DELTA STEWARDSHIP COUNCIL
A California State Agency

State Investments in Delta Levees

Key Issues For Updating Priorities

January 2015

"The Legislature further finds and declares that the leveed islands and tracts of the delta and portions of its uplands are floodprone areas of critical statewide significance due to the public safety risks and the costs of public emergency responses to floods, and that improvement and ongoing maintenance of the levee system is a matter of continuing urgency to protect farmlands, population centers, the state's water quality, and significant natural resource and habitat areas of the delta. The Legislature further finds that improvements and continuing maintenance of the levee system will not resolve all flood risks and that the delta is inherently a floodprone area wherein the most appropriate land uses are agriculture, wildlife habitat, and, where specifically provided, recreational activities, and that most of the existing levee systems are degraded and in need of restoration, improvement, and continuing management."

Public Resources Code section 29704

"The Council envisions a future in which risks of flooding in the Delta are reduced, despite an increase in sea levels and altered runoff patterns. The Council sees a future where Delta residents, local governments, and business are better prepared to respond when floods threaten. The Council envisions a future where bypasses are expanded; channels are improved; and strong, well-maintained levees protect local communities-but also protect State interests in a more reliable water supply for California, and a protected and restored Delta ecosystem. These improvements will include new or expanded floodways and bypasses, maintaining and improving levees, and floodproofing new development.

The Council envisions that rural areas and the Delta's legacy communities will also be protected from flood risks by careful land use planning that discourages urban development in flood-threatened areas. The Council envisions that local agencies will be better financed and protected through a locally controlled emergency response and flood protection district, with fee assessment authority. State funds for desired projects will be focused at State interests in the Delta, but some of that activity will protect local interests as well. Eliminating flood risks will be impossible, but prudent planning, reasonable land development, and improved flood management will significant reduce risk, and serve the coequal goals of a more reliable water supply, and a protected and restored Delta ecosystem."

Delta Stewardship Council Delta Plan 2013

Introduction and Problem Statement

The Sacramento-San Joaquin Delta (Delta) is an intersection of multiple interests and dependencies. A common thread that holds these interests together is an extensive system of over 1,100 miles of levees. However, "the number of levees in the system, their general condition, the practices used to maintain and rehabilitate them, and the level of investment are simply not adequate to counter the number, severity, and likelihood of risks they currently face" (Delta Stewardship Council 2010a).

California began providing funds to maintain the Delta levee system in 1973 and prepared its first plan for Delta levees in 1975 (DWR 1975). An estimated $700 million of State funds has been invested in Delta levee maintenance and improvement since then. This includes $274 million of bond funds that are encumbered for future Delta levee projects. Significant risks remain, despite these expenditures. For example, 15 years after the CALFED Bay-Delta program set a goal of bringing all Delta levees up to the standards of the U.S. Army Corps of Engineers' (USACE) PL 84-99 program, the levee systems protecting 69 percent of the Delta's land do not meet this standard (Delta Stewardship Council 2013). Demands for future levee improvements are significant. Recent estimates for Delta levee improvements range from $1.3 billion to nearly $3 billion, adjusted for inflation.

Table 1

Estimates for Delta levee improvements Adjusted For Inflation

	Low Cost Estimate for Levee Improvement (2014 dollars using ENR CCI)	High Cost Estimate for Levee Improvement (2014 dollars using ENR CCI)
2012 Central Valley Flood Protection Plan (Delta North + Delta South)	$2.49 B	$2.97 B
2011 DRMS estimate to improve 764 miles to PL 84-99	$1.31 B	$1.31 B

Source: DWR 2012 Central Valley Flood Protection Plan Table 3-5 lists the total costs of implementing recommendations for the State Plan of Flood Control in the Delta regions to be between $2.35 billion and $2.80 billion. DWR 2011 Delta Risk Management Strategy Phase 2 Table 4-2 lists the costs of improving Delta levees to PL 84-99 Standard as $1.2 billion. These values were adjusted to 2014 amounts using the annual average ENR Construction Cost Index for 2011 and 2012 along with the September 2014 index.

The Delta Reform Act requires that the Delta Plan promote strategic levee investments that attempt to reduce risks to people, property, and state interests in the Delta (Water Code section 85305) and recommend priorities for state investment in levee operation, maintenance, and improvements in the Delta (Water Code section 85306). In addition, the Delta Plan may identify actions to be taken outside of the Delta, if those actions are determined to significantly reduce flood risks in the Delta and may include local plans of flood protection (Water Code section 85307(a-b)).

Payments through the Delta Levee Maintenance Subventions Program must "reflect the priorities of, and be consistent with, the Delta Plan" (Water Code section 12986(c)). The legislative staff analysis of the Delta Reform Act noted that "these recommendations, in combination with the Council's authority to assure that State agencies act consistently with the Delta Plan, will ensure that levee spending by the Department of Water Resources (DWR) and the Central Valley Flood Protection Board (CVFPB) reflects the Delta Plan's priorities. The Legislature generally does not appropriate funding to specific Delta levee projects, and has not succeeded in imposing priorities on state levee spending in the Delta. Instead, the State budget leaves the discretion to DWR and the CVFPB to determine how to spend state money on both levees in the State Plan of Flood control and non-project levees. These priorities will affect both the

Delta levee subventions program (non-project levees) and the special projects program (levees with a State interest)" (California State Senate 2009).

Agreeing on priorities for State investments in Delta levees during the Delta Plan's development, however, was difficult because of the complexity of the Delta's flood control systems (see Figure 1) and disagreements about the level of protection that State-funded levees should attain, including which islands and tracts should be priorities for levee investments. Therefore, the Delta Plan's regulatory policies include interim priorities to be used until a comprehensive investment methodology could be developed (RR P1).

Table 2 below lists the interim priorities that are to guide budget and funding allocation strategies for levee improvements. These State priorities for investment are but one element of the Delta Plan's comprehensive risk reduction plan for the Delta, in addition to strategies such as improving residential flood protection or expanding floodways and bypasses.

Table 2.
Priorities for State Investment in Delta Integrated Flood Management Categories of Benefit Analysis

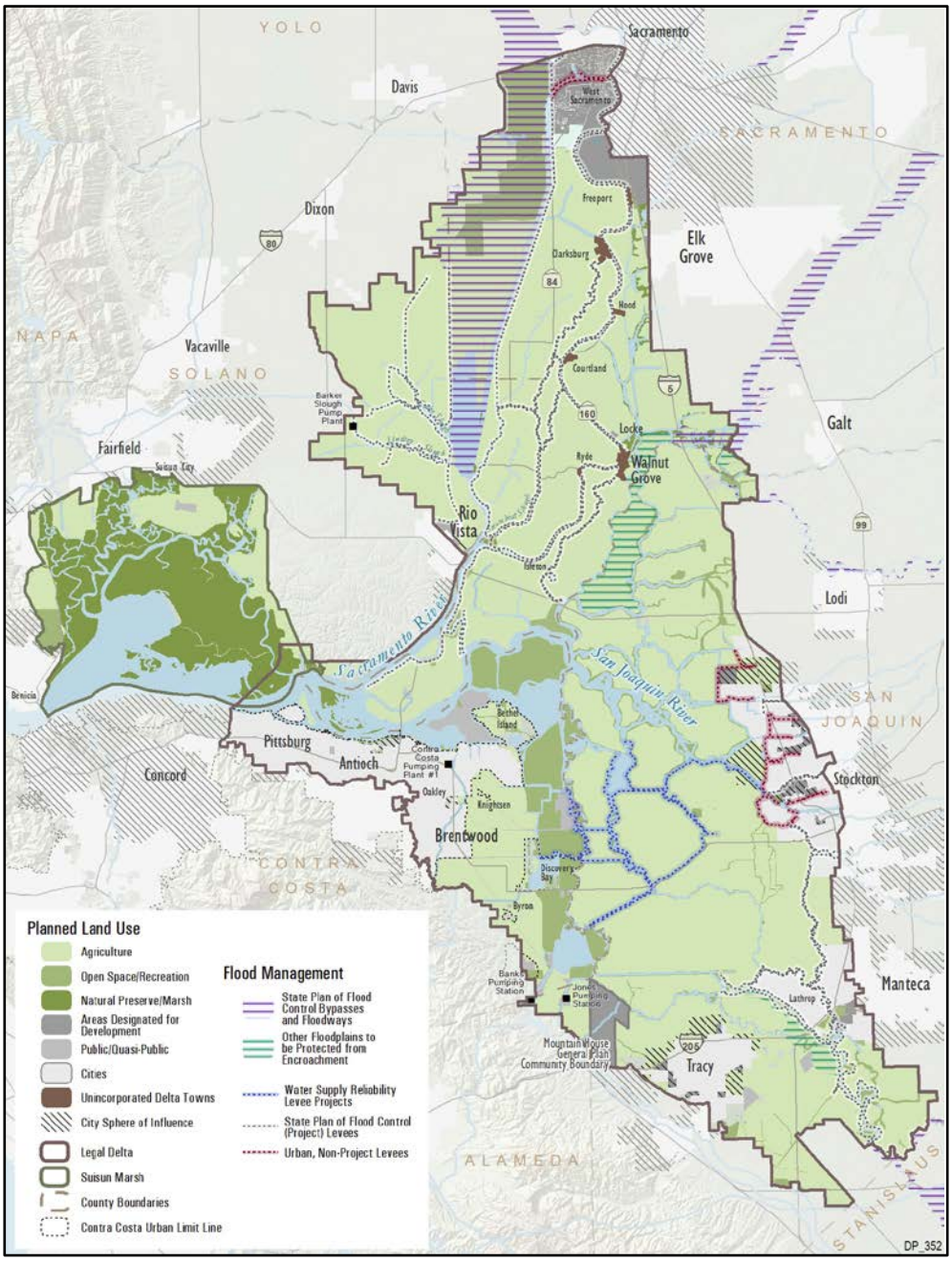
Goals	Localized Flood Protection	Levee Network	Ecosystem Conservation
1	Protect existing urban and adjacent urbanizing areas by providing 200-year flood protection.	Protect water quality and water supply conveyance in the Delta, especially levees that protect freshwater aqueducts and the primary channels that carry fresh water through the Delta.	Protect existing and provide for a net increase in channel-margin habitat.
2	Protect small communities and critical infrastructure of statewide importance (located outside of urban areas).	Protect floodwater conveyance in and through the Delta to a level consistent with the State Plan of Flood Control for project levees.	Protect existing and provide for net enhancement of floodplain habitat.
3	Protect agriculture and local working landscapes.	Protect cultural, historic, aesthetic, and recreational resources (Delta as Place).	Protect existing and provide for net enhancement of wetlands.

Source: Delta Stewardship Council, Delta Plan, 2013

The Delta Plan's policy RR P1 notes that these goals for Delta levee funding priorities are all important and that it is expected that over time, the DWR must balance achievement of these goals.

The Delta Plan indicates that the Council would act promptly to update these interim priorities, working in consultation with DWR, the Central Valley Flood Protection Board (CVFPB), the Delta Protection Commission (DPC), local agencies, and the California Water Commission (Delta Plan 2013 - RR R4). The Plan notes that "currently, no comprehensive method exists to prioritize State investments in Delta levee operations, maintenance, and improvement projects. Without a prioritization methodology, the apportionment of public resources into levees may not occur in a manner that reflects a broader, long-term approach." The plan outlines factors to be considered when the priorities are updated (Delta Stewardship Council 2013).

Figure 1.
Delta Flood Management Facilities



Others are awaiting these updated priorities. The *California Water Action Plan* includes updating these Delta levee priorities as a key action to be undertaken to increase flood protection (Natural Resources Agency 2014a). The Legislature limited the duration of its recent reauthorization of a key state Delta levee funding program, noting that the extension was sufficient only to support levee maintenance while "the State reassesses the direction it will pursue in protecting the Delta" (California State Senate 2010).

The Council's 2014-16 Delta Levee Priorities Update

A new approach for investing State funds in Delta levees must be developed. This new approach should guide the ongoing investment of State funds in a way that considers the interconnection of assets protected by levees, the exposure of these assets to different risk factors, the beneficiaries of levee protection and the appropriate cost-share allocation for this protection. It must recognize that assets such as water supply, ecosystem health, and the unique values of the Delta are not only valuable to the State of California and residents of the Delta, but to a range of beneficiaries.

The Council recently embarked on the development of this new approach, working together with other affected State and local agencies, Delta residents, a wide variety of Delta stakeholders, and consultants at ARCADIS, the Rand Corporation, and ESA. The Delta Levees Investment Strategy will be developed using a comprehensive methodology that considers the assets protected by Delta levees, the threats to Delta levees, the multiple beneficiaries of Delta levee investments, and both structural and non-structural approaches for reducing risk. The outcome of the project will include a final report that proposes a Delta levee investment and risk reduction strategy, and that outlines a suite of investments that best addresses State goals and priorities. The strategy is expected ultimately to result in proposed revisions to the Delta Plan's flood risk reduction regulatory policies, recommendations, and narrative. The proposed strategy may also be submitted to the California Legislature to help guide its future decisions about funding for Delta levees. The Council's new approach will be used to guide existing (or new) Delta levee programs and shall be consistent with the State law that applies to these programs or as modified by future Legislative actions.

Key Issues for Consideration in Updating Priorities for State Delta Levee Investment

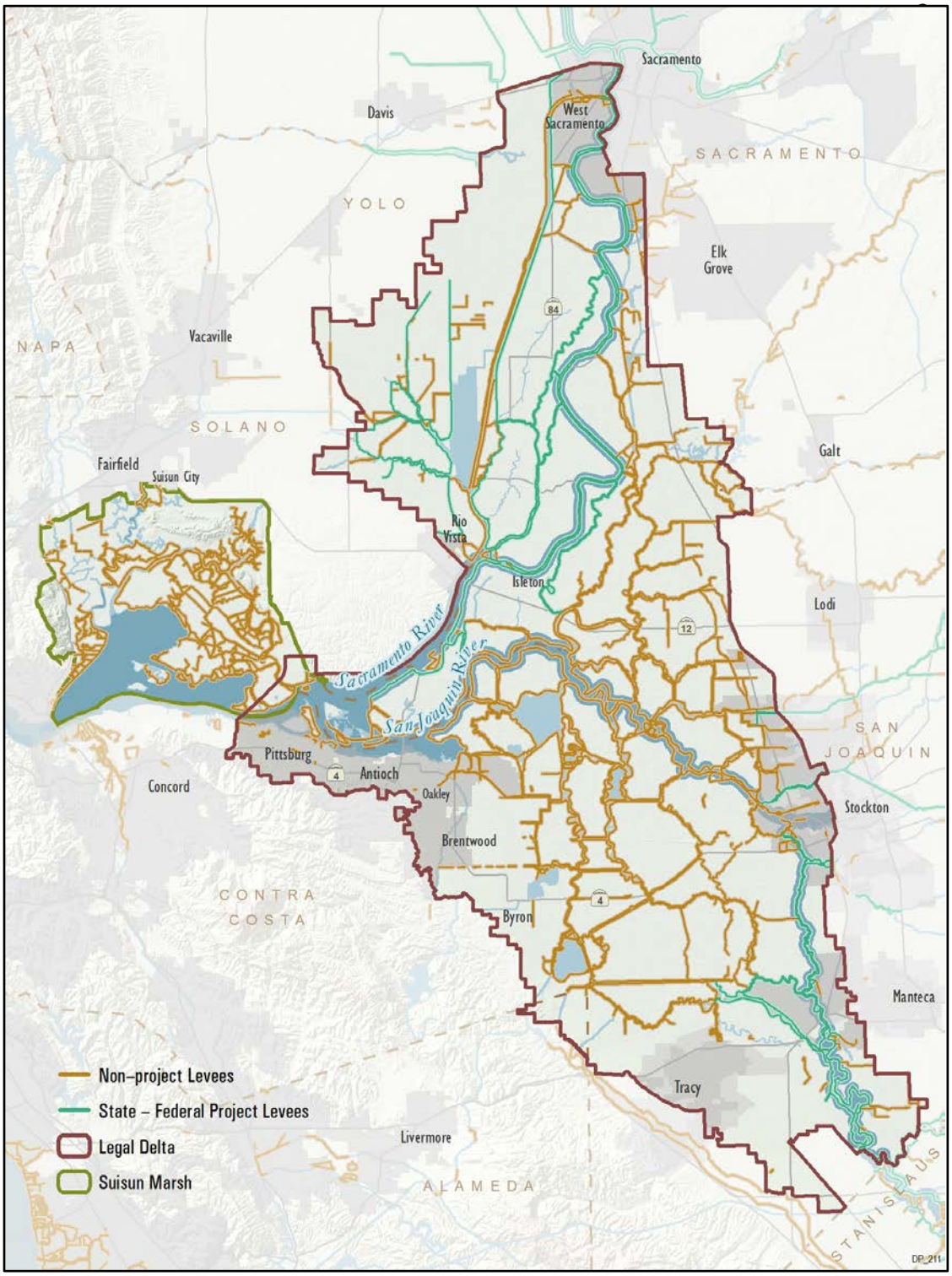
This paper outlines 15 issues that will need to be considered as the Council updates the Delta Plan's provisions regarding State investment in the Delta's levees. It summarizes background information about these issues, provides references for further information, and highlights key points that will need to be addressed over the coming months.

1. What are the Delta's Levees?

The Delta Reform Act calls for the Delta Plan to include recommendations for Delta levees that are part of the State Plan of Flood Control ("project levees") and for the Delta's private, non-project levees (Water Code section 85306). There are more than 1,100 miles of those levees in the Delta (including Suisun Marsh). Figure 2 depicts the delineation of these two categories of levees within the Delta.

Figure 2.

Project and Non-project Levees within the Delta



Source: Delta Stewardship Council, Delta Plan, 2013

"Project" levees are part of the State Plan of Flood Control and are identified by the CVFPB, with whom the Council is consulting in developing levee priorities. Roughly one-third of the Delta's levees, or about 380 miles, are "project levees". "Non-project" Delta levees are identified in DWR's *Delta Atlas* (1995) (Water Code section 12980) and comprise the remaining two-thirds of the Delta's levees.

An issue that requires resolution is the extent of potential State investment in levees in Suisun Marsh. Some of these levees are important to the Delta's ecosystem and others contribute to the unique values of the Delta as a place, especially recreation. In 1996, the Delta Levee Special Projects Program was expanded to include approximately 12 miles of Suisun Marsh levees on islands bordering northern Suisun Bay from Van Sickle Island westerly to Montezuma Slough (Water Code section 12311(a); Lobato 2014). The *Suisun Marsh Plan* (U.S. Bureau of Reclamation 2012) identifies a need to expand public funding for Suisun Marsh levees beyond its current limit.

2. What Goals and Objectives Should State Investments in Delta Levees Further?

The Delta Reform Act sets objectives for the Delta Plan's provisions to reduce risk and guide levee investments.

The Delta Plan shall attempt to ***reduce risks to people, property, and state interests in the Delta*** by promoting effective emergency preparedness, appropriate land uses, and strategic levee investments (Water Code section 85305(a)).

The State's coequal goals for the Delta also warrant consideration as priorities for levee investment are set.

The basic goals of the State for the Delta are the following:

(a) Achieve the two coequal goals of providing ***a more reliable water supply for California*** *and* ***protecting, restoring*****, and** ***enhancing the Delta ecosystem*****.** The coequal goals shall be achieved in a manner that protects and enhances ***the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place***.

(b) ***Protect, maintain, and, where possible, enhance and restore the overall quality of the Delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities***.

(c) ***Ensure orderly, balanced conservation and development of Delta land resources***.

(d) Improve flood protection by structural and nonstructural means to ***ensure an increased level of public health and safety*** [emphasis added](Public Resources Code section 29702).

Legislative declarations in the Delta Protection Act, including Public Resources Code section 29704, affirm these goals and objectives. The Delta Protection Act also provides direction for resolving potential conflicts among Legislative directions.

> To the extent of any conflict or inconsistency between this division and any provision of the Water Code, the provisions of the Water Code shall prevail (Public Resources Code section 29715)

3. What are the State's interests in the Delta?

The Delta Reform Act provides that the Delta Plan should "attempt to reduce risks to people, property, and state interests in the Delta" (Water Code section 85305(a)). This direction to attempt to reduce risks to people and property is clear. The Delta Plan reports that 570,000 people reside in the Delta and about 116,000 residential structures are located in the 100-year floodplain of the Delta, mostly near Sacramento, West Sacramento, and Stockton. The 8,000 residences below the elevation of typical tides (mean higher high water) are especially vulnerable (DWR 2008). Protecting these lives and property is important. During flood events, Delta levees convey flood water from the Sacramento River, San Joaquin, Cosumnes, Mokelumne, Calaveras, and Stanislaus rivers through the Delta to protect lives and property and minimize damage.

But what are the other "State interests in the Delta"? The Delta Reform Act, other Legislative provisions, and the Delta Plan provide guidance. These interests are shared with many federal, local, and private stakeholders.

- **A more reliable water supply for California**. The Delta provides water for in-Delta users, including local municipalities such as Stockton, the Contra Costa Water District, and Antioch and agricultural users, and for export through the State Water Project and the Central Valley Project. All these uses rely upon the quality of the Delta's waters, governed by objectives established in the State Water Resources Control Board's (SWRCB) Bay Delta Water Quality Control Plan to protect beneficial uses of Delta water. Delta levees affect the quality of water on which these users rely because they influence the hydrodynamics of the Delta and the mixing of brackish and fresh water and other constituents.

  Select Delta levees also are important to the conveyance of water from the Sacramento River through the Delta for export by State Water Project and the Central Valley Project. In the south Delta, levees on Roberts Island and Jones Tract, and adjoining islands protect East Bay Municipal Utility District's aqueduct that conveys water from the Mokelumne River to the East Bay.

  Failure or alterations of levees that result in degraded water quality can also harm water supplies, too, by requiring the release of large amounts of water from storage to flush out or repulse brackish water, and so reducing supplies otherwise available to water users. Some studies have shown, however, that pre-flooding sets of Delta islands could reduce the possibility that a large volume of saltwater would be drawn into the Delta after levee failures and would, therefore, reduce the duration of disruptions to water exports (DWR 2011a).

  DWR's *Delta Risk Management Strategy Phase 2* (2011a) found that, from the perspective of the statewide economic impacts, levee improvements that reduce the risk to fresh-water exports from the Delta have the highest benefits to California as a whole. This is in comparison to reducing other significant impacts such as the loss of transportation and utility services and in-Delta losses (e.g., businesses, population at risk, and ecosystems).

- **Delta ecosystem.** The Delta's aquatic ecosystem, including its anadromous fish, Delta smelt, longfin smelt, and other aquatic life, depends on the quality of Delta waters. Attainment of the SWRCB's Bay Delta Water Quality Plan's objectives that protect ecosystem values relies on the levee system, which influences ecosystem water quality in the same ways that levees affect municipal, agricultural, and export water supplies. In Suisun Marsh, the levee system, along with special

features like the Suisun Marsh Salinity Control Gates and leveed freshwater distribution systems at Roaring River and Morrow Island**,** are crucial to maintaining water quality and controlling water levels for waterfowl habitats. The Delta also provides habitat for numerous listed and special status terrestrial species including Swainson's Hawk, Giant Garter Snake, Riparian Brush Rabbit, Western Burrowing Owl, Pacific Pond Turtle, and wintering Sand Hill Cranes. Some leveed floodways, such as the Yolo Bypass, also provide habitats of special value to fish and wildlife. A new bypass on the San Joaquin River near Paradise Cut, as recommended in the Delta Plan (RR R5), may also provide fish and wildlife habitat, depending on its ultimate design.

Restoring the Delta ecosystem will entail creating additional habitat, possibly by altering or even removing some levees. A recent report by the San Francisco Estuary Institute-Aquatic Science Center estimates that "98% of the freshwater emergent marsh in the Delta has been lost (from approximately 190,000 hectares to just over 4,000 hectares)" (SFEI-ASC 2014).The Delta Plan calls for setting levees back from their current alignment, where feasible, to improve migratory corridors for anadromous fish and songbirds along the Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta boundary to Mossdale; and the north and south forks of the Mokelumne River, Paradise Cut, Steamboat Slough, and Sutter Slough (ER P4). When levees cannot be set back, it may be possible sometimes to incorporate woody debris, vegetation, or other features in and adjoining levees to create more natural channel habitat. Restoring the 8,000 acres of tidal marsh referenced in the Delta Plan performance measures or the larger area of tidal and freshwater marsh envisioned in the draft Bay Delta Conservation Plan (BDCP) will also entail altering or even removing some levees within the designated restoration opportunity areas (ER R2).

Vegetation on levees and adjoining berms, where it remains, also contributes to the Delta ecosystem by providing habitat for birds and shade that cools adjoining waters. Protection and management of levee vegetation is a persistent challenge, partly because of Army Corps of Engineers (USACE) regulations that require its clearance from levees. The Delta Plan recommends that the USACE should exempt Delta levees from its levee vegetation policy, where appropriate. The Water Resources Reform and Development Act of 2014 requires the USACE to revise its vegetation management policy for levees to take into consideration and incorporate regional characteristics, habitat for species of concern, and levee performance. While there is no new policy yet, the USACE will no longer disqualify a levee system from its Rehabilitation Program (PL-84-99) due solely to vegetation issues. (Personal communication with CVFPB staff.)

Local levee-maintaining agencies sometimes suggest that pursuing ecosystem-related goals and objectives redirects funds that would otherwise be available to improve levees to protect lives and property or secure a more reliable water supply.

- **Delta as place***.* The Delta Plan and legislative provisions identify unique values of the Delta as a place. These are inherent in the coequal goals that underlie the State's interest in the Delta.

  The Delta's geography of low-lying islands and tracts, shaped by rivers, sloughs, and shipping channels, is defined by the region's levees.

  Agriculture in the Delta, which is central to the region's rural economy, depends on levees, which protect farms from flooding, enable their drainage, and incorporate irrigation and water control facilities.

Infrastructure important to the economy of the Delta and State is protected by levees. This includes, in addition to water management facilities, interstate and state highways and local roads, railroads (Burlington Northern Santa Fe and Union Pacific) and the navigation channels that support the ports at Stockton and West Sacramento; energy facilities, including electric transmission lines (Western Area Power Administration; Pacific Gas and Electric), pipelines, gas storage facilities, and local distribution systems; and telecommunications infrastructure.

Recreation, including waterfowl and upland game hunting, is provided on some Delta lands protected by levees. Resorts and marinas are often found adjacent to levees. Some levees provide recreation such as riverside biking or walking trails, view points, and bankfishing access. Scenic roads atop and adjoining some Delta levees are popular for recreational motorists. Access to Delta levees for recreation is a persistent issue, because most Delta levees are private property where trespassing is prohibited.

The Delta's legacy communities are protected by levees from flood damage.

The Delta Plan and other legislative provisions anticipate that these values of the Delta will not remain unchanged, but rather call for protection of the Delta "as an evolving place". The Delta Plan says that this means accepting that change will not stop but that fundamental characteristics and values that contribute to the Delta's special qualities and that distinguish it from other places can be preserved and enhanced.

In its authorization of State funding for the Delta Levee Maintenance Subvention Program, the Legislature also acknowledged that some change was inevitable, providing: "The physical characteristics of the Delta should be preserved essentially in their present form; and that the key to preserving the Delta's physical characteristics is the system of levees defining the waterways and producing the adjacent islands. However, the Legislature recognizes that it may not be economically justifiable to maintain all Delta islands" (Water Code section 12981).

4. What Threatens Delta Levees?

Many of the levees in the Delta originally were constructed more than a century ago. These early levees were not built to any recognized standard; they were built with available materials and knowledge to reclaim "swamp and overflow" lands[1]. There have been over 140 levee failures in the last century. The most recent failure, on Upper Jones Tract on June 3, 2004, inundated 12,000 acres of farmland with approximately 160,000 acre-feet of water (DWR 2005).

Four geologic and hydrologic forces threaten the Delta levee system with steadily increasing rates and consequences of levee failure: land subsidence, changing inflows, sea-level rise, and earthquakes. Many Delta levees have significantly subsided over the years due to their foundations being set in soft, organic soils. The issue of levee subsidence will only be exacerbated in the coming decades by rising sea levels and the risk of earthquakes that affect levees (Public Policy Institute of California 2008). Other factors that threaten Delta levees may include boat wakes, rodents, wind fetch, and ongoing normal deterioration.

[1] A more extensive description of the history of the Delta's levee system is available in other documents such as the Delta Plan, Public Policy Institute of California's *Comparing Futures for the Sacramento-San Joaquin Delta* or the Delta Protection Commission's *Economic Sustainability Plan for the Sacramento-San Joaquin Delta*.

5. Who is Responsible for the Delta's Levees?

The Delta Plan's priorities for State investment in Delta levees will affect a complex mix of private landowners and State and local agencies that share responsibilities for the Delta's levees. Because so many interests are involved, agreement on priorities can be difficult and responsibility for progress is diffused.

The Delta Plan can guide these myriad interests towards more coordinated action. Priorities incorporated in the Plan's regulatory policies will affect projects in the Delta carried out, funded or approved by State or local agencies (Water Code section 85225). In addition, State and local levee agencies are responsible for coordinating their actions pursuant to the Delta Plan with the Council and other relevant agencies (Water Code section 85204). In particular, DWR's Delta Levee Maintenance Subvention Program, which subsidizes maintenance of Delta levees, must reflect the priorities of, and be consistent with, the Delta Plan (Water Code section 12986(c)).

- **Private landowners.** Most Delta levees, whether project levees or non-project levees, are private property, over which flood control or drainage agencies have only an easement authorizing the levees' construction and maintenance.

- **Local maintaining agencies**. Almost all Delta levees are maintained by local agencies, usually reclamation districts. Nearly 100 local agencies are involved. Reclamation districts are controlled by their landowners, who are allotted votes based on the assessed value or acreage of their ownership (Water Code section 50704). At Bethel Island, levees are maintained by a municipal improvement district. Metropolitan flood control agencies are well funded and staffed, but many local agencies have small budgets and few staff.

- **Central Valley Flood Protection Board (CVFPB).** The CVFPB has a diverse set of duties enabling it to oversee planning and improvement of both the Delta's project and its non-project levees. For project levees, the CVFPB is responsible for approving and overseeing the Central Valley Flood Protection Plan which, in cooperation with the USACE project authorizations, is the State's flood management plan for lands along the Sacramento and San Joaquin rivers and their tributaries. Through agreements with USACE, the CVFPB fulfills the State's cost-sharing responsibilities to the federal government for federally-authorized improvements to facilities of the State Plan of Flood Control for these rivers and their tributaries, providing lands, easements, rights-of-way, relocations, and cash payments for USACE-constructed or cost-shared flood control projects. When a project is completed and assurance agreements are secured from local maintaining agencies, the CVFPB accepts responsibility for the project and transfers it to the local agency to operate and maintain. The CVFPB also regulates encroachments within this State-federal system and some other Board-designated floodways.

  Finally, for both project and non-project levees, the CVFPB approves costs allocated or reimbursed through the DWR's Delta Levee Maintenance Subvention Program (Water Code section 12986(a)(6)) and local plans for maintenance and improvement of project and non-project levees eligible for reimbursement through the subventions program (Water Code section 12897). Local agencies are required to enter into agreements with the CVFPB to perform the maintenance and improvement work specified in these plans. If sufficient State funds for the subventions program are unavailable, it is the responsibility of the CVFPB to apportion them among the levees or levee segments that are

more critical and beneficial, in response to recommendations from DWR (Water Code section 12897(f)).

In practice, CVFPB activities are primarily focused on its duties related to the State Plan of Flood Control. Few resources are available to support its duties related to other Delta levees.

- **Department of Water Resources.** DWR guides many flood management activities across the State. Its broad view, engineering and environmental science skills, multiple programs, and size contribute to its role as the leading State flood management agency.

  For project levees, DWR develops and recommends the Central Valley Flood Protection Plan to the CVFPB. Pursuant to State law, on the Sacramento River DWR maintains at its expense many bypasses and a few levees of the State Plan of Flood Control, including in the Delta the west levee of the Yolo Bypass above Putah Creek and Putah Creek's levees (Water Code section 8361).

  For non-project levees DWR administers two key programs. The first is the Delta Levee Maintenance Subvention Program, which cost shares local agencies' maintenance of Delta levees (Water Code sections 12980 through 12995). The other is the Delta Levees Special Flood Control Projects Program which funds improvements to levees and levee-related wildlife and fish habitats that have discrete and identifiable public benefits, including the protection of public highways and roads, utility lines and conduits, and other public facilities, and the protection of urbanized areas, water quality, recreation, navigation, fish and wildlife habitats, and other public benefits (Water Code sections 12300-12314). In the past, DWR has prepared plans for the Delta levee system (DWR 1975; DWR 1982; DWR 1992; DWR 2011a). It recommends criteria for maintenance and improvement of non-project levees to the CVFPB (Water Code section 12984), and inspects completed projects funded through the Delta Levee Maintenance Subventions Program, reporting its findings to the CVFPB (Water Code section 12988).

- **California Water Commission (Commission)**. When requested by DWR, the Commission is responsible for reviewing and approving a list prepared by DWR of Delta areas where flood control work through the Delta Levees Special Flood Control Projects Program is needed (Water Code section 12313). This was last done in 1990, when DWR submitted and the Commission approved a list of priorities (DWR 1990). The Commission also presents to Congressional committees its view on flood control projects being planned or constructed by the USACE.

- **Department of Fish and Wildlife (DFW).** In addition to its many other responsibilities to protect fish and wildlife, DFW has special duties that affect improvement of levees funded through the Delta Levee Maintenance Subventions Program and the Delta Levees Special Flood Control Projects Program. It reviews projects to make sure they have no net long-term habitat loss and have a net benefit for aquatic species in the Delta (Water Code section 78543).

6. What plans guide the State's investment in Delta levees?

For many years, the State has prepared plans to guide investment in Delta levees.

For project levees, guidance is provided by the aforementioned *Central Valley Flood Protection Plan* (2012). It proposes a system-wide investment approach to flood management in areas protected by the State Plan of Flood Control, including the Delta's project levees.
The plan identifies some priorities for State investment but it also caveats its programmatic nature: "The CVFPP is a descriptive document. It is not a system wide feasibility study of sufficient detail to support project-specific actions such as authorizing legislation, design, and construction. It is intended to provide a foundation for prioritizing Central Valley flood risk reduction and ecosystem restoration investments, including feasibility studies on appropriate scales – from valley wide to project-specific" (DWR 2012).

For the Delta, the plan's actions include, but are not limited to, urban flood protection in metropolitan Sacramento and Stockton and the City of West Sacramento; small community flood protection including structural (e.g., ring levees, training levees, or floodwalls) and non-structural improvements (e.g., flood proofing, willing seller purchases/relocation); and rural-agricultural area flood protection including maintaining levee crown elevations, providing all-weather access roads, levee improvements to resolve known performance issues and conservation easements to preserve agriculture while preventing urbanization in these areas. Potential system improvements the plan identifies in the Delta include expanding the lower end of the Yolo Bypass upstream from Rio Vista by setting back levees and evaluating a new bypass in the South Delta through expansion of Paradise Cut or other waterways. According to the CVFPP, ecosystem restoration opportunities will be integrated with flood risk reduction projects.

A State plan for non-project levees, DWR's *Bulletin 192 Plan for Improvement of Delta Levees,* was first prepared by DWR in 1975 as State funding for Delta levees began. It was endorsed by the Legislature as a conceptual plan to guide the formulation of projects to preserve the levee system's integrity (Water Code section 12225). It was updated in 1982's *Bulletin 192-82: Delta Levees Investigation*. Local agencies plans for improving non-project levees must be compatible with Bulletin 192-82 to be eligible for reimbursement through the State's Delta levee subventions program (Water Code section 12987(b)). DWR's *Actions and Priorities Delta Flood Protection Act – Eight Western Delta Islands* (1990) provides a list of priority projects in response to Water Code section 12313. More recent plans include the CALFED Bay-Delta Program's *Levee System Integrity Program Plan (*2000) and the *Delta Risk Management Study* (DWR 2009; DWR 2011a).

Table 3 shows a chronology of significant events related to the Delta levees along with related responses that were taken by the State and others. A more extensive chronology of events affecting the Delta is included in Appendix A.

Table 3
Chronology of Significant Delta Events and Related Responses

Year	Event	Response
1972	San Joaquin River levee breaks flooding Brannan and Andrus Islands and the town of Isleton.	The Way Bill is passed and begins the DWR Delta Levees Maintenance Subvention Program. DWR publishes Bulletin 192 which analyzes the feasibility of providing flood control, recreation, wildlife habitat, and environmental enhancement by improving Delta levees.

1982	June 1982, California voters reject Proposition 9, also known as the Peripheral Canal Act	Bulletin 192-82 is published and establishes levee geometry requirements for the DWR Delta Levees Maintenance Subvention Program.
1983	Extremely wet conditions, brought on by El Niño weather conditions, coupled with voluminous Sierra runoff led to very high river stages throughout the system and caused extensive damage to the flood management system of the Sacramento Valley. The levee at Venice Island breached and flooded 3,220 acres of farmland.	The Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta is published and establishes the HMP levee geometry to be used as a short-term compliance for FEMA assistance.
1986	The floods of 1986 caused extensive damage to the flood management system of the Sacramento Valley.	The Delta Flood Protection Act of 1988 establishes the DWR Special Projects Program to provide State financial assistance for Delta levees to $12 million per fiscal year for the eight western islands and for the towns of Thornton and Walnut Grove.
1997	Storms caused one of the worst floods of the century over the New Year holiday. McCormack-Williamson Tract and Dead Horse Island levees failed. High flows in the San Joaquin River led to failure of a levee at Mossdale, flooding that area and Stewart Tract, and the nearby Paradise Cut levee breach flooded the Pescadero District. Fourteen levee breaches occurred on the San Joaquin River between Fresno and the Chowchilla Bypass. Flood releases from Don Pedro Dam exceed downstream channel capacities.	CALFED Programmatic Record of Decision was certified, including adoption of the Delta-specific PL 84-99 design as the base level of protection for the Delta levee system.
2004 **2005**	Lower Jones Tract levee failed Hurricane Katrina devastates New Orleans	The Central Valley Flood Protection Act directs DWR to prepare and CVFPB to adopt a Central Valley Flood Protection Plan (CVFPP) by 2012. Delta Risk Management Strategy Phase 1 &2 are developed to assess the performance of Delta and Suisun Marsh levees under various stressors along with the consequences of levee failure and also to develop risk reduction strategies. Central Valley Flood Protection Plan is completed and establishes a system wide approach to improving flood management in the areas currently receiving some amount of flood

	protection from the existing facilities of the State Plan of Flood Control.

Table 4 summarizes levee improvement costs. Though investments have been made in Delta levees for around 40 years, each study has shown that there is significant work still to be done to improve levees to acceptable levels. It should be noted that the earlier studies looked at levees mostly within the central portion of the Delta whereas the Delta Risk Management Strategy (DRMS) evaluated the majority of non-project levees throughout the Delta. The Council has also heard from stakeholders in the Delta that estimates for levee improvements published in earlier reports are too pessimistic and that funding made available through Propositions 1E and 84 has helped significantly with levee improvements in recent years.

Table 4
Levee Improvement Cost Estimates from Prior State Delta Levee Plans

	Miles needed of Improvement	Estimates of Recommended Improvements	Per Mile Cost of Recommended Levee Improvements
Bulletin 192 (1975)	310	$115 M	$370,968
Bulletin 192-82 (1982)	500	$930 M	$1,860,000
CALFED (2000)	521	$1,000 M	$1,919,386
DRMS Total (2009)	951	$1,950 M	
DRMS (PL 84-99 standard)	*764*	*$1,200 M*	*$1,570,681*
DRMS (Urban Project Levee standard)	*187*	*$750 M*	*$4,010,695*

Additional reports, by the State and other entities, also include recommendations relevant to the Delta's levees.

- **Delta Protection Commission (DPC).** The Delta Protection Commission's *Economic Sustainability Plan for the Sacramento-San Joaquin River Delta* (2012) concluded that large investments in strengthening all of the Delta's levees are a cost-effective approach to improving water supply reliability, economic sustainability, and reliable energy, transportation, and water infrastructure. The report states that "the levee system is the foundation on which the entire Delta economy is built". The Economic Sustainability Plan included several specific proposals regarding investments in the Delta's levee system included in Table 5.

  The DPC will soon award a contract to study the feasibility of the Delta levee assessment district which its Economic Sustainability Plan (and the Council's Delta Plan) recommends.

Table 5
Delta Levee Recommendations of Delta Protection Commission's Economic Sustainability Plan

Topic	Recommendations for Economic Sustainability
Levees and Public Safety Recommendations	1. Improve and maintain all non-project levees to at least the Delta-specific PL 84-99 standard. 2. Improve most "lowland" levees and selected other levees to a higher Delta-specific standard that more fully addressees the risks due to earthquakes, extreme floods, and sea-level rise, allows for improved flood fighting and emergency response, provides improved protection for legacy communities, and allows for growth of vegetation on the water side of levees to improve habitat. 3. The Delta Levee Subventions and Special Projects Program should continue to be supported. 4. Transfer to a regional agency with fee assessment authority on levee beneficiaries responsibility for allocating funds for the longer-term improvement of Delta levees and the maintenance of regional emergency preparedness, response, and recovery systems developed jointly with the Delta counties and State and federal governments.
Recommendations for Infrastructure	1. Planning of levee investments must fully consider the economic value of infrastructure services along with all other benefits.

Source: Delta Stewardship Council. 2012. The Delta Protection Commission's Proposal to Protect the Delta as an Evolving Place (February, 2012)

- **Suisun Marsh**. The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (U.S. Bureau of Reclamation 2012) recommends that public funding for Suisun Marsh levees needs to be expanded beyond its current limit to address maintenance and improvement activities for exterior levees (levees exposed to tidal action). In addition, the Suisun Marsh Plan notes that as tidal marshes are restored there, some levees will require reinforcement, more maintenance, and in some instances, significant upgrades.

- **Public Policy Institute of California (PPIC).** PPIC's 2008 report, *Comparing Futures for the Sacramento-San Joaquin Delta*, recommended moving away from levees as the primary means of managing Delta land and water. They suggested that California prepare for island failures and provide major State levee investments only for those Delta islands that have a cost-effective statewide interest. Also, the report stated that California should devise mitigation strategies for land owners on other islands.

- **Coalition to Support Delta Projects.** In 2012, the Coalition to Support Delta Projects, a group of diverse Delta stakeholders that included the Planning and Conservation League, Metropolitan Water District of Southern California, San Joaquin County, and other stakeholders, wrote Governor Brown recommending that State funding be used to improve levees to protect the Delta's publicly-owned western islands, Victoria and Woodward Islands and Jones Tract to protect water and transportation infrastructure, and critical islands such as Bethel and Bradford Islands and Hotchkiss Tract. The

levee funding recommendation was part of a larger proposal that also sought funds for various water supply reliability and ecosystem enhancement projects.

- **Regional Flood Control Agencies**. As a result of the Central Valley Flood Protection Plan in 2012, DWR has been coordinating with local flood management groups to prepare Regional Flood Management Plans throughout the Central Valley. The intent is for these plans to be locally developed to provide DWR information on the local visions for flood management for use in future DWR studies such as the State basin-wide feasibility studies scheduled for completion by 2017 (DWR 2012). Two regional plans are being developed that will look at the northern and southern regions of the Delta. These are the *Lower Sacramento River-Delta North Regional Flood Management Plan* and the *Lower San Joaquin River and Delta South Regional Flood Management Plan*.

7. How are Delta levee maintenance, operation, and improvement funded now?

The estimated costs of upgrading Delta levees are substantial, ranging from $1.3 billion to nearly $3.0 billion, adjusted for inflation (see Table 1). The CALFED Bay-Delta Program, for example, estimated preliminarily in 2000 that its recommended improvements to the Delta's non-project levees would cost $1.43 billion. The DPC estimated in 2012 that its recommended levee improvements would cost an additional $500 million to $1.5 billion.[2] Estimated costs to implement the Central Valley Flood Protection Plan's recommendations for the State Plan of Flood Control in its Delta regions are $2.35 billion to $2.8 billion, about 17 percent of the plan's estimated total cost (CVFPB 2012). These costs, however, are only a small part of California's large flood management needs. Statewide, DWR estimates that more than $100 billion in capital investment is needed throughout the State for flood management projects, including $50 billion for currently identified projects (DWR 2013a).

The State has provided and continues to provide the majority of investments in the Delta levee system. Since the 1970s the State has committed approximately $700 million to levee operations, maintenance and improvement (Delta Stewardship Council, Delta Plan, 2013).

DWR administers the key State programs that provide large Delta levee investments: the Delta Levees Maintenance Subventions Program, Delta Levees Special Flood Control Projects, and a variety of other programs funded by voter-passed Propositions 84 and 1E.

DWR's Delta Levee Maintenance Subventions Program provides technical and financial assistance to local levee maintaining agencies in the Delta for the maintenance and rehabilitation of Delta levees. It pays up to 75 percent of levee maintenance and improvement costs after a minimum cost threshold has been paid by that district (DWR 2013), an increase that occurred in 1988 from the 50 percent State cost share when the program was established in 1973. While the Subventions Program is primarily for non-project levees, project levees qualify if more than 50 percent of the island acreage is within the Delta primary zone. In the secondary zone, project levees are not eligible for Delta Levees Maintenance Subventions funding.

DWR's Delta Levees Special Flood Control Projects program provides financial assistance to local levee maintaining agencies for improvement or rehabilitation of levees in the Delta. It can fund up to 100 percent of project costs. The program has provided more than $350 million to the Delta's local agencies

[2] DPC estimated that its recommended levee improvements would cost $1-$2 billion more than the cost of improving all Delta levees to the PL 84-99 standard. CALFED's estimate of the cost of improving all levees to PL 84-99, its base standard, was $1 billion.

for flood control and related habitat projects since its inception (DWR 2014; Lobato 2014). The program serves the entire Delta and portions of Suisun Marsh (approximately 12 miles of levees on islands bordering Suisun Bay from Van Sickle Island westerly to Montezuma Slough) as well as the towns of Thornton and Walnut Grove (Water Code section 12311). This service area was expanded in 1996 from the program's initial focus on only the eight western Delta Islands—Bethel, Bradford, Holland, Hotchkiss, Jersey, Sherman, Twitchell and Webb Islands—and Thornton and Walnut Grove. Today, any project or non-project levee in the Delta's primary zone or a non-project levee in the secondary zone is eligible for Special Projects funding.

In September 2013, DWR drafted its report *FloodSAFE - A Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun Marsh*. The report provides a framework that guides DWR flood management investments in the Delta and authorized portions of Suisun Marsh, with a focus on multiple benefit projects. The priorities shown in Table 6 guide DWR's funding and work planning for Delta Integrated Flood Management (IFM) based on categories of benefit. The priorities are consistent with the Delta Plan. The report says "funding source and associated legislation will be used to determine exactly how the priorities are used during decision-making."

Table 6

DWR Priorities for Delta Integrated Flood Management

DWR Investment Priority for Delta IFM	Categories of Benefit		
	Localized IFM Projects	**Generalized IFM Projects**	**Ecosystem Conservation Projects**
First	Urban/Urbanizing Flood Protection	Water Quality, Water Supply Reliability, and Conveyance	Protect Existing and Provide for Net Increase of Channel-Margin Habitat
Second	Small Community Protection and Delta as a Place	Flood Water Conveyance and Protection of Infrastructure of Statewide Interest, (i.e., Transportation Assets, Major Utility Corridors)	Protect Existing and Provide for Net Increase of Wetland and Floodplain Habitat
Third	Protection of Agriculture and Local Working Landscapes	Public Recreation Resources	Habitat Protection and Net Habitat Increase

Source: Table 1-1. DWR Priorities for Delta IFM on page 17 of Department of Water Resources. 2013b. *FloodSAFE A Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun Marsh (Draft V9).* September 2013.

Note: The priorities reflected in this table represent the best thinking at the time of its publication. These priorities may be altered by DWR in response to future large-scale planning efforts affecting the Delta over the long-term (DWR 2013b).

Recent Statewide voter-approved propositions, such as Propositions 84 and 1E, are providing large sums of money for Delta levee maintenance, repair, and improvements. As of March 2012, the State has expended about $218 million of bond funds authorized by these propositions in the Delta, including $110 million for the Subventions Program and Special Projects. Table 7 reports data from the Council's records on the committed and expended funds for Delta levees, by work task, as of September 2012, the most recent full report available.

Local maintaining agencies provide a lesser but still significant portion of investment in Delta levees. Local agencies' ability to provide the matching funds required by the State's Delta levee programs is affected by the provisions of Proposition 218, approved by California voters in 1996. Proposition 218 requires voter approval for fees and assessments for "property-related" flood protection. Anything not qualifying as a fee is a tax, which may require a two-thirds supermajority of local voters under Proposition 13. A further constitutional reform, Proposition 26 passed in 2010, restricts the definition of other, non-property-related fees, potentially further hampering funding of flood system improvements that include ecosystem improvements. These provisions make it harder for local agencies to investment in levee system improvements that integrate risk reduction goals with other objectives (PPIC 2014).

Table 7

Propositions 84 and 1E Delta Expenditure Report to March 2012

Tasks	Committed $ Millions	Expended $ Millions
Subventions Program	79	50
Special Projects	214	60
Five-Year Plans	5	2
Contracts	13	10
Program Delivery	20	20
Emergency	110	25
Urban Levee Evaluation	13	13
Non-Urban Levee Evaluation	7	7
Sac Bank	6	6
Bond Servicing Cost	25	25
Total	**492**	**218**

Source: "Table 4-2 Propositions 84 and 1E Delta Expenditure Report to March 2012" on page 42 of Department of Water Resources. 2013b. FloodSAFE A Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun Marsh (Draft V9). September 2013

Notes:

1. The amounts shown in this table are approximate and cover expenditures beginning with FY 2007/08.
2. Contracts amount includes the interagency contract with DFW and work on LiDAR, USGS, and DRMS.
3. Project expenditures are shown on the Bond Accountability website.
4. Bond Servicing Cost is based on 3.5 percent of maximum available funds to the Delta programs.
5. Subventions Program commitments are based on approved plans by the CVFPB.
6. Special Projects commitments cover expenditures starting with FY 2008/09.
7. Expenditures beyond March 2012 are not included in this table

8. What level of Delta levee improvement is warranted?

The Delta Reform Act and other legislation recognize that levee improvements cannot eliminate flood risks. The Legislature has found that "improvements and continuing maintenance of the levee system will not resolve all flood risks" (Public Resources Code section 29704) and calls for the Delta Plan to include provisions that *attempt* to reduce risks (Water Code section 85305). The Delta Plan acknowledges that eliminating flood risks is impossible, but that they can be significantly reduced by improved flood management, prudent planning, and reasonable land development. The Delta Plan's interim policy governing Delta levee improvements (RR P1) resulted from the difficulty in resolving disagreement about the level of improvement to be recommended for Delta levees, as embodied in differing standards for Delta levees proposed by Council staff, the DWR, the DPC, and local levee maintaining agencies.

A variety of criteria can help guide judgments about the level of levee improvements for different areas of the Delta. For property, a common judgment is that the costs of protection should not exceed the value of the assets protected (Water Code sections 12582.7(a)(2)). When economic measures may be poor criteria, planners often seek the least costly protection alternative. Least cost alternatives are often used to evaluate measures to protect lives or the environment or cultural resources. For example, in rural areas, elevating residences and improving flood warning systems and evacuation measures may be a more cost-effective way to protect people's lives than expensive levee improvements. For important infrastructure, the effects of service interruptions can be considered. The Federal Highway Administration's design standards, for example, tolerate flooding of interstate and federal highways once every 50 years. Sometimes it is more cost-effective to provide redundancy in infrastructure, such as the ability to transmit electric power through multiple power transmission lines, than to provide risk-free protection for each infrastructure component.

The levels of protection provided by Delta levees must also consider flows from upstream areas that are discharged past a levee as well as effects on downstream areas. For example, at the McCormack-Williamson Tract on the Cosumnes River, a court order limits levee improvements so that its levees do not cause floodwaters to overflow levees on other islands or back up floodwater discharging from upstream. It is especially important to consider the improvements proposed by the Central Valley Flood Protection Plan, which governs the project levees and floodways that discharge to the Delta.

Inadequate funding of maintenance or improvement can also entail expenses if levees fail. These costs can include emergency response to remove flood debris and to offset hazards mitigated by the failed levees, or to repurpose flooded areas for wildlife and fish habitat or other uses.

Various plans for the Delta have proposed differing levels of flood protection, often tied to the assets protected.

- **200-year urban levees**. The Central Valley Flood Protection Plan and related statutes propose that project levees provide 200-year protection for urban and urbanizing areas that will attain populations of 10,000 or more (Government Code section 65865.5(a)(3)). This standard goes beyond criteria for levee height and geometric design to include requirements for freeboard, slope stability, seepage/underseepage, erosion, settlement, and seismic stability. It protects against a flood that has a 0.5 percent chance of being equaled or exceeded in any given year. Plans for improvements to this level are under development and improvements are underway in Sacramento, West

Sacramento, and Stockton. Under State law, development may be limited in areas that cannot show substantial progress towards this standard.

- **Federal Emergency Management Agency (FEMA) 100-year levees.** The Central Valley Flood Protection Plan recommends this standard for small communities when benefits exceed costs. This "insurance" standard, often called the "1 percent annual chance flood" level of protection, protects against flooding that is the basis for FEMA's flood insurance rate maps. The standard provides crown heights 3 feet above the 100-year flood and 16 feet wide, with side slopes of 2 to 1. Few Delta levees outside of cities meet this standard, and many urban levees need improvement to meet it. Where levees meet this standard, new developments are not required to meet federal floodproofing standards. For property-owners, a benefit of attaining the 100-year standard is relief from the cost of purchasing flood insurance that is required for properties with federally-guaranteed mortgages. For rural areas protected by project levees, attaining this level of protection is often difficult to justify economically.

- **Public Law 84-99 (PL 84-99).** The CALFED Bay-Delta Program's Levee System Program Plan proposed attaining levels of protection for non-project levees consistent with the USACE's PL 84-99 program. The PL 84-99 standard provides for levees 1.5 feet above the 100-year flood elevation and side slopes of 2 to 1. The PL 84-99 standard is a minimum requirement established by USACE for levees that participate in its Rehabilitation and Inspection Program. Delta islands or tracts that meet this standard are eligible for USACE funding for levee rehabilitation and island restoration after flooding, if the benefits exceed the cost.

  Sufficient funds to attain this standard were not provided through the CALFED Bay-Delta Program. Twenty-five Delta reclamation districts, protecting about 31 percent of the legal Delta's land behind about 516 miles of levees, are at or above this standard (Delta Stewardship Council 2013).

  The DPC's *Economic Sustainability Plan* also proposed raising all Delta levees to the USACE's PL 84-99 standard, with additional improvements, such as wide berms to improve levee stability, for levees that protect essential infrastructure.

- **Bulletin 192 standard.** The plan for Delta levee improvements proposed by DWR when State funding for Delta levees began, Bulletin 192 (DWR 1975), proposed two levels of improvement: 100 year protection roughly equivalent to the FEMA 100 year standard described above for levees protecting areas with urban centers – Brannan, Andrus, and Bethel Islands and Hotchkiss, Shima, Wright-Elmwood, Walnut Grove, and Sargent Barnhart Tracts. Levee improvements on other islands used primarily for agriculture were to provide 50 year protection roughly equivalent to the PL 84-99 standard. The plan anticipated that on a few islands, levee improvements would be uneconomical, a conclusion with which the Legislature concurred (Water Code section 128981(b)). Bulletin 192 is endorsed as a conceptual plan to guide the formulation of projects to preserve the Delta levee system (Water Code section 12225). Bulletin 192-82, its update, provides guidance for the Delta Levee Maintenance Subventions Program (Water Code section 12987).

- **Hazard Mitigation Plan (HMP).** The standard first developed for FEMA's Hazard Mitigation Program (HMP) provides for levees with crowns 1 foot above 100-year flood heights and 16 feet wide, with side slopes of 1.5 to 1. Fifty-three of the Delta's reclamation districts, protecting more than 47 percent of the legal Delta's acreage, fall below this standard, as do 139 miles of Delta levees (Delta Stewardship Council 2013). The HMP guidance, negotiated between DWR and FEMA in 1983 and

1987, was intended as an interim guidance. Until recently, local communities that met the HMP guidance were eligible for FEMA disaster assistance if levees fail or islands flood. FEMA's recent cancelation of its agreement with the State about Delta levees makes this commitment uncertain. The Delta Plan's policy on State investments in Delta levees (RR P1) provides that improvement of non-project levees to the HMP standard may be funded without justification, but that higher levels of protection should be provided "as befits the benefits to be provided."

- **Suisun Marsh**. Standards for levees in Suisun Marsh are established in the 1980 *Suisun Marsh Local Plan of Protection*, and are approved by the San Francisco Bay Conservation and Development Commission. The crowns of exterior levees are to be 2 feet above expected high water levels. Where wave action is expected, the freeboard must be at least 3 feet. The more recent *Suisun Marsh Plan* (Bureau of Reclamation 2012) also proposes habitat levees -- low, wide, gently sloping vegetated levees, which may be overtopped during storm surges with nominal eroding or destabilizing. Habitat levees would include benches or berms that provide wind- and wave-action protection as well as opportunities for high marsh/upland transition habitat.

9. How should levee maintenance and improvement costs be allocated?

'Who pays what' is a key to financing for all public works. The Delta Plan endorses the principles that "beneficiaries pay" and "stressors pay." In practice, however, almost all funds for Delta levee maintenance and improvement are derived from two sources – landowners through property taxes on lands protected by the levee systems and by the State's general fund, both through direct appropriation and through the repayment of general obligation bonds, such as Proposition 1E, authorized for flood protection. The reliance on general fund reflects in part a proper allocation to the State of costs to provide protection of broad-based public benefits such as protecting public safety, enhancing fish and wildlife habitat or safeguarding water quality. Without another way to collect funds from State and federal water project customers, highway users, or utility customers, the general fund may approximate these broad-based classes of beneficiaries.

Property owners' contributions to levee maintenance reflect the historic origins of the Delta's islands under the 1850 federal Swamp Land Act, under which California received unpatented federal swamp lands to be sold to private owners who were required to reclaim and drain them to broaden the economy of the fledgling state. The Delta Reform Act provides "that property ownership and the exercise of associated rights, continue to depend on the landowners' maintenance of those non-project levees and do not include any right to State funding of levee maintenance and repair" (Water Code section 85003).

Most project levees are maintained without State support by local agencies or State-imposed maintenance areas funded by local landowners. The west levee of the Yolo Bypass above Putah Creek and Putah Creek's levees are maintained by the State at its expense (Water Code section 8361).

Cost sharing for improving project levees usually includes federal participation. The federal government pays between 50 and 75 percent of the total costs of flood control projects authorized by Congress, with the non-federal costs typically shared by State (70 percent) and local entities (30 percent) (Water Code section 12310-12318). The cost sharing ratio varies with the kind of benefits provided. For example, federal cost-share for ecosystem restoration projects can be as much as 65 percent in urban flood risk reduction projects. Water supply, recreation, and other benefits included in flood risk reduction projects

can further modify federal cost sharing. The State share of nonfederal costs also depends on the mix of benefits.

The Delta Levees Maintenance Subventions Program is "a cost share program that provides technical and financial assistance to local agencies in the Sacramento – San Joaquin Delta for the maintenance and rehabilitation of nonproject and eligible project levees" (DWR 2011c). The Subventions Program is authorized by California Water Code sections 12980-12995. The program pays up to 75 percent of local costs above $1,000 per levee mile. Reimbursements are limited by the funding available to the program and they are administered according to the priorities established in the *Delta Levees Maintenance Subventions Program Guidelines: Procedures and Criteria* approved by the Central Valley Flood Protection Board (DWR 2011c). Subventions to defray levee maintenance costs are not available in Suisun Marsh.

Eligible projects which meet requirements established by the Department of Water Resources, as published in periodic Proposal Solicitation Packages (PSP), including Improvements of non-project levees, may be funded though the Delta Levees Special Flood Control Projects Program. This program pays a variable percentage of costs, depending on how a specific project meets requirements of the PSP. Payments are typically between 75 and 100 percent of eligible costs, including costs for approved habitat improvements.

State funding for non-project Delta levees is generous in comparison to other areas of the Central Valley and State. Usually, State funds for routine levee maintenance are unavailable outside the Delta. State funds occasionally provide a State cost share for major repairs of project levees, such as repair of high risk erosion damage. Local cost shares for these major repair projects are typically 10 percent, with the State paying for 25 percent and the USACE paying for 65 percent. State funds for levee improvements outside the Delta are available only for federally authorized projects, including the State Plan of Flood Control. For these State-federal projects, a minimum local share of 10 percent is typically required with the State paying for 25 percent and the USACE paying for 65 percent. (See the section below for more detail regarding the Federal role in flood management).

Local maintenance funds are limited, with many budgeting less than $50,000 to $100,000 annually for levee maintenance, according to testimony to the Council.

DWR, in cooperation with the CVFPB, is required to seek information about local agencies' ability to pay for levee maintenance and consider it when determining the amount of subventions to be paid to particular maintenance agencies (Water Code section 12986(a)(3)). Information about local agencies' ability to pay, however, has been collected for only a few districts in the western Delta (Camp Dresser & McKee 1992).

Earlier Delta levee studies proposed creating a revolving fund to make loans to local agencies that were unable to fund the local share of levee improvements, but this has not occurred.

Delta levees benefit many interests, including owners and users of water, power, telecommunications and transportation systems. Securing funds from these beneficiaries, however, depends on establishing the Delta flood risk management assessment district recommended by the Delta Plan (RR R2). The Council will coordinate with the DPC as it assesses the feasibility of such a district.

10. What is the federal government's role?

No federal assistance is likely to be provided for improvements of non-project Delta levees, because the recent draft of the USACE's *Delta Islands and Levees Feasibility Study* (2014) concludes that the USACE will not recommend federal funding of levee improvements. Nor is federal support provided for Delta levees' maintenance. Prior plans for Delta levee improvements, including Bulletin 192, Bulletin 192-82, and the CALFED Levee System Integrity Program Plan presumed some level of assistance in funding improvements of non-project Delta levees would be available through the USACE. That no longer appears likely, removing almost $500 million of anticipated federal support for Delta levee improvements.

For the Delta's non-project levees, the recent draft of the USACE's *Delta Islands and Levees Feasibility Study* (2014) concludes that the USACE will not recommend federal funding of levee improvements, because the costs of improvements considered in the study exceed the identified economic benefits and because the ecosystem restoration benefits of those levee alterations were more expensive than other USACE ecosystem restoration priorities. The USACE's conclusion that there is no federal interest in improving non-project Delta levees removes the expectation that the federal government might pay up to half the cost of these levees' improvement. Benefits that levee improvements could provide to the reliability of water supplies delivered through the federal Central Valley Project were not considered in this study, as under federal policy this is a responsibility of the Bureau of Reclamation rather than the USACE.
For project levees in the Delta, especially to protect urban areas, continued federal assistance is authorized or likely.

The federal government can also continue to play an important role in the Delta levee system through the disaster recovery programs of FEMA's HMP and the USACE's PL 84-99 program. These programs provide cost sharing for the reconstruction of levees after Presidentially-declared disasters. The programs are, in effect, an insurance policy providing assistance for post-disaster reconstruction of the levees. Aid is available, however, only to projects that meet the program's eligibility requirements, including these federal programs' standards for levee design, maintenance, and inspection. In addition, eligibility for assistance from the USACE is available only for projects whose economic benefits exceed the cost of post-disaster reconstruction. The standards applicable to these federal programs are in a state of flux, which impedes planning for levee improvements[3].

Post disaster federal aid to rebuild damaged levees is critically important. For example, of the estimated $90 million total cost of levee repairs following the 2004 Jones Tract flood, $60 million of claims were filed with the federal government, leaving approximately $30 million for the flood fight, levee repair, and island pump out to be paid by the State (PPIC 2008). Landowners alone would be unlikely to repair levees damaged in a disaster on 18 to 23 Delta islands where the cost of repairs is likely to exceed the value of the islands' property (Suddeth, et. al. 2010). Federal assistance in rebuilding these levees could significantly lower landowners' repair costs, increasing the likelihood that damaged islands would be reclaimed. The lack of federal assistance shifts to the State the cost of aiding local agencies in levee

[3] Testimony by representatives of the Office of Emergency Services (OES), FEMA, and USACE at the Council's February 27, 2014 hearing disclosed considerable disagreement about these programs between the State and federal agencies. A memorandum of understanding between OES and FEMA that had governed the Delta HMP program has lapsed, so that conditions of FEMA funding are uncertain.

repairs, because State law provides that post-disaster levee repair claims not paid by federal agencies may be reimbursed by the State through DWR's levee subventions program (Water Code section 12993).

11. What conditions should be attached to State funding of levees?

State law requires that, in order to receive State funds, local agencies maintaining both project and non-project levees must agree to perform annual routine maintenance of their levees (Water Code section 12987(f)) and agree to indemnify the State from liability for damages related to State-funded levee projects (Water Code section 12992). Local agencies, however, are not required to participate in FEMA or USACE's levee rehabilitation and repair programs in order to be eligible for state funding. Local plans for improvement of project and non-project levees are supposed to include provisions to acquire easements along levees that will allow for the control and reversal of subsidence, where determined by DWR, by restricting land use to habitat, untilled crops, or other compatible uses depending on the needs of the State and priorities approved by the Central Valley Flood Protection Board (Water Code section 12987(b)). Earlier proposals had suggested additional conditions of State funding, such as adequate local floodplain zoning of protected islands and tracts or the donation of easements for public recreation, but those requirements were not enacted in law.

12. What provision should be made to improve habitat for fish and wildlife or provide public recreation?

Fish and wildlife habitat and public recreation have been a concern during the development of each State plan for Delta levees. The Delta Plan includes these policies and recommendations providing for habitat improvement and public recreation that are relevant to levees:

- **Setback levees and channel margin enhancement**. The Delta Plan calls for setting back levees, where feasible, to improve migratory corridors for anadromous fish and songbirds along the Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta boundary to Mossdale; the north and south forks of the Mokelumne River, Paradise Cut, Steamboat Slough, and Sutter Slough. Other alternatives to increase riparian habitats and floodplains must also be considered and, when feasible, incorporated (ER P4). DWR, in conjunction with the CVFPB, DFW, and the Delta Conservancy, should develop criteria to define locations for future setback levees in the Delta and its watershed (RR R7).

- **Protecting restoration opportunities**. Within the Delta's six priority habitat restoration areas, significant adverse impacts to future restoration opportunities are to be protected or mitigated (ER P3).

- **Vegetation on levees.** The USACE should exempt Delta levees from its vegetation policy (ER R4).

- **Recreation.** Public agencies owning land should increase opportunities where feasible, for bank fishing, hunting, levee-top trails, and environmental education (DP R16).

Existing State law also addresses these issues. For project levees, the Central Valley Flood Protection Plan describes structural and nonstructural ways to promote natural dynamic hydrologic and

geomorphic processes, increase riparian, wetland, floodplain, and shaded riverine aquatic habitat, and promote the recovery and stability of native species (Water Code section 9616). A Central Valley Flood System Conservation Strategy is being drafted to provide a comprehensive approach for improving riverine and floodplain ecosystems consistent with the flood plan's implementation.

State-funded projects to improve project and non-project Delta levees must also be consistent with a net-long term habitat improvement program and have a net benefit for aquatic species in the Delta, as determined by the Department of Fish and Wildlife (Water Code section 12987). State-funded levee improvements must protect fish and wildlife habitat, fully mitigate any damage to channel islands or berms with significant riparian habitat, and not result in net long term loss of riparian, fisheries, or wildlife habitat.

Under the Delta Levee Maintenance Subventions and Special Flood Control Projects programs, the dual commitment to levees and fish and wildlife is the foundation for the collaboration between local levee maintaining agencies and DWR and DFW. As provided by Water Code section 12314 and 12987, DFW ensures that there is no net loss of fish and wildlife habitat and a long-term improvement of fish and wildlife habitat in conjunction with State sponsored levee work. Under an interagency agreement with DWR, DFW staff inspects both levee maintenance and improvement projects, and authorizes expenditures of funds for levee work after determining that full mitigation and net habitat improvement have been provided. DFW performs assessments of existing habitats, determines potential impacts of levee work, develops onsite and large-scale mitigation sites, assists with the planning of larger projects including designing and implementing habitat restoration and monitoring plans, and invasive plant control measures, and ensures that mitigation and enhancement sites are monitored and maintained in good condition in-perpetuity.

Levee improvements are also supposed to take account of the most recent Natural Resources Agency's Delta Master Recreation Plan. An agreement between the Natural Resources Agency, DWR, DFW, and the CVFPB outlines procedures for fulfilling these requirements (DWR 1992). To comply with these provisions, the Delta Levees Special Projects Program has restored habitat and set back levees, for example. Some local levee maintaining agencies find these requirements of restoration and setback levees burdensome. How well Delta levee projects are attaining their ecosystem objectives is not known, because few are thoroughly monitored to ascertain their results.

13. What if local agencies don't act?

Many local levee maintaining agencies diligently maintain and improve their levee improvements. Others have made little progress. DWR is to annually inspect non-project levees that receive Subventions funding to ascertain progress towards standards for levee maintenance and improvement (Water Code section 12989). Budgets are inadequate for comprehensive inspections, however.

When DWR finds that annual routine maintenance of non-project levees participating in its Subventions or Special Projects programs is not being performed, it may establish a maintenance area to perform the maintenance, with those maintenance costs allotted to the affected property owners. Establishing a maintenance area is cumbersome, and costs for State maintenance are high, in part because most levees are distant from DWR's levee maintenance yard in West Sacramento. As discussed below, State liabilities may increase when it performs levee maintenance. No maintenance area has ever been created for non-project levees. Although no maintenance area has been created for non-project levees,

there have been some created to fund state maintenance of project levees. One of these is located within the Delta in the Pocket neighborhood of Sacramento.

14. How should the State's levee priorities address the risk of State liability for levee failures?

Concerns about the potential for State liability for Delta levee failures extend back for decades. In *Galli v. California* [4], the State was excluded from liability for damages from a levee failure in 1972 that flooded Brannan-Andrus Island because the island's levees were improved and maintained by a local district, not the State, the flood was caused by failure of a non-project levee, rather than a project levee, and State agencies were not responsible for reviewing or approving the local agency's levee work. When the Delta levee programs were created, the Legislature declared 'the State does not thereby assume any responsibility for the safety of any Delta levee against failure' (Water Code section 12983). Enactment of the Delta Reform Act did not alter the State's liability for flood protection in the Delta (Water Code section 85032(j)). Before State funds for Delta levee maintenance or improvement are approved, the local maintaining agency agrees to indemnify the State from liability, except for gross negligence, related to the State funding or approval of the local agency's work (Water Code section 12992).

For project levees, the most notable recent court decision on flood liability was the California Court of Appeal decision in *Paterno v. State of California* (2003) (113 Cal. App. 4th 998). The court found the State was liable for damages caused by the failure of a project levee on the Yuba River that the State did not design, build, or even directly maintain. This decision makes it possible that the State will ultimately be held responsible for the structural integrity of much of the state-federal flood control system in the Delta and Central Valley. The *Paterno v. State of California* decision will ultimately cost State taxpayers approximately $464 million in awarded damages (Delta Stewardship Council 2013).

It will be important, at a minimum, to retain these protections against State liability in updating levee priorities in the Delta Plan. The Delta Plan recommends a further step to limit State liability: constitutional and/or statutory changes to provide State agencies the same level of immunity from flood liability that federal agencies have under federal law (RR R10).

15. What about climate change?

Climate change, including rising seas and altered flood discharges, complicates the development of recommendations for State priorities for levee improvements. The Natural Resources Agency's climate adaptation strategy (2014) calls for State agencies to identify climate risks to existing and new infrastructure projects. Better scientific assessments of potential climate change impacts are becoming available, enhancing considerations of climate change in setting funding priorities. In the short term, responses such as improving levees to account for increasing tidal and flood discharges may be appropriate. Longer term forecasts of increases in sea level of 55 inches or more suggest that protection of levees at some islands or tracts may someday become infeasible. Other low-lying areas in San Francisco Bay, Humboldt Bay, and other coastal areas are beginning to consider similar long term threats, so that approaches they consider may provide suggestions about how to proceed in the Delta. A balanced approach needs to consider both the risk of excessive investment in unsustainable infrastructure on the one hand or premature abandonment of important areas in the Delta on the other.

[4] 98 Cal.App.3d 662 (2002).

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Glossary (from the Delta Plan)

"Adaptive management" means a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives.

"Base Flood" means the flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).

"Base Flood Elevation" (BFE) means the water surface elevation associated with the base flood.

"Best available science" means the best scientific information and data for informing management and policy decisions. Best available science shall be consistent with the guidelines and criteria found in Appendix 1A.

"Central Valley Flood Protection Board" or "Board" means the Central Valley Flood Protection Board (formerly The Reclamation Board) of the Resources Agency of the State of California as provided in Water Code section 8521.

"Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. In addition, "achievement" for the purpose of determining whether a plan, program, or project meets the definition of a "covered action" under section 5001(j) is further defined as follows:

(1) "Achieving the coequal goal of providing a more reliable water supply for California" means all of the following:

(A) Better matching the state's demands for reasonable and beneficial uses of water to the available water supply. This will be done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increase water efficiency and conservation, increase water recycling and use of advanced water technologies, improve groundwater management, expand storage, and improve Delta conveyance and operations. The evaluation of progress toward improving reliability will take into account the inherent variability in water demands and supplies across California;

(B) Regions that use water from the Delta watershed will reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance, consistent with existing water rights and the State's area-of-origin statutes and Reasonable Use and Public Trust Doctrines. This will be done by improving, investing in, and implementing local and regional projects and programs that increase water conservation and efficiency, increase water recycling and use of advanced water technologies, expand storage, improve groundwater management, and enhance regional coordination of local and regional water supply development efforts; and

(C) Water exported from the Delta will more closely match water supplies available to be exported, based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. This will be done by improving conveyance in the Delta and expanding groundwater and surface storage both north and south of the Delta to optimize diversions in wet years when more water is available and conflicts with the ecosystem are less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely. Delta water that is stored in wet years will be available for water users during dry years, when the limited amount of available water must remain in the Delta, making water deliveries more predictable and reliable. In addition, these improvements will decrease the vulnerability of Delta water supplies to disruption by natural disasters, such as, earthquakes, floods, and levee failures.

(2) "Achieving the coequal goal of protecting, restoring, and enhancing the Delta ecosystem" means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of

supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.

(3) "Achieving the coequal goals in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place" means accepting that change, including change associated with achieving the coequal goals, will not cease, but that the fundamental characteristics and values that contribute to the Delta's special qualities and that distinguish it from other places can be preserved and enhanced while accommodating these changes. In this regard, the following are core strategies for protecting and enhancing the unique values that distinguish the Delta and make it a special region:

(A) Designate the Delta as a special place worthy of national and state attention;

(B) Plan to protect the Delta's lands and communities;

(C) Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life;

(D) Encourage recreation and tourism that allow visitors to enjoy and appreciate the Delta and that contribute to its economy;

(E) Sustain a vital Delta economy that includes a mix of agriculture, tourism, recreation, related industries and business, and vital components of state and regional infrastructure; and

(F) Reduce flood and other risks to people, property, and other interests in the Delta.

"Covered action" means a plan, program, or project that meets all of the following criteria (which are collectively referred to as covered action screening criteria):

(A) Is a "project," as defined pursuant to section 21065 of the Public Resources Code;

(B) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;

(C) Will be carried out, approved, or funded by the State or a local public agency;

(D) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta; and

(E) Is covered by one or more provisions of the Delta Plan, which for these purposes, means one or more of the regulatory policies contained in Article 3.

"Covered action" does not include any plan, program, or project that is exempted pursuant to Water Code section 85057.5(b).

A State or local public agency that proposes to carry out, approve, or fund a plan, program, or project that may be subject to this Chapter must determine whether that proposed plan, program, or project is a covered action. That determination, which is subject to judicial review, must be reasonable, made in good faith, and consistent with the Delta Reform Act and this Chapter.

Nothing in the application of the definition of a "covered action" shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law.

"Delta" means the Sacramento-San Joaquin Delta as defined in section 12220 of the Water Code and the Suisun Marsh, as defined in section 29101 of the Public Resources Code.

"Delta Plan" means the comprehensive, long-term management plan for the Delta to further the achievement of the coequal goals, as adopted by the Delta Stewardship Council in accordance with the Sacramento-San Joaquin Delta Reform Act of 2009.

"Designated Floodway" means those floodways, as defined in California Code of Regulations, Title 23, section 4(i), under the jurisdiction of the Central Valley Flood Protection Board.

"Encroachment" means any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by any means for any purpose, into or otherwise affecting a floodway or floodplain.

"Enhancement" or "enhancing," for purposes of section 5001(h)(2), means improving existing desirable habitat and natural processes. Enhancement may include, by way of example, flooding the Yolo Bypass more often to support native species or to expand or better connect existing habitat areas. Enhancement includes many fish and wildlife management practices, such as managing wetlands for waterfowl production or shorebird habitat, installing fish screens to reduce entrainment of fish at water diversions, or removing barriers that block migration of fish to upstream spawning habitats.

"Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

"Floodplain" means any land area susceptible to being inundated by flood waters from any source.

"Floodplain values and functions" has the same meaning as set forth in 33 Code of Federal Regulations section 320.4(l)(1).

"Floodproofing" means any combination of structural and nonstructural additions, changes, or adjustments appropriate for residential structures, which reduce or eliminate risk of flood damage to real estate, improved real property, or structures with their contents.

"Floodway" means the portion of the floodplain that is effective in carrying flow (that is, the channel of a river or other watercourse and the adjacent land areas that convey flood waters).

"Government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta" means any State or federal strategy, project, approval, funding, or other effort that is intended to reduce the likelihood and/or consequences of flooding of real property and/or improvements, including risks to people, property, and State interests in the Delta, that is carried out pursuant to applicable law, including, but not limited to the following:

(1) State Water Resources Law of 1945, Water Code section 12570 et seq.;

(2) Sacramento-San Joaquin River Flood Control Projects (Flood Control Act of 1941, P.L. 77-228);

(3) Local Plans of Flood Protection prepared pursuant to the Local Flood Protection Planning Act (Water Code section 8200 et seq.), that are consistent with the Central Valley Flood Protection Plan pursuant to Water Code section 9612;

(4) Central Valley Flood Protection Plan (Water Code section 9600 et seq.);

(5) Subventions Program, Special Projects Program (Water Code section 12300 et seq.);

(6) Way Bill 1973-Subventions Program, Special Projects Program (Water Code section 12980 et seq.);

(7) Central Valley Flood Protection Board Authority (California Code of Regulations, Title 23, Division 1); and

(8) National Flood Insurance Program (National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., P.L. 90-448).

"Nonproject levee" means a local levee owned or maintained by a local agency or private owner that is not a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).

"Project levee" means a federal flood control levee that is a project facility under the State Water Resources Law of 1945, Chapter 1 (commencing with Water Code section 12570) and Chapter 2 (commencing with section 12639 of Part 6 of the Water Code).

"Protection" or "protecting," for purposes of section 5001(h)(2), means preventing harm to the ecosystem, which could include preventing the conversion of existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive nonnative species.

"Regulated stream" means those streams identified in Table 8.1 of California Code of Regulations, Title 23, section 112, under the jurisdiction of the Board.

"Restoration" or "restoring," for purposes of section 5001(h)(2), has the same meaning as in Water Code section 85066. Restoration actions may include restoring interconnected habitats within the Delta and its watershed, restoring more natural Delta flows, or improving ecosystem water quality.

"Setback levee" means a new levee constructed behind an existing levee which allows for removal of a portion of the existing levee and creation of additional floodplain connected to the stream. In the Delta, a "setback levee" may not necessarily result in removal of the existing levee.

"Significant impact" for the purpose of determining whether a project meets the definition of a "covered action" under section 5001(j)(1)(D) means a substantial positive or negative impact on the achievement of one or both of the coequal goals or the implementation of a government-sponsored flood control program to reduce risks to people, property, and State interests in the Delta, that is directly or indirectly caused by a project on its own or when the project's incremental effect is considered together with the impacts of other closely related past, present, or reasonably foreseeable future projects. The following categories of projects will not have a significant impact for this purpose:

(1) "Ministerial" projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(1);

(2) "Emergency" projects exempted from CEQA, pursuant to Public Resources Code section 21080(b)(2) through (4);

(3) Temporary water transfers of up to one year in duration. This provision shall remain in effect only through December 31, 2016, and as of January 1, 2017, is repealed, unless the Council acts to extend the provision prior to that date. The Council contemplates that any extension would be based upon the California Department of Water Resources' and the State Water Resources Control Board's participation with stakeholders to recommend measures to reduce procedural and administrative impediments to water transfers and protect water rights and environmental resources by December 31, 2016. These recommendations should include measures to address potential issues with recurring transfers of up to 1 year in duration and improved public notification for proposed water transfers;

(4) Other projects exempted from CEQA, unless there are unusual circumstances indicating a reasonable possibility that the project will have a significant impact under Water Code section 85057.5(a)(4), as further defined by this section. Examples of unusual circumstances could arise in connection with, among other things:

(A) Local government general plan amendments for the purpose of achieving consistency with the Delta Protection Commission's Land Use and Resource Management Plan; and,

(B) Small-scale habitat restoration projects, as referred to in CEQA Guidelines, section 15333 of Title 14 of the California Code of Regulations, proposed in important restoration areas, but which are inconsistent with the Delta Plan's policy related to appropriate habitat restoration for a given land elevation (section 5006 of this Chapter)

"Urban area" means a developed area in which there are 10,000 residents or more.

"Urbanizing area" means a developed area or an area outside of a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years.

Appendix A – Chronology of Sacramento-San Joaquin Delta Significant Events

This table of events has been compiled from the following sources:

- CALFED *Levee System Integrity Program Plan*
- DWR *FloodSAFE A Framework for Department of Water Resources Integrated Flood Management Investments in the Delta and Suisun Marsh (Draft V9)*
- DWR *California's Flood Future*

DATE	EVENT
1850	Congress passed the Federal Swamp and Overflow Act, which provided for the tide of wetlands to be transferred from the federal government to the states.
1861	The California Legislature authorized the State Reclamation District Act. As a result of state and federal legislation, swamp and overflow land was sold and reclaimed for agricultural use by construction of levees. The Delta was transformed from a large tidal marsh to a system of improved channels and levees by the early 1900s.
1884	Discharge of hydraulic mining debris into California rivers declared illegal.
1902	Congress passed the Reclamation Act for development of irrigated lands in the western United States.
1911	The Reclamation Board was created by the California Legislature.
1933	Congress authorized the Central Valley Water Project (CVP). The Stockton Deep Water Ship Channel, which extends from the confluence of the Sacramento and San Joaquin Rivers to the City of Stockton, was completed.
1940	The Contra Costa Canal, which exports water from the south Delta to the Bay Area, was completed. This was first unit of the CVP that used existing channels to convey water through the Delta for export.
1944	Shasta Dam and Reservoir, a key feature of the CVP used to capture and store water, was completed. This project provided additional waster to Delta channels during low-flow periods.
1951	The Delta-Mendota Canal, which exports water from the Delta via the Tracy Pumping Plant to the San-Joaquin Valley, was completed. This unit of the CVP increases exports from the Delta.
1959	Delta Protection Act – CWC §12200-12220. Established a boundary for the legal Delta. The act was oriented toward protecting water quality in the Delta and protecting holders of Delta water rights, in part by preventing excessive withdrawals, providing salinity control and integrating releases from storage into the Delta to the maximum extent possible in order to fulfill the objectives of the Act. It was oriented not only to protecting water uses within the legal Delta, but also for export to areas of water deficiency.
1960	Voters approved the State Water Resources Development Bond Act (also known as the Burns-Porter Act) to help finance the initial facilities of the State Water Project (SWP). These facilities included master levees, control structures, channel improvements, and appurtenant facilities in the Delta that are used for water

	conservation, water supply in the Delta, transferring water across the Delta, and flood and salinity control.
1960	Corps completion of the Sacramento River Flood Control Project, terminating at the mouth of the Delta, with the State as non-federal partner. This project incorporated and improved certain Delta levees to provide improved flood control for a portion of the Delta. These levees are commonly referred to as "project" levees.
1963	The Sacramento Deep Water Ship Channel, which extends from the confluence of the Sacramento and San Joaquin Rivers, was completed.
1966	Dedication of the Corps' Lower San Joaquin River Flood Control Project, also progressing into and terminating within the Delta, with the State as non-federal partner
1967	Oroville Dam and Reservoir, which provides increased channel flows during low-flow periods, was completed. This is a key feature for the SWP and includes the Feather River Fish Hatchery to replace spawning areas lost as a result of the dam.
1967	The first stage of the Harvey O. Banks Delta Pumping Plant, another unit of the SWP, was completed along with the John E. Skinner Fish Facility. Diversions began from the Delta to the California and South Bay Aqueducts of the SWP.
1967	Construction of Clifton Court Forebay located in the sough Delta began. This unit of the SWP facilitates export of water from the Delta.
1969	Delta levees break flooding Mildred and Sherman Islands.
1969	The California Legislature, under Senate Concurrent Resolution No. 151, requests the Department of Water Resources to study the problems relating to Delta levees and recommend a course of action to implement feasible solutions to the problems.
1971	The State Water Resources Control Board adopted Delta Water Rights Decision 1379, establishing Delta water quality standard to be met by the CVP and SWP.
1972	San Joaquin River levee breaks flooding Brannan and Andrus Islands and the town of Isleton.
1973	The Way Bill – CWC §12980-12991. Directed DWR (working with the Reclamation Board; now CVFPB) to reimburse eligible local public agencies for a portion (50 percent) of non-project levee maintenance and improvement costs after satisfaction of specific deductibles and with specific limits. This was the beginning of the Delta Levees Maintenance Subvention Program. The initial appropriation of $300,000 was reduced by Governor Reagan to $200,000.
1975	DWR publishes Bulletin 192 which analyzes the feasibility of providing flood control, recreation, wildlife habitat, and environmental enhancement by improving Delta levees.
1976	Nejedly-Mobley Delta Levees Act – CWC §12225-12227 and 12987. Adopted DWR Bulletin 192-75 as a conceptual plan for preserving the integrity of the Delta non-project levee system. Authorized DWR to prepare detailed plans and specifications for levee improvements and report recommendations to the Legislature. Authorized DWR to proceed immediately with a pilot project through an agreement with a local district, so long as the local district provided at least 20 percent of the costs. Appropriated $150,000. Required maintenance projects (CWC §12987) to be compatible with Bulletin 192-75. Appropriated $200,000 for FY 1976-77 for projects under Section 12980-12991.
1982	DWR issued Bulletin 192-82 "Delta Levee investigation" with alternative Delta

	levee plans. This bulletin was DWR's report in response to the 1976 Act. The plans were developed cooperatively with USACE and cost estimates were provided. The USACE bare-bones plan (USACE, 1982) was indicated to have a 1982 cost of $450 million, which would escalate to $1.5 billion by completion. Recreation and wildlife enhancements were estimated to add 16 to 20 percent to these costs. The estimate for a complete rehabilitation of the Delta levee system was estimated to be $930 million (cost in 1982 dollars) and escalate to $3.4 billion by completion. The report preface highlights the major issue of "who pays" for legislative discussion and decision.
1983 (February)	President Reagan determined that damage resulting from severe storms, flooding, high tides, and wave action in certain areas of California warranted a major disaster declaration under provision of the Federal Disaster Relief Act of 1974 (Public Law 93-288). *Source: Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta.*
1983	DWR and Office of Emergency Services release the Flood Hazard Mitigation Plan for the Sacramento-San Joaquin Delta. The report establishes the HMP levee geometry to be used as short-term compliance for FEMA assistance
1983	Brought on by El Niño weather conditions, extremely wet conditions coupled with voluminous Sierra runoff led to very high river stages throughout the system and caused extensive damage to the flood management system of the Sacramento Valley. The levee at Venice Island breached and flooded 3,220 acres of farmland.
	1983, 1986, and 1987 – Negotiations (following major floods in 1983 and 1986) by DWR with FEMA adopting the Flood Hazard Mitigation Plan (HMP), including agreement on completion of the "short term levee rehabilitation plan" for non-project levees (implementation of the HMP geometry) by September 10, 1991. The HMP geometry was developed as an interim step – an improvement over the then-current condition of many levees, but not adequate for long-term reliability. The HMP geometry and deadline for compliance was applicable to the specific reclamation districts (RDs) that had received FEMA disaster assistance and, per RD engineers, the deadline was met by most of those RDs.
1985	CWC §12981(b) The Legislature further finds and declares that the delta's uniqueness is particularly characterized by its hundreds of miles of meandering waterways and the many islands adjacent thereto; that, in order to preserve the delta's invaluable resources, which include highly productive agriculture, recreational assets, fisheries, and wildlife environment, the physical characteristics of the delta should be preserved essentially in their present form; and that the key to preserving the delta's physical characteristics is the system of levees defining the waterways and producing the adjacent islands. However, the Legislature recognizes that it may not be economically justifiable to maintain all delta islands.
1986	Congress passed the DWR and U.S. Bureau of Reclamation historic accord, the CVP-SWP Coordinated Operation Agreement
1986	The California Supreme Court confirmed the State Water Resources Control Board's broad authority and discretion over water rights and water quality issues in the Bay/Delta system, including jurisdiction over the federal CVP.

1986	The floods of 1986 caused extensive damage to the flood management system of the Sacramento Valley. The storms caused nearly $50 million in public and private property damage, excluding damage to roads and other infrastructure. In the northern Delta, 1,600 people were evacuated, and $20 million in property damage occurred.
1988	SB 34 – The Delta Flood Protection Act of 1988 – CWC §12986 and following (amendments and additions) and CWC §12300 and following. Declared the Legislature's intent to provide State financial assistance for Delta levees to $12 million per fiscal year and established the Special Projects Program for the eight western islands and for the towns of Thornton and Walnut Grove. Annual appropriations were intended to be $6 million for Subventions and $6 million for Special Projects. Required that Subventions and Special Projects include provisions for protection of fish and wildlife habitat, as determined by the Department of Fish and Game, including "no net long-term loss of riparian, fisheries, or wildlife habitat." Raised State cost sharing on Subventions Projects for non-project levees to 75 percent until January 1, 1999. Required that Subventions Projects be compatible with Bulletin 192-82. Allowed for advances of State funds. Required work agreements between State and local agency that indemnify the State. Required that the local agency apply for federal disaster assistance whenever eligible.
1988	Barker Slough Pumping Plant, which provides water from the northwest Delta for the North Bay aqueduct, was completed.
1988	Suisun Marsh salinity control gates, which aid in controlling water quality in the marsh for protection of waterfowl, were completed.
1991	SB 1065 – CWC §12306-12308 and Budget Act. Required cooperation among the Resources Agency, DWR, The Reclamation Board (now CVFPB), and Department of Fish and Game (now Wildlife) on habitat mitigation for Delta levee projects. Reaffirmed the "no net long-term loss" of habitat policy. Made various budget appropriations.
1992	SB 1866 – The Delta Protection Act of 1992– Public Resource Code (PRC) 29700 and following. Created the DPC. Affirmed the boundary of the legal Delta and established the Primary and Secondary zones. Many findings regarding uniqueness, statewide importance, need to preserve and protect the Delta and improve flood protection. Required development of a Resource Management Plan for the Primary Zone. Leaves land use authority over Secondary Zone in the hands of the counties and cities. The Legislature declares that it is a basic goal of the State to improve Delta flood protection to ensure an increased level of public health and safety.
1992	Congress passed the Central Valley Project Improvement Act (Public Law [PL] 102-575).
1994	SB 285 – PRC 29735, 2960 and following. Provided refinements to the Delta Protection Act, extending deadlines regarding the Resource Management Plan.
1994	State and federal agencies and representatives signed the Bay-Delta Accord.
1995	Assembly Joint Resolution No. 30 – Authorized CALFED. Delta levee integrity was one of CALFED's four major objectives.
1996	AB 360 – CWC §12300 and following and CWC §12980 and following. Made substantial changes to the Delta Levee Maintenance Subventions Program and the Special Delta Flood Protection Projects Program. Reaffirmed intent to appropriate

	$6 million per year to each. Extended the Subventions Program to Project levees in the Primary Zone, and it extended Special Projects to "other locations in the Delta" and to approximately "12" miles of levees on islands bordering Northern Suisun Bay from Van Sickle Island westerly to Montezuma Slough (In fact, the distance in levee miles from Van Sickle to Montezuma Slough is more nearly 20 miles.), and contained a provision to sunset the Delta Flood Protection Fund on July 1, 2006. Reemphasized coordination with Department of Fish and Game to ensure no net long-term loss of habitat and initiated the requirement for habitat enhancement – expenditures must be "consistent with a net long-term habitat improvement program and have a net benefit for aquatic species in the Delta." Required local public agencies to apply for federal disaster assistance whenever eligible. Extended a maximum of 75 percent State cost share on eligible Subventions cost reimbursement to July 1, 2006. Authorized emergency work with Delta Levee Program funds of up to $50,000 per site and not exceeding $200,000 per year, contingent on local cost sharing. Authorized DWR to "prepare and submit to the Board for adoption a Delta emergency response plan for levee failures.
1996	Proposition 204 – SB 900 – CWC §78500. Safe, Clean, Reliable Water Supply Act. Total general obligation water bonds of $995 million, including $193 million to the Delta Improvement Account, of which $25 million was for Delta Levee Rehabilitation, $10 million was for South Delta Barriers, $2 million for recreation, $3 million for CALFED costs, $60 million for CALFED/Bay-Delta/ecosystem/non-flow Regional Board Water Quality requirements, and $93 million to the Central Valley Project Improvement Act subaccount for State actions and cost sharing complementing CVPIA activities.
1997	Storms caused one of the worst floods of the century over the New Year holiday. McCormack-Williamson Tract and Dead Horse Island levees failed. High flows in the San Joaquin River led to failure of a levee at Mossdale, flooding that area and Stewart Tract, and the nearby Paradise Cut levee breach flooded the Pescadero District. Fourteen levee breaches occurred on the San Joaquin River between Fresno and the Chowchilla Bypass, inundating agricultural lands, including many vineyards north of the river. Inflows to Don Pedro Dam on the Tuolumne River peaked at over 100,000 cfs. Releases from the dam peaked at about half of this amount. However, the peak releases from the dam where about six times the downstream channel design capacity of 9,000 cfs.
1998	SB 1075 – Refinements to the Delta Protection Act –PRC Sections 29729 and following. Authorized the DPC to act as facilitating agency for implementation of any joint habitat restoration or enhancement program. Extended life of DPC until January 1, 2010 (but this sunset provision was repealed by AB 2930 in 2000, giving DPC a continuing existence).
2000	Proposition 13 (March Primary) – AB 1584 (1999) – Safe Drinking Water, Clean Water, Watershed Protection, and flood Protection Act. General obligation bonds of $1.97 billion, including $292 million for flood protection, of which $30 million were for Delta levee rehabilitation.
2000	CALFED Programmatic Record of Decision was certified, including adoption of the

(August)	Delta-specific PL 84-99 design as the base level of protection for the Delta levee system.
2002	Proposition 50 (November) – Voter Initiative – Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 – CWC §79500 and following. General obligation bonds totaling $3.44 billion, including $825 million to implement CALFED, of which $70 million were allocated to Delta Levee Restoration.
2002	SB 1653 and AB 2683 – California Bay-Delta Authority Acts –CWC §79400 – and following. Established the California Bay-Delta Authority to implement the CALFED Programmatic Record of Decision.
2004	The Lower Jones Tract levee failed, inundating the 5,894-acre island.
2005	Hurricane Katrina caused severe destruction along the Gulf coast from central Florida to Texas. This causes heightened awareness of the California levee system conditions.
2005	AB 1200 – Required DWR to consider potential Delta impacts of subsidence, earthquakes, floods, changes in precipitation, temperature, and ocean levels and a combination of those impacts (CWC §139.2 et seq.). Required DWR and the Department of Fish and Game to identify, evaluate and comparatively rate the principal options for addressing those impacts.
2005	SB 264 – Extended Delta Flood Protection Fund to July 1, 2008.
2005	Yuba County Water Agency, USACE, the National Weather Service, and DWR initiated a two-phase development program for forecast-coordinated operations of New Bullards Bar Reservoir on the North Yuba River and Lake Oroville on the Feather River.
2006	AB 798 – Delta Levee Maintenance. Declared intention of Legislature to appropriate available bond funds beyond the previously indicated amount of $12 million per year (combined total) for the Subventions and Special Projects Programs. Extended Delta Flood Protection Fund and Subventions maximum State cost share of 75 percent until July 1, 2010. Extended authority to advance funds until July 1, 2010.
2006	SB 1574 –Required Secretary of Resources to convene a multi-department committee to provide a Strategic Vision for a Sustainable Delta by December 31, 2008.
2006	Proposition 84 – Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. Provided nearly $5.4 billion in bond funds for various resource management and water projects, including $800 million for flood management of which $275 million was for Delta projects for levee maintenance and improvements in emergency response preparedness.
2006	Proposition 1E – Disaster Preparedness and Flood Protection Bond Act of 2006. Provided nearly $4.1 billion for flood-related planning and projects throughout the State, including $3 billion for State-federal project levees and the Delta. The portion for the Delta has not been firmly set, although the Legislature has appropriated $305 million for Delta flood-related projects so far. The “Bond Expenditure Plan” (DWR, 2007) allocated “a minimum of $500 million to reduce the risks of levee failure in the Sacramento-San Joaquin Delta.”
2007	FloodSAFE – Legislation that pertains to DWR/FloodSAFE and CVFPB activity

	and responsibilities in the Delta occurs in several contexts: 1) general (applicable to the whole State or the entire Central Valley), 2) specific to the State Plan of Flood Control (project levees), 3) specifically applicable to the whole Delta, and 4) specifically applicable to non-project levees in the Delta. The first two of these categories were significantly affected by the 2007 package of California Flood Legislation. The legislation that is more specific to the Delta was updated by the broad package of water legislation passed in 2009 and has also accumulated from more specific legislation over time. The summary for the Delta draws much detail from the current CWC. The following paragraphs address each of the four topics in turn: 1) ***General FloodSAFE Legislation –*** The 2007 flood legislation package consisted of five bills – SB 5 and 17 and AB 5, 70, and 156 – plus a sixth bill (AB 162). Present flood management work is also significantly influenced by Propositions 84 and 1E passed in 2006. This legislation established a substantially modified approach to flood management in general. 2) ***State Plan of Flood Control –*** The Central Valley Flood Protection Act of 2008 (enacted by SB 5) directs DWR to prepare and CVFPB to adopt a Central Valley Flood Protection Plan (CVFPP) by 2012. Per the DWR Summary, "The CVFPP is to establish a system wide approach to improving flood management in the areas currently receiving some amount of flood protection from the existing facilities of the State Plan of Flood Control. In addition, the CVFPP is to include a recommended list of both structural and nonstructural means for improving performance and eliminating the deficiencies of flood management facilities, while also addressing ecosystem and other water-related issues. DWR shall develop a recommended schedule and funding plan to implement the recommendations of the CVFPP. The flood legislation establishes the 200-year flood event (flood with a 1-in-200 chance of occurring in any year) as the minimum level of flood protection to be provided in urban and urbanizing areas. The flood legislation also limits the State's liability for developing and adopting the CVFPP to that already associated with the existing State Plan of Flood Control." 3) ***The Delta as a Whole –*** Recognizing the specific intent of Propositions 84 and 1E to address the needs of the flood management system including the Delta and DWR's existing programs addressing the Delta, DWR has incorporated all its Delta flood management activities into FloodSAFE. Thus, funds for the Delta go beyond the State Plan of Flood Control to consider other needs, including vulnerable urban areas, vulnerable infrastructure, the reliability of water conveyance capabilities, as well as the needs of the Delta more broadly as a region. 4) ***Non-Project Levees in the Delta –*** The Delta Flood Protection Program (Subventions and Special Projects) is a FloodSAFE program and is specifically oriented toward maintenance and improvement of non-project and eligible project levees in the Delta based on CWC §12980 et seq. and §12310 et seq. The legislative direction for this program was developed in four principal bills described above.

2008	SB 27 – Sacramento-San Joaquin Delta Emergency Preparedness and Response Act of 2008 (CWC §12994.5). Requires that Cal EMA, in cooperation with DWR, DPC, and a representative of each of the five counties form a Sacramento-San Joaquin Delta Multi-Hazard Task Force, is to develop an interagency unified command structure, coordinate the development of a draft emergency preparedness and response strategy, and develop and conduct an all hazard emergency response exercise in the Delta. The period of performance for the Task Force was recently extended to January 1, 2013.
2009	The Delta Protection Act of 2009, SBX7 1, established the Delta Stewardship Council.
2010	SB 808 – Delta Levee Maintenance. The sunset on the 75 percent maximum State cost share for the Subventions Program reimbursement of eligible costs was extended to July 1, 2013. Similarly, the sunset on the authorization to advance funds on current projects was extended to July 1, 2013.
2012	SB 200 – extends the above to 2018.