

State Investments in Delta Levees – An Issue Paper

“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~~State'sstate'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 significantly reduce risk, and serve the coequal goals of a more reliable water supply, and a protected and restored Delta ecosystem.” (Delta Plan Delta Stewardship Council 2013)

INTRODUCTION AND PROBLEM STATEMENT

The Sacramento-San Joaquin Delta (Delta) is an intersection for many 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 have been invested in Delta levee maintenance and improvement since then. Significant risks remain, despite these expenditures. For example, fifteen years after the CALFED Bay-Delta program set a goal of bringing all Delta levees up to the standards of the Corps of Engineers' 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. The sum of recent estimates for Delta levee improvements totals ~~\$\$\$~~\$3.8 billion to ~~\$\$\$~~\$4.28 billion¹, adjusted for inflation.

The Delta Reform Act requires that the Delta Plan promote strategic levee investments that attempt to reduce risks to people, property, and ~~stateState~~ interests in the Delta (Water Code section 85305) and recommend priorities for ~~stateState~~ investment in levee operation, maintenance, and improvements in the Delta (Water Code section 85306). The legislative staff analysis of the 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 DWR and the Central Valley Flood Protection Board reflects the Delta Plan's priorities" (California State Senate 2009).

Agreeing on priorities for State investment 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). The table 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.

Comment [dkr1]: Use Delta Plan's Figure 7-6

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	Protect existing and provide for a net increase in channel-margin habitat.

Comment [JAS2]: This should also add a statement that it also protects the infrastructure of roads, railroads, gas pipelines, and electrical transmission lines. These are also protected by the levees in the Delta.

1

	Low Cost Estimate for Levee Improvement (2014 dollars using ENR CCI)	High Cost Estimate for Levee Improvement (2014 dollars)
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
TOTAL	\$3.80 B	\$4.28 B

		primary channels that carry fresh water through the Delta.	
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.

From Delta Plan Policy RR P1

Comment [DFW3]: Seems like "increase" or gain would be more appropriate. Same goes for wetlands below.

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 Department of Water Resources (DWR) must balance achievement of these goals.

The Delta Plan indicated 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 (DSC 2013).

Others are awaiting these updated priorities. The Governor's *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-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).

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Comment [AMH4]: If this is referring to the Delta Levees Subvention and Special Projects Program, it is a normal process for the program to have a periodic sunset date and to have the legislature re-authorize funding to continue. The "limited duration" of the program authorized by legislation is a regular part of the Program, and not because they don't believe the Programs are working and beneficial. This should be reworded to reflect what is outlined in the comment above.

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, beneficiaries of levee protection and 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 this new approach's development, working together with other affected State and local agencies, Delta residents, a wide variety of Delta stakeholders, and its 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 address State goals and priorities. The strategy is expected to ultimately 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.

KEY ISSUES FOR CONSIDERATION IN UPDATING PRIORITIES FOR STATE DELTA LEVEE INVESTMENT

This draft issue paper outlines fifteen issues that will need consideration as the Council updates the Delta Plan's provisions regarding ~~state~~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.

"Project" levees are part of the State Plan of Flood Control and are identified by the Central Valley Flood Protection Board, 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). Non-project levees comprise 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 Subventions 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.

http://www.water.ca.gov/floodsafe/fessro/docs/special_letter14_final.pdf. The *Suisun Marsh Plan* (U.S. Bureau of Reclamation 2012) recommends that public funding for Suisun Marsh levees needs to be expanded beyond its current limit.

2. WHAT GOALS AND OBJECTIVES SHOULD STATE INVESTMENTS IN DELTA LEVEES FURTHER?

Comment [GF5]: The section below seems to be more of an answer to the question "What types of levees occur in the Delta?"

Comment [JAS6]: This seems awkward and should be reworded as follows: "What should be the goals and objectives of State investments in the Delta Levee system?"

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~~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** (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~~State interests in the Delta" (Water Code section 85305(a)). The 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.

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 a common pool of 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 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.

The Delta’s levees are also 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.

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

- Delta ecosystem. The Delta’s aquatic ecosystem, including its anadromous fish, Delta smelt, longfin-Longfin smelt, and other aquatic life, depends on the quality of Delta waters. 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. Attainment of the State Water Resources Control Board’s *Bay Delta Water Quality Plan*’s objectives that protect aquatic 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, including 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. 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

Comment [GF7]: Not only aquatic life, but also terrestrial life.

Comment [DFW8]: The gates provide water quality benefits, ie. Maintain lower salinities during low outflow periods to meet Water Quality standards. Distribution systems just deliver water to managed wetlands, their WQ and water level control seem to be over stated.

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 altering or even removing some levees. 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; 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 still be possible sometimes~~ **should be a priority** to incorporate woody debris, vegetation, or other features in and adjoining levees to create more natural channel habitat. Restoring the 8000 acres of tidal marsh called for in the **Delta Plan 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).

Comment [DFW9]: Shouldn't this be the FWS Smelt Biological Opinion. Couldn't find anywhere in the Delta Plan where it called for 8000 acres, other than recognizing the requirement in the BO.

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 Corps of Engineers regulations that require its clearance from levees. The Delta Plan recommends that the Corps of Engineers should exempt Delta levees from its levee vegetation policy, where appropriate. **Some progress has occurred on this recommendation**

Comment [GF10]: It would be nice to include illustrations of what the progress is that has occurred.

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

d. Recreation, including waterfowl and upland game hunting, is provided on some Delta lands protected by levees. Resorts and marinas are often sited adjoining 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.

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

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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 were originally 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" lands². 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 the 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).

Comment [AMH11]: But only 2 since the year 2000 and those were sunny-day levee breaks on sections of levee that had recently been repaired. This section should be rewritten to lay out a clearer picture of the status of levee breaks over the last couple of decades and show that with the inception of numerous levee programs, including SB34 in 1988 and AB360 in 1995 which provided more funding and increased the cost share benefits to reclamation districts, the number of breaks has greatly decreased, even in comparison to the 1980's and that levee system as a whole has improved.

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² A more extensive description of the history of the Delta's levee system is available in other documents such as the Delta Plan, PPIC'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 [stateState](#) or local agencies (Water Code section 85225). In addition, [stateState](#) 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, the Department of Water Resources' 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 U.S. Army Corps of Engineers (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 [stateState](#)-federal system and some other Board-designated floodways.

For non-project levees, the CVFPB also has authorities. For example, they approve criteria for maintenance and improvement non-project levees recommended by DWR (Water Code section 12984).

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). DWR guides many flood management activities across the [stateState](#). 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 [stateState](#) 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 the Delta Levee Maintenance Subvention Program (Water Code sections 12980 through 12995) and the Delta Levees Special Flood Control Projects Program (Water Code sections 12300-12314). In the past, it has prepared plans for the Delta levee system (DWR 1975; DWR 1982; DWR.1992; DWR.2011). 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 and the Delta Levees Special Flood Control Projects Program, reporting its findings to the CVFPB (Water Code section 12988).

- California Water Commission. The California Water Commission is responsible to review and approve 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 Corps of Engineers.

- 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 result in a net long term habitat improvement 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 2011)*.

Other State reports 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 the table below.

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

Topic	Recommendations for Economic Sustainability
Levees and Public Safety Recommendations	<ol style="list-style-type: none"> 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 addresses 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 stateState and federal governments.
Recommendations for Infrastructure	<ol style="list-style-type: none"> 1. Planning of levee investments must fully consider the economic value of infrastructure services along with all other benefits.

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

The DPC will soon release a request for proposals to study the feasibility of the Delta levee assessment district which its -Economic Sustainability Plan (and the Council's Delta Plan) recommends.

- Suisun Marsh. The Suisun Marsh Plan (U.S. Bureau of Reclamation 2012) recommends that identifies 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 affected by that restoration will require reinforcement, more maintenance, and in some instances, significant upgrades, which would need to be addressed as part of the proposed restoration.
- 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 stateState 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.

7. HOW ARE DELTA LEVEE MAINTENANCE, OPERATION, AND IMPROVEMENT FUNDED NOW?

The costs of upgrading Delta levees are substantial, totaling \$3.80 billion to \$4.28 billion, adjusted for inflation. 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.³ 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

³ 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.

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 (DSC 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 programs funded by voter-passed Propositions 84 and 1E. These programs and funding sources are described below.

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 50% ~~state~~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 been provided more than \$350 million to the Delta's local agencies 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.

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 mandated 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

Comment [GF12]: Maybe the CDFW role in this program should be included in this paragraph?

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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.

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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 investments in flood management in the Delta and authorized portions of Suisun Marsh, with a focus on multiple benefit projects. The priorities shown in Table 3 guide DWR’s funding and work planning for Delta Integrated Flood Management (IFM) based on categories of benefit. The priorities are consistent with those of the Delta Plan. The report states “funding source and associated legislation will be used to determine exactly how the priorities are used during decision-making.”

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

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 Department of Water Resources, the Delta Protection Commission, 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. 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 ~~s-also~~ entails 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 project levees that 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~~State law, development may be limited in areas that cannot show substantial progress towards this standard.
- 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 Corps of Engineers’ PL 84-99 program. The PL 84-99 standard approximates protection against a 50-year flood. It 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 Delta Protection Commission’s *Economic Sustainability Plan* also proposed raising all Delta levees to the Corps of Engineers’ PL-99 standard, with additional

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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 [stateState](#) 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 the Federal Emergency Management Agency'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 over 47 percent of the legal Delta's acreage, fall below this standard, which 139 miles of Delta levees do not meet (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 [stateState](#) 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 LEEVE 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~~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~~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~~State funding of levee maintenance and repair" (Water Code section 85003).

Most project levees are maintained without ~~state~~State support by local agencies or ~~state~~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~~State share of nonfederal costs also depends on the mix of benefits.

Maintenance of non-project Delta levees is subsidized through the Delta Levee Maintenance Subventions Program (Water Code section 12980-12995). The program pays up to 75 percent of local costs above \$1,000 per levee mile. Subventions to defray levee maintenance costs are not available in Suisun Marsh.

Improvements of non-project levee are funded though the Delta Levees Special Flood Control Projects program. It pays up to 100 percent of levee improvement of rehabilitation costs, including costs for levee-related habitat improvements. In Suisun

Marsh, State funding for levee improvements is available only for some levees along its southwest margin.

State funding for non-project Delta levees is generous in comparison to other areas of the Central Valley or ~~state~~State. Usually, State funds for routine levee maintenance are unavailable outside the Delta. State funds occasionally provide a ~~state~~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 Corps of Engineers 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~~State-federal projects, a minimum local share of 10 percent is typically required with the State paying for 25 percent and the Corps of Engineers 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 Central Valley Flood Protection Board, 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 Delta Protection Commission 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 levee, because the recent draft of the Corps of Engineers' *Delta Islands and Levees Feasibility Study* (2014) concludes that Corps 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 Corps of Engineers. 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 Corps of Engineers' *Delta Islands and Levees Feasibility Study* (2014) concludes that Corps 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 Corps of Engineers' ecosystem restoration priorities. The Corps' 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 Corps of Engineers.

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 the Federal Emergency Management Agency's Hazard Mitigation Program (HMP) and the Corps of Engineers' 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 Corps of Engineers 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 improvements⁴.

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~~State at (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 repairs, because

⁴ Testimony by representatives of the Office of Emergency Services (OES), Federal Emergency Management Agency, and Corps of Engineers 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.

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~~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 Corps of Engineers' levee rehabilitation and repair programs in order to be eligible for ~~state~~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 (Water Code section 12987(b)), but few easements have been acquired. 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.

11. 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~~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).
- Protecting restoration opportunities. Within the Delta's six restoration opportunity areas, significant adverse impacts to future restoration opportunities are to be protected or mitigated (ER P3).
- Vegetation on levees. The Corps of Engineers 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. Levee improvements are also supposed to take account of the most recent Natural Resources Agency Delta Master Recreation Plan. 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 burdensome. How well Delta levee projects are attaining their ecosystem objectives is not known, because few are thoroughly monitored to ascertain their results. A review of current levee related ecosystem enhancement programs should be conducted to assess performance and the benefits provided to the ecosystem.

To determine the most effective integration of habitat enhancement with levee improvements a plan should be developed identifying flood improvement needs in areas identified in the Delta Plan for habitat enhancement/restoration. This plan would identify the most appropriate locations for levee setbacks, channel margin enhancement and other habitat improvements based on ecosystem benefits and compatibility with flood protection improvements.

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 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 but one in the Pocket neighborhood of Sacramento funds state maintenance of project levees there.

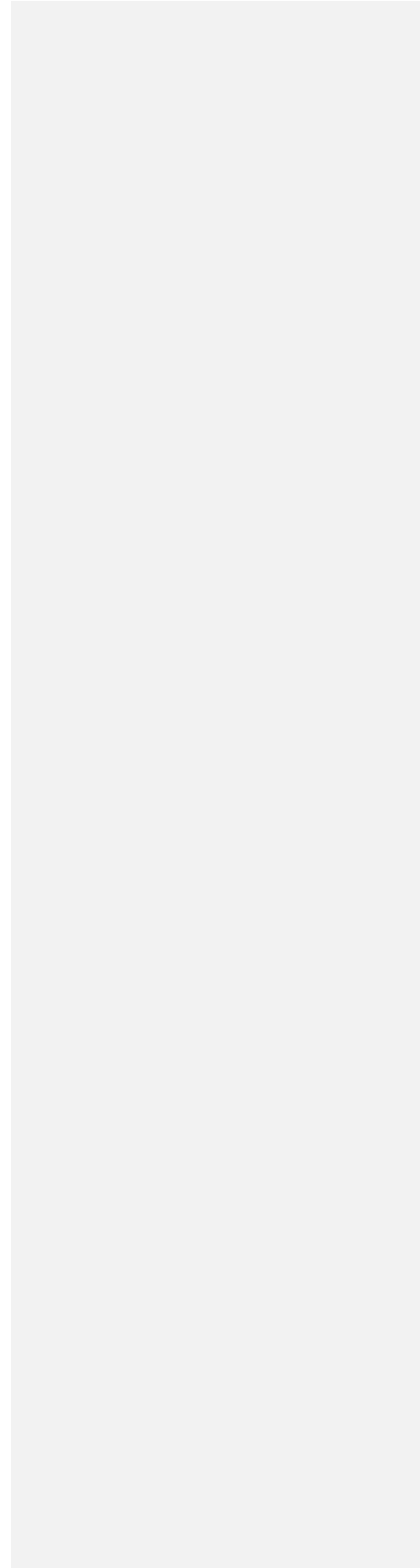
14. HOW SHOULD THE STATE'S LEVEE PRIORITIES ADDRESS THE RISK OF STATE LIABILITY FOR LEVEE FAILURES?

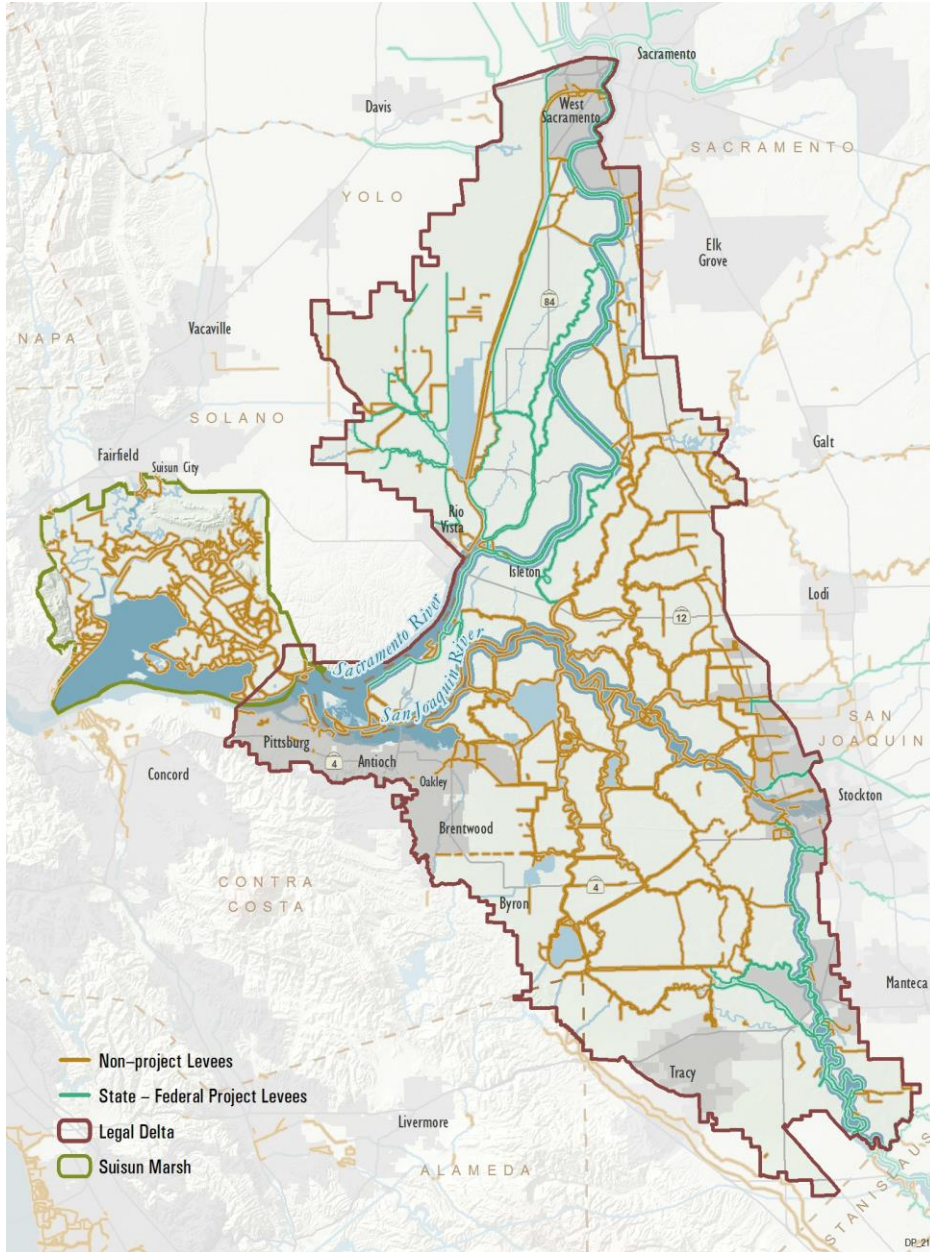
Concerns about the potential for State liability for Delta levee failures extend back for decades. In *Galli v. California*, the State was excluded from liability for damages from a levee failure in 1972 that flooded Brannan-Andrus Island because the island's levees were improved and maintained by a 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).

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~~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. 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.





Project and Non-project Levees within the Delta (Council 2013)

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Comment [IA13]: which agency and where is the plan located? review this entire References section and use our Style Guide/ask for Keith's group's help

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