over about the next four years. Its intent is to demonstrate a commitment to flood system improvement that allows California Central Valley levees to maintain PL 84-99 eligibility while long-term system improvements are being considered and appropriately implemented.

This Framework should be viewed as a living document – a work in progress – that provides general guidelines for helping the State move forward while the comprehensive plan is being developed. The participating agencies recognize that many of the specifics needed for this Framework have to be resolved together during the next four years. Therefore, details in this document should be viewed as supporting a good-faith effort to make progress in the interest of public safety improvements over time while establishing milestones to track progress toward reaching the goals of the Framework.

#### **Long-Term Compliance with Corps Levee Vegetation Standards**

Levee and channel vegetation can be compatible with Corps levee vegetation standards:

- Corps Engineering Technical Letter (ETL) 1110-2-571 and the Levee Owners Manual provide guidelines for landscape plantings and vegetation management on levees, floodwalls, embankment dams and appurtenant structures.
- Overbuilt cross sections can support woody vegetation.
- Setback levees can allow for retention and enhancement of riparian habitat.
- Guidelines allow for designs or treatments that provide for levee vegetation.
- Regional variances can allow vegetation on some levees.
- Corp’s vegetation standards are under peer review and may be adjusted appropriately based on the review and further scientific and engineering research.

Note: Depending on results of future evaluations and the system improvement plan, complying with the Corps’ standards for some levees may not be feasible. In these cases, the conservation strategy will guide management of the levee vegetation. However, these levees may therefore become ineligible for PL 84-99 rehabilitation assistance.

The Corps developed basic tenets to help the process of completing this Framework document and integrating vegetation requirements for the short- and long-term in order to maintain PL 84-99 eligibility during the flood system improvement process. DWR and other agencies participating in the Roundtable (see Section 14, Coordination) worked with the Corps in developing this Framework to address the tenets as much as possible.

#### **Corps Tenets**

The Corps developed the following tenets:

- The Central Valley flood management system is complex with unique issues beyond vegetation
- System conformance to vegetation standards will be a function of overall system risk reduction priorities
- Milestones will be identified for short-term and long-term activities
- Corps vegetation standards will be applied to early implementation projects, major project improvements and new levee construction
- Vegetation standards may be adjusted by application of approved regional variances
- State will develop and implement short-term maintenance requirements that will transition to Corps standards with implementation of CVFPP
- Maintenance of new vegetation growth and encroachments will comply with Corps standards
- Research will be conducted regarding vegetation impacts and standards adjusted as appropriate
- Framework should focus on system-wide corrections, corrective actions should be environmentally compliant and the framework will incorporate mitigation and conservation strategies

### **California's Flood Challenges**

By the beginning of the 21<sup>st</sup> Century, several challenges with California's flood management system became increasingly apparent:

- Escalating development in floodplains had increased the potential for flood damage to homes, businesses and communities
- The system, comprised of aging infrastructure with a variety of deficiencies, had been further weakened by deferred maintenance
- State and local funding for effective flood risk reduction and management had been reduced
- Court decisions had resulted in greater State flood damage liability
- The State's floodplain ecosystems had become impacted, adversely affecting numerous species and habitats
- Awareness of climate change presented new, not well understood, challenges of potential increased flood frequency and sea level rise

In January 2005, Governor Schwarzenegger drew attention to the State's flood problem, calling for improved maintenance, system rehabilitation, effective emergency response, and sustainable funding. In a white paper entitled "*Flood Warnings: Responding to California's Flood Crisis*", the Department of Water

Resources (DWR) outlined the flood problems that California faces and offered specific recommendations for administrative action and legislative changes ([http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-05flood\\_warnings.pdf](http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-05flood_warnings.pdf) ).

Since that time, California has begun the long process to improve the system by:

- Investing heavily to complete emergency repairs quickly near several high risk urban areas and some rural areas
- Informing the public about flood risks
- Enacting significant new laws
- Providing funds to lead a sustained effort to improve flood management statewide
- Launching FloodSAFE California - a multi-faceted initiative to improve public safety through integrated flood management

### **FloodSAFE California**

The FloodSAFE California initiative builds upon recent progress, fueled by almost \$5 billion of bond funding provided through Propositions 1E and 84 in 2006. This State money should be considered as a down payment for flood system improvements that could cost many times that amount over the next 25 years. Success of the initiative will depend on active participation and cost-sharing from California's federal and local partners.

The FloodSAFE initiative provides significant emphasis in the Central Valley where communities and resources face high risk of catastrophic damage, often in deep floodplains. Under the initiative, the State is repairing and improving flood protection systems by addressing levee seepage problems, repairing erosion sites, improving flood forecasting and response, enhancing floodplain management, improving levee maintenance including vegetation management, and enhancing its emergency response capability.

As top priority, the State will use an integrated statewide approach for managing California's aging flood systems, considering changing climate conditions and growing population. Careful planning is required to assure wise and effective investment of bond funds over the long-term. FloodSAFE California builds upon past and current flood programs to strengthen not only the State Flood System in the Central Valley, for which the State has provided legal assurances to the federal government, but also assists local governments throughout California in meeting flood management challenges and emergency response preparedness.

### **Unique Character of State Flood System in the Central Valley**

Due to the unique history of gold mining and agricultural development in California, levees were constructed at the edge of the Sacramento and San Joaquin river channels. As a result, the levee slopes in the Central Valley often contain brush and trees that are only small remnants of riparian forests which once extended across the valley floor adjacent to the rivers. In the Sacramento

Valley alone, it has been estimated that less than 2 percent of the original riparian vegetation remains. Much of this remaining vegetation provides important environmental, recreational, and cultural benefits.

Most of the State Flood System levees in the Central Valley are different than the great majority of project levees throughout the nation in the following ways:

- Most levees were never engineered, but were built up over time with readily available but undesirable material. Levees were generally legislated into the federal flood control system with only minor federal modifications.
- Many of the Sacramento River levees were built close together to create high river velocities that would scour away tailings from 19th century hydraulic mining. The tailings are gone – the high velocities are now scouring the levees.
- The ecosystem value of vegetation on levees and in channels is significant and represents much of the remaining Central Valley vegetation that existed before the Central Valley was settled. Levees and channels provide critical habitat to many fish and wildlife species listed under the Federal Endangered Species Act and California Endangered Species Act. Threatened or endangered species, or species of concern, include, but are not limited to:
  - delta smelt
  - Valley elderberry longhorn beetle
  - Central Valley spring-run Chinook salmon
  - Central Valley fall- and late fall-run Chinook salmon
  - Central Valley steelhead
  - southern distinct population segment of the North American green sturgeon
  - long-fin smelt
  - giant garter snake
  - riparian brush rabbit
  - Swainson's hawk
  - burrowing owl

Preservation of this habitat, particularly on the waterside slope, is critical to fisheries habitat and several listed and protected species. Elimination of this waterside vegetation may be difficult to mitigate – if anything, it needs to be enhanced over time to benefit the various species in decline. As a result, levee maintenance and improvement efforts require a comprehensive planning effort.

- Due to loss of critical habitat and many fish and wildlife species, the process of performing routine maintenance has become more difficult.

- Due to conditions peculiar to California's Central Valley, Corps Project Standard Operation and Maintenance Manuals state that "brush and small trees may be retained on the waterward slope where desirable for the prevention of erosion and wave wash." This reflects the difficulty in growing sod on levee slopes given the arid nature of this part of California.
- Notwithstanding allowance of small trees and brush, heritage and landmark trees line many of the Sacramento River levees as recognized by the State Legislature in California Water Code Section 8450. Some of these trees and levees existed when the State's flood control system was authorized as a federal project. Levee maintenance standards in the O&M Manual placed restrictions on the size of large woody vegetation on levees, but trees were not removed prior to or after project authorization. The Corps and the State have had continuing discussions over several decades regarding vegetation maintenance and public safety standards, although no systematic effort was initiated to manage or remove these trees.
- The State depends on a large number of local levee maintaining agencies to keep the levees of the State Flood System in good condition.

# Short-Term Flood Management Improvement Framework

California has begun the long process to improve flood management systems by investing heavily to complete emergency repairs near several high risk urban areas and a in limited number of rural areas, informing the public about flood risks, enacting significant new laws, and providing funds to lead a sustained effort to improve flood management statewide. This process requires time for data gathering, evaluations, and planning to fully define what needs to be accomplished over the next several decades. After years of reduced budgets for State flood programs in the early 2000s, DWR is adding staff to its ongoing flood management programs. Over the last three years, DWR's operation and maintenance budget has increased by approximately 300 percent and the emergency response budget has increased by 150 percent. Substantial funding increases are now available for inspections, O&M, system repair and improvement, emergency response, and Delta levee programs.

Although the flood management work is a continuous process, this report describes the process in two parts – short-term and long-term. The most detail is shown for the short-term flood management Framework that is already underway. An important part of the short-term Framework is development of the long-term comprehensive CVFPP that will be ready for implementation beginning in 2012. Most of the activities in the short-term Framework are expected to continue, with more definition and refinement, once the long-term comprehensive plan is complete.

## 1. Introduction

There are several threats to California's flood systems that must be considered together when looking for ways to reduce the risk of flooding:

- Channel capacity – Flood channels, and adjacent levees, must have capacity to carry design flood flows that vary throughout the system. In part, this means that levees must be high enough to contain the design flows.
- Seepage – Water seepage through or under a levee embankment can lower the integrity of a levee.
- Erosion – High velocity flows can erode levee material, making a levee unstable and subject to failure.
- Encroachments – A levee should generally be clear of inappropriate structures or debris that can cause problems with inspections, maintenance, flood fights, or the stability of levees.
- Vegetation – Growth of some vegetation, especially large trees in certain areas on levees, may weaken levees and reduce public safety. However, research will be initiated to determine the extent to which various types of vegetation may be beneficial in the design of flood control systems or substantiate the need for rigorous application of current maintenance standards on the levee prism.

- Structural Instability – The levees must be structurally stable and founded on foundations with adequate strength in order to retain flood flows.
- Seismic Loadings – Many levees that were constructed without the benefit of modern engineering practice may perform poorly during earthquake shaking.

Ongoing activities in this short-term Framework are focused on addressing these threats to improve public safety in flood-prone areas. No single threat should be given priority. For vegetation, the intent is to strategically remove some levee vegetation to provide visibility for levee inspections, access for flood fight efforts, and access for maintenance. Vegetation removal will require mitigation as appropriate. Monitoring of remaining levee vegetation and rapid response to developing problems during high water will improve public safety until the long-term plan is implemented. Long-term activities will also focus on addressing these threats, including structural stability and seismic loadings. In the event of seismically-induced levee settlement or cracking, remediation should be completed prior to the next flood season.

## **2. Inspections**

The State, Corps, and local levee maintaining agencies have recently developed improved levee inspection processes and will continue to improve levee inspections.

### **State and Corps Roles**

The State is responsible for inspections of the State Flood System levees in the Central Valley. The State inspects the levees that are maintained by many separate local agencies, and then reports the findings of the inspections to the Corps who performs quality assurance (QA) work. From the inspection information submitted, the Corps may choose to conduct follow-up inspections in certain areas. The Corps uses their own follow-up inspections and the State's inspection findings to make PL 84-99 eligibility determinations for each local agency.

Following a Corps levee inspection or after reviewing the State's inspection findings, if it is determined that the levee system be rated "unacceptable" due to channel capacity, seepage, erosion, encroachments, or vegetation deficiencies, the system will be allowed to remain "active" in the PL 84-99 program and will continue to receive rehabilitation assistance in the event of a flood if the State is demonstrating positive progress in achieving the Framework's short-term maintenance objectives. However, once the rating determination has been made, the Corps will provide notification in accordance with existing policy, including FEMA. The notification letter will inform FEMA that the flood damage reduction project is not being maintained to Corps' criteria. If the levee is shown as providing protection on a Flood Insurance Rate Map, FEMA may determine that remapping of the area is necessary. The PL 84-99 eligibility criteria described above shall remain in effect until 2012 when it will be reconsidered based on the contents of the CVFPP.

## Current and Proposed Inspection Activities

Over the last two years DWR has increased its inspection activities to bring the DWR inspection program into closer compliance with the expectations of the Corps' National Levee Safety Program and Inspection of Completed Works Program as follows:

- DWR began incorporating Corps' levee inspection nomenclature and criteria for maintenance ratings into DWR's inspection program and implemented a self-inspection program that requires levee maintaining agencies (LMAs) to inspect their levees in the summer and winter, while DWR continues inspecting in the spring and fall.
- DWR and the Corps jointly inspected many of the LMAs found to be unacceptable with regard to FEMA Memo 43 and will continue outreach work with the LMAs.
- DWR has increased inspections on major portions of the Sacramento and San Joaquin river systems. DWR has also independently developed and applied rating criteria for levee and bank erosion in the Sacramento and San Joaquin river systems.
- DWR inspectors identified, documented and advised LMAs to take corrective action for levee vegetation that required trimming and thinning of trees and other vegetation to allow flood fight access and visibility.
- In 2007, DWR created a general inventory of trees and vegetation on Project levees and newly extended toe easements to estimate the potential impact of implementing the Corps' vegetation standards. DWR also completed a general inventory of encroachments in the system and in January 2008 documented windfall trees after a major windstorm.
- DWR's inspection program will continue to actively: (1) perform high water PL 84-99 reconnaissance inspections and high water staking, (2) perform outreach and communication to LMAs, (3) address critical encroachment issues, (4) perform investigations of critical site specific integrity issues, (5) perform high water patrols and flood response, (6) provide flood fight training to local agencies, etc.

### FEMA Memo 43

On March 16, 2007, FEMA issued a revised version of *Procedure Memorandum No. 43 - Guidelines for Identifying Provisionally Accredited Levees*, with several attachments, to clarify procedures to be followed for federal and non-federal levee projects that are maintenance deficient. The Corps is providing qualifying communities/levee owners with a one-time "maintenance deficiency correction period" of one year.

In addition to continuing with the above inspection activities, DWR will implement the following practices:

- Beginning with the Spring 2008 inspections, DWR fielded a newly created inspection database program allowing efficient documentation of system conditions and compatibility with Corps' National Levee Database reporting requirements.

- The inspection database has been made compatible with Flood Operations needs to provide information on levee conditions during high water and emergency events beginning Winter 2008-2009.
- DWR will continue developing a geo-referenced and database recorded inspection program by Fall 2010 to become more comprehensive and efficient in inspection procedures and more compatible with Corps' inspection reporting requirements.
- DWR may implement additional changes to the inspection program as existing Corps' policies are clarified over time, as vegetation maintenance standards in ETL 1110-2-571 are adopted, and as other levee management issues arise.

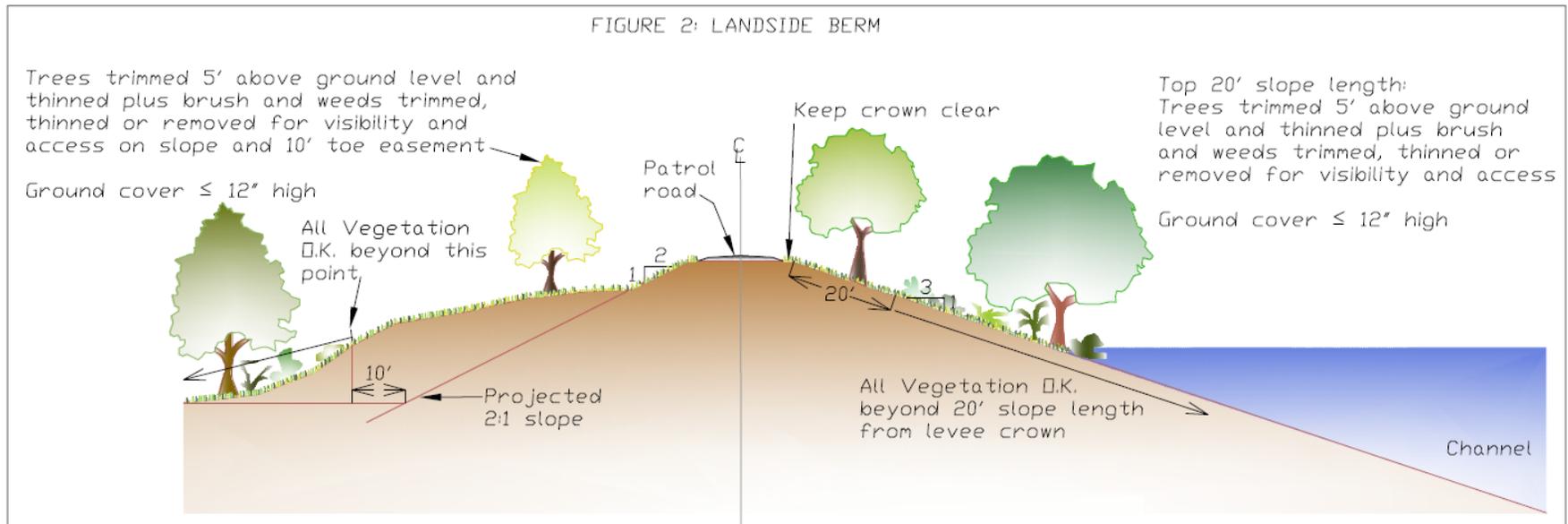
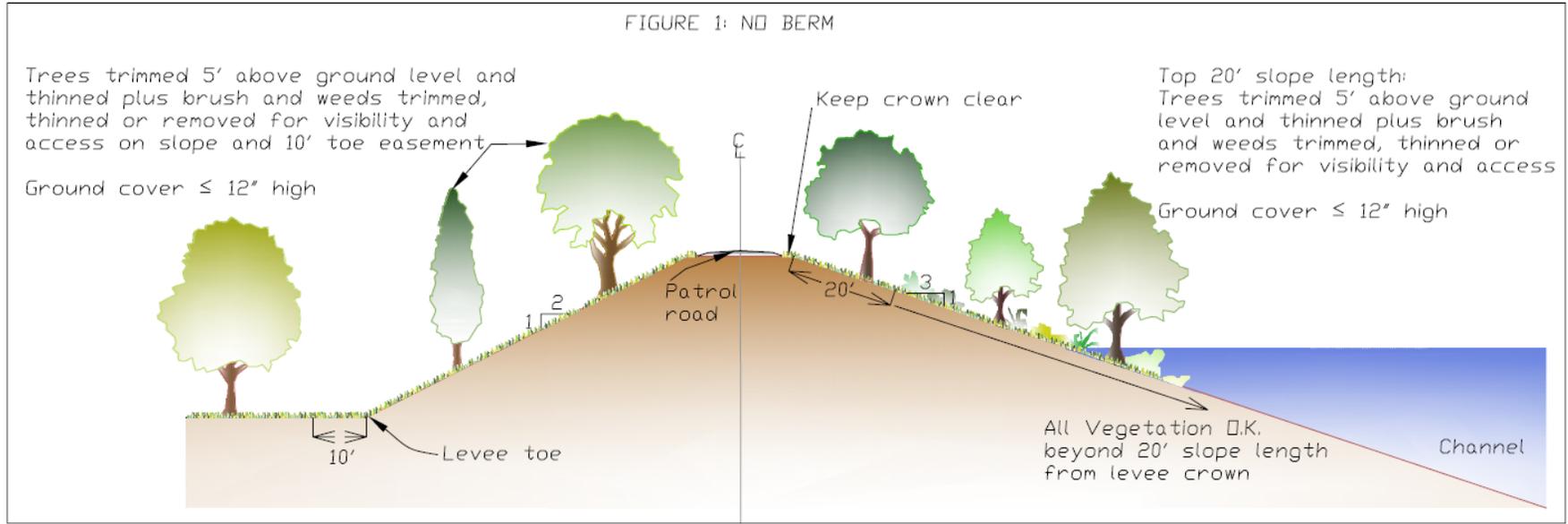
DWR revised its levee inspection criteria for vegetation in Fall 2007. The interim vegetation inspection criteria will be used in the short-term until it can be revised using best available science and the Corps completes its review and revision of its levee vegetation standards. The inspection criteria are aimed at improving public safety by providing visibility for inspections, eliminating vegetation conflicts and encroachments that could hamper flood fight activities, and improving access for overall maintenance.

These criteria (see following two figures) apply on the entire landside slope plus a 10-foot wide easement<sup>2</sup> beyond the landside toe. On the waterside, these criteria apply to vegetation on only the top 20 feet (slope length) of the levee slope. Trees within these areas must be trimmed up five feet above the ground (12 feet above the crown road) and thinned enough for visibility and access. Brush, weeds, or other vegetation over 12 inches high blocking visibility and access within these levee areas should be trimmed, thinned, mowed, burned, dragged, or otherwise removed in an allowed manner.

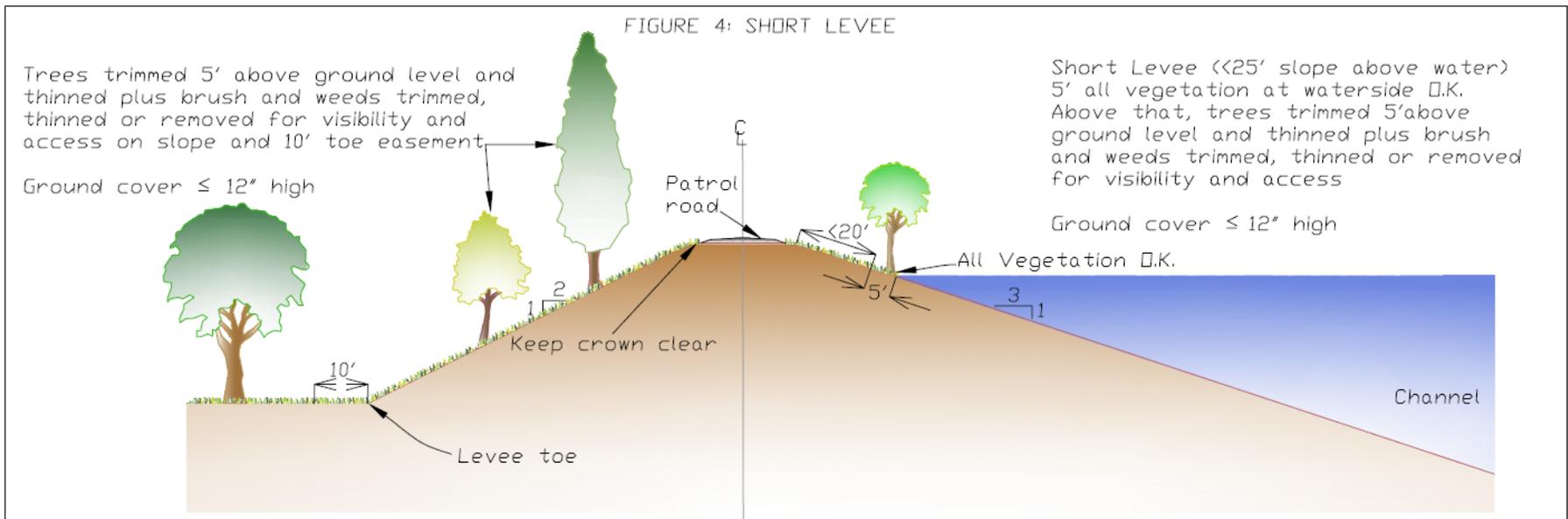
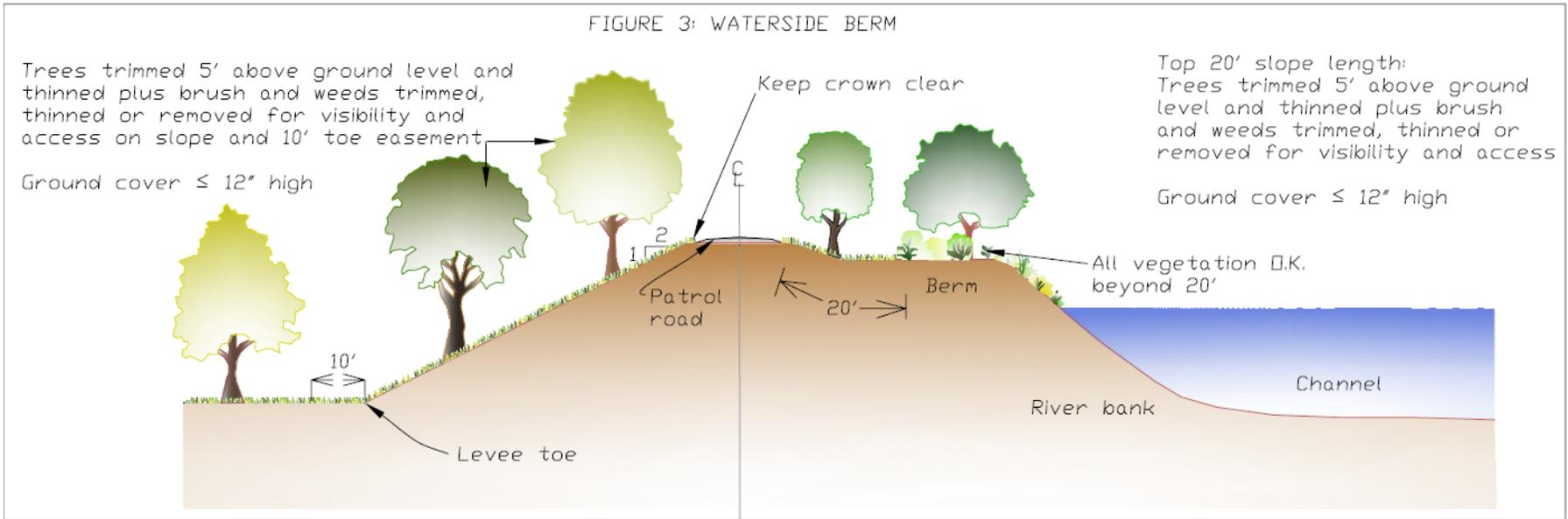
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<sup>2</sup> Note: Not all areas have easements and it will take considerable time to establish them. Therefore, in the interim, inspections will be conducted as though 10-foot easement exists in all areas.

DWR Interim Vegetation Inspection Criteria for Standard Levees, October 2007



DWR Interim Vegetation Inspection Criteria for Standard Levees, October 2007



Levee areas that are partially obstructed by vegetation will be rated “Minimally Acceptable.” Levee areas that are completely obstructed by vegetation will be rated “Unacceptable.” Below the top 20 feet of the waterside slope length, the maintaining agency can use their discretion to let vegetation continue to grow or remove it, subject to State and federal environmental laws. During the interim period, management of **new** vegetation and encroachments will comply with Corps’ standards, except for the portion of the levee below the top 20 feet of the waterside slope length.

The State will require LMAs responsible for maintenance of State-federal project levees in the Central Valley to be in compliance with the interim vegetation requirements by November 1, 2010. The State will further require that LMAs report status of compliance by November 1, 2009, and (for any levees for which the LMAs do not expect full compliance during 2010) to provide levee location, justification for non-compliance, and plans/schedules for complying with the interim requirements. Landscape encroachment vegetation from adjoining properties will be handled as part of the long-term flood improvement plan along with other encroachments. In the event LMAs are not making acceptable progress, and/or the State begins the maintenance area formation process, the Corps will consider this action when evaluating whether to grant extensions relative to PL 84-99 eligibility.

Progress in implementing interim vegetation requirements and other Framework milestones will be reviewed annually by the Corps and DWR to assess progress in complying with the milestones. The review will also address those areas of the system where compliance with the milestones may be delayed due to technical, economic, or environmental factors.

LMAs made significant progress during 2008 – the first “maintenance year” since DWR revised the interim vegetation criteria in the Fall of 2007. It is projected that substantial compliance with interim criteria will be achieved by Fall 2010. There may be levees in some areas where it is not feasible to meet the criteria and those segments of the flood control system could lose eligibility for PL 84-99.

During maintenance activities, the State of California and LMAs are responsible for satisfying all environmental and resource agency requirements or laws that apply to the removal of vegetation. Levees that are already free of vegetation should be maintained in that condition, unless they meet allowable criteria for vegetation enhancement, including overbuilt and setback levees and levees with an approved variance to existing Corps policy.

Encroachments that obstruct visibility and access for inspection and flood fighting pose the same types of threats as created by dense vegetation. DWR currently inspects and reports on the following three types of encroachments:

1. Any encroachment that presents a threat to levee integrity
2. Any encroachment that is inappropriate for being on the levee or easement, such as trash, pruned branches, or abandoned equipment

3. Any encroachment that blocks visibility or access to the landside levee slope, the 10-foot toe easement, or the top 20 feet (slope length) of the waterside levee

### **3. Enforcement**

During the spring and fall inspection cycles, DWR will identify and document inspection items as Acceptable (A), Minimally Acceptable (M), or Unacceptable (U) considering the Corps' inspection rating criteria, and will identify vegetation maintenance items in accordance with the DWR interim vegetation inspection criteria dated October 2007.

In the short-term, the Central Valley Flood Protection Board (CVFPB), in conjunction with DWR and local maintaining agencies, will address deficient items including:

- Critical items impacting the structural integrity of the levee
- Vegetation not in compliance with interim vegetation inspection criteria, or determined to critically weaken a levee and lower public safety
- Critical erosion issues
- Aggressive rodent control and damage repair program
- Encroachments affecting flood fighting activities or levee integrity

To ensure these inspection deficiencies are addressed, the CVFPB in conjunction with DWR will:

- Notify the Corps of the inspection findings
- Require submittal of a local maintaining agency Corrective Action Plan consistent with the agency's operations and maintenance responsibility
- Identify a time period required to correct deficiencies
- Send notification letters to appropriate land use agencies indicating the inspection status, maintenance history, and impacts on PL 84-99 eligibility through DWR's Flood Risk Notification Program

Administration of local maintaining agency corrective action plans and land use agency notifications will be subject to resource availability through State general fund appropriations. To enforce compliance of deficiencies, the State will rate items that are minimally acceptable as unacceptable if they are not corrected within the time period in the notification, unless work is scheduled or in progress. This may lead to an overall rating of unacceptable resulting in loss of PL84-99 eligibility.

Local maintaining agencies with unacceptable levees for vegetation will be expected to remedy the deficiencies. To remain eligible for the PL 84-99 program, DWR will expect these issues to be addressed expeditiously, and in compliance with all appropriate environmental laws. Local maintaining agencies will need to develop a plan and resolve these vegetation deficiencies by November 2010, or within 2 years after the vegetation issues are first identified. The Corps may give extensions beyond 2010 if the local maintaining agencies have made substantial efforts and adequate progress to expeditiously remedy

vegetation deficiencies. In the event local maintaining agencies are not making acceptable progress, and/or the State begins the maintenance area formation process, the Corps will consider this action when evaluating whether to grant extensions relative to PL 84-99 eligibility.

DWR and the CVFPB will comply with Article 4, Enforcement Proceedings, CCR Title 23, Waters. Unauthorized encroachments that pose an immediate threat to the integrity of the flood control system will be addressed first.

Levees identified with the above types of deficiencies shall be considered for PL 84-99 eligibility up to 2012, provided the levee was originally eligible as described above in **Inspections - State and Corps Roles**.

## **4. Maintenance**

### **Maintenance Area Formations**

When no local maintaining agency is willing to accept maintenance responsibilities specified in the Corps' O&M Manual, or when the local maintaining agency is not adequately performing their maintenance responsibilities, DWR will initiate the formation of a maintenance area. The procedure is covered in Water Code Sections 12878 through 12878.21. It assumes that the unit is part of a "project" within the meaning of Water Code Section 12639 or WC 12850, or a "project" that the Corps has performed work upon under Section 208 of PL 83-780, and it also assumes that appropriate assurances of proper operation and maintenance have been given to the federal government. The major flood benefit of this program is that it eliminates sections of levee that are not being maintained by finding a maintainer locally or turning over maintenance responsibilities to the State.

Recent examples of areas considered for maintenance area formations include:

- In February 2008, the Knights Landing Ridge Drainage District signed an agreement with the CVFPB to formally accept maintenance responsibilities for a segment of the south Colusa Basin Drain levee.
- In April 2008, DWR's Division of Flood Management (DFM) began the process of forming a maintenance area for a 1.5-mile segment of levee along the south of Honcut Creek in Sutter County. Unless a local maintaining agency agrees to take over maintenance of this levee section, a maintenance area will be formed within 18 months.

In addition, there are approximately 7 miles of levee within three reclamation districts that DWR will pursue decommissioning with the Corps. These levees have been found to provide little flood management benefit as the land they are protecting is now owned by the Fish and Wildlife Service (FWS) and is used as a habitat area. In September 2008, DWR sent a letter to the Corps to begin the process of decommissioning the following:

- RD 2099, 2.44 miles

- RD 2100, 2.69 miles
- RD 2102, 1.84 miles

This is an ongoing program.

### **Levee Maintenance Program**

This State program oversees maintenance of levees and roads in accordance with the Corps' O&M manuals. The program maintains and evaluates 293 miles of levees under DWR jurisdiction. Key components of the program are:

- Vegetation control – mowing, disking, dragging, burning, and spraying by Sacramento and Sutter Maintenance Yards
- Rodent control – preventive rodent control and grouting of burrow holes by Sacramento and Sutter Maintenance Yards
- Road maintenance – grade and clear toe roads; grade and gravel crown roads
- Erosion repairs
- Encroachment control
- Environmental permitting for maintenance activities
- Evaluation of potential underseepage problems

DWR's maintenance yards routinely identify and remove trees considered to have the potential to fall and undermine levees. In general, identification of problem trees occurs in the spring (after a season of high water) on windy days after trees leaf out. Inspections and monitoring of large trees during high water will allow quick response in case a large tree falls and initiates levee erosion. DWR currently has contractors on call during flood events that can quickly respond to stabilize and repair those conditions. Levees damaged by falling trees will get priority for repair.

This is an ongoing program.

### **Channel Maintenance Program**

The main objective of this program is to maintain channel flow capacity and perform channel-specific maintenance activities identified in the Corps' O&M manuals. The Sutter and Sacramento Maintenance yards perform routine vegetation clearing and sediment management. Recent channel maintenance has included:

- October 2006 - Completed the removal of 920,000 cubic yards of sediment from Yolo Bypass adjacent to the Fremont Weir and also repaired two scour holes downstream of the weir. This project restored the original flood flow conveyance through the Yolo Bypass. The cost of this project was \$6.9 million.

- Summer 2007 – Initiated extensive vegetation clearing within Sutter Bypass with additional clearing planned through 2010.
- August 2007 – Completed development of a hydraulic model for Cherokee Canal (from Gage-Shippe Road to HWY 162).
- November 2007 – Completed removal of 1.8 million cubic yards of sediment from the Tisdale Bypass, increasing flood flow conveyance through the bypass. The Cost of this project was \$7.5 million.
- April 2008 – Initiated development of the Elder Creek Vegetation Management Plan.
- August 2008 – Initiated a three-year sedimentation analysis for Cache Creek Settling Basin.
- October 2008 – Completed hydraulic evaluation for Sutter Bypass and Lindo Channel.
- October 2008 – Initiated construction of a 138 acre mitigation site on the Sacramento River adjacent to Colusa.
- May 2009 – Complete hydraulic assessment of Cache Creek.

Future planned work includes:

- Vegetation management plans are currently being developed for Elder Creek, Cache Creek Settling Basin, Bear River, and Cherokee Canal. Plans are expected to be completed for these channels by December 2010.
- Hydraulic evaluations for Elder Creek, Bear River, and Cherokee Canal (from Gage-Shippe Road to Highway 162) are anticipated to be completed by December 2009. A model for Deer Creek should be completed as well by August 2009.
- Removal of approximately 60,000 cubic yards of sediment from Sycamore Creek is expected to be completed by November 2009.
- Removal of approximately 200,000 cubic yards of sediment from Cherokee Canal is planned for Summer 2010.
- Removal of approximately 60,000 cubic yards of sediment from the Sacramento Bypass upstream of the Sacramento Weir is planned for Summer 2009.
- Planning for sediment removal in Bear River was initiated based on a Summer 2010 construction date.

This is an ongoing program.

### **Rehabilitation of Flood Control Structures Program**

The goal of this program is to make repairs and/or replace flood control structures assigned to the DWR in Water Code Section 8361 as necessary to: 1)

protect lives and infrastructure from floods, 2) minimize the State's exposure to flood damage liabilities, and 3) reduce the risk to the lives of DWR personnel. Program activities include routine maintenance and repairs of existing flood control structures by Sutter and Sacramento Maintenance Yards and capital outlay projects to rehabilitate and/or replace aging structures.

Recent maintenance work included:

- June 2006 through November 2007 – Refurbished all 14 pumps and motors at the three pumping plants located along the East levee of the Sutter Bypass as part of the Sutter Bypass Pumping Plant Rehabilitation Project.
- October 2006 – Replaced 36-inch discharge pipe through levee at MA-17 (Middle Creek) pumping plant.
- July 2007 – Completed replacement of the O'Banion Road Bridge at Lateral No. 6 Canal in the Sutter Basin.
- March 2008 – Expanded the Sutter Bypass Pumping Plant Controls Replacement Project to increase the electrical backup power capability and upgrade the communication system for each of the three pumping plants and at the Sutter Maintenance Yard because of the extensive electrical power and communications outage that occurred during the January 2008 storm.
- October 2008 – Initiated feasibility study at the end of Sycamore Creek Diversion Channel to address ongoing erosion issues.
- December 2008 – Completed inspection of Butte Slough Outfall Gates and repaired a broken hinge on one flap gate. Currently developing a plan to remediate erosion discovered on the outfall headwall.
- February 2009 – Construction completed on the Garmire Road Bridge replacement project. The new bridge located at the mouth of the Tisdale Bypass will pass debris that formerly lodged on the old structure, requiring removal by crane.

Future planned work includes:

- Sutter Bypass East Borrow Canal Water Control Structures:
  - Weir #2 and Willow Slough Weirs – Rehabilitation to begin in May 2010 with an expected completion in December 2012.
  - Sutter Bypass Pumping Plants Control Systems Project – Rehabilitation to begin in October 2009 with an expected completion in December 2010.

This is an ongoing program.

## Critical Erosion Repairs

On February 24, 2006, Governor Arnold Schwarzenegger declared a state of emergency for California's levee system. Executive Order S-01-06 directs DWR to identify and repair critically eroded levee sites on California's levee system to prevent catastrophic flooding and loss of life. Thirty-three sites identified in 2005 were determined to be critical and in need of immediate repair. In 2006, the Corps identified an additional 24 Critical Erosion Sites on the Sacramento River and its tributaries.

In addition, the January and April 2006 flood events damaged levees throughout the Sacramento and San Joaquin flood control systems. Hundreds of levee damage sites were prioritized by the Corps under the federal PL 84-99 Rehabilitation Program. Of these, 47 were identified as sites that were critically damaged and located on levees that protect areas for which immediate repairs were economically justified. In response, the Governor issued Executive Order S-18-06 on October 3, 2006, directing the immediate repair of these 71 new sites, referred to as the "2006 Critical Erosion and PL 84-99 Sites." Out of a total of 104 critical erosion and PL 84-99 rehabilitation assistance sites, the State has already spent about \$277 million for repairs to 102 sites. The majority of repaired sites include:

- 2006 Critical Erosion Repairs (57) - Work on all 57 sites led by DWR and the Corps under the Sacramento River Bank Protection Project was completed by December 2007, except two Cache Creek sites. Property appraisals for the two Cache Creek setback sites have been completed. DWR has started negotiations with the landowners and initiation of repair work depends upon success of the negotiations.
- PL 84-99 Sites (47) - Repairs were prioritized, beginning with 40 critically damaged levees that protect urban infrastructure ("Order 1" sites). The second priority ("Order 2" sites) for repairs under PL 84-99 includes an additional 7 sites that were also critically damaged, but predominately protect agricultural property. During 2007, DWR and the Corps identified 152 damaged sites under the Sacramento River Bank Protection Project of which 7 sites are planned for repairs in 2008-09. Also, San Joaquin River erosion assessment was completed in 2007, and 87 erosion sites were identified under the San Joaquin Flood Protection Program. Repairs to three sites are planned in 2008.

Additional Order 2, 3, 4 and 5 sites account for the remaining damaged sites which are eligible for repair and rehabilitation by the Corps. There are approximately 161 such sites. Only five of these sites were repaired before the 2007 flood season due to lack of funds, delays in design, and environmental restrictions related to endangered species and limited construction windows. DWR is providing environmental permitting, rights-of-way and borrow materials for these sites. The Corps has repaired 127 sites by November 2008 and the remaining sites are scheduled for repairs in 2009.

Depending on flood flows, the additional erosion repairs will likely be needed in the future.

### **Environmental Initiatives Program**

The Environmental Initiatives Program is tasked with determining the environmental compliance requirements for DWR flood control maintenance activities and obtaining the required permits and environmental clearances (the California Environmental Quality Act) by working with the appropriate resource agencies (the Department of Fish and Game (DFG), FWS, National Marine Fisheries Service (NMFS) State Water Quality Control Board (SWQCB)) and the Corps. In addition the program is developing methods for streamlining the permitting process.

The program has obtained environmental clearances and permits for a number of maintenance projects such as the recent Tisdale Bypass Sediment Removal. In addition, the program has responsibility for a number of ongoing activities such as:

- Supporting routine maintenance activities such as conducting biological surveys to obtain permission to work outside of work windows, provide pesticide application recommendations from a certified PCA, and provide onsite biological monitors for sensitive species when required by permits.
- Coordinating the Interagency Flood Management Collaborative to promote cooperation among resource agencies and DWR.
- Coordinating the Vegetation Variance Subcommittee of the Collaborative tasked with developing a Regional Variance Agreement.
- Performing yearly review of maintenance yard activities and existing permits to determine if permit conditions need updating.
- Conducting yearly monitoring of mitigation areas and preparing required reports:
  - M&T Mitigation Planting
  - Fremont Weir Sediment Removal
  - Tisdale Sediment Removal
  - Colusa SRA Mitigation Area
  - Furlan Site (acquired, but not constructed)
  - Palm Avenue Surface Mining and Reclamation Act (SMARA) Report
  - O'Conner Lakes SMARA Report
  - Butte Creek Erosion Repair Site
  - American River Mile 0.5 (in design phase)
- Overseeing partnering agreements with the Corps, FWS, and NMFS.

The following initiatives are being implemented:

- Obtain Regional General Permit for channel clearing activities. Review the maintenance yard activities and the Corps' regulations for working in waterways and determine if additional permits are required for routine maintenance practices.
- Develop Elderberry Management Plan/Bank.
- Support Channel Maintenance Program by developing Vegetation Management Plans for individual river and stream reaches.
- Complete development of streamlined Small Erosion Repair Permit process with resource agencies by working through the Interagency Flood Management Collaborative.

This is an ongoing program.

## 5. Early Implementation Projects

Although much of the bond money from Propositions 1E and 84 will be expended after completion of the CVFPP in 2012, there is an identified need to proceed with some high priority projects before then, especially for increased protection of urban areas in deep floodplains. Early Implementation Program (EIP) includes projects that are ready to proceed in advance of the CVFPP. An element of approval for these projects ensures that they do not eliminate opportunities or prejudice the flood risk reduction alternatives that would provide regional or system-wide benefits. EIP projects will only be considered until the CVFPP is ready for implementation.

Under 33 U.S.C. 408, the Corps must review and give permission for many of these projects. Over the last year, the number and urgency of these EIP projects has stressed the Corps administrative capacity, particularly in the lack of agreement with the State as to what key issues must be addressed to quickly move eligible projects forward. The Corps is concerned about both the proper authorization and implementation of any local sponsor project which impacts a federal project and the cumulative effects,

### Section 408

It shall not be lawful for any person or persons to take possession of or make use of for any purpose, or build upon, alter, deface, destroy, move, injure, obstruct by fastening vessels thereto or otherwise, or in any manner whatever impair the usefulness of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States, or any piece of plant, floating or otherwise, used in the construction of such work under the control of the United States, in whole or in part, for the preservation and improvement of any of its navigable waters or to prevent floods, or as boundary marks, tide gauges, surveying stations, buoys, or other established marks, nor remove for ballast or other purposes any stone or other material composing such works: Provided, That the Secretary of the Army may, on the recommendation of the Chief of Engineers, grant permission for the temporary occupation or use of any of the aforementioned public works when in his judgment such occupation or use will not be injurious to the public interest: Provided further, That the Secretary may, on the recommendation of the Chief of Engineers, grant permission for the alteration or permanent occupation or use of any of the aforementioned public works when in the judgment of the Secretary such occupation or use will not be injurious to the public interest and will not impair the usefulness of such work.

primarily hydraulic impacts, of the project.

Proposition 1E and Proposition 84 authorize DWR to provide funds to local agencies under the State-Federal Flood Control System Modifications Program for: (a) the rehabilitation, reconstruction, or replacement of levees, weirs bypasses and facilities of the State Plan of Flood Control, and (b) improving or adding facilities to the State Plan of Flood Control to increase levels of flood protection.

Modifications and improvements to the State-federal flood control system are typically accomplished through a partnership between the State, a local sponsor, and the Corps. However, in recent years, the Corps' budget for capital projects has not kept up with the flood protection system requirements, and the necessary system modifications and improvements have not been initiated or have had their completion date severely delayed. To continue the forward progress of these much needed projects, DWR is using Proposition 1E and 84 funding to direct funds, or competitively award Local Assistance funds, to local flood control agencies in a cost-sharing arrangement to advance projects ready to proceed.

EIPs that result in new levee sections will comply with the Corps' levee vegetation standards. Major modification of existing sections will comply with the Corps' levee vegetation standards where practical.

#### **FY 2007-08**

The FY 2007-08 budget provided \$167.45 million in Proposition 1E funds and \$44.55 million in Proposition 84 funds. EIPs approved in FY 2007-08 were selected in a competitive process using the ten criteria established in the Governor's FY 2007-08 Bond Expenditure Plan. EIPs selected for FY 2007-08 funding are:

- **Levee District No. 1 of Sutter County**

- *Setback Levee at Star Bend on the Lower Feather River Right Bank (RM 18.0)*

- The Setback Levee and Star Bend project will construct a new 3,400 foot long setback levee replacing the existing problematic levee. The existing levee juts out into the Feather River channel at a near right angle and has documented underseepage issues. The new setback levee is designed as part of the strategy to provide 200-year level flood protection for the entire basin. The project also includes conversion of up to 45 acres of land on the riverside of the setback levee for riparian habitat restoration.

- Total cost: \$20.15 million, estimated State cost share: \$16.33 million (\$15.78 million Prop. 1E + \$0.55 million Prop. 84)

- **Reclamation District No. 2103**

- *Bear River North Levee Rehabilitation Project*

- This project rehabilitates the levee and restores the original 1957 design level of protection for Wheatland and the surrounding area. The rehabilitation includes landside berms with internal drains, cutoff walls to

prevent underseepage, the repair of four irrigation pipe penetrations, and restoration of riverbank erosion sites.

Total cost: \$14.7 million, estimated State cost share: \$7.35 million (Prop. 1E)

- **Sacramento Area Flood Control Agency (SAFCA)**  
Natomas Levee Improvement Program (NLIP)-  
Natomas Cross Channel South Levee Project (NCCSLP)

SAFCA's NLIP improves the level of flood protection to the Natomas Basin perimeter levee and will: (1) provide at least a 100-year level of flood protection to the Natomas Basin by 2010, (2) provide 200-year protection to the basin by 2012, and (3) avoid any substantial increase in expected annual damages for new development in the basin. The NLIP consists of five project elements. The NCCSLP is the first element to be implemented and includes installing over five miles of seepage cutoff walls to depths of up to 80 feet, providing additional freeboard, and levee re-shaping.

Total cost of NCCSLP: \$73.4 million, estimated State cost share: \$49 million  
(\$5 million Prop. 1E + \$44 million Prop. 84)

- **Three Rivers Levee Improvement Authority (TRLIA)**  
Feather River Levee Repair Project (FRLRP)

The FRLRP provides 200-year level flood protection to an urban area that includes 35,000 residents, 11,766 residential structures, 486 commercial/industrial structures, and 74 public building with an estimated value of over \$1 billion. The project consists of strengthening existing levees by installing seepage cutoff walls and constructing a new setback levee over six miles in length.

Total cost: \$201.3 million, estimated State cost share: \$138.5 million (Prop. 1E)

## **FY 2008-09**

Proposed EIP funding for FY 2008-09 includes \$170 million of Proposition 1E funds to be allocated to projects in a competitive process similar to the FY 2007-08 EIP. Additionally, two other projects that meet the criteria for EIP eligibility are ready to proceed and have been submitted as Capital Outlay BCPs (directing funding to local agencies). Total Proposition 1E requested for these two projects is \$231.39 million, bringing the total requested to \$401.39 million for FY 2008-09.

Proposed FY 2008-09 Capital Outlay EIPs:

- **West Sacramento Area Flood Control Agency (WSAFCA)**

The overall project is comprised of 12 levee segments surrounding West Sacramento. The project will provide 200-year protection to the City of West Sacramento, including 32,000 residents, 13,000 commercial/industrial structures, the Port of Sacramento, a US Postal

Service hub, a United Parcel Service hub, as well as portions of Interstate 80 and the Union Pacific Railroad. Four of the 12 segments have been identified as EIPs ready for implementation. The levee improvement work primarily consists of seepage cutoff walls and berms to address deficiencies in through-levee seepage and foundation underseepage and embankment instability.

Estimated cost for the four EIP segments: \$53.0 million (currently being revised), estimated State cost share: \$37.37 million

- **Sacramento Area Flood Control Agency**  
Natomas Levee Improvement Program (NLIP)-  
Sacramento River East Levee (SREL) and Pleasant Grove Creek Canal (PGCC) Projects

These projects are the next two elements of the five project elements of the NLIP that are now ready to proceed. The overall work to be performed is similar in nature to the NCCSLP work previously described, but also includes an erosion repair component for reaches associated with the Sacramento River East Levee project.

Estimated for these two elements of the NLIP: \$276.1 million (currently being revised), estimated State cost share: \$194.02 million.

## 6. Emergency Response

Emergency response is a critical and important element of flood risk reduction and thus is being improved on several fronts as noted below. These activities will be periodically revised as future conditions warrant.

### Mapping

Mapping the expected extent of flooding is an important part of emergency response.

**Awareness Floodplain Mapping** – The primary purpose of this program is to provide assistance in protecting new growth areas (new development for the next 25 years) in the state from flood damages by delineating the approximate 100-year floodplains. The awareness floodplains provided by the State are advisory floodplains, not regulatory floodplains. FEMA requires communities to use the best available information when considering development needs in or near any potential flooded area. Each community has reviewers/planners that will consider this mapping product to support the needs of the community and the individual property owners. Review by the community may determine that the development under consideration is not at risk or that further detailed investigation into potential flooding is warranted. These maps are available to the public on-line and are being expanded annually to include new areas State-wide.

**Central Valley Floodplain Evaluation and Delineation Program** - This program will provide new floodplain information and data for the State Plan of Flood Control in the Central Valley to improve the accuracy of flood hazard data

available to local communities. This is a multi-million dollar effort supported by Propositions 1E and 84. Five major engineering contracts have been created to develop the products required for this program.

The area of study includes all stream systems that impact flooding associated with the State Plan of Flood Control in the Central Valley, specifically in the Sacramento and San Joaquin basins. Project work includes surveys, aerial topographic data acquisition, bathymetry, hydrologic analyses, hydraulic analyses, use of geotechnical information from the Urban Levee Evaluation Program, public involvement and coordination of activities at the local, State and federal levels of government. Work products will include water surface profiles for the 10- and 50-year flood events, and floodplain delineation and water surface profiles for the 100-, 200-, and 500-year flood events.

Funding for this program was authorized with the passage of Propositions 1E and 84 in November 2006. For fiscal years 07-08 and 08-09, the budget was \$19M from Prop. 1E and \$25M from Prop. 84. Contract work began in January 2008 and is expected to be completed by 2012.

**Alluvial Fan Task Force** – Alluvial fans present different flood problems from those of levee river reaches due to the unpredictable path of floodwaters. The Alluvial Fan Task Force was first recommended by the 2002 California Floodplain Management Task Force. In 2004, Assembly Bill 2141 (Longville, Chapter 878, Statutes of 2004) requested DWR to convene an Alluvial Fan Task Force. The Task Force began work in Fall 2007. Task Force products will include:

- Model Ordinance for Alluvial Fans by December 2009
- Guidelines for Development on Alluvial Fans by December 2009

**Alluvial Fan Mapping** – Flood mapping on alluvial fans for ten Southern California communities began in early 2009 and is expected to be completed by December 2009 (depends on \$2.4 million from Prop. 84)

## **Flood Emergency Response Programs**

In accordance with CA Water Code, DWR actively responds to disasters, works with partners to prepare for the oncoming flood season, preparing teams and materials to deploy at a moment's notice and evaluating the increased flood potential following devastating wildfires. The emergency response (ER) programs are responsible for this obligation and are categorized into the following four initiatives:

- Real-time flood Conditions, Status, and Warning
- Climate Data Collection and Precipitation / Runoff Forecasting
- Reservoir Operations and River Forecasting
- Flood Emergency Response

In addition to these initiatives, two other “emergency response-related program initiatives” will further enhance flood emergency response. They are:

- Update Hydrology and System Re-operations
- Delta Flood Preparedness, Response, and Recovery Project

In addition to baseline State general funding for a program staff of over 60 people, DWR will use up to \$15M from available bond funding (Prop. 1E and Prop. 84) as needed to bolster these initiatives, but might need as much as \$60M to fully develop the programs.

Many of the ER activities are operational in nature and are ongoing. Some accomplishments include notable improvements to DWR processes or products:

- Pre-season flood coordination meetings (held statewide each fall)
- Incident Command Team staffing, training, equipping (including communication trailers)
- Implementation of the Department's Multi-year Flood Emergency Training and Exercise Plan
- Southern California fire recovery coordination (Fall and Winter 2007 and Spring and Summer 2008)
- Technical assistance by flood fight specialist (in Santa Barbara Co., 2007, Inyo Co., 2008, Delta Region 2008, 2009)
- Flood fight training (over 1500 people trained in 2006-2008 season)
- Information Technology improvements included updated California Data Exchange Center (CDEC) interface, Flood Operations Center Information System (FOCIS) portal improvements
- Web cast weather/flood briefings to flood control agencies
- Pre-deployment of rock materials to two Delta locations in preparation for catastrophic levee failure response (through June 2008)
- Continued coordination with Yuba County Water Agency, State Water Project, Corps, and NWS on the Forecast-Coordinated Operations of New Bullard's Bar Reservoir and Oroville Reservoir
- Completed San Joaquin River system erosion surveys and mapped sites (Fall 2007)
- Completed levee inspections and related reports and notifications
- Continued coordination with 5 County – Delta Flood Response Group
- Continued support of the Delta Working Group to implement the Department's Delta Flood Risk Reduction Project

Some of the key components currently under development or planned for the near future include:

- Develop geospatial applications to assess the status and evaluate the function of the flood control system (December 2009)

- Develop and maintain a Statewide Flood Control System Documentation Database and Library (December 2009)
- Document, categorize, and geo-reference system-wide levee distress locations (July 2009)
- Draft DWR Emergency Response Plan for Delta catastrophe (October 2009)
- Modernize flood warning notification, weather and hydrologic advisories products (2009-2012)
- Improve inter-agency access to FOCIS and Response Information Management System (RIMS) between partners (2009-2012)
- Incorporate climate change into forecasting models (2009-2012)
- Enhance snow-melt forecasting model for flood forecasting (2008-2009)
- Integrate probabilistic forecasting into routine operations (2011-2012)
- Enhance real-time reservoir routing forecasting tool for the San Joaquin & Tulare watersheds (2008-2009)
- Develop and implement three pilot projects to further enhance existing emergency operations plans (April 2009)
- Develop, support and conduct multi-agency flood exercises (annually)
- Develop a comprehensive State Flood Emergency Response Plan (ongoing)

### **Emergency Response to Delta Catastrophe**

In 2007, DWR began enhancing its ability to respond to large-scale levee failures or flood related emergencies in the Sacramento-San Joaquin Delta. The majority of the activities are focused on improving the physical response to an emergency via pre-event planning preparation work including developing new emergency response facilities that will reduce the amount of time required to move critical supplies from trucks to barges, stockpiling additional flood response materials, and developing plans to use these facilities and materials in a DWR emergency response effort.

In October 2007, two transfer/stockpile sites were secured near Rio Vista and Rough & Ready and contracts were awarded to provide approximately 240,000 tons of rock for the sites. All rock was in place by Summer 2008. For fiscal year 07-08, \$10M is dedicated to the pre-event preparation work.

By late April 2008, a Delta emergency management plan to coordinate more extensive measures and plans for implementation over the next year should be completed. This plan will help guide use of up to \$80M to establish permanent facilities (as opposed to leased ones) and to augment and diversify stockpile materials to include sheet piles, geo-textile fabric, and other common flood fight materials that will be available for Delta-wide emergency response.

## 7. Public Outreach

The State has been actively pursuing a course of public outreach and stakeholder/partner involvement since the inception of the FloodSAFE California initiative, following approval of Propositions 84 and 1E by California voters in November 2006.

While DWR is leading FloodSAFE, success depends on active participation from many key partners, such as Governor's Office of Emergency Services, CVFPB, DFG, Corps, FEMA, FWS, the National Oceanic Atmospheric Administration, Tribal entities, and many local sponsors and other stakeholders.

The State will continue to work closely with key partners and stakeholders to inform and educate them on this Framework, and to accomplish the FloodSAFE vision of improved public safety through integrated flood management.

Key milestones with respect to public outreach and stakeholder involvement include:

- Participation in interagency funding fairs to promote awareness and understanding of DWR-administered funding assistance programs, including funding opportunities for flood management improvement projects (2008 and 2009)
- Initiation of federal advocacy program to facilitate improved understanding and support of California flood management activities among congressional delegates (February 2008)
- Release of draft FloodSAFE Strategic Plan for public comment (May 2008)
- Participation in Association of State Floodplain Managers (ASFPM) annual conference (May 2008)
- Public meetings to inform stakeholders and public of urban and non-urban levee evaluations activities (June 2008)
- Participation in Society of American Military Engineers/American Society of Civil Engineers Midwest Levee Conference (June 2008)
- Provide information about the best available maps of flood risk for communities in the Sacramento-San Joaquin Valley outside areas protected by State-federal project levees using available information (July 1, 2008)
- Workshops to solicit local levee maintaining agency input on annual reporting submittal processes (August 2008)
- Development and launch of website tool to support local levee maintaining agencies in complying with legislatively mandated reporting requirements (August 2008)
- Participation in National Association of Flood and Stormwater Management Agencies (NAFSMA) annual conference (August 2008)

- Participation in Floodplain Management Association (FMA) annual conference (September 2008)
- Public workshop on role of integrated flood management in key California programs, including FloodSAFE initiative, California Water Plan, and integrated regional water management (September 2008)
- Initiation of unprecedented data collection effort in support of Central Valley flood management planning, Central Valley floodplain evaluation and delineation, and urban and non-urban levee evaluations (October 2008)
- Tour of Central Valley flood management facilities to facilitate improved understanding and support of flood management activities among State legislative staff (October 2008)
- Initiation of assistance to support local planning entities (cities and counties) in complying with flood management legislative requirements (Fall 2008)
- Implementation of DWR Regional Coordination Program to facilitate improved interaction with stakeholders/interested public and improved coordination and delivery of DWR programs, including flood management programs (Fall 2008)
- Preparation of levee flood protection zone (LFPZ) maps for lands protected by State-federal project levees using available information (December 31, 2008)
- Kick-off of CVFPP promoting broad participation by diverse interests (January 2009)
- Initiation of unprecedented statewide flood management needs assessment and identification of opportunities for integrated flood management projects (anticipated in Spring 2009)
- Coordinated development of cost-sharing formulas, as needed, for funds made available by Propositions 1E and 84 for repairs or improvements of facilities included in the CVFPP to determine the local share of design and construction costs (January 1, 2010)
- Submittal of Central Valley Flood Protection Plan to Central Valley Flood Protection Board (January 1, 2012)
- Coordinated development of regional cost estimates for flood protection improvements (January 1, 2012)
- Coordinated development of finance strategy to fund flood management improvements statewide (January 1, 2012)
- Production of statewide flood management planning document, *Recommendations for Improving and Sustaining Integrated Flood Management in California* (projected completion date of January 1, 2012)

Additional public outreach efforts will take place as needed to support California's flood management activities.

## **8. Data Collection**

Data collection is the key to understanding existing conditions and identifying needed system changes. Much of this data will feed into the CVFPP.

### **Hydrology Study of the Sacramento and San Joaquin River Basins**

In order to support necessary floodplain mapping requirements, FloodSAFE evaluation needs, and project planning purposes, DWR has contracted with the Corps to develop the statistical hydrology for the Sacramento and San Joaquin river watersheds. The scope of the study is to provide hydrology models and flow hydrographs for significant storm centerings (paths) for the Sacramento and San Joaquin rivers and tributaries. The models are designed for use in preparing floodplain mapping studies based on standards used by FEMA for the National Flood Insurance Program. This project is expected to take up to three years to complete and cost \$8,000,000 dollars (funded by capital outlay money from Proposition 1E), but is likely that two additional years will be necessary for follow-up work and outreach.

This project was initiated in Summer 2007. Initial work was begun by the Corps and its consultant team under existing DWR funds from previous related work. To date, the Corps has developed a Project Management Plan, has initiated a data management plan, and is accepting feedback on its planned procedures for hydrologic analysis.

The principle deliverables are hydrographs necessary for unsteady state hydraulic modeling for the 10-, 50-, 100-, 200-, and 500-year floods for the Sacramento and San Joaquin river systems. Models and data developed for the analysis and the documentation describing the process are additional deliverables.

Other DWR evaluations that need to be addressed as part of the hydrology and hydraulics effort for the Central Valley include:

- DWR Flood Maintenance
  - Improved topography, bathymetry, and survey information to support maintenance
  - Hydraulic models to support maintenance needs
- DWR Flood Operations
  - Real-time models for inundation forecasts associated with levee breaks
  - Depth duration curves
- DWR Urban Levee Geotechnical Evaluation Project
  - Hydraulic water surface profiles for 200-year flood event to assist with cost estimates for levee improvements

Schedule: Ongoing

### **Urban Levee Evaluations**

The Urban Levee Evaluation Program started in November 2006. It includes geotechnical exploration, testing, analyses, and pre-feasibility design. The levees are evaluated with respect to seepage, static and seismic stability, settlement, and erosion. A 200-year level of flood protection is the goal for urban areas (areas that protect more than 10,000 people). Currently urban areas in the Central Valley are under investigation. Approximately 50 percent of the evaluations have been completed with the first of twelve geotechnical evaluation design reports to be completed by the end of 2008. The Urban Levee Evaluation Program is expected to be completed by December 31, 2009. While this program does not generate policy decisions, it will influence a seismic design policy as well as the CVFPP.

The total urban levee evaluation program cost is \$85 million. Since the beginning of the program, the scope has increased to include geomorphology, a helicopter electromagnetic survey, boils, seeps, and penetrations surveys, hydrology and hydraulics to support geotechnical studies, LiDAR survey, bathymetry, a comprehensive geographic information system, numerous stakeholder and public outreach meetings, a soil sample storage warehouse, the additional urban miles of study in Sutter and Marysville, independent consulting board meetings, and AB 142/Budget Delay (interest and overhead).

This project is being closely coordinated with the Corps and local stakeholders. DWR is currently evaluating approximately 350 miles of State-federal project levees that protect urban areas in the Central Valley. These areas include Marysville, Yuba City, Reclamation District 784, Davis, Woodland, West Sacramento, the Lower American River, Natomas, Sacramento, Stockton, and Lathrop.

In addition, the State has begun coordinating with the Corps and local levee owners to implement the non-urban levee geotechnical evaluation studies that will address the rest of the flood defense system.

### **California Statewide Levee Database**

California has over 13,000 miles of levees that protect residential and agricultural lands. The levee failures in New Orleans during hurricane Katrina prompted DWR to initiate development of a state-of-the-art levee database for the purpose of better understanding and managing levees. The California Levee Database (CLD) will support an efficient and effective methodology for assessing levee reliability risk assessment factors and structural data impacting individual levee reaches. Starting in 2005, partnering with FEMA under the auspices of the Map Modernization Management Support (MMMS) program, DWR has initiated assembly of critically needed levee information identifying relevant data about ownership, location, and risk assessment factors for all levees in the state. Recognizing other agencies are undergoing similar efforts, DWR team members are actively participating on national committees organized by FEMA (Galloway

Levee Committee), and Corps to help ensure compatibility and coordination with other national efforts. As of this fiscal year, FEMA MMMS program and DWR have invested almost two and half million dollars in the CLD.

Since 2005, DWR and FEMA have developed a GIS database for levees and flood control structures within the State of California. Major accomplishments for the CLD include:

- Capturing geographic levee features for 58 counties in the state
- Contacting 147 agencies jurisdictions
- Reviewing and identifying 13,737 miles of levees and flood control structures
- Reviewing approximately 2,770 USGS quad maps
- Geo-referencing and reviewing 861 Flood Insurance Rate Maps (FIRM)
- Capturing existing stream stations from USGS quads for major tributaries
- Capturing attribution for bank location and flooding source for 98% of levees
- Capturing attribution for maintenance and authorities for approximately 50% of levees
- Capturing attribution for project levee for appropriate levees
- Coordinating with Corps and FEMA on integration of levee database with other efforts
- Participating in Galloway Committee on levee issues
- Reviewing 4,000 technical resources documents and retrieving and linking relevant information to levees
- Adding data of boreholes, levee distress points, flood-fight points, and inspection points
- Incorporating GPS survey location data from the Corps National Levee Database and LiDAR data collected for over 350 miles of urban levees
- Developing data sharing and exchange protocols with database from Corps and FEMA
- Developing web-based programs of levee profile viewer, levee information viewer, and technical resources viewer

DWR is in the process of applying for the \$120K grant for the final year of the five-year FEMA MMMS program committed to the CLD. DWR will continue to provide funding as necessary to support the enhancement and expanding of the CLD. The programmed new tasking will include:

- Incorporating electronic reports from levee inspection program including GIS data field retrieval

- Researching and populating the additional technical resources into CLD
- Improving the web-based levee profile viewer, levee information viewer, and technical resources viewer
- Developing and scanning historical documents into CLD

## **Summary of Legislative Requirements and Milestones**

The following is a summary of the legislative requirements and milestones associated with the CVFPP and other Central Valley hydrology and hydraulics issues:

- July 1, 2008 - DWR shall develop preliminary maps for the 100-year and 200-year floodplains protected by project levees. The 100-year floodplain maps shall be prepared using criteria developed or accepted by FEMA. DWR shall use available information from the 2002 Sacramento River and San Joaquin River Basins Comprehensive Study (Comp Study), preliminary or final regulatory FEMA FIRMs, recent floodplain studies and other sources to compile the maps. DWR 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. (SB 5)
- July 1, 2008 - DWR shall give notice to cities in the Sacramento-San Joaquin Valley outside areas protected by project levees regarding maps or other information as to flood risks available from FEMA or other federal, State, or local agency. (SB 5)
- December 31, 2008 – DWR shall prepare and maintain maps for LFPZ. The maps are to indicate areas protected by project facilities. The maps shall include a designation of those lands where flood levels would be more than three feet deep if a project levee were to fail, using the best available information. The maps shall include other flood depth contours if that information is available. (AB 156)
- December 31, 2008 (and each year thereafter) – DWR shall prepare, and the CVFPB shall adopt, a schedule for mapping areas at risk of flooding in the Sacramento and San Joaquin River drainage. (AB 5 and AB 156)
- January 1, 2009 – The safety element (of General Plans), upon the next revision of the housing element shall identify information regarding flood hazards including but not limited to: flood hazard zones; NFIP maps from FEMA; information from Corps; designated floodway maps from the CVFPB; dam failure inundation maps from OES; awareness floodplain maps and 200-year floodplain maps from DWR; maps of LFPZs; areas subject to inundation in the event of failure of project or non-project levees or floodwalls; historical data on flooding; existing and planned development in flood hazard zones; and local, State, and federal agencies with responsibility for flood protection, including special districts and local offices of emergency services. (AB 162)

- January 1, 2009 – DWR shall propose for adoption and approval by California Building Standards Commission updated requirements to the California Building Standards Code for construction in areas protected by the CVFPP anticipated to exceed three feet for the 200-year flood event. (SB 5)
- September 1, 2010 (and each year thereafter) – DWR shall provide written notice to each landowner whose property is determined to be entirely or partially with an LFPZ. (AB 156)
  - This is envisioned to include the risk of flooding, including depth if possible, by parcel for areas protected by project facilities
  - The program may extend to urban areas included in the CVFPP (not required by code)
- December 31, 2010 - DWR shall prepare a Status Report on the progress and development of the CVFPP. (SB 5)
- January 1, 2012 - DWR shall prepare the CVFPP and transmit the plan to the CVFPB. (SB 5)
  - Best assessment of current risk in the Central Valley
  - Need to address climate change
  - Evaluate system performance and alternative changes to the system
  - Recommend adding and removing facilities (structural and non-structural) from the State Plan of Flood Control
- July 1, 2012 - The CVFPB shall adopt the CVFPP. (SB 5)
- Every 5 years after 2012 - The CVFPP shall be updated in subsequent years ending in 2 and 7. (SB 5)
- 2025 – Achieve 200-year level of flood protection in urban and urbanizing areas protected by project levees. (SB 5)

## 9. Program Planning

State, federal, and local partners will continue flood management program planning during the interim period. Much of this work will help to define the detailed, long-term flood management improvement process for California. The schematic below shows the general progression of program planning activities that will take place during this early phase of FloodSAFE planning.



### FloodSAFE Strategic Plan

The FloodSAFE Strategic Plan will serve as the cornerstone for the flood management efforts that the State wants to accomplish over the next few decades. DWR conducted public workshops on the draft FloodSAFE Strategic Plan mid-May through mid-June 2008..

The strategic plan will target lasting outcomes from program activities, such as:

- Provide 200-year (or greater) level of flood protection to urban areas in the Sacramento - San Joaquin Valley by December 31, 2025.
- Identify system improvements within rural areas.
- Establish a long-term Multi-Species and Floodplain Conservation Strategy that prescribes standards and guidelines providing a high likelihood of the continued existence of viable habitats and populations of fish and wildlife species in the planning area by January 1, 2012.

- Establish a flood corridor management program and an interagency conservation banking program that provides lasting environmental benefits by January 1, 2012.
- Delineate expected floodplains for 100 and 200-year flood flows for urban communities in the Sacramento - San Joaquin Valley by January 1, 2012.

### Implementation Plans

FloodSAFE Implementation Plans for various programs and projects will present the details of how to accomplish the broad direction provided by the Strategic Plan. DWR plans to adopt program scoping documents by June 2009 as the first step in developing the FloodSAFE Implementation Plans.

### California Water Plan Update 2009

Beginning with the 2009 Update of the California Water Plan, strategic planning for statewide integrated flood management will be included among other water resource management elements of the plan. Regional planning groups across the state will be called upon to develop regional flood management plans as part of integrated water management plans. Together with the results of the Delta Vision process, these regional plans will be incorporated into the California Water Plan, which will contain a greater emphasis on flood management than previously released updates. Flood management systems that are not part of the State Plan of Flood Control, notably non-project levees within and outside the Central Valley, will be eligible for funding from Proposition 84 to support flood management planning. In 2008, DWR invested continuously appropriated funds from Proposition 84 to initiate cost-shared grant programs for non-Project levee repairs and evaluations.

The public review draft of the California Water Plan Update 2009 was released in December 2008. The final plan is scheduled for release in December 2009.

### FloodSAFE

#### Vision

A sustainable integrated flood management and emergency response system throughout California that improves public safety, protects and enhances environmental and cultural resources, and supports economic growth over the next 50 years.

#### Goals

1. Increase flood protection
2. Improve preparedness and response
3. Sustain economic growth
4. Protect and enhance ecosystems
5. Promote sustainability

#### Guiding Principles

1. Approach flood risk management on a system-wide basis and prevent adverse impacts
2. Integrate land use planning with flood risk management
3. Encourage and fund projects that offer multiple or regional benefits
4. Protect and restore natural floodplain processes and promote environmental stewardship
5. Design and build flood protection facilities to avoid catastrophic or unexpected failures
6. Promote and fund regional planning
7. Adapt flood management to cope with climate change
8. Provide accurate information about flood risks to help residents and communities make safer decisions
9. Leverage State investments to provide maximum public benefits
10. Provide equitable access to decision process

## **Central Valley Flood Protection Plan**

The CVFPP will be a system-wide plan for improving integrated flood management in the Central Valley. In April 2008, DWR selected a consultant to support this work. The first draft plan will be completed by January 1, 2012 (and adopted by the CVFPB by July 1, 2012) (SB 5), with subsequent updates every five years. Additional information on the CVFPP is available in the *Long-Term Flood Management Improvement Framework* section of this document.

## **Integrated Regional Water Management Plans**

Many of the flood management facilities in California are essential to managing water supplies, providing fish and wildlife habitat, and managing water quality. Due to this undeniable interconnection, flood management planning should be integrated with other water management planning, restoration and other resource stewardship efforts, regional blueprint efforts, and hazard mitigation planning in each region. DWR will work with regional planning groups to enhance integrated flood management content within Integrated Regional Water Management Plans as they are developed. Chapter 2 of Proposition 84 provides \$1 billion for DWR to provide grants to local agencies for Integrated Regional Water Management, including plan development as well as implementation of projects (including flood management projects) identified within approved Integrated Water Management Plans.

## **Funding**

DWR's investment strategy calls for State, federal, and local participation. As required by Proposition 1E, DWR is developing an updated State Plan of Flood Control for the Central Valley as a major feature of the CVFPP required in 2012 by Senate Bill 5.

By June 2009, DWR will investigate and report to the Legislature and Administration on potential means to expand the area contributing to current levee maintenance costs to support more equitable apportionment of these costs among the various beneficiaries and levee maintenance agencies. [Note: Prior attempts to form a Central Valley Flood Assessment District have failed to pass the Legislature.] The State will continue to seek leverage of State bond funding by actively working with the federal government and local agencies toward cost sharing of flood management system improvements.

## **10. Feasibility Studies**

DWR, the Corps, and local partners will continue to work on site-specific feasibility projects that will ultimately result in construction of critically needed flood risk reduction projects. Examples of feasibility studies that are currently underway are shown below.

### **Sutter Basin, California, Feasibility Study**

The study will investigate measures to improve the level of flood protection for Yuba City to a 200-year level. The Study will also evaluate existing flood

protection and determine if further protection is feasible for the area located within the boundaries of the Sacramento River Flood Control Project in Butte and Sutter counties. The Project Study Plan was completed in 1999 and the Feasibility Scoping Meeting (F3 milestone) Report was completed in 2004. Alternatives to be considered during the feasibility study include reoperation of upstream reservoirs, reconstruction of project levees, constructing a ring levee around Yuba City, modification of the Sutter Bypass, modification of the Fremont Weir and others. If possible, the study will include environmental features beyond the scope of mitigation, and potential funding sources for ecosystem restoration are being researched. Following are tentative dates for study deliverables:

- Corps Alternative Review Conference (F4) – July 2010 (The completion of the evaluations for the final array of alternatives to be presented in the Feasibility Study)
- Corps Alternative Formulation Briefing (F4A) – January 2011 (The Corps will identify the recommended plan and the NED plan)
- Corps Draft Feasibility Report and EIS/EIR (F5) – June 2011
- Corps Final Feasibility Report (F8) – July 2012

### **Lower San Joaquin River Feasibility Investigation**

The Corps completed a reconnaissance scope study of flood damage reduction and ecosystem restoration improvements along the Lower San Joaquin River in September 2004. Although it was concluded that there was sufficient federal interest for continuing into the feasibility investigation phase, further coordination failed to generate sufficient local interest to continue with the Project Management Plan (PMP) and Feasibility Cost Sharing Agreement (FCSA) at that time.

In mid-2007, representatives from the San Joaquin Area Flood Control Agency (SJAFCA – San Joaquin County, City of Stockton, and San Joaquin County Flood Control Agency), and cities Manteca and Lathrop identified their interest in becoming the local sponsor for the feasibility investigation. On 17 November 2007, The Reclamation Board sent a letter to the Corps stating its interest to be a non-Federal sponsor for the study.

Since the end of 2007, the CVFPB, DWR, and local sponsors have been working with the Corps in their development of the PMP and FCSA. DWR is also preparing a Local FCSA to define the responsibilities between the State and local sponsor(s) consistent with the FCSA. It is expected that the FCSA and Local FCSA will be ready for signature in Spring 2009. The estimated total study cost is likely to be approximately \$10 million, with the State's share about \$2.5 million. Initiation of the investigation will depend on availability of adequate federal funds. The study will take about 36 months to complete.

## **Lower Cache Creek, Yolo County, Woodland Area General Investigation**

The CVFPB together with the Corps and the City of Woodland are developing a feasibility study to increase the level of flood protection for the urbanized City of Woodland to a 200-year or greater level of protection. The study will also investigate an increase in protection for some incorporated lands in Yolo County beyond the current 1-in-10 year level. A series of studies, beginning with the Corps 1994 reconnaissance study have been completed. About \$3.2 million has been expended on the studies.

The Corps is exploring the reformulation of alternatives and scoping for a new feasibility study. Scoping meetings are planned for Spring-Summer 2009. The Corps estimates that the new feasibility study will be complete in 2012 with design of a selected alternative to commence in 2013.

## **11. Ongoing Flood Protection Projects**

DWR, the Corps, and local partners will continue to work on implementation of site-specific projects as they become ready for construction. Examples of ongoing projects are shown below.

### **Sacramento River Bank Protection Project**

In 1960, Congress recognized that the Sacramento River levees are seriously threatened by erosion and authorized the Sacramento River Bank Protection Project (SRBPP), to address river bank erosion issues for 1,300 miles of levees within the Sacramento River Flood Control Project. Over 750,000 linear feet of erosion sites have been repaired since 1960.

In August and September 2001, the FWS and NMFS issued draft Biological Opinions for the bank protection project. Of the species addressed in those opinions, the project was identified as jeopardizing the existence of five fish species (Sacramento splittail, delta smelt, winter-run and spring-run Chinook salmon, and steelhead). In 2001, the Corps convened the Sacramento River Bank Protection Interagency Working Group (IWG) to reconcile needs for continued bank protection with impacts of the Biological Opinions. The IWG has developed a model to evaluate project effects on endangered fish species that allowed the streamlining of federal permits during the Governor's declaration of emergency in 2006, mapped the entire Sacramento River Flood Control Project for existing habitat conditions, and constructed 29 critical bank repairs. The Water Resource Development Act (WRDA) of 2008 authorized an additional 80,000 linear feet of repair under the SRBPP Program. In 2008, the Corps began preparation of an environmental impact statement/report with an accompanying feasibility report. It is expected that the Corps will implement measures under the new authorization in the 2010-2011 timeframe.

The SRBPP initiated a system-wide sediment study in 2008 to determine the need for future maintenance needs and habitat conditions with the current

system alignment over the next 50 years. This will determine the need for additional authorization of a future Phase III of the SRBPP.

### **DWR Delta Levees Flood Protection Program**

The ongoing program provides technical and financial assistance to local levee maintaining agencies for 732 miles of non-project Delta levees and 385 miles of project levees through its Delta Levees Maintenance Subventions Program and for Delta Levees Special Flood Control Projects. About \$45 million has been invested to assist local districts in maintenance, protection, enhancement and rehabilitations of Delta levees. The program will continue to provide technical and financial assistance including participating in emergency preparedness activities.

### **Folsom Joint Federal Project**

The CVFPB together with the Corps and SAFCA are increasing the level of flood protection for the greater Sacramento urban area through the design and construction of a new auxiliary spillway at Folsom Dam. The Folsom Dam Safety and Flood Damage Reduction Joint Federal Project is expected to improve flood protection in the Sacramento area by 50% from previous conditions. Construction of the spillway began in January 2008. Total project expenditures are currently about \$60 million.

The Corps will continue to design the various project features and begin construction of major civil works in 2010. Spillway construction is expected to be complete in 2015. A concurrent Re-operations Study and Plan is underway by the Corps and Reclamation and must be completed to operate the spillway as designed.

### **Mid-Valley Area Levee Reconstruction Project**

The ongoing Mid-Valley Reconstruction Project will restore levees to design standards on the Feather and Sacramento Rivers and tributaries just north of Sacramento. Project sites extend from the Tisdale Bypass to the Sacramento Bypass and include levees of the Sacramento River, Feather River, Yolo and Sutter Bypasses, and Knights Landing Ridge Cut. Project partners include the Corps, the CVFPB, and seven local agencies and Counties.

In 1996, the Corps completed a Design Memorandum that designates approximately 18.3 miles of levees as economically justified for reconstruction. Since that time, several construction projects have upgraded levees with stability berms, slurry walls, and toe drains. Total project expenditures are currently about \$28.8 million.

The Corps is revising a Limited Reevaluation Report (LRR) for approval in 2009. Environmental Documents must also be revised. Construction contracts for an additional 12 miles of levee upgrades could go out in Fall 2009 with construction following in 2010, if the LRR is approved.

## **South Sacramento County Streams Project**

Congress authorized the South Sacramento County Streams project in the 1999 WRDA to build approximately 12 miles of floodwalls and construct 13 miles of levee improvements. This project will increase the level of flood protection for the highly urbanized area of South Sacramento County and the City of Sacramento, protecting more than 100,000 residents and the Sacramento Regional Wastewater Treatment Plant.

The project features include constructing 12.6 miles of floodwalls, raising 4.6 miles of existing levees, constructing 1.3 miles of new levees, installing sheet-pile cutoff walls in 7.7 miles of existing levees along portions of the North Beach Lake levee and Morrison, Florin, Elder, and Unionhouse Creeks; channel excavation and widening of the levee on North Beach Lake and a portion of the levee on Morrison Creek; raising and extending the levee around Sacramento Regional Water Treatment Plant; constructing box culverts and retrofitting 17 bridges. Construction began in 2005. Total project expenditures are currently about \$50 million.

The Corps anticipates designing improvements along the east bank of Morrison Creek from the UPRR bridge to Unionhouse Creek, and Unionhouse Creek between Franklin Boulevard and Center Parkway. Construction of these improvements is expected to begin in 2009. The construction contract for these improvements is expected to be awarded in late 2009.

Work remaining to be accomplished includes Morrison Creek from Franklin to the vicinity of Stockton Boulevard, and Florin and Elder Creeks from Franklin Boulevard to the vicinity of Highway 99. Design of these improvements is scheduled to begin in 2009, with construction occurring in subsequent years. Construction of the project is expected to be complete around 2012.

## **American River Common Features Project GRR**

The project objective is to provide flood damage reduction improvements along the lower American River (downstream of Folsom Dam to the Sacramento River confluence), the Sacramento River (downstream of the Natomas Cross Canal to Freemont), and the Natomas Cross Canal and the North-East Main Drainage Canal. The proposed improvements include: (1) strengthening the levees to reduce the chance of failure due to seepage and levee instability; (2) raising the levees to increase flood conveyance capacity to a level of performance consistent with providing system-wide minimum levee parity; (3) providing an improved automated advance flow release warning system along the lower American River to facilitate emergency evacuation of the floodway; (4) widening the Sacramento Bypass to direct more water into the Yolo Bypass; and (5) providing telemetered stream gages upstream of Folsom Dam to improve reservoir operational flow release criteria during flood events.

The Corps and Board are re-evaluating the project and preparing a General Re-evaluation Report (GRR) to increase the level of flood protection to 200-year for the Sacramento metropolitan area. The GRR is scheduled for completion in 2010

and the sponsors expect congressional reauthorization of the Project in WRDA 2010. The Natomas Levee Improvement Program Early Implementation Projects (described in Section 5) is currently underway in advance of the completion of GRR with work being performed on the Natomas Cross Canal portion of the project.

### **West Sacramento Project GRR**

At the time of project authorization, the purpose was to increase the level of flood protection for the City of West Sacramento from 70-year to 400-year. However, new technical information developed after project construction revealed that the level of protection is likely to be under 100-year. Federal authorization was obtained from WRDA 1992.

The project has raised and strengthened about five miles of existing levees by a maximum of five feet on the east side of the Yolo Bypass and the south side of the Sacramento Bypass. The project included relocation of utilities and the development of a wetland/marshland environmental restoration site contiguous to the Sacramento Deepwater Ship Channel. Additional riparian mitigation, required when Reach C was widened, strengthened, and relocated west, was added to the Sacramento Urban site along the river road. Project expenditures through 2007 total about \$35 million.

During the high water events in January 2006 and April 2006, two slips occurred that require repair. Design to repair the damaged levee sections was completed in 2008. Construction is scheduled to begin May 2009.

A General Reevaluation Report (GRR) is currently being initiated for the evaluation of levees surrounding West Sacramento. The goal is to secure Congressional authorization to improve the level of flood protection for the community to a minimum of 200-year.

### **Yuba River Basin Project GRR**

The project's scope is to increase the level of flood protection for the communities of Marysville, Linda, Olivehurst, Arboga, and Plumas Lakes. Although the 1998 Final Feasibility Study identified needed project elements, the Corps and Board are re-evaluating the project and preparing a GRR to expand the project area to include the Goldfields, the Feather River from RM 20 to the Bear River confluence, the Bear River from the Feather River confluence to the Western Pacific Interceptor Canal, and the Western Pacific Interceptor Canal. In addition, the study will evaluate increasing the level of flood protection to 200-year for the Yuba River basin area. The GRR is scheduled for completion in 2009 and the sponsors expect congressional reauthorization of the Project in WRDA 2010.

Some construction was performed in 2005 to deepen a slurry wall along the Yuba River. The estimated cost through September 2008 is \$7.5 million. Design of the Marysville ring levee will begin in 2009, with construction expected to be completed in 2011. Construction has also begun on the estimated \$200 million

Feather River Levee Improvement Project being funded as an Early Implementation Project (described in Section 5) in advance of the completion of GRR. It is anticipated that federal credit will be approved for portions of the project once the GRR is complete and the project is authorized.

## 12. Research

The Corps has recently conducted a significant amount of literature review and is pursuing a research program into the science regarding levee vegetation and its management. Concurrently, a collaborative research program is being considered by the SAFCA and DWR. DWR will support broad federal, local, and State agency participation in a process to:

- Identify data gaps and research efforts needed to augment scientific knowledge related to vegetation and levee management
- Collect and share historical photos showing vegetation conditions on levees when they were turned over to the State by the Corps
- Document any California levee failure case histories and levee performance related to vegetation
- Outline types of vegetation on levees including the types/species that would be clearly acceptable and those that would clearly not be acceptable
- Develop a technical research and funding strategy

The goal is to contribute peer reviewed scientific research to support the development of a technically defensible vegetation management policy in support of the FloodSAFE initiative. Additional research will include both beneficial and harmful impacts of levee vegetation, focusing specifically on Central Valley conditions. Additional follow-on technical research could include:

- Ascertaining how and where tree roots grow on or near levees, the importance of position of trees on root development in levees, and the effects of river hydrology and soil conditions on rooting patterns
- Substantiation of whether and how woody root patterns contribute to 'piping' and seepage risks through or under levees

### **Vegetation Symposium, August 2007**

In order to learn more about how levee safety goals can be met while protecting environmental assets, the Corps, the State of California, and the Sacramento Area Flood Control Agency sponsored a levee vegetation symposium in Sacramento on August 28-29, 2007. The symposium brought together over 500 scientists, engineers, and policy-makers who shared important information about the risks, benefits, and methods to manage vegetation on and near levees. Although no conclusions were drawn as a result of the symposium, significant issues arose both supporting and questioning the benefit to public safety if Corps vegetation standards are strictly implemented.

- Developing a windthrow/tree fall risk assessment and management/decision support tool
- Studying burrowing rodent abundance on vegetated and unvegetated levee systems, and the effectiveness of grouting programs and control measures
- Conducting field trials of alternative approaches to both woody and herbaceous types of levee vegetation establishment and maintenance, and associated variations in root architecture, depth, size and density
- Other levee integrity – vegetation topics
- A second Vegetation Challenge Symposium with findings and recommendations for further research if needed

All this information should be considered along with reviewing techniques to stabilize levees with vegetation and retain shaded riverine aquatic (SRA) habitat without jeopardizing levee integrity. Recommendations for further research beyond this effort should be included in the system-wide CVFPP in 2012.

High winds during January 2008 provided an opportunity to view wind fallen trees and root ball damage to the ground. DWR recorded fallen trees in select reaches of the Central Valley and found that the areas of ground disturbance at fallen trees were generally shallow and limited in extent.

### **13. Environmental Considerations**

Changes in California's flood management system will result in impacts to associated habitats and species. Both mitigation of these effects and habitat enhancements will be part of the environmental considerations for the system. DWR, the Corps, resources agencies, and non-governmental organizations will continue to look for ways to avoid, minimize, and compensate for impacts, and also ways to enhance ecosystem values.

#### **Flood Protection Corridor Program**

DWR's Flood Protection Corridor Program (FPCP) was established to implement non-structural approaches to flood management in areas of critical need. Such projects must also have a resource conservation component addressing wildlife habitat conservation and/or agricultural land conservation. The projects can be State-sponsored direct expenditure projects or competitive grants to local government agencies (including levee maintenance districts) and non-profit organizations. The FPCP was initially authorized by voters with the passage of Proposition 13 in March of 2000 and received an additional \$40 million with the passage of Proposition 84 in November 2006.

The FPCP has completed or is in the process of completing 21 non-structural flood risk reduction projects representing \$57 million in project costs. These projects involve activities such as increasing the amount of floodplain available for transitory storage during peak flows, removing obstructions from conveyance channels to increase channel capacity, acquiring conservation easements in

areas that cannot be made safe from future flooding and therefore should not urbanize, removing structures from floodplains that have insufficient flood protection, and building setback levees. As a result of program expenditures to date, in addition to the flood benefits, the following conservation benefits have been achieved: 9,500 acres of agricultural land and 2,500 acres of habitat in and adjacent to floodplains have been protected that were previously at risk for urban development.

In July 2008, the FPCP began to transition into the Floodway Corridor Program which will distribute up to \$45 million in grant funds over a six year period. The grant funds will be used for flood risk reduction projects similar to those done through the FPCP. FPCP projects are “no regrets” projects undertaken in advance of FloodSAFE regional planning. Floodway Corridor Program projects will work towards implementing regional plans developed through FloodSAFE.

### **Multi-Species and Floodplain Conservation Strategy**

A system-wide Multi-Species and Floodplain Conservation Strategy will be developed and implemented by DWR, the Corps, and resources agencies to maintain and restore the ecological health of riparian, aquatic, and terrestrial ecosystems within the planning area of the flood control project. DWR will be the lead agency in preparing and implementing the strategy. The purpose of the strategy is to reconcile the management of flood risk with the conservation of natural resources. The objective is to move beyond reacting to individual or incremental actions on a case-by-case basis and develop advanced conservation strategies and actions that meet or exceed baseline conditions, provide stability or enhancement to associated fish, wildlife and habitat, and contribute to recovery of target species. The conservation strategy will function as a management plan for focus species and ecosystems and will prescribe standards and guidelines that, if implemented, will provide a high likelihood that viable habitats and populations will continue to exist throughout the planning area.

Consistent with the broader plan for flood control maintenance, a short-term (interim) and long-term conservation strategy will be developed. The purpose of the short-term strategy is to avoid, minimize, and compensate for the effects of immediate and ongoing corrective actions on focus species and ecosystems. The long-term strategy will be more comprehensive and will interface with new operation and maintenance standards established through development and implementation of the FloodSAFE initiative.

A detailed Interim Conservation Strategy, outlined below, will be developed by December 2010. Early implementation of avoidance, minimization, compensation, and conservation measures will begin immediately. The details of the long-term conservation strategy will be developed by 2012.

### **Interim Multi-Species and Floodplain Conservation Strategy**

The Interim Multi-Species and Floodplain Conservation Strategy will avoid, minimize and compensate for short-term actions required to meet DWR’s interim vegetation inspection criteria illustrated above in Section 2 **Inspections**. The

interim strategy will address resource issues on both the landward and waterside portions of system levees.

To avoid and minimize adverse effects to natural resources the Interim Multi-Species and Floodplain Conservation Strategy will include the following course of action:

1. DWR and the CVFPB will notify levee maintainers within the system of this vegetation management plan, and their individual and collective responsibilities to comply with all State and federal environmental laws related to maintenance actions required to meet the interim vegetation inspection criteria, including any possible penalties for not complying with state and federal laws.
2. Vegetation on the levee crown and levee slopes will be managed as shown above in Section 2 **Inspections** to allow for flood fighting and maintenance.
3. If tree retention is required as a result of ESA consultations, vegetation management activities on the landward side of levees will meet the criteria established in those consultations. Given species needs, this could include thinning and pruning of vegetation to a height of five feet or site-specific removal to conduct levee inspections or emergency response activities.
4. Vegetation management activities on the waterside portion of levees will be consistent with current local maintenance practices. This may include retention of existing waterside vegetation except for the top 20 feet of the levee slope which will be managed as shown above in Section 2 **Inspections** consistent with environmental compliance.

To compensate for unavoidable impacts that result from meeting interim vegetation inspection criteria, and to develop actions that provide stability or enhancement to associated fish, wildlife and habitat and contribute to the recovery of target resources, the Interim Multi-Species and Floodplain Conservation Strategy will include the following actions:

1. Working with State and federal resource agencies, define target resources for recovery focus
2. Define the Program action area
3. Define the existing resource baseline
  - Quantitative assessment of the quantity and quality of riparian, wetland, and terrestrial habitat and species distributions within and directly adjacent to Program levee areas based on existing or acquired information
  - Identify areas of over-sized and setback levee reaches within and directly adjacent to Program levees
4. Establish biologically meaningful sub-regions of the action area

5. Develop conservation goals and objectives for each sub-region
6. Define the scope of proposed project maintenance activities
  - Routine maintenance
  - Extra-ordinary maintenance
  - Special projects (i.e., Early Implementation, directed funding)
7. Identify actions that will occur in biological sub-reaches
8. Define the scope of potential maintenance impacts
9. Develop and implement projects to compensate for impacts that occurred earlier in calendar year 2008 from implementing Corps policy
10. Review species recovery plans and meet with State and federal resource agencies to identify and plan near-term conservation opportunities and projects for resource enhancement, including:
  - Riparian corridor enhancement for the portion of the levee below the top 20 feet of the waterside slope length
  - Enhancement of riparian corridors in areas of over-built levees or where levees are setback from the river
  - Early implementation projects that include levee setbacks
  - Advance conservation banking program (see next subsection for details)
  - Development of upstream and tributary riparian seed sources
  - Develop, with other ongoing planning efforts, additional bypass/stream channel/floodplains that provide riparian corridor habitat for target resources
  - Develop, with other planning efforts, a better understanding of the magnitude of flows and the rate of change of flows that would enhance riparian vegetation germination throughout the Project action area
11. Develop a tracking system to account for resource impacts and associated conservation measures.
12. DWR, the Corps, and resources agencies will begin a process, and by June 2009, determine if Section 7 or Section 10 consultation will be used to address anticipated system-wide levee vegetation management.

### **Advance Conservation Banking Program**

With the passage of Proposition 1E and implementation of the FloodSAFE initiative, DWR will be required to implement wide-ranging flood management and flood protection activities in the Central Valley and Delta. These activities will include on-going maintenance of flood control structures including vegetation management, repair of levee bank erosion sites, and rebuilding and upgrading

aging facilities to meet new regulatory demands and higher standards. The CVFPP, due to be completed in 2012, will address these needs in a system-wide approach and it is expected that implementation of an Advance Conservation Banking Program will commence shortly thereafter. These activities, both on-going maintenance of the current system and new or expanded system improvements, will require environmental documentation, compliance with CEQA, NEPA and State and federal ESA and acquisition of a number of permits. DWR is currently in the early stages of planning and developing a comprehensive mitigation strategy on a system-wide, ecologically relevant scale consistent with DWR's policy of environmental stewardship and ecosystem enhancement consistent with its mission.

A key component of this strategy will be the establishment of one or more conservation banks throughout the system within biologically-based sub-regions of the flood control project, in cooperation and partnership with other State, federal agencies and non-governmental organizations. This comprehensive approach will improve public relationships and create a more resilient, sustainable and economically viable flood management system. This advance Conservation Banking Program is consistent with the guiding principles of the FloodSAFE Strategic Plan and helps achieve three of the Plan's foundational objectives:

- Preserve or improve natural ecosystem processes
- Establish an interagency mitigation banking program that provides lasting environmental benefits
- Develop a comprehensive CVFPP

Key progress for this Conservation Banking Program and timing include:

- Impact Identification, initiated February 2008
- Habitat Prioritization, initiated February 2008
- Pilot Mitigation Project, planning/development initiated March 2008
- Streamlined Environmental Permitting, started 2008
- Mitigation Cooperators, started 2008
- If a Section 10 is the selected approach to permitting, development of a Habitat Conservation Plan to comply with ESA regulations; and preparation of CEQA and NEPA documents, initiate late Summer 2009
- Implementation (includes land acquisition in year 4), expected beginning January 2012

FloodSAFE also recognizes that climate change impacts will require more reliance on the use and expansion of current floodplains to accommodate higher peak flood flows and volume. This will require planning and building additional bypasses, setback levees and other strategies that will not only result in increased flood system resilience and sustainability, but will provide opportunities

for mitigation and improving wildlife habitat, as well. Consideration of the effects of climate change will be a key factor in the development and implementation of the long-term Multi-Species and Floodplain Conservation Strategy and a comprehensive mitigation strategy.

## **14. Coordination**

State and federal agencies are working together on several fronts to address levee vegetation management and the broader problems with California's levees.

### **California Levees Roundtable**

The California Levees Roundtable (Roundtable) was created through an effort by officials at the CVFPB following the successful Levee Vegetation Science Conference organized by SAFCA, DWR, and the Corps in August 2007. The Roundtable is comprised of senior level officials representing the Corps from Headquarters, South Pacific Division, and the Sacramento District; the CVFPB, DWR, NMFS, FWS, DFG, Reclamation District No. 2068 and SAFCA. The Roundtable agencies agreed to work together to draft a phased system-wide levee vegetation plan, with short and long-term elements. The vegetation plan transitioned into this document.

The Roundtable participants agreed to the following principals in formulating this plan:

- Providing for public safety is the top priority of all involved federal, State, and local agencies.
- Achieving and maintaining levee integrity is an urgent ongoing concern that needs to be addressed as rapidly as possible.
- Riparian vegetation along Project levees is coincident with the "system" and is important for habitat, recreation and aesthetic values.
- The Corps has lead responsibility to ensure that levee maintenance standards are enforced nationwide, including the management of vegetation on levees.
- Vegetation on levees can sometimes compromise levee integrity or flood-fighting access, or provide valuable erosion control, depending on vegetation type and location.
- The Agencies need to utilize the best available science when making decisions about how to improve and maintain levee integrity, including decisions regarding vegetation management.

The agencies further agreed:

- To work together expeditiously to develop short- and long-term plans to achieve system-wide compliance with Corps' standards for the State Flood System in the Central Valley.

- That levee deficiencies will be addressed on a priority basis within each of the major funding areas of rehabilitation and operations/maintenance, with the most urgent and cost effective actions implemented first in each area.
- The CVFPP plan developed by 2012 will seek to reconcile the management of flood risk with the conservation of natural resources without compromising public safety. Where the flood management system does not meet current public safety objectives, interim measures will be employed, subject to appropriate environmental compliance, to reduce the probability and consequences of failure while permanent measures are pursued.

### **Interagency Collaborative**

In 2005, DWR, the Corps, resource agencies including the FWS, NMFS and DFG, and other flood control agencies and stakeholders began meeting to encourage better cooperation among flood control and environmental resource agencies.

**Interagency Collaborative**

The new approach includes improving the way projects proceed to reduce the public's exposure to risks from flooding while incorporating appropriate environmental resource protection and enhancement.

This Interagency Collaborative group is now working to encourage better cooperation among flood control and environmental resource agencies and coordinate and streamline the planning and permitting of flood management activities. The group was successful during repair of critical levee erosion sites in 2006, and the partners intend to continue working together to encourage flood management projects that can proceed quickly, in part by streamlining and coordinating regulation and by avoiding needless environmental damage.

### **Regional Variance Group**

The Regional Variance Group, a multi-agency subgroup to the Interagency Collaborative, was evaluating the feasibility of using existing Corps regulation (EP 500-1-1) as one solution to existing vegetation issues. The group investigated setting up a regional variance agreement that would have included technical protocols and procedures for levee maintaining agencies to follow. The group is currently not meeting, pending better understanding of Roundtable stakeholder expectations.

### **Sacramento River Bank Protection Project Interagency Working Group**

In 2001, the Corps, DWR, NMFS, FWS and DFG began meeting to encourage better cooperation among flood control and environmental resource agencies with respect to erosion repairs on the Sacramento River Flood Control Project. The group developed and implemented tools to streamline the permitting process while protecting the environment. Its tools and members were used during the 2006 flood emergency and will lead the effort to implement an additional 80,000 linear feet of bank protection to be implemented over the next 10 years.

## 15. Issues to Resolve

The participating agencies recognize that the short-term Framework provides general guidelines for helping the State move forward on flood system improvements while the long-term comprehensive plan is being developed. Therefore, many of the specifics needed for this Framework have to be resolved together during the next four years as implementation progresses. Following is a partial list of recommended actions that will be addressed through interagency collaboration.

- Define standardized maintenance processes and responsibilities of levee maintaining agencies
- Clearly identify all applicable environmental law requirements that must be met when dealing with short- and long-term actions identified in this document
- Work on authorized and unauthorized encroachments, including processes for identification and enforcement
- Define how the State will facilitate opportunities for local agencies to cost-effectively mitigate impacts of their levee maintenance
- Work with local agencies to help them achieve stable and sustainable funding for maintenance activities
- Work on levee certification issues
- Work on a statewide vision to address the need for environmental protection and public safety
- Clarify CVFPB role in enforcement of maintenance standards and in defining flood system improvement impacts and associated mitigations
- Develop stable funding mechanisms at State, federal, and the local level
- Develop programmatic approaches for environmental compliance
- Clearly define ESA consultation or permitting alternatives and agree on a direction and solution
- Develop and implement the Multi-Species and Floodplain Conservation Strategy
- Implement meaningful mitigation and conservation actions for interim vegetation management actions
- Annually review progress on implementing interim vegetation criteria and other Framework milestones and work on approaches to advance milestones delayed by technical, financial, or economic factors
- Develop the long-term comprehensive flood improvement plan in the CVFPP by 2012

## 16. Implementation Roles

Implementation of the short- and long-term Framework requires continued work of State, federal, and local agencies. This section summarizes what can be expected of various agencies, subject to funding and staffing limitations.

### DWR and CVFPB

DWR, in close collaboration with the CVFPB, will perform much of the work outlined in the Framework. The participating agencies can expect DWR and CVFPB to:

- Implement the numerous actions described in the short-term and long-term Framework Sections 2 through 15 covering inspections, enforcement, maintenance, early implementation projects, emergency response, public outreach, data collection, program planning, feasibility studies, ongoing flood protection projects, research, environmental considerations, further coordination, and resolving issues.
- Identify future flood system improvement actions based on further evaluation of system risk and available funding
- Continue to coordinate with the Corps and other agencies to implement the short-term Framework outlined in this document
- Continue enhanced inspection procedures developed over the past few years and transition the State's inspection program to be consistent with the Corps' inspection program
- Enforce the interim vegetation inspection criteria developed by the DWR in Fall 2007
- Implement all actions in compliance with environmental requirements and begin the foundation for long-term environmental compliance (CEQA/NEPA & permit acquisition)
- Develop and implement the Short-term and Long-term Multi-species and Floodplain Conservation Strategies
- Contribute to levee vegetation research
- Require that urban levee projects constructed prior to the system-wide analysis comprehensively address erosion, seepage, channel capacity, encroachments, and vegetation
- Coordinate with the Corps as they review their levee vegetation standards
- Aggressively pursue compliance with Corps issued policies and regulations consistent with research findings, project cooperation agreements, the Multi-Species and Floodplain Conservation Strategy, and in the interest of public safety

- Apply resources to complete the system-wide analysis by 2012 that includes a comprehensive long-term plan, including vegetation management, for the State Flood System in the Central Valley

## **Corps**

The participating agencies can expect the Corps to:

- Function as a partner on planning flood system improvements, including alterations, modifications and/or additions to the existing flood system, and participate in developing the CVFPP
- Participate in accordance with federal law and Corps regulations in the environmental process relating to vegetation, erosion, and other flood management issues
- Participate in scientific peer reviewed research along with State and local entities and determine if the vegetation ETL should be revised to reflect findings of this research, including consideration of regional variations to the standards
- Provide system documentation support for projects transferred to the State for operation and maintenance
- Provide federal cost sharing for flood system improvements as authorized by Congress
- Support improved maintenance by developing and issuing Regional General Permits for routine maintenance of local flood protection projects
- Perform periodic inspections and screening level risk assessments of local flood protection projects under the National Levee Safety Program
- Provide timely review of 33 USC 408 Permission for EIPs or other State sponsored alterations to the flood control infrastructure
- Participate actively with the Interagency Collaborative Group to monitor the Framework progress and develop Regional Vegetation Variances
- Provide technical assistance to the State on local flood protection projects including review of innovative maintenance procedures
- Review and provide recommendations to the CVFPB on encroachment permits and assist in resolving unauthorized encroachments

## **Environmental Resources Agencies**

The participating agencies can expect the environmental resources agencies to:

- Participate in the development of a Multi-Species and Floodplain Conservation Strategy
- Participate in CVFPP long-term planning process to integrate flood risk reduction goals, environmental sustainability goals, and O&M goals into flood system improvement alternatives

- Participate in and support levee vegetation research efforts designed to provide a scientific based policy about management of vegetation on levees in California
- Identify goals and objectives for resource avoidance, minimization, mitigation, protection, enhancement, and recovery
- Provide guidance on short- and long-term ESA and CESA consultation alternatives and requirements
- In coordination and consultation with DWR and the Corps, where applicable and appropriate, and consistent with the Conservation Strategy, develop and apply streamlined consultation procedures for interim actions
- In coordination and consultation with DWR and the Corps, where applicable and appropriate, and consistent with the Conservation Strategy, develop and apply streamlined consultation procedures as part of long-term, programmatic consultations or permits

### **Levee Maintaining Agencies**

The participating agencies can expect the levee maintaining agencies to:

- Meet the November 1, 2010 milestone date for compliance with the interim vegetation criteria
- Pursue continued efforts to meet the interim vegetation criteria in areas with special environmental or physical circumstances
- Seek additional funding as needed to carry out maintenance responsibilities
- Continue improving overall maintenance and strive to maintain a consistent level of acceptable performance to achieve a minimum public safety requirement
- Implement long-term maintenance requirements as they are further developed through a collaborative process, which includes research findings

Clarification - Nothing in this Framework is intended to or shall be construed to affect or limit the authority of any Party to fulfill its statutory, or contractual responsibilities or to comply with judicial orders under applicable law.

# Long-Term Flood Management Improvement Framework

As mentioned previously in the short-term Framework, California has initiated a multi-faceted and phased process to reduce risks of flooding and improve public safety, while seeking to preserve riparian habitat along river corridors. More definition will be available in the CVFPP in 2012. Most activities contained in the short-term flood management improvement Framework are expected to continue in the long-term. However, they are subject to revisions to improve their performance based on the findings in the CVFPP and subsequent five-year updates to the CVFPP.

## 1. Introduction

Although the CVFPP will not be adopted until 2012, the following long-term Framework provides an overview of expected progress. Senate Bill 5 (Machado), signed into law in October 2007, provides the commitment for the long-term Framework. This legislation recognizes that the Federal Government's current "100-year flood protection standard" is not sufficient to protect urban and urbanizing areas within flood prone areas throughout the Central Valley. In reality, the FEMA 100-year threshold is an "actuarial standard" associated with the National Flood Insurance Program. The legislation declares that the minimum standard for urban areas is a 200-year level of flood protection. It also establishes a deadline of 2025 to achieve 200-year flood protection if the urban area is protected by State-federal project levees. After 2015, urban areas which cannot demonstrate adequate progress to achieve the 200-year level of protection will face potential limitations in approving new development in potential floodplains.

Development of the CVFPP will involve three major elements: (1) mapping of the 100-year and 200-year floodplains based on information from the Sacramento-San Joaquin River Basins Comprehensive Study and revised hydrologic and levee evaluations, (2) identification of the existing and proposed performance standards for all facilities within the system, including those in the SRFCP and SJRFCS, and (3) proposals for additional structural and non-structural facilities that may become part of the flood management system, including:

- Bypasses
- Floodway corridors
- Floodplain storage
- Other projects that:
  - Expand the capacity of the system
  - 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 as a multi-objective component of flood management where appropriate
  - Minimize the flood management system operation and maintenance requirements

- Promote the recovery and stability of native species populations and overall biotic community diversity

The long-term plan for levee vegetation will be part of the comprehensive system-wide plan for repairing and upgrading all aspects of the levees for the State Flood System in the Central Valley.

## **2. Partnerships**

Partnerships similar to those described in the short-term Framework will continue in the long-term. The Corps will continue to be a partner in planning and project development.

## **3. Central Valley Flood Protection Board Responsibility**

The Central Valley Flood Protection Board (recently renamed from The Reclamation Board) has overall responsibility:

- To reduce flood risks along the Sacramento and San Joaquin rivers and their tributaries in cooperation with the Corps.
- To cooperate with various agencies of the federal, State and local governments in establishing, planning, constructing, operating, and maintaining flood control works.
- To maintain the integrity of the existing flood control system and designated floodways through the Board's regulatory authority by issuing permits for encroachments.
- To enforce provisions of CCR, Title 23.

## **4. DWR Responsibility**

DWR will lead development and implementation of the FloodSAFE initiative to establish the FloodSAFE vision statewide. Some of the key roles for DWR within FloodSAFE include:

- Lead efforts to establish integrated flood management throughout California
- Provide State cost sharing funds to implement new projects
- Develop and administer new grant programs to support regional and local efforts to meet the FloodSAFE foundational objectives
- Continue to administer existing State sponsored flood management programs
- Promote Legislative reforms that support accomplishing FloodSAFE goals and objectives
- Provide State cost sharing funds to support an effective Delta Levee Maintenance and Special Projects Program

## **5. Central Valley Flood Management Planning Program**

DWR has begun the Central Valley Flood Management Planning (CVFMP) program. The CVFMP program addresses most of the flood-related planning activities that were authorized by the California Legislature during the 2007/2008 session within much of the Central Valley. The purpose of the CVFMP program is to develop a sustainable integrated flood management plan for areas protected by facilities of the State-federal flood protection system in the Central Valley<sup>3</sup>.

The CVFMP program consists of two primary projects – the Central Valley Flood Protection Plan (CVFPP) and the State Plan of Flood Control (SPFC). Following is a summary of the primary elements of the CVFMP program.

### **CVFPP**

DWR is required to prepare a sustainable, integrated flood management plan called the CVFPP by January 1, 2012, for adoption by the CVFPB by July 1, 2012. The CVFPP will reflect a system-wide approach to protecting areas of the Central Valley currently receiving protection from flooding by existing facilities of the SPFC. In addition, the CVFPP will include a prioritized list, schedule of implementation, and recommendations of both structural and nonstructural means for improving performance and eliminating deficiencies of flood management facilities, and addressing ecosystem and other water-related issues. The CVFPP will be updated every five years (years ending in 7 and 2).

This effort will require the development of CVFPP goals, objectives, and constraints important in the formulation process; potential plan elements; and recommendations for further actions from local, regional, State, and federal perspectives. A comprehensive communications and engagement process with partners and interested parties will be used in each step of the CVFPP planning process to solicit information, generate content, promote feedback, and allow input from partners and the public.

DWR anticipates that the CVFPP planning process will evaluate potential management actions and solutions for the first CVFPP (due in 2012) using existing information, expert judgment, and new information as available from other ongoing FloodSAFE efforts. The effort will include describing and promoting understanding about existing flood management related problems and objectives, inventorying potential management actions to improve the existing SPFC and associated elements that influence the performance of the SPFC,

evaluating and prioritizing those potential near-term and long-term actions, and

making recommendations for future actions and investments to better define these actions. The CVFPP will consider potential climate impacts from sea level

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<sup>3</sup> See the Central Valley Flood Management Planning Program Scoping Document for more detailed information.

rise, increased temperatures, shifting precipitation, and extreme weather events. Significant inputs to the CVFPP will be provided by the two related SPFC planning activities (see next section): 1) preparation of documentation for the SPFC, and 2) preparation of the Flood Control System Status Report (FCSSR) for the SPFC. Technical analyses to support the planning and engagement process will be performed primarily using existing and available tools and information. Additional information will be provided by the Central Valley Floodplain Evaluation and Delineation (CVFED) program, and the urban and

non-urban levee evaluation programs being conducted under FloodSAFE.

## **SPFC**

The SPFC effort will include preparation of the Description Document for the SPFC and the Flood Control System Status Report (FCSSR).

**Description Document for the SPFC.** The SPFC includes the State and federal flood control works, lands, programs, plans, conditions, and mode of maintenance and operations of the Sacramento River Flood Control Project (WC § 8350), of flood control projects in the Sacramento River and San Joaquin River watersheds for which the CVFPB or DWR has provided the assurances, and of those facilities identified in WC § 8361. DWR is required to prepare the Description Document for the SPFC that will contain descriptions of SPFC facilities including:

- Location and description of each facility
  - Population and property protected
  - System benefits provided
  - Brief history (year of construction, major improvements, any failures)
- Design capacity of each facility
- Description and evaluation of the performance of each facility
  - Evaluation of failure risks (overtopping, under seepage and seepage, structural failure, other sources of risks including seismic)
  - Uncertainties regarding performance capability (need for additional engineering evaluations, changed conditions such as changes in estimated channel capacities)

Completion of the Description Document for the SPFC is anticipated by December 31, 2009.

**FCSSR.** DWR will prepare the FCSSR for adoption by the CVFPB. The FCSSR will be developed based on the SPFC, and it will be an intermediate product

incorporating additional assessments on levee conditions for identifying evident deficiencies and risks of levee failures, thereby providing an important foundation

for the development of the long-term planning strategy leading to the CVFPP.

The FCSSR will include:

- Identification and description of each SPFC facility
- Assessment of conditions of existing facilities, including levee systems
- Discussion of inspection and review undertaken of the existing system
- Appropriate recommendations regarding the levees
- Identification of recommended actions and future work activities

In late 2008, DWR prepared a schedule for implementation of the FCSSR for the CVFPB to submit to the Legislature. CVFPB adoption of the FCSSR is anticipated to occur by December 31, 2010. .

As part of the CVFPP, the State will seek to conserve and enhance riparian habitat on the waterside of levees and aggressively pursue compliance with the Corps' levee standards including vegetation standards through the use of improved maintenance inspections, phased vegetation management practices, regional variances, and other management tools that would be consistent with the Multi-Species and Floodplain Conservation Strategy. Peer reviewed scientific research will be conducted to support the development of a technically defensible vegetation management policy in support of the FloodSAFE initiative. The research will consider both beneficial and harmful impacts of levee vegetation on Central Valley levees. The State expects that scientific research may result in modifications to the Corps' guidance on vegetation standards for flood control structures contained in its levee standards and/or variances to the standards. In addition, research is expected to identify appropriate engineering actions from a risk perspective to mitigate leaving select vegetation on levees.

In addition to requiring DWR to prepare the CVFPP and an integrated flood management plan as described above, associated legislation passed in 2007:

1. Requires a new standard of at least 200-year level of flood protection for urban and urbanizing areas in the Central Valley in order to continue to approve development in areas of moderate flood risk, and that urban areas protected by State-federal levees shall achieve this by 2025 (SB 5).
2. Allows urban flood improvement projects funded by the State to proceed in advance of the Plan (Early Implementation Projects already underway in FY 2007-08) only if the Director of DWR first determines in writing that the improvements are necessary, will reduce or avoid risk to human life in urban areas, will not impair or impede future changes to regional flood

- protection, and that there is funding for local agencies for the operation and maintenance of the facility (SB 5).
3. Requires Early Implementation Projects to take advantage of levee setback opportunities, have local agencies formally acknowledge flood risk and have emergency response plans, and requires local funding for continued levee maintenance of the completed project (Governor's Bond Expenditure Plan 2007).
  4. Requires that the completed Plan be used by local agencies in developing land use policies and General Plans (SB 5, AB 162), and requires restrictions in new development after the Plan is developed if adequate progress has not been achieved in providing the required level of improving flood protection (SB 5).
  5. Requires DWR to develop updated floodplain maps and disseminate the information (SB 5, AB 156).
  6. Requires DWR to provide annual notification of flood risk to property owners whose properties are protected by State-federal project levees (SB 5, AB 156).
  7. Requires DWR to prepare and transmit to the CVFPB annual reports on Project levees operated and maintained by each levee maintaining agency, using information provide by the LMA, together with other relevant information (AB 156).
  8. Requires DWR to recommend new building standards by January 1, 2009 that would reduce the risk of flood damage and to protect life, safety, and construction in areas where flood levels are anticipated to exceed three feet for the 200-year flood (SB 5).
  9. Requires the development of improved emergency preparedness and response, including emergency repair of critically damaged levees (AB 156, SB 5, Governor's policy/emergency declarations).
  10. Provides, generally, that a city or county may be required to contribute a fair and reasonable share of the increased flood liability caused by its unreasonable approval of developments following the failure of a State flood control project (AB 70).

In addition to the required actions shown above, during the development of the CVFPP, DWR intends to:

1. Provide a long-term levee vegetation management plan to replace DWR's interim vegetation maintenance requirements.
2. Provide a long-term levee encroachment management plan.
3. Provide a long-term Multi-Species and Floodplain Conservation Strategy that will include biological goals and objectives developed from recovery plans or other applicable resource plans, and will include coordination and integration with other habitat or species conservation plans for species

found within the area of the State's flood control system. The long-term conservation strategy will build on and incorporate much of the interim strategy, but will be more comprehensive, and will include the development of riparian management standards and guidelines, goals and objectives, and adaptive management strategies. The long-term strategy also will include an in-depth review and development of science to inform the selection of conservation actions. The strategy also may include long-term agreements and programmatic permitting mechanisms.

The CVFPP will commit resources in a manner that provides the highest priority areas for public safety first. Levees for urban areas that were not improved during the short-term plan will be improved to at least 200-year flood protection by addressing all flood threats in the same project. The CVFPP will also identify upgrades for rural levees. Although the plan will include a schedule for completing the levee upgrades, twenty years or more could be expected before all urban areas are upgraded. The schedule will substantially depend on gaining federal cost sharing for the comprehensive projects.

Some techniques that may be considered in addressing urban levee vegetation deficiencies are:

- Setback levees that are free of vegetation (allow SRA habitat adjacent to river channel)
- Enlarged levee cross sections such that root systems of existing trees on the water side are outside of the effective reconstructed levee
- Levees with seepage remediation cutoff walls
- Removal of vegetation from the levee and mitigation of the habitat loss
- Special designs or treatments determined from best available science that provide suitable methods to safely leave select vegetation in place

#### **Potential Life-Cycle Approach to Vegetation Management**

DWR may consider revising interim vegetation inspection criteria in the short-term or develop new criteria as part of the CVFPP to include life-cycle management of heritage oaks and other large trees on or near levees in urban areas – criteria for rural levees will wait until the system-wide plan is complete. The life-cycle approach would allow large trees to live out their lives while providing for removal and levee repair during the next dry season after the trees die. Depending on where a tree is located, techniques to isolate the roots from the levee embankment may be appropriate. Since new trees would not be allowed to become established on the crown or the landward side of the levee, the long-term goal of the criteria would be to gain a crown and landside levee slope free of large, high-risk, woody vegetation, or manage vegetation under a regional variance. Even this phased approach to landside vegetation removal is expected to require significant mitigation. It is expected that vegetation on the lower waterside slope will largely remain in place over time as the State implements a variety of techniques to protect the levee prism. Safety issues associated with vegetation on the lower waterside slope would be addressed on a case-by-case basis using the best available science and historical performance of vegetated levee slopes without compromising public safety.

- Leaving vegetation (type and location) in place that is determined not to threaten the integrity of the levee (e.g. levees with seepage remediation cutoff walls, oversized levees, setback levees, or vegetation found to be non-threatening through research)
- Life-cycle management of trees with increased monitoring and response
- Other system-wide flood control improvements that help to establish a permanent regional variance for California levees

Over the long-term, urban levees (about 350 miles) are expected to comply with Corps' levee vegetation standards or revisions to those standards from the Corps's ongoing review process. The use of oversized urban levees, seepage cutoff walls, setback levees, or regional variances may be used to retain some or much of the critical riparian habitat along urban levees as long as there is no compromise to public safety.

The system-wide CVFPP will also include specific approaches and schedules for reducing flood risk in rural areas. Rural levees (about 1300 miles) support the majority of the SRA habitat that is important to the ecosystem. Some of the techniques that may be considered in addressing rural vegetation deficiencies are:

- Selected levee upgrades
- Operation and maintenance support to local maintaining agencies
- System-wide improvement projects such as setback levees and expanded and new bypasses
- Flood easements
- Phasing out vegetation on the crown and the landside portions of rural Project levees
- Leave vegetation (type and location) in place that is determined through scientific research not to threaten the integrity of the levee (Regional Variance)

The State recognizes that the Corps' national standard for levees, as embodied in draft Engineering Technical Letter 1110-2-571, is an appropriately conservative national public safety standard, and is likely achievable for most of the federally authorized levees across the country. Some parts of the State-federal flood protection system in California's Central Valley currently meet the ETL standards for vegetation, and the State will enforce the standards in those areas into the future. New levees being added to the System (such as setback levees, backup levees, and ring levees) will also be designed, constructed, and maintained to ETL Standards. However, as described in this Framework document, the "legacy levees" built immediately adjacent to California's major riverine systems present unique challenges that will likely require regional variances or other engineered alternatives. Vegetation management on levees will be addressed by collaboratively transitioning from interim criteria towards the

Corps' national standards within the context of many levee risk factors. This will be accomplished by federal, State and local agencies as part of development of the Central Valley Flood Protection Plan and its implementation after 2012.

## Key Recommendation

This Framework provides an aggressive but incremental approach for reducing flood risks related to State-federal project levees in California's Central Valley. It relies on a short-term Framework (four years) that improves urban public safety by continuing and modifying ongoing flood management activities while a more comprehensive system-wide solution for Central Valley levee problems is developed by 2012. The short-term Framework itemized in this paper will increase public safety by improving inspections and maintenance, constructing Early Implementation Projects in high risk urban areas, and implementing the many other actions identified in the Framework. The improved maintenance will strategically remove levee vegetation to provide visibility for levee inspections, access for flood fight efforts, and access for maintenance. The impacts to fish and wildlife resources and their habitats will be avoided, minimized, and mitigated in the short- and long-term. Long-term actions will comply with the Multi-Species and Floodplain Conservation Strategy.

The participating agencies recognize that California's levees present unique challenges requiring projects that address all flood risks and that vegetation management is only one important factor in developing and implementing comprehensive solutions to improve public safety.

*Recommendation* – The participating agencies should endorse this Framework and commit to collaboratively work together as partners in upcoming years during implementation of this Framework and the Central Valley Flood Protection Plan to improve public safety and environmental sustainability.