



Increased investments and new approaches to sustainable funding will protect millions of people, billions of dollars of assets, and important habitat and ecosystems.

Funding and Implementing the 2017 Refined SSIA Portfolio

Funding and implementing the CVFPP relies on the establishment of priorities for the next 30 years and lays the groundwork for future actions and investment. Each CVFPP update will describe implementation progress, new information, and changes in available funding resources, thereby continually informing and enabling the next cycle of near-term and longer-term implementation for future updates of the CVFPP, conceptually shown in Figure 4-1.

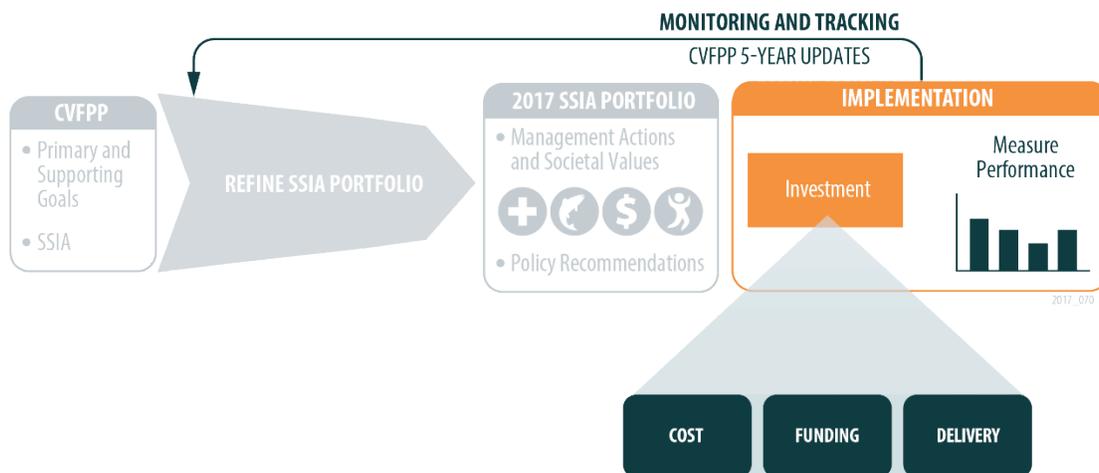


Figure 4-1. 2017 Central Valley Flood Protection Plan Update Development Process

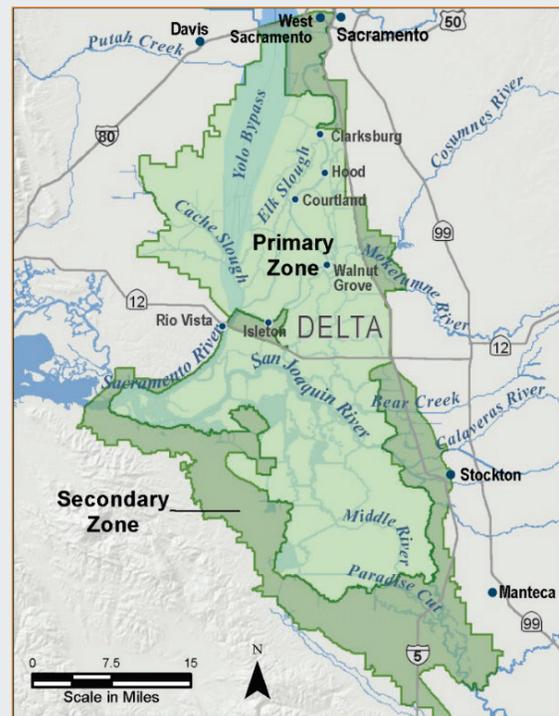
CVFPP implementation is phased to ensure that the primary goal of the CVFPP—to improve flood risk management—is addressed first by improving public safety. Implementation phasing must account for relationships between upstream and downstream actions, while also ensuring that near-term actions are feasible with regard to readily available funding, secured cost-sharing, stakeholder coordination, and other important factors. Phased implementation will also help accommodate the timing of project design, permitting, land acquisition, stakeholder alignment, and partner cost-share funding availability. The following discussion covers five key topics:

- Cost estimates for capital and ongoing investment in the prioritized management action categories described in Chapter 3
- A funding plan overview for funding the 2017 refined SSIA portfolio
- Proposed implementation phasing and delivery of the 2017 refined SSIA portfolio through DWR implementation programs
- Tracking of the intended outcomes from CVFPP implementation, and demonstrating return on investment to California taxpayers
- A summary of key flood management policy recommendations for continuing implementation of the CVFPP and the plan for moving forward

Collaboration with Delta Levee Investment Strategy

The Sacramento–San Joaquin Delta Reform Act of 2009 directed the Delta Stewardship Council to provide a Delta Plan that reduces risks to people, property, and outlines the State’s interest in the Delta. The Delta Stewardship Council supported the Delta Plan through the draft Delta Levee Investment Strategy (DLIS), an updated prioritization of levee investments.

The Delta is part of the overall system for which the CVFPP has guided the State’s participation in managing flood risk in areas protected by the SPFC as directed by the Central Valley Flood Protection Act of 2008. Collaboration between the investment strategies supporting the Delta Plan and CVFPP is necessary to deliver effective improvements in integrated flood management to the Central Valley and Delta.

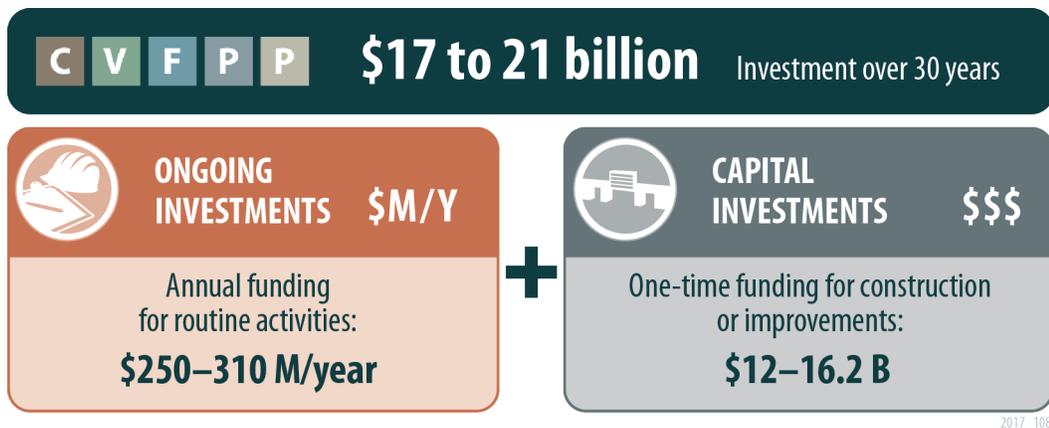


4.1 Total Investment Costs

Data sources from multiple planning and implementation efforts (described in further detail in Chapters 2 and 3) provided a basis for estimating total costs for the broad portfolio of management actions that will contribute to achieving CVFPP goals. Investment is divided into two types: capital and ongoing. Many management actions require only capital investment, whereas others require ongoing, annual investment sustained over the entire 30-year planning horizon. Because funding for these two types of investment are different, they are often discussed separately:



- Capital investment in improvements, which often requires years to spend and implement, are described in terms of **present value cost**.
- Ongoing investments are described in terms of **annual levels of investment**.



4.1.1 Estimating Costs

Multiple planning and implementation efforts completed or initiated since 2012 provided a wealth of data, cost, and other information that enabled identification and refinement of SSIA investment opportunities across the Central Valley. These efforts include State-Federal feasibility studies, BWFSs, RFMPs, the CVFPP Conservation Strategy, OMRR&R TM, and other efforts with data that supported updating a total cost estimate for the 2017 refined SSIA portfolio. Other efforts provided detail on costs for emergency and floodplain management activities and for State operation, planning, and performance tracking activities. A more detailed discussion of the analysis performed to develop these cost estimates and phasing for investment is provided in the Draft CVFPP Investment Strategy TM.

4.1.2 Summary of Capital and Ongoing Costs over 30 Years

The total 30-year investment for the CVFPP is broken down by the two river basins and by the four areas of interest: systemwide, urban, rural, and small community. All applicable tables presented in this chapter are organized similarly and presented as an approximate range of costs. Table 4-1 represents the summation of the cost estimates provided by the State-Federal feasibility studies, BWFSs, RFMPs, OMRR&R Work Group, and other efforts. This summation is the critical “need” for SPFC investments demonstrated by multiple efforts

and agencies with responsibility for improving and maintaining the SPFC. Both the 30-year capital investment and 30-year ongoing investments of the 2017 refined SSIA portfolio are summarized in Table 4-1 and Figure 4-2 in 2016 dollars.

Taken together, the cost estimates indicate a total present value investment need of approximately \$17 to \$21 billion over the next 30 years. The cost of implementing the full range of investments identified in the CVFPP represents a major increase from current and historical levels of funding, and will need to occur over 30 years.

Figure 4-2. CVFPP 30-Year Investment

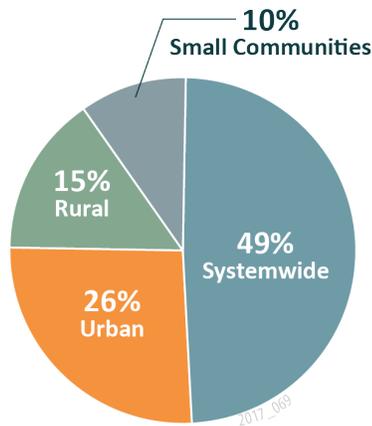


Table 4-1. Total Capital and Ongoing CVFPP Investments Over 30 Years

Area of Interest	Sacramento Basin		San Joaquin Basin		Total	
	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Systemwide	\$6,310	\$7,710	\$2,220	\$2,720	\$8,530	\$10,430
Urban	\$3,410	\$4,160	\$1,090	\$1,330	\$4,500	\$5,490
Rural	\$1,640	\$2,000	\$950	\$1,160	\$2,590	\$3,160
Small Community	\$1,490	\$1,830	\$320	\$390	\$1,810	\$2,220
Grand Total:	\$12,850	\$15,700	\$4,580	\$5,600	\$17,430	\$21,300

Note: Totals reflect annual ongoing investments converted to present value (2016 dollars) and summed with present value capital investment costs.

Understanding the True Cost of OMRR&R

Many parts of the flood system are aging and experiencing a substantial backlog of deferred maintenance resulting in part from a lack of consistent funding. In response, the 2012 CVFPP included the improvement of operations and maintenance as the first of its supporting goals. Additionally, several LMAs¹ have passed assessments pursuant to the requirements of Proposition 218 during the past 5 years to address deferred maintenance.

While progress has been made to address these issues, necessary ongoing maintenance is still critically underfunded. Within their budgets and assurances, maintainers must make difficult decisions and prioritize their work to sustain a functioning flood control system. Societal expectations, changing standards, regulatory requirements, and multiple uses of the flood management system have all influenced the current cost of OMRR&R.

DWR convened an OMRR&R Workgroup after adoption of the CVFPP in 2012 to identify true long-term OMRR&R costs of current and proposed urban and rural facilities² in the SPFC planning area over a 50-year time horizon.³ This true-cost analysis is meant to include both the State and local shares of OMRR&R activities, and assumes no accumulation of future deferred maintenance. The Workgroup developed cost estimates based on review of a variety of sources and input received from DWR staff, LMA representatives, and regional stakeholders and experts.

Projected OMRR&R costs identified by this Workgroup focus on future needs:

- Future ongoing annual maintenance needs, estimated at \$88M annually
- Future repair, rehabilitation and replacement needs, estimated at \$43M annually
- Total future OMRR&R estimate: \$131M annually
- Current local and State expenditures on OMRR&R: \$30M annually

**Total future OMRR&R
cost estimate:**
\$131M annually

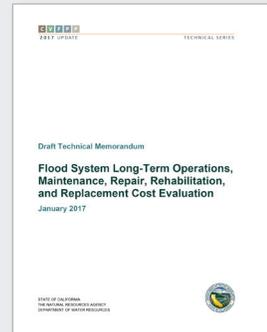
The Workgroup's cost estimates do not account for necessary deferred maintenance and repairs required to address known design deficiencies. The OMRR&R Workgroup focused instead on the true cost of long-term OMRR&R throughout the SPFC after deferred maintenance is complete. The OMRR&R TM documents an estimate of how much funding is needed so that deferred maintenance does not continue to increase in the future. The OMRR&R Workgroup estimate is reflected in the ongoing routine maintenance management action category.

Other key efforts supporting the CVFPP, such as the RFMPs, also address needed deferred maintenance and repairs. DWR's flood project inspections and Flood System Repair Project (FSRP) also provided information on deferred maintenance and repair needs to supplement what was described in the RFMPs. These efforts collectively identified solutions to address deferred maintenance and repairs in support of a more resilient flood management system. The present value of deferred repair, rehabilitation and replacement needs provided by RFMPs and DWR are reflected in the capital investments of the 2017 refined SSIA portfolio.

¹ LMAs passing assessments since 2012 include, RD 784, RD 999, RD 900, RD 1001, RD 10, RD 2103, RD 536, and San Joaquin County.

² The estimated true long-term OMRR&R costs assume fully functioning facilities that meet applicable standards. The true-costs analysis included the following urban and rural SPFC facilities: levees, channels, major structures (as described in CWC Section 8361 and 12878 and administered by DWR, and include weirs, bypass outflow control structures, outfall gate facilities, and large regional pumping plants), and minor structures (stop log or gated closure structures, pumping plants, monitoring wells and piezometers, retaining walls and floodwalls, pipe penetrations, and encroachments). Non-project levees and non-project ecosystem and multi-benefit features are not included within the OMRR&R true costs provided by the OMRR&R Workgroup.

³ Although the CVFPP has a 30-year time horizon, a 50-year time horizon was chosen for this effort because it better corresponds to the typical design life of flood management infrastructure.

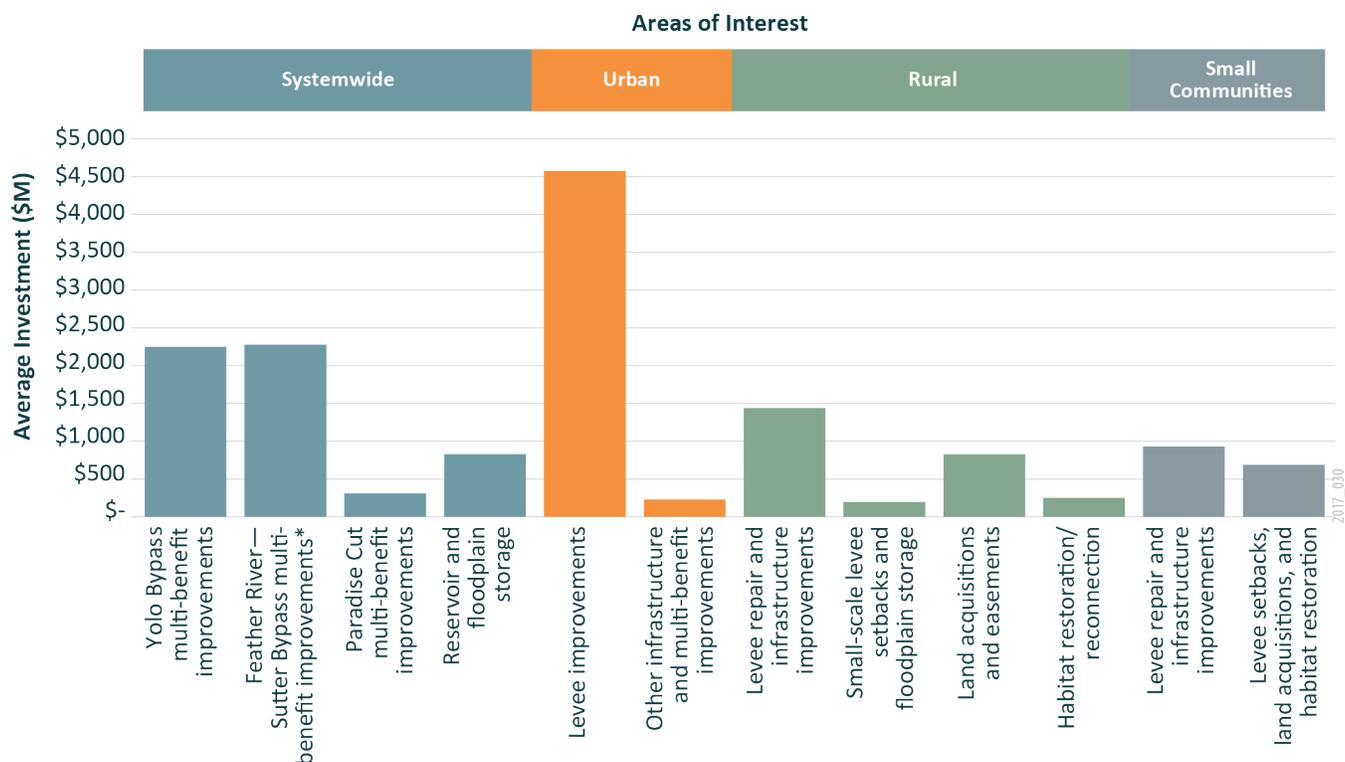


4.1.3 Capital Investment Costs over 30 Years

Actions contributing toward CVFPP supporting goals of promoting ecosystem functions and multi-benefit projects are embedded mostly in larger-scale activities

Implementation of the 2017 refined SSIA portfolio of capital improvements is estimated to cost approximately \$12.0 to \$16.2 billion over the next 30 years, as summarized in Figure 4-3. Table 4-2 elaborates on cost estimates and data sources for each management action category under each area of interest. Many systemwide actions are expected to promote ecosystem functions and multi-benefit projects, as are some rural easements, levee setbacks, and floodplain storage actions. Therefore, costs for actions that promote ecosystem functions and multi-benefit projects are included in all areas of interest, and are embedded mostly within larger-scale activities, where feasible. An estimated cumulative capital and ongoing cost of approximately \$1.3B within the 2017 refined SSIA portfolio contributes to the CVFPP supporting goals of promoting ecosystem functions and promoting multi-benefit projects. All of the State funding mechanisms could provide a funding stream for multi-benefit projects, including ecosystem components, depending on what is legally authorized. Each funding mechanism’s applicability depends on the nature of the mechanism’s revenue stream (ongoing vs. limited-duration capital) and nexus of the mechanism’s purpose with the proposed action’s benefits. Other funding mechanisms, such as federal ecosystem programs, could also provide funding for ecosystem components of multi-benefit projects. For more information on funding mechanisms, see Section 4.2.1.

Figure 4-3. Total Capital CVFPP Investments Over 30 Years



Note: All estimated dollar values are in 2016 dollars and indicate average annual investments made over 30 years.

*The high end cost estimate was used for the Feather River—Sutter Bypass multi-benefit improvements. This is due to the larger range of uncertainty compared to other systemwide improvements, given the Sacramento River BWFS recommendations to determine an array of multi-benefit actions through future study in close coordination with local and regional partners after Yolo Bypass improvements are implemented.

Table 4-2. Capital Investments of the 2017 Refined SSIA Portfolio Over 30 Years (shown in 2016 \$)

Management Action Category and Area of Interest	Data Source	Sacramento		San Joaquin		Total	
		Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Systemwide							
Yolo Bypass multi-benefit improvements	BWFSs	\$2,050	\$2,500	\$–	\$–	\$2,050	\$2,500
Feather River–Sutter Bypass multi-benefit improvements	BWFSs	\$600	\$2,300	\$–	\$–	\$600	\$2,300
Paradise Cut multi-benefit improvements	BWFSs	\$–	\$–	\$280	\$340	\$280	\$340
Reservoir and floodplain storage	BWFSs and RFMPs	\$130	\$150	\$620	\$750	\$750	\$900
Subtotal:		\$2,780	\$4,950	\$900	\$1,090	\$3,680	\$6,040
Urban							
Levee improvements	USACE	\$3,240	\$3,960	\$900	\$1,100	\$4,140	\$5,060
Other infrastructure and multi-benefit improvements	BWFSs and RFMPs	\$100	\$120	\$50	\$60	\$150	\$180
Subtotal:		\$3,340	\$4,080	\$950	\$1,160	\$4,290	\$5,240
Rural							
Levee repair and infrastructure improvements	BWFSs and RFMPs	\$790	\$960	\$540	\$660	\$1,330	\$1,620
Small-scale levee setbacks and floodplain storage	BWFSs and RFMPs	\$100	\$120	\$70	\$90	\$170	\$210
Land acquisitions and easements	RFMPs and floodplain management effort	\$490	\$590	\$280	\$340	\$770	\$930
Habitat restoration/reconnection	RFMPs	\$250	\$300	\$10	\$10	\$260	\$310
Subtotal:		\$1,630	\$1,970	\$900	\$1,100	\$2,530	\$3,070
Small Community							
Levee repair and infrastructure improvements	BWFSs and RFMPs	\$750	\$910	\$110	\$140	\$860	\$1,050
Levee setbacks, land acquisitions, and habitat restoration	RFMPs and floodplain management effort	\$530	\$640	\$110	\$140	\$640	\$780
Subtotal:		\$1,280	\$1,550	\$220	\$280	\$1,500	\$1,830
Capital Total:		\$9,030	\$12,550	\$2,970	\$3,630	\$12,000	\$16,180

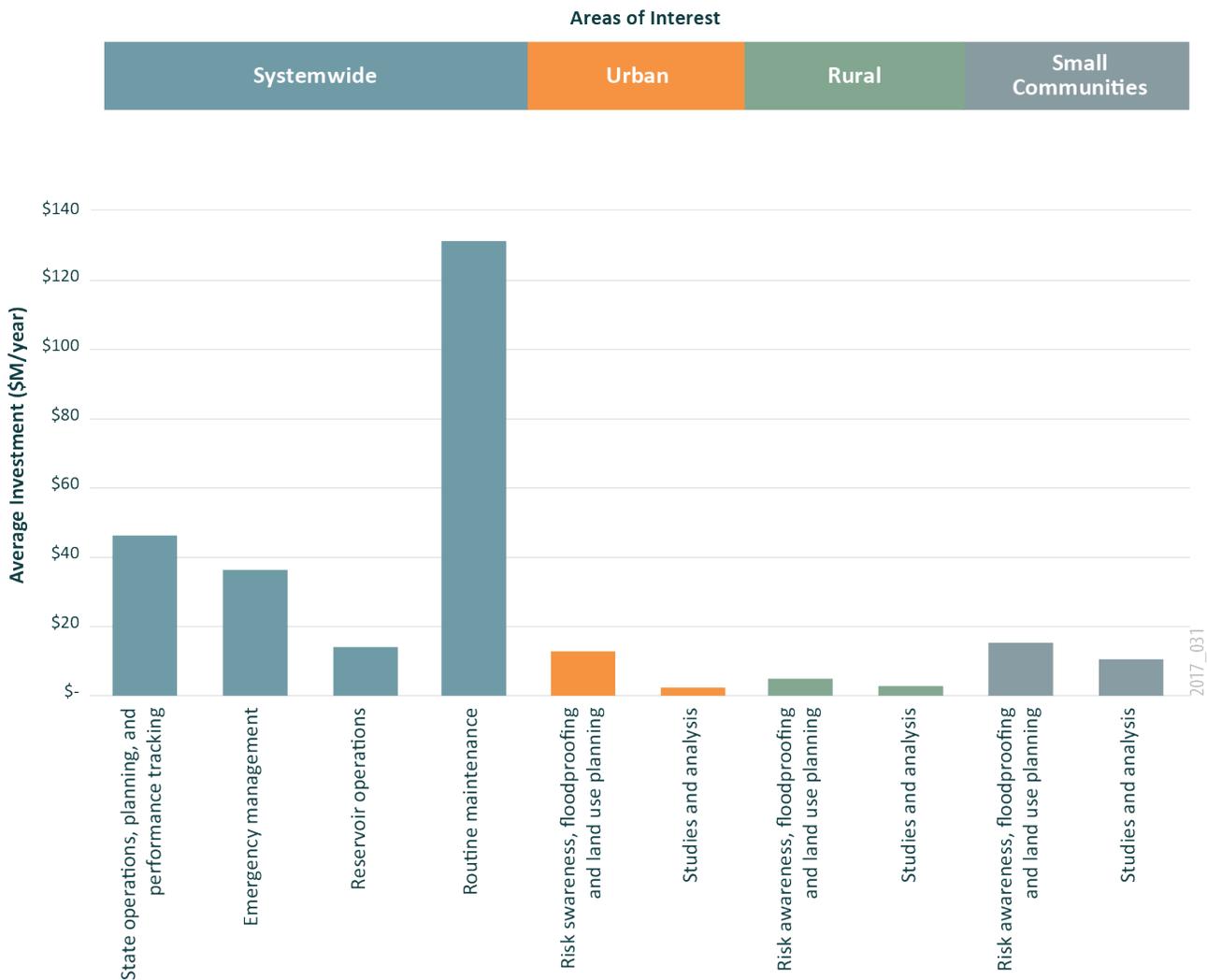
Notes:

1. All estimated dollar values are in 2016 dollars and indicate an investment over 30 years.
2. Feather River–Sutter Bypass Multi-benefit Improvement cost ranges are included for completeness, but additional study is needed to refine recommended improvements, including consideration of improvements to Tisdale and Colusa Weirs.
3. An estimated cumulative capital and ongoing cost of \$1.3B within the 2017 refined SSIA portfolio contributes to the CVFPP supporting goals of promoting ecosystem functions and promoting multi-benefit projects, embedded most within larger scale activities.

4.1.4 Ongoing Investment Costs over 30 Years

Implementation of the 2017 refined SSIA portfolio for ongoing investments is estimated to range in cost annually from \$251 to \$305 million. Figure 4-4 summarizes annualized costs for the ongoing investments by each area of interest. Ongoing investments are discussed in annualized dollar values throughout this section. This estimate is informed by the same efforts as described in Section 4.1.1. Table 4-3 elaborates on cost estimates and data sources for each management action category under each area of interest.

Figure 4-4. Annual Total of Ongoing CVFPP Investments



Note: All estimated dollar values are in 2016 dollars and indicate average annual investments made over 30 years. They have not been discounted to present value nor escalated for inflation.

Table 4-3. Ongoing Investments of the 2017 Refined SSIA Portfolio Per Year (shown in 2016 \$)

Management Action Category and Area of Interest	Data Source	Sacramento		San Joaquin		Total	
		Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Systemwide							
State operations, planning and performance tracking	RFMPs and State operations/planning effort	\$21	\$26	\$20	\$24	\$41	\$50
Emergency management	RFMPs and emergency management effort	\$16	\$20	\$16	\$20	\$32	\$40
Reservoir operations	BWFSSs	\$1	\$1	\$12	\$14	\$13	\$15
Routine maintenance	OMRR&R Workgroup	\$81	\$99	\$37	\$45	\$118	\$144
Annual Subtotal:		\$119	\$146	\$85	\$104	\$205	\$250
Urban							
Risk awareness, floodproofing and land use planning	RFMPs and floodplain management effort	\$4	\$5	\$8	\$10	\$12	\$15
Studies and analysis	RFMPs and USACE	\$2	\$2	\$1	\$1	\$3	\$3
Annual Subtotal:		\$6	\$7	\$9	\$11	\$15	\$18
Rural							
Risk awareness, floodproofing and land use planning	RFMPs and floodplain management effort	\$1	\$2	\$3	\$4	\$4	\$6
Studies and analysis	RFMPs	\$1	\$1	\$2	\$3	\$3	\$4
Annual Subtotal:		\$2	\$3	\$5	\$7	\$7	\$10
Small Community							
Risk awareness, floodproofing and land use planning	RFMPs and floodplain management effort	\$7	\$9	\$7	\$9	\$14	\$18
Studies and analysis	RFMPs and Small Communities Program	\$10	\$12	\$-	\$-	\$10	\$12
Annual Subtotal:		\$17	\$21	\$7	\$9	\$24	\$30
Ongoing Annual Total:		\$144	\$177	\$106	\$131	\$251	\$308

Notes:

1. Estimated dollar values are in 2016 dollars and indicate annual investments made over 30 years. They have not been discounted to present value nor escalated for inflation.
2. Present value of total ongoing investments is approximately \$5B over 30 years.
3. A cumulative capital and ongoing cost of \$1.3B within the 2017 refined SSIA portfolio contributes to the CVFPP supporting goals of promoting ecosystem functions and promoting multi-benefit projects, embedded most within larger scale activities.
4. Currently, DWR's Division of Flood Management spends an approximate annual \$58M/year. SPFC-related staff work on a range of activities and management actions across all areas of interest. Therefore, staff costs may be incorporated into other ongoing management action categories other than the State operations, planning, and performance tracking line item.

4.2 CVFPP Funding Plan

The CVFPP funding plan (included in the Draft CVFPP Investment Strategy TM) aligns the 2017 refined SSIA portfolio with appropriate funding mechanisms and implementation

programs. The CVFPP funding plan also considers other influential factors affecting the timing of investments and provides a recommended approach to fully fund the 2017 refined SSIA portfolio. Actions needed at the local, State, and federal levels to support the fully funded 2017 refined SSIA portfolio are included in the recommended CVFPP funding plan.

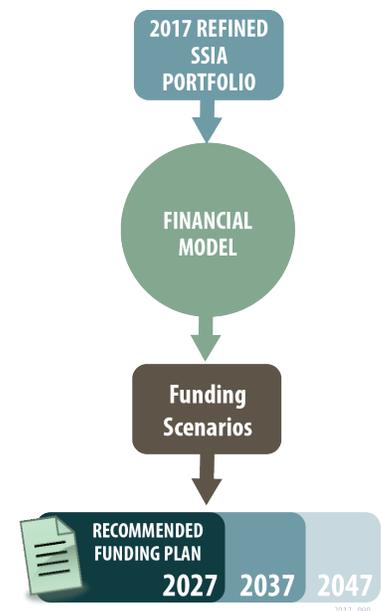
Figure 4-5 presents the process used to develop the recommended CVFPP funding plan.

The process included the following steps within the financial analysis:

- 2017 refined SSIA portfolio
 - ▶ Analyze the categories and costs of capital and ongoing management actions within the 2017 refined SSIA portfolio to develop investment priorities
- Financial Model
 - ▶ Apply existing and potential new funding mechanisms
 - ▶ Apply other influential factors, such as ability to pay and cost-share agreements
 - ▶ Assign DWR implementation program with potential funding mechanisms
- Funding Scenarios
 - ▶ The financial model analyzed several possible funding scenarios ranging from partial to full funding.
 - ▶ Funding scenarios provide insight on mechanisms required and contribution from cost-share partners.
- Recommended Funding Plan
 - ▶ The timing of investments results from an optimal funding scenario that would fully fund the 2017 refined SSIA portfolio for both capital and ongoing investments.
 - ▶ \$17 to \$21 billion over the next 30 years, divided into three 10-year phases.
 - ▶ New funding mechanisms required
 - ▶ Increase cost-shares for federal, State, and local partners



Figure 4-5.
Financial Model Development Overview



4.2.1 Analyzing the Portfolio and Applying Funding Mechanisms

Many uncertainties will affect future flood management investments; the financial analysis builds in these uncertainties as prescribed constraints. Financial analysis of the 2017 refined SSIA portfolio consists of these constraints: prioritized management actions, existing and potential new funding mechanisms, and other influential factors such as ability to pay or cost-share agreements.

The financial analysis was organized by area of interest and by prioritized management action categories as described in Chapter 3. The management action categories were matched with the DWR flood management implementation programs for delivery.

The management action categories were then matched to existing and new funding mechanisms. The Draft CVFPP Investment Strategy TM includes multiple scenarios that vary the revenues of existing and potential new funding mechanisms, contributions from cost-share partners, and other constraints. The multitude of scenarios included in the investment strategy ranges across (1) decreased investment in all activities, (2) current level of investment for all activities, (3) funding only ongoing investments and no capital investments, (4) fully funding ongoing investments and partially funding capital investments, and (5) fully funding ongoing and capital investments. This range of scenarios helps identify solutions as future funding constraints and political conditions change. The recommended CVFPP funding plan was chosen as the most promising of these possible scenarios that would fully fund the ongoing and capital investments, with flexibility to make adjustments over time in future CVFPP updates as implementation proceeds.

What is a Funding Plan?

- The 2017 CVFPP Update states why flood investments are needed.
- The 2017 CVFPP Update and Investment Strategy TM specify what investments are needed.
- The CVFPP funding plan then identifies how these investments could be funded over the 30-year planning horizon.

Current bond funding for flood system investments is expected to be depleted by 2019.¹ Continued implementation of the CVFPP requires new incremental State, federal, and local funding. Greater use of existing—and establishment of new—funding mechanisms is needed to provide more stable and secure funding for critical ongoing investments, such as operations and maintenance and emergency management.

A variety of potential funding mechanisms are summarized in Table 4-4. The table briefly describes local, State, and federal funding mechanisms by providing a summary description of each mechanism, what management actions it best applies to, and the role the mechanism could play in the CVFPP investment strategy. Assessment-based funding mechanisms are designed to have a clear nexus between the benefits received and the costs allocated to the user or property. More detailed evaluations of each mechanism are provided in the Draft CVFPP Investment Strategy TM. Funding mechanisms that could apply to pay for the 2017 refined SSIA portfolio within the 30-year planning horizon are described in Section 4.2.2.

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¹ DWR anticipates that by FY 2019/2020, it will no longer have the ability to commit Proposition 1E and 84 funds. Funds will not be completely expended until after 2020, because several projects under construction will continue using those funds.

Table 4-4. Summary of Funding and Financing Mechanisms by State, Federal, and Local Entities

Mechanism	New Mechanism	Description	Applicable Management Actions	Level of Applicability	Inter-annual Reliability	Recommendations for CVFPP Funding Plan
State						
Additional State General Fund		The General Fund has traditionally funded some flood management. The CVFPP funding plan recommends increasing General Fund appropriations.	All capital and ongoing management actions	Applicability is high. There is a nexus between lowering the risk of flooding and benefits to the State economy.	Moderate	Key part of the near-term approach
Sacramento and San Joaquin Drainage District	✓	Reutilize the function of the Sacramento and San Joaquin Drainage District to provide another source of funding. This would require new legislation to amend the Sacramento and San Joaquin Drainage District currently in the California Water Code. This mechanism would need to be coordinated with other potential assessments.	All capital and ongoing management actions	Applicability is high. There is a strong nexus between the assessments and benefits received in the drainage district.	High	A new funding source to pay local cost shares
State River Basin Assessment	✓	A river basin assessment would be a tool for integrated water management. Assessment revenue would be returned to the watershed to be shared across the integrated water management activities. This assessment would cover the whole watershed and be shared by water agencies within the watershed.	All capital and ongoing management actions	Applicability is low (if implemented, assessment revenue would be spread across other water activities in the basin with likely no more than \$5 to \$10M/year for flood management). Nexus is strong between the assessment and the benefits received in the watershed.	High	A new funding source that could fund some projects in the longer term, but a minor role in the CVFPP funding plan
State Flood Insurance Program	✓	The State would augment/replace the NFIP program with a State-led program. Beyond providing risk coverage, the program would be set up to invest in infrastructure and other floodplain management activities that reduce flood risk. Another version of this could be a local basin-wide insurance program. A local basin-wide insurance program could potentially be a companion program with the Statewide Flood Insurance Program. Any new program could also consider insurance for agricultural properties.	Levee improvements, small-scale levee setbacks and floodplain storage, land acquisitions and easements	Applicability is high (anticipated to generate \$5 to \$20M/year; however, this would require significant effort to determine feasibility). There is a strong nexus between insurance and the benefits received as rates could fluctuate depending on benefit level.	High	A new funding source that could fund projects in the longer term

Table 4-4. Summary of Funding and Financing Mechanisms by State, Federal, and Local Entities

Mechanism	New Mechanism	Description	Applicable Management Actions	Level of Applicability	Inter-annual Reliability	Recommendations for CVFPP Funding Plan
General Obligation Bonds (GO Bonds)		Issuance of new State general obligation bonds would require a statewide vote. This mechanism would require time to prepare language for the bond measure for the statewide vote, as well as a 2-year lag before funds would be available after passage.	Systemwide capital actions, levee improvements, small-scale levee setbacks and floodplain storage, land acquisitions and easements, habitat restoration/reconnection	Applicability is high. The benefits of reducing the flood risk and benefits to the State economy create a nexus with this mechanism.	High for bonds that have passed, low over the long term	Could continue to play a significant role in capital investments
Federal						
USACE		The Water Resource Development Act (WRDA) authorizes the Secretary of the Army to study and/or implement various projects and programs for improvements and other purposes to rivers and harbors of the United States. Federal authorized funds would require appropriation by Congress.	Systemwide capital actions; urban levee improvements; small-scale levee setbacks and floodplain storage; <i>rural land acquisitions and easements</i> ; habitat restoration/reconnection; risk awareness, floodproofing, and land use planning; urban and <i>small community studies and analysis</i>	Applicability is high. Projects qualifying for USACE funding have to demonstrate that they provide national benefits to receive funding.	Moderate	A key part of the federal contribution
FEMA		FEMA is the disaster response agency of the federal government. As such, FEMA provides State and local governments with funding for emergency preparedness programs in the form of non-disaster Grants.	Risk awareness, floodproofing, and land use planning; rural and small community studies and analysis	Applicability is high (expected to generate no more than \$10M/year). The limited uses of the funds maintain the nexus between the funds and benefits received.	High	Part of the CVFPP funding plan, but provides smaller percentage of overall CVFPP funds
Ecosystem Programs		There are several federal programs that provide grants for ecosystem purposes. For example, voluntary Farm Bill conservation programs are offered through Natural Resources Conservation Service (NRCS).	Habitat restoration/reconnection, rural land acquisitions and easements	Applicability is high. The application process for these funds would require a nexus to be shown.	Moderate	Programs should be explored to augment funding
Local						
Benefit Assessments and Special Taxes		The typical mechanism for funding local activities. Increases to benefit assessments and special taxes would require a property owner or a registered voter vote (depending upon specific circumstances).	All capital and ongoing management actions	Applicability is high. Benefit assessments by definition would have a strong nexus.	High	Could continue to play a major role in local funding

Notes:

1. *Italics* represent a requested change for the USACE project approval methodology.
2. All funding mechanisms listed are used in the recommended funding plan. Additional funding mechanisms that have been explored are described in the Draft CVFPP Investment Strategy TM.

4.2.2 Timing of Investments

The CVFPP investment strategy considers priorities, complexity and variety of management actions, availability and applicability of funding mechanisms, and other influential factors to optimize the timing of investments. The financial model varied these factors to analyze several possible funding scenarios. These influential factors included: historical expenditures, political sentiment, cost-share agreements, project benefits, competing demands and complementary actions, ability and willingness to pay.

These scenarios included consideration of historical levels of funding through a fully funded 2017 refined SSIA portfolio. Using only the current revenue sources, generating revenue at historical levels would only fund \$4 to 5 billion of the SSIA over the next 30 years. Other scenarios varied the cost shares among federal, State, and local entities, as well as the amount of revenue that could be generated from the various funding mechanisms.

The recommended timing of investments results from a funding scenario that would fully fund the 2017 refined SSIA portfolio over 30 years, for both capital and ongoing investments, is divided into three 10-year phases generally described below.

- **Phase 1:** Reactively address the highest levels of risk to lives and assets concentrated in the densely populated areas
- **Phase 2:** Actively transition to more balanced flood management
- **Phase 3:** Proactively balance flood investments for both capital and ongoing activities in a sustainable manner

Table 4-5 describes details on each phase. Each CVFPP 5-year update will refine investment timing as priorities and conditions change during CVFPP implementation. Figure 4-6 shows capital investments phased over time by areas of interest and Figure 4-7 shows ongoing investments phased over time by management action category.

Table 4-5. Recommended Timing of CVFPP Investments Shown by Average Annual Expenditures in Each Phase (\$M/year, 2016 dollars)

	Phase 1	Phase 2	Phase 3
Focus	Reactively address the highest levels of risk to lives and assets concentrated in the densely populated areas	Actively transition to more balanced flood management	Proactively balance flood investments for both capital and ongoing activities in a sustainable manner
Anticipated Duration	2017 to 2027	2027 to 2037	2037 to 2047
Capital Investment			
Capital Revenue Sources	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$13M/year Sacramento/San Joaquin Drainage District (once established) ▶ 2020s \$2.5B GO Bond ■ Federal <ul style="list-style-type: none"> ▶ \$200M/year USACE ▶ \$3M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$15M/year local revenue 	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$14M/year Sacramento/San Joaquin Drainage District ▶ \$5M/year State river basin assessment (once established) ▶ \$11M/year State flood insurance program (once established) ▶ 2030s \$2.5B GO Bond ■ Federal <ul style="list-style-type: none"> ▶ \$220M/year USACE ▶ \$3M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$20M/year local revenue 	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$19M/year Sacramento/San Joaquin Drainage District ▶ \$15M/year State river basin assessment ▶ \$11M/year State flood insurance program ▶ 2040s \$2.5B GO Bond ■ Federal <ul style="list-style-type: none"> ▶ \$240M/year USACE ▶ \$3M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$25M/year local revenue
Ongoing Investment			
Ongoing Revenue Sources	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$135M/year general fund ▶ \$2M/year Sacramento/San Joaquin Drainage District (once established) ■ Federal <ul style="list-style-type: none"> ▶ \$10M/year USACE ▶ \$7M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$30M/year local revenue 	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$170M/year general fund ▶ \$6M/year Sacramento/San Joaquin Drainage District ▶ \$10M/year State river basin assessment (once established) ▶ \$1M/year State flood insurance program (once established) ■ Federal <ul style="list-style-type: none"> ▶ \$12M/year USACE ▶ \$12M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$35M/year local revenue 	<ul style="list-style-type: none"> ■ State <ul style="list-style-type: none"> ▶ \$190M/year general fund ▶ \$6M/year Sacramento/San Joaquin Drainage District ▶ \$10M/year State river basin assessment ▶ \$1M/year State flood insurance program ■ Federal <ul style="list-style-type: none"> ▶ \$15M/year USACE ▶ \$17M/year FEMA ■ Local <ul style="list-style-type: none"> ▶ Incremental increase of \$35M/year local revenue

Notes:

1. Estimated values are in 2016 dollars, and are annual averages over each 10-year period.
2. General Obligation Bond (GO Bond): GO Bonds issued by the State of California are full faith and credit bonds pledged by the State’s general fund, and require majority voter approval.
3. Phase 3 allocations represent the real need of annual ongoing investments within the 2017 refined SSIA portfolio. Ramping of investments shown here represent needed increases of staff and resources.

- **Phase 1** is aimed at *reactively* addressing the highest levels of risk to lives and assets concentrated in the densely populated areas (urban and small communities). Funding comes from increasing revenue from existing sources and recommends seeking additional funding from the Sacramento San Joaquin Drainage District after necessary legislative amendments are made. Phase 1 also leverages the most promising and readily viable opportunities for ecosystem restoration that exist in the Central Valley. Phase 1 includes Yolo Bypass multi-benefit improvements, land acquisition for Paradise Cut multi-benefit improvements, and reservoir and floodplain storage. It also includes continued investment in urban levees and other infrastructure, some rural levee repairs and other infrastructure improvements, and beginning investment in small communities. Ongoing Phase 1 actions emphasize actions related to addressing deferred and ongoing maintenance of the SPFC with additional emergency preparedness and flood risk awareness activities that are timely and a highly cost-effective means of improving public safety.
- **Phase 2** is aimed at *actively* transitioning to more balanced flood management. Funding would require sustaining Phase 1 revenues and adding new statewide revenue sources (such as funds through a new State flood insurance program and State river basin assessment). Phase 2 includes continued Yolo Bypass multi-benefit improvements, increased investment in Paradise Cut multi-benefit improvements, and continued investment in reservoir and floodplain storage. It also includes decreasing investment in urban levees and other infrastructure, decreasing rural levee repairs and other infrastructure improvements, and increasing investment in small communities. Ongoing Phase 2 actions emphasize increasing State operations, planning, and performance tracking activities; studies and analysis; reservoir operations; and more floodproofing and land use planning activities.
- **Phase 3** is aimed at *proactively* balancing flood management system investments for both capital and ongoing activities in a sustainable manner. Funding is based on sustaining revenue levels as established in Phases 1 and 2. Phase 3 includes completion of Yolo Bypass multi-benefit improvements, investment in Feather River–Sutter Bypass multi-benefit improvements, and continued investment in reservoir and floodplain storage. It also includes continued ongoing investments, such as O&M, needed to sustain the value of past capital investments. It also includes decreased investment in new or improved urban levees and other infrastructure, increased rural levee repairs and other infrastructure improvements, and decreased investment in small communities. Ongoing Phase 3 actions continue the ramping up of investments established in Phases 1 and 2.

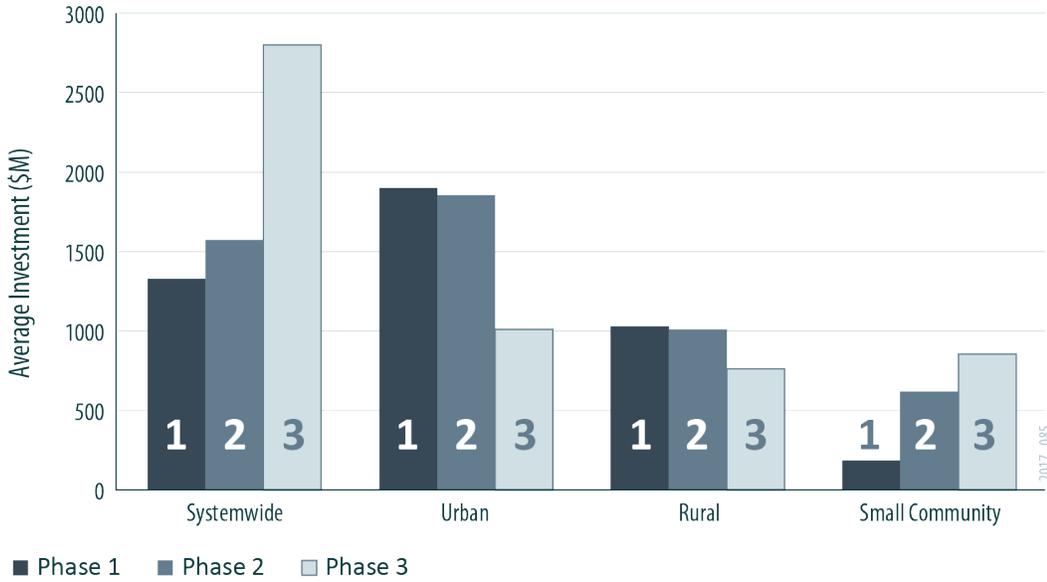


Figure 4-6.
Capital SSIA
Phased Over
Time by Area
of Interest

Note: All estimated dollar values are in 2016 dollars and indicate an investment over 30 years.

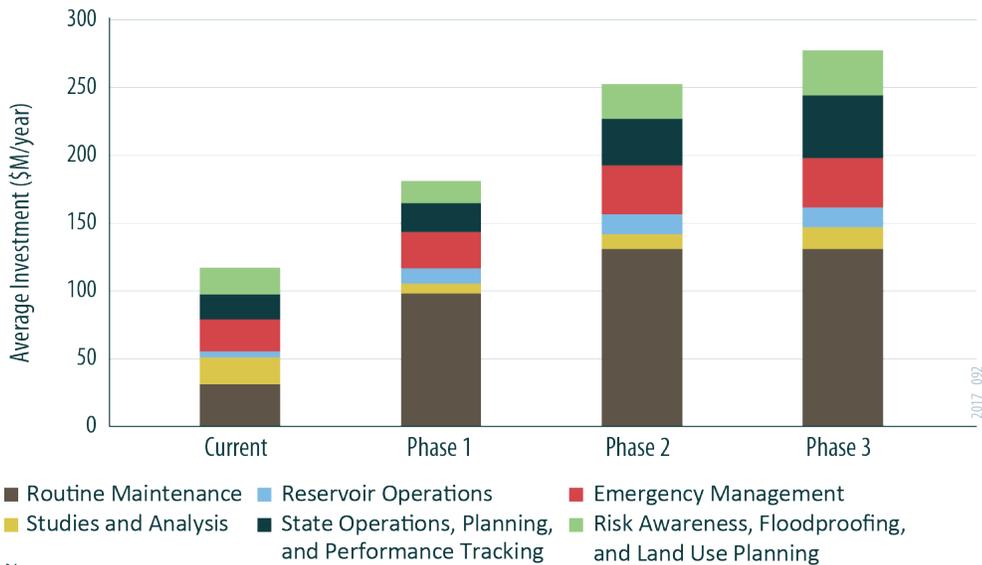


Figure 4-7.
Ongoing SSIA
Phased Over
Time by
Management
Action
Categories

Notes:

1. All estimated dollar values are in 2016 dollars and indicate average annual investments made over 30 years. They have not been discounted to present value nor escalated for inflation.
2. Ramping of investments shown represent capacity building of staff and resources, it is not intended to account for escalating costs from inflation.

To implement the CVFPP over the next 30 years, much larger contributions would be required from all entities. Figure 4-8 outlines recommended funding and phasing of funding for each cost share partner to support the CVFPP funding plan. The information is presented this way to demonstrate when funding mechanisms could be available and how much would be needed. The recommended CVFPP funding plan would take advantage of existing revenues sources and needed increases in revenue-generation capacity.

Larger State Contributions and New Funding Mechanisms Are Needed

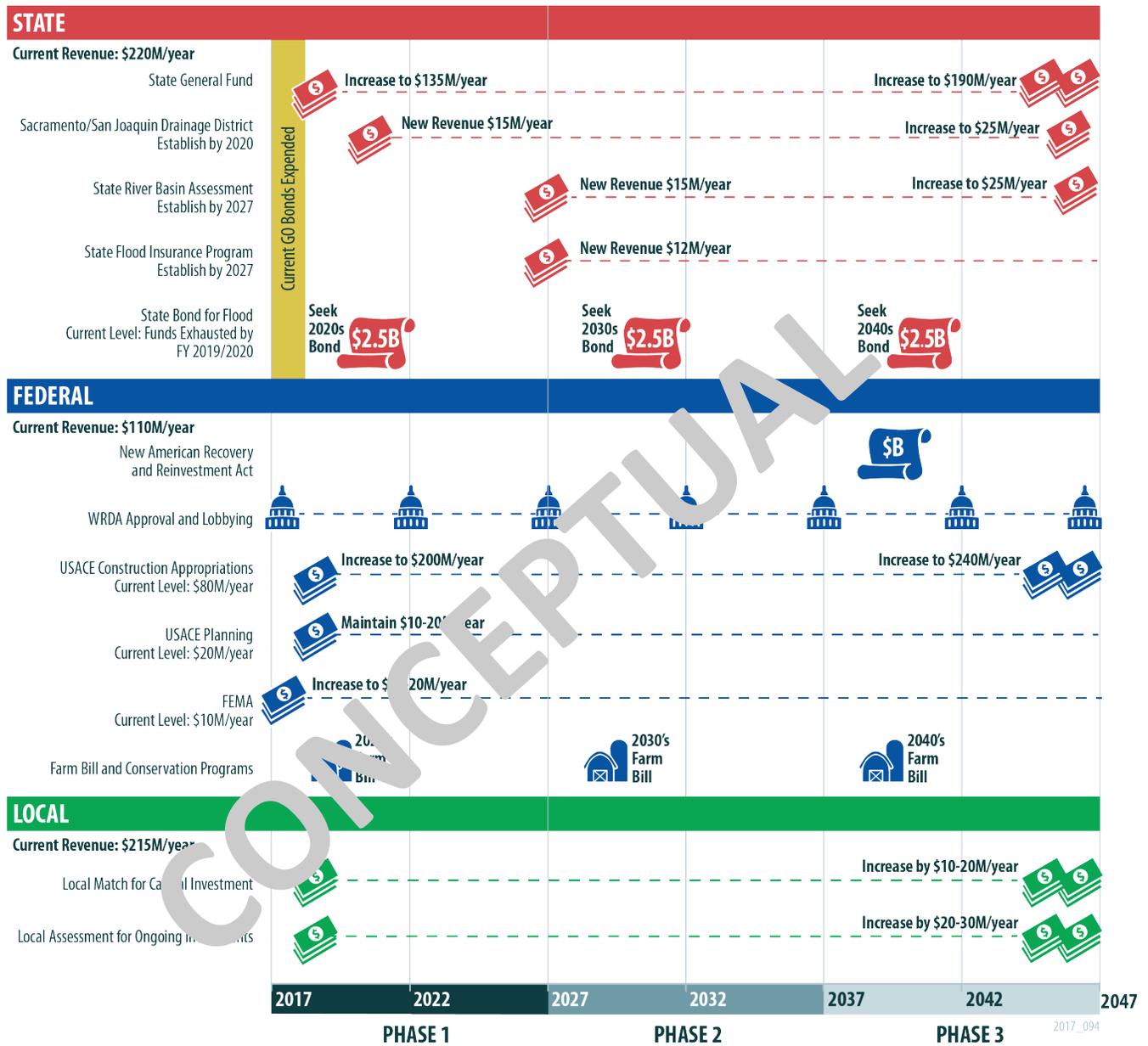
- Increasing contributions from the State General Fund
- Successfully passing new State bonds with unprecedented amounts and frequency for flood management investments
- Developing new sources of funds, including evaluating a State flood insurance program and implementing a State river basin assessment program
- Reutilize the function of the Sacramento and San Joaquin Drainage District to conduct assessments and amending its authority in the California Water Code to modernize it for today's needs

For the State, this would include a much larger contribution from the State General Fund and successfully passing new State bonds. The three bonds would be unprecedented in the amount of funding requested and frequency for flood-specific investments: an estimated 10-year frequency tied to overall State capacity to implement flood management system improvements. Time and effort would be required to develop new funding mechanisms, including evaluating the feasibility of a State flood insurance program and implementing a State river basin assessment program. In addition, the Sacramento and San Joaquin Drainage District could be reutilized if its authority is amended in the California Water Code. This district would be a vehicle to implement an assessment.

For the federal government, contributions from the USACE would need to increase from current levels. This requires the State to effectively promote the SSIA, likely seeking federal authorizations through the WRDA and annual appropriations from Congress to fund the authorized projects. FEMA contributions could remain at current levels. The NRCS programs (such as the Farm Bill and Conservation Programs) could also provide some funds for flood management and ecosystem restoration projects.

Local entities would need to generate funds to provide the local match for federal and State capital investments. Locals would also need to generate more funds for their share of ongoing costs.

Figure 4-8. Recommended Funding Plan Timeline for CVFPP



Notes:

1. Although revenues from the Sacramento/San Joaquin Drainage District would be generated from locals within the district boundaries, it would require action by the California State Legislature to implement. This is why this funding mechanism appears as a State mechanism.
2. Current State contributions include approximately \$40M/year from the General Fund and current GO Bond funding from Propositions 84 and 1E.
3. Current local contributions to all capital and ongoing investments are unknown. The \$215M/year local revenue estimate (reflects the average revenue from 2003 – 2014) is assumed to cover capital and maintenance obligations and expenditures for local operating costs. It was assumed that this revenue could not be applied to the CVFPP funding plan, with one exception: local maintenance expenditures already currently being spent on SPFC facilities are applied towards the ongoing portion of the 2017 refined SSIA portfolio.
4. All estimates provided include both capital and ongoing activities unless otherwise specified.

4.2.3 Near-Term Funding Actions

The recommended CVFPP funding plan for the 2017 refined SSIA portfolio supports approximately \$17 to \$21 billion over the next 30 years, requiring substantially more funding in the Central Valley than has been generated in the past. This would require a combination of significant changes in how the State and its partners fund flood project implementation, operations and maintenance, as well as increased funding through existing and new mechanisms. Recommendations are presented for local, State, and federal partners to successfully implement the CVFPP. Additionally, the CVFPP funding plan will also inform the flood investment needs of the Central Valley for California’s Five-Year Infrastructure Plan, which the Governor is required to submit to the Legislature for consideration with the annual budget bill.

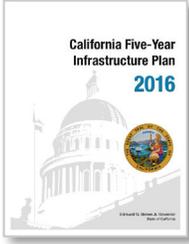
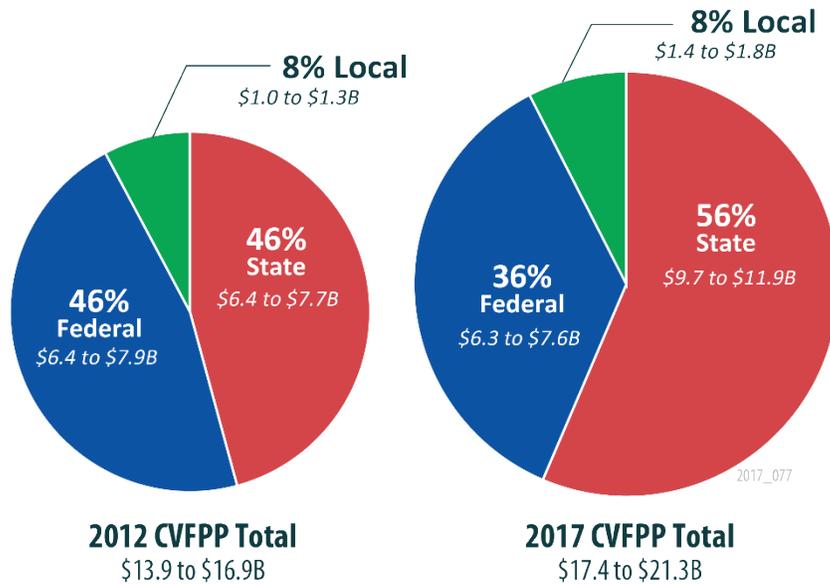


Figure 4-9 presents the estimated cost shares between federal, State, and local for the 2017 refined SSIA portfolio investment, along with a comparison of CVFPP cost shares estimated in 2012. The State’s estimated share of the SSIA has increased, whereas the federal share has decreased. The 2017 refined SSIA portfolio also has greater investment needs identified for rural and small communities compared to 2012. It is anticipated that these types of investments are less likely to meet current federal guidelines for federal participation, so these costs shifted more to the State.

Figure 4-9.
2012 and
2017 Cost
Share
Comparisons



Notes:

1. 2017 CVFPP Totals reflect annual ongoing investments in present value terms (2016 dollars) and summed with present value capital investment costs.
2. 2012 CVFPP Totals are from Table 4.3 in the 2012 CVFPP.

4.3 Implementation through Program Delivery

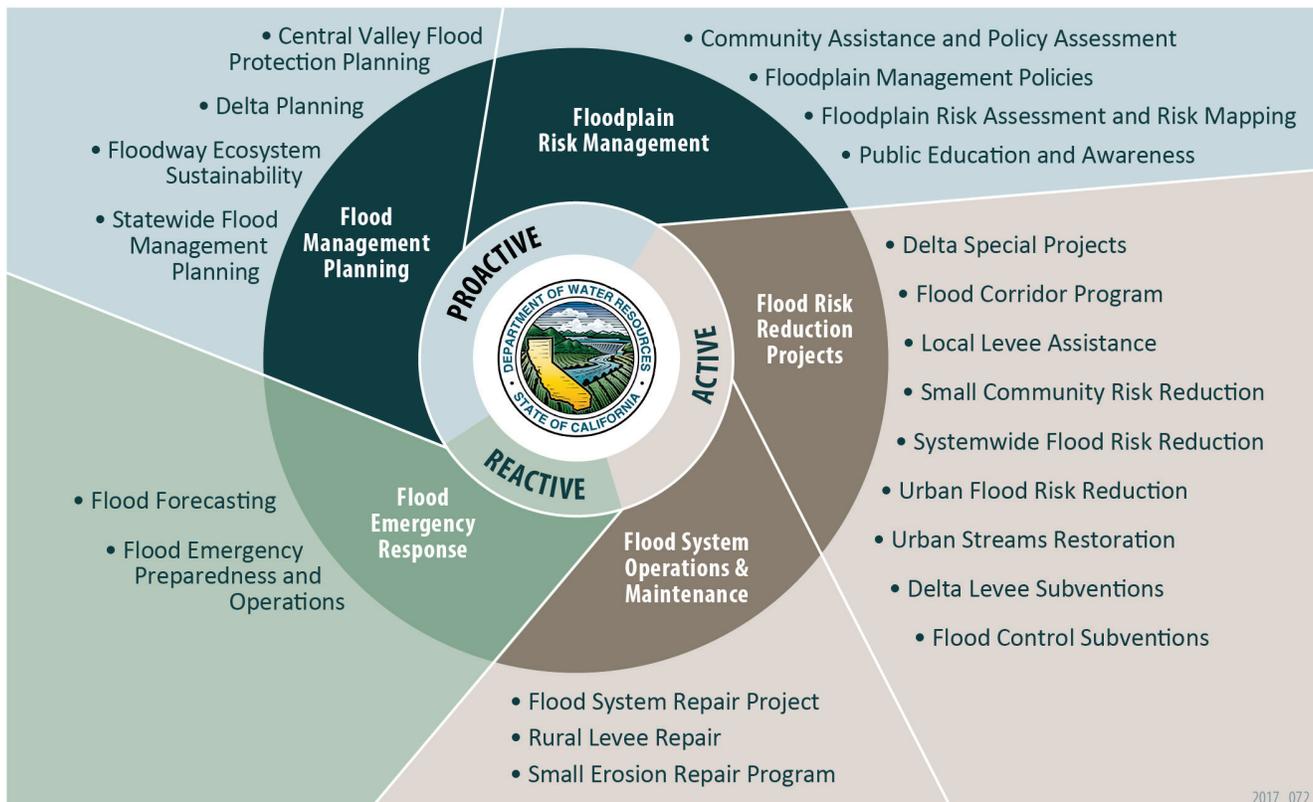
Along with obtaining funding for the 2017 refined SSIA portfolio through the various mechanisms described in Section 4.2, important aspects of implementation such as program delivery must be considered. The following sections provide a brief overview of CVFPP delivery through DWR’s flood management programs.



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Delivery of the program activities and implementation of near-term and longer-term actions require a wide range of expertise to plan, design, fund, construct, and operate improvements to the flood management system. At the State level, this work is organized into five major flood management programs with DWR staff working closely with CVFPB and other local, State, and federal partner agencies and non-governmental organizations (NGOs). Each program is responsible for specialized implementation of different types of actions (together, they cover all work required for implementation of the actions identified in the CVFPP) and for overall flood management in the areas protected by SPFC facilities. Each DWR flood management program is divided into sub-programs that are responsible for various aspects of flood management. Figure 4-11 shows the organization of five programs and their sub-programs.

Figure 4-11. Existing DWR Flood Management Programs and Sub-Programs



The Flood Management Planning program is responsible for formulation of CVFPP Updates, feasibility assessment, and prioritization of actions for implementation. The Flood Risk Reduction Projects program is responsible for implementation. The remaining three programs, Floodplain Risk Management, Flood System Operations and Maintenance, and Flood Emergency Response, are responsible for various categories of residual risk management.

- **Flood Management Planning:** This program performs the planning and feasibility assessments of the SPFC facilities and formulates potential actions to repair, rehabilitate, or improve facilities. The program provides the rationale, engineering support, and feasibility evaluations to support development of site-specific improvements for the CVFPP. Feasibility studies and updates to the CVFPP are prepared under this program. This program also performs flood system engineering and ecosystem modeling assessments of existing facility conditions for use in identifying areas needing improvements and flood management policy development.
- **Floodplain Risk Management:** The program strives to reduce the consequences of riverine flooding in the Central Valley. A major focus of this work is the delineation and evaluation of floodplains to assist local decision makers with their near-term and long-term land use planning efforts. Risk awareness campaigns and flood insurance activities are also a major focus of this program. In addition to its routine activities, this program will implement floodplain management enhancement activities from the CVFPP.
- **Flood Risk Reduction Projects:** This program conducts the work necessary to implement on-the-ground projects that are formulated and recommended through the CVFPP. State investments in system improvements may be through direct investment in new or improved facilities, or through grant programs. System improvements will generally be implemented through partnership programs among DWR, CVFPB, and USACE, and in coordination with local agencies and NGOs.
- **Flood System Operations and Maintenance:** This program includes work to keep SPFC flood management facilities, including those for which the State is responsible for as defined in California Water Code Sections 8361 and 12878, maintained pursuant to State and federal requirements so facilities continue to function as designed. This program's work includes on-the-ground daily and annual routine maintenance activities, and frequent coordination with regulatory agencies.
- **Flood Emergency Response:** The responsibility of this program is to prepare for floods, effectively respond to flood events, and support quick recovery when flooding occurs. This program will implement flood emergency response enhancements formulated in the CVFPP, including the provision of technical and funding assistance to local agencies to improve local flood emergency response.

The State covers the cost of operation and administration of all of these programs under the ongoing investment category of State operations, planning, and performance tracking as described in Section 4.1.4 to the extent funding is available. It is critical that the State maintain capacity to provide efficient project delivery to local agencies.

Table 4-6. Comparative Investment by DWR Flood Management Programs
Total Program Investment (State, Local, and Federal Investment)

Flood Management Program	2012 Total CVFPP Investment Estimate ¹		2017 Total CVFPP Investment Estimate	
	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Flood Management Planning	\$1,890	\$2,300	\$750	\$930
Floodplain Risk Management	\$600	\$800	\$4,720	\$5,080
Flood Risk Reduction Projects	\$10,520	\$12,740	\$9,000	\$11,700
Flood System Operations and Maintenance	\$440	\$560	\$2,310	\$2,820
Flood Emergency Response	\$480	\$510	\$650	\$770
Total	\$13,920	\$16,910	\$17,430	\$21,300

Notes:

1. From Table 4.3 in the 2012 CVFPP

2. Estimated totals reflect annual ongoing investments in present value terms (2016 dollars) and summed with present value capital investment costs.

The 2012 CVFPP organized the funding of the entire SSIA and the State’s share of the SSIA over time through the flood management programs described above. Table 4-6 provides a comparison of the 2012 SSIA investment by program to the 2017 refined SSIA portfolio.

Table 4-7 presents the 2017 refined SSIA portfolio phased investment over time (in 2016 dollars) organized by DWR flood management program and broken down by State, federal, and local share. This information was provided similarly in the 2012 CVFPP. The 2017 refined SSIA portfolio provides more clarity on the funding need for several of the flood management programs, specifically the Flood Emergency Response and Flood System Operations and Maintenance programs.

Table 4-8 presents only the capital portion of the 2017 refined SSIA portfolio investment phased over time in present value terms.

Table 4-9 presents only the ongoing portion of the 2017 refined SSIA portfolio in annualized amounts. Annual ongoing investments are shown without discounting in order to highlight the real need for increased resources to many of the DWR flood management programs necessary for achieving CVFPP goals. Ramping of ongoing investments is based on assumptions of time needed to build capacity for these programs.

The 2017 refined SSIA portfolio is aimed in part at rebuilding and expanding the programs with a surge of investment to reduce flood risk in the Central Valley and contribute toward CVFPP goals. This is why recommended investments identified types of management actions categories rather than individual projects. This approach allows flexibility for the individual programs to fund the necessary types of management actions as priorities or conditions change throughout time. Individual projects will still have to apply for these programs and comply with program guidelines to receive implementation funding. Additionally, individual projects can pursue other potential avenues of funding, including funding from other State or federal grant programs, philanthropic contributions, private industry investment, and NGOs.

Table 4-7. Combined Present Value Capital and Ongoing State Systemwide Investment Approach Range of Investments Over Time

Flood Management Programs		Flood Management Planning		Floodplain Risk Management		Flood Risk Reduction Projects		Flood System Operations and Maintenance		Flood Emergency Response		Total	
		Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Phase 1	State	\$140	\$170	\$1,270	\$1,280	\$890	\$1,390	\$720	\$730	\$190	\$220	\$3,210	\$3,790
	Federal	\$130	\$170	\$450	\$460	\$1,380	\$1,610	\$10	\$20	\$0	\$0	\$1,970	\$2,260
	Local	\$0	\$10	\$20	\$30	\$230	\$280	\$160	\$170	\$0	\$10	\$410	\$500
	Subtotal	\$270	\$350	\$1,740	\$1,770	\$2,500	\$3,280	\$890	\$920	\$190	\$230	\$5,590	\$6,550
Phase 2	State	\$170	\$200	\$880	\$1,160	\$1,240	\$1,510	\$670	\$710	\$320	\$360	\$3,280	\$3,940
	Federal	\$70	\$80	\$1,000	\$1,010	\$1,540	\$1,850	\$10	\$20	\$0	\$0	\$2,620	\$2,960
	Local	\$0	\$10	\$20	\$30	\$390	\$400	\$180	\$190	\$0	\$10	\$590	\$640
	Subtotal	\$240	\$290	\$1,900	\$2,200	\$3,170	\$3,760	\$860	\$920	\$320	\$370	\$6,490	\$7,540
Phase 3	State	\$180	\$200	\$780	\$790	\$1,550	\$1,940	\$390	\$790	\$140	\$160	\$3,040	\$3,880
	Federal	\$60	\$80	\$280	\$290	\$1,420	\$2,090	\$0	\$10	\$0	\$0	\$1,760	\$2,470
	Local	\$0	\$10	\$20	\$30	\$360	\$630	\$170	\$180	\$0	\$10	\$550	\$860
	Subtotal	\$240	\$290	\$1,080	\$1,110	\$3,330	\$4,660	\$560	\$980	\$140	\$170	\$5,350	\$7,210
Total	State	\$490	\$570	\$2,930	\$3,230	\$3,680	\$4,840	\$1,780	\$2,230	\$650	\$740	\$9,530	\$11,610
	Federal	\$260	\$330	\$1,730	\$1,760	\$4,340	\$5,550	\$20	\$50	\$0	\$0	\$6,350	\$7,690
	Local	\$0	\$30	\$60	\$90	\$980	\$1,310	\$510	\$540	\$0	\$30	\$1,550	\$2,000
	Subtotal	\$750	\$930	\$4,720	\$5,080	\$9,000	\$11,700	\$2,310	\$2,820	\$650	\$770	\$17,430	\$21,300

Notes:

1. Estimated totals are the sum of annual ongoing and capital investments in present value terms (2016 dollars).
2. Flood Emergency Response program does not include federal contributions because the 2017 refined SSIA portfolio only includes State and local emergency response activities. The federal government does not participate in cost share on these State and local emergency response activities.

Table 4-8. Capital State Systemwide Investment Approach Range of Investments Over Time

Flood Management Programs		Flood Management Planning		Floodplain Risk Management		Flood Risk Reduction Projects		Flood System Operations and Maintenance		Flood Emergency Response		Total	
		Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)	Low (\$M)	High (\$M)
Phase 1	State	\$0	\$0	\$840	\$1,200	\$890	\$1,390	\$0	\$0	\$0	\$0	\$1,730	\$2,590
	Federal	\$0	\$0	\$350	\$460	\$1,380	\$1,610	\$0	\$0	\$0	\$0	\$1,730	\$2,070
	Local	\$0	\$0	\$20	\$30	\$230	\$280	\$0	\$0	\$0	\$0	\$250	\$310
	Subtotal	\$0	\$0	\$1,210	\$1,690	\$2,500	\$3,280	\$0	\$0	\$0	\$0	\$3,710	\$4,970
Phase 2	State	\$0	\$0	\$810	\$1,160	\$1,240	\$1,510	\$0	\$0	\$0	\$0	\$2,050	\$2,670
	Federal	\$0	\$0	\$270	\$570	\$1,540	\$1,850	\$0	\$0	\$0	\$0	\$1,810	\$2,420
	Local	\$0	\$0	\$20	\$30	\$390	\$400	\$0	\$0	\$0	\$0	\$410	\$430
	Subtotal	\$0	\$0	\$1,100	\$1,760	\$3,170	\$3,760	\$0	\$0	\$0	\$0	\$4,270	\$5,520
Phase 3	State	\$0	\$0	\$500	\$790	\$1,550	\$1,940	\$0	\$0	\$0	\$0	\$2,050	\$2,730
	Federal	\$0	\$0	\$180	\$220	\$1,420	\$2,090	\$0	\$0	\$0	\$0	\$1,600	\$2,310
	Local	\$0	\$0	\$10	\$20	\$360	\$630	\$0	\$0	\$0	\$0	\$370	\$650
	Subtotal	\$0	\$0	\$690	\$1,030	\$3,330	\$4,660	\$0	\$0	\$0	\$0	\$4,020	\$5,690
Total	State	\$0	\$0	\$2,150	\$3,150	\$3,680	\$4,840	\$0	\$0	\$0	\$0	\$5,830	\$7,990
	Federal	\$0	\$0	\$800	\$1,250	\$4,340	\$5,550	\$0	\$0	\$0	\$0	\$5,140	\$6,800
	Local	\$0	\$0	\$50	\$80	\$980	\$1,310	\$0	\$0	\$0	\$0	\$1,030	\$1,390
	Subtotal	\$0	\$0	\$3,000	\$4,480	\$9,000	\$11,700	\$0	\$0	\$0	\$0	\$12,000	\$16,180

Note:

1. Estimated capital investment costs are in present value (2016 \$) terms.

Table 4-9. Annual Ongoing State Systemwide Investment Approach Range of Investments Over Time

Flood Management Programs		Flood Management Planning		Floodplain Risk Management		Flood Risk Reduction Projects		Flood System Operations and Maintenance		Flood Emergency Response		Total	
		Low (\$M/yr.)	High (\$M/yr.)	Low (\$M/yr.)	High (\$M/yr.)	Low (\$M/yr.)	High (\$M/yr.)	Low (\$M/yr.)	High (\$M/yr.)	Low (\$M/yr.)	High (\$M/yr.)	Low (\$M/yr.)	High (\$M/yr.)
Phase 1	State	\$27	\$30	\$5	\$6	\$0	\$0	\$68	\$82	\$22	\$27	\$122	\$145
	Federal	\$4	\$5	\$9	\$11	\$0	\$0	\$1	\$2	\$0	\$0	\$14	\$18
	Local	\$0	\$1	\$0	\$1	\$0	\$0	\$26	\$32	\$0	\$1	\$26	\$35
	Subtotal	\$31	\$36	\$14	\$18	\$0	\$0	\$95	\$116	\$22	\$28	\$162	\$198
Phase 2	State	\$39	\$44	\$7	\$9	\$0	\$0	\$92	\$112	\$30	\$37	\$168	\$201
	Federal	\$6	\$8	\$14	\$17	\$0	\$0	\$1	\$2	\$0	\$0	\$21	\$27
	Local	\$0	\$1	\$1	\$2	\$0	\$0	\$35	\$43	\$1	\$2	\$37	\$48
	Subtotal	\$45	\$53	\$22	\$28	\$0	\$0	\$128	\$157	\$31	\$39	\$226	\$276
Phase 3	State	\$54	\$65	\$9	\$11	\$0	\$0	\$93	\$112	\$30	\$37	\$186	\$225
	Federal	\$9	\$11	\$19	\$23	\$0	\$0	\$1	\$2	\$0	\$0	\$29	\$36
	Local	\$0	\$1	\$0	\$1	\$0	\$0	\$35	\$43	\$1	\$2	\$36	\$47
	Subtotal	\$63	\$77	\$28	\$35	\$0	\$0	\$129	\$157	\$31	\$39	\$251	\$308

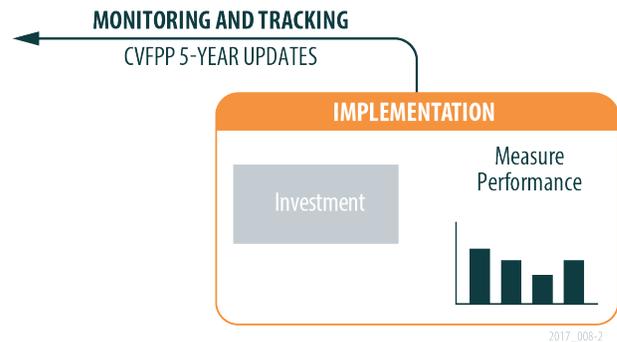
Notes:

1. Estimated ongoing annual investments are in 2016 dollars. They have not been discounted to present value nor escalated for inflation.
2. Phase 3 allocations represent the real need of annual ongoing investments within the 2017 refined SSIA portfolio. Ramping of investments shown here represent the time needed to build capacity of staff and resources for all programs other than Flood Risk Reduction Projects.
3. Present value of total ongoing investments is approximately \$5 billion over 30 years.
4. Flood Emergency Response program does not include federal contributions because the 2017 refined SSIA portfolio only includes State and local emergency response activities. The federal government does not participate in cost share on these State and local emergency response activities.

4.4 Measuring Performance

The value of flood management system investments for the SPFC will only be fully realized over the long term. As implementation of flood system improvements proceeds, it is necessary to track performance as a means to evaluate effectiveness of investments. Further, as the flood system is tested over

time, performance tracking should be improved to inform future CVFPP updates. This contributes to a meaningful iterative planning process that allows for course-correction and adaptation. At the same time, the planning process reflects a commitment to carry forward the vision adopted in the CVFPP.



For the CVFPP, specific outcomes contributing to the ultimate goal of sustainability have been formulated in the context of achieving the CVFPP primary and supporting goals as directed by the Act. Examples of these outcomes (and metrics) were described in Chapter 2. Outcomes are intended to be actionable, measurable, and attainable within the life of the CVFPP. Furthermore, tracking the progress of these outcomes is key to demonstrating the return on investment of the flood system improvements and raising the State and federal funds needed for future implementation. Ultimately, the specific outcomes should result in desired trends that indicate how CVFPP investment is contributing towards the broader societal values, as conceptually depicted in Figure 4-12.

Although it is conceptually easy to track to one metric that addresses each of the societal values, each of the four societal values is a composite of several flood-specific outcomes. Examples of potential flood-specific outcomes that contribute towards the societal values are shown in Section 2.1.2. For example, in order to accurately understand how many lives are lost or injured in large flood events, an understanding of the following is needed: number of people within the floodplain, percentage of people vulnerable when flood occurs, and level of system performance in populous areas. Flood-specific outcomes are more thoroughly addressed in the Draft CVFPP Investment Strategy TM.

The State is committed to improving its ability to assess progress in future CVFPP updates. This will require data acquisition, management, and analysis. To this end, the State will dedicate sufficient institutional capacity to the ongoing tracking, interpreting, and reporting of outcomes at regular intervals for the purpose of evaluating the effectiveness of flood system improvements to the extent available resources allow. This more clearly demonstrates the value of flood management to California taxpayers and to justify course-corrections and continued public support.

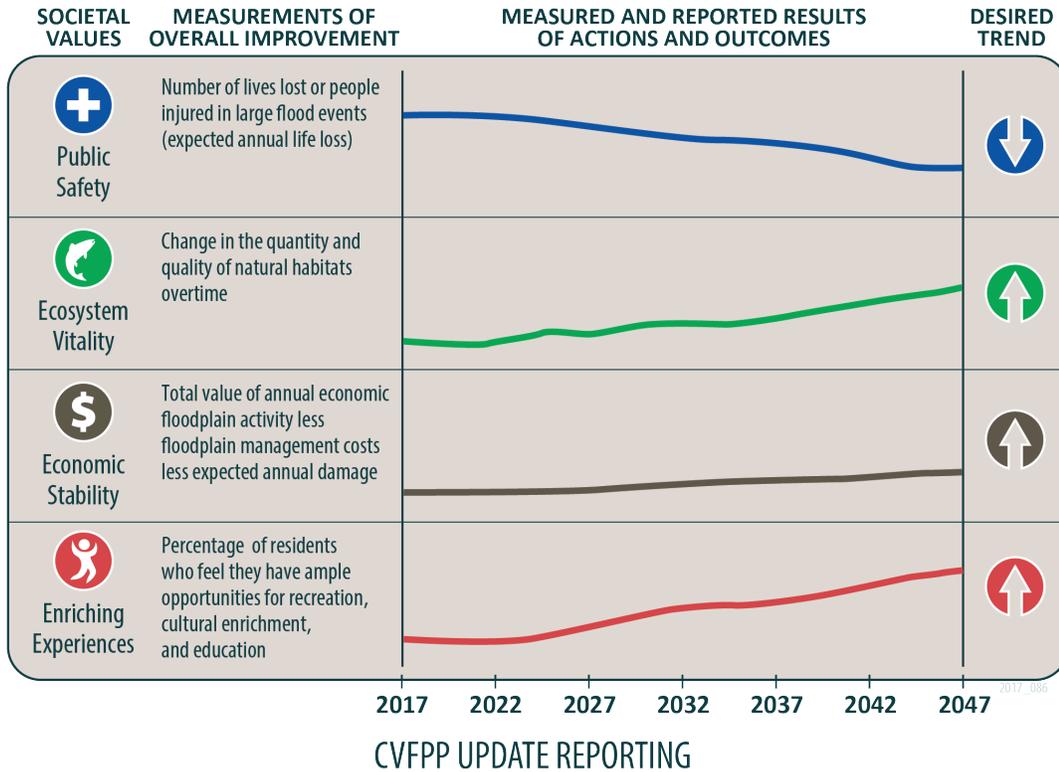


Figure 4-12. Conceptual Example of Monitoring and Reporting Trends

The FSSR focuses on describing the current status (i.e., the physical condition) of SPFC facilities at a systemwide level. In support of the 2017 CVFPP Update, the 2017 FSSR primarily presents information about the physical condition of SPFC facilities, and will help guide future inspection, evaluation, reconstruction, and improvement of those facilities. To support future updates to the CVFPP, the FSSR will continue to track changes in physical conditions of SPFC facilities such as levee conditions and channel capacities, but will also be expanded to include a more comprehensive set of performance tracking metrics. Examples of potential metrics were presented in Chapter 2, but developing a more comprehensive set of outcome-based metrics requires further effort with stakeholder input. Improved performance tracking for future updates to the CVFPP could begin to measure and track contributions to ecosystem vitality according to the metrics identified in the CVFPP Conservation Strategy. Measurement and tracking of value related to improvements in O&M (and outcomes for public safety, economic stability, and ecosystem vitality) could also be improved for future CVFPP updates. Furthermore, additional metrics for tracking outcomes related to economic stability and enriching experiences could be developed. Future updates to the FSSR could also track the amount of funding received and where that funding is applied during implementation of the CVFPP. Sufficient and sustainable funding is one of the largest challenges facing the flood management system; demonstration of responsible and effective investments is necessary.

4.5 The Way Forward

Implementation of significant flood management system improvements has been enabled by funding from State general obligation bonds, but this temporary funding boost is nearing its end.

Over the previous 5 years, the State, in cooperation with local, regional, and federal partners, has made significant progress in advancing the CVFPP goals as a result of on-the-ground project implementation and further planning. Implementation of significant flood management system improvements has been enabled by funding from State general obligation bonds, but this temporary funding boost is nearing its end. Additional funding sources will be required to manage and improve the flood management system into the future. For full implementation of the CVFPP, this 2017 CVFPP Update provides an updated estimate of needed investments that total \$17 to \$21 billion over the next 30 years.

However, additional funding alone is not enough; flood management policy issues present longstanding impediments to achieving full implementation of the CVFPP that must be addressed. To promote progress toward addressing these longstanding impediments, the flood management policy issues discussed in this 2017 CVFPP Update are organized with a consistent structure that will enable the creation of work plans to collectively address the issues. These work plans will drive toward implementation progress, but it is critical that all levels of government increase time and resources dedicated to working together to balance prioritization of near-term actions and realize longer-term opportunities.

All CVFPP partners and stakeholders will need to sustain this momentum and focus on continued cooperation looking forward to the 2022 CVFPP Update and beyond.

4.5.1 Recommendations for Flood Management Policy Issues

The flood management policy discussions in this update have included a brief introduction to each issue in Chapter 1, partner and stakeholder perspectives relative to these issues in Chapter 2, strategies for addressing these issues in Chapter 3, and, finally, recommended actions addressing these issues presented here. By articulating these policy recommendations and the associated achievement strategies described in Chapter 3, the 2017 CVFPP Update provides broad guidance for an important shift in approach—one that will lead to more resilient and long-lasting flood risk management, and which can reconcile flood risk management with other economic, social, and environmental values. All flood management policy issues discussions under the following recommendations are structured to support the creation of work plans to collectively and consistently address these issues. Each policy issue follows this structure:

- **Flood management policy issue name**
- **Issue Summary:** brief definition statement of what the issue encompasses
- **Near-term Milestone:** brief statement of progress that may be achieved by the 2022 CVFPP Update if sufficient resources are available
- **Recommended Actions:** compiled list of near- and longer-term recommendations with supporting details and recommended participating agencies. Where applicable, participating agencies are denoted as State (S), federal (F), and local (L).

Recommendations for Land Use and Floodplain Management

Issue Summary: Ongoing and planned development in the floodplain continues to intensify flood risk.

Near-Term Milestone: Seek resources to establish floodplain management programs to implement key activities such as expanded agricultural easements, environmental conservation, flood risk awareness campaigns, floodproofing, and similar activities that promote land uses compatible with periodic flooding.

Recommended Actions:

- **Reaffirm and clarify the CVFPP land use policy to guide State investments (S).** As stated in the 2012 CVFPP, the SSIA is intended to reduce flood risk in the areas protected by SPFC facilities while avoiding land use changes that promote growth in deep floodplains and increase State flood hazards. The State encourages policies and actions that avoid, to the extent feasible, putting people and property at risk that are not presently at risk in flood hazard areas. The 2017 CVFPP Update reaffirms and refines the CVFPP land use policy to guide State investments (see Section 3.2.1).
- **Establish a DWR Floodplain Management Strategic Implementation Plan (S).** Originally developed in 2002, the California Floodplain Management Task Force outlined a vision for floodplain management across the state. This vision included 38 recommendations State, local, and federal agencies should undertake with the intent to promote wise use of floodplains. *A California Challenge – Flooding in the Central Valley* (California Floodplain Management Task Force Independent Panel, 2007) also articulated specific recommendations California should take toward the same goal. These recommendations reflect a system approach to dealing with Central Valley flood risk. As work progresses, the estimated long-term economic, engineering, environmental, and social costs and benefits of actions will be considered. Establishing a Floodplain Management Strategic Implementation Plan would track what recommendations have progressed since the 2002 and 2007 reports and propose a framework to prioritize any outstanding recommendations.
- **Ensure State implementation of floodplain management actions (S).** The State will promote internal efforts to facilitate implementation of measures prioritized in the update to the Floodplain Management Strategic Implementation Plan. This includes an evaluation of resources and actions that can be utilized and executed and updated every 5 years.
- **Assess the benefits and costs of participation in the NFIP and evaluate the feasibility of a State insurance program. Mitigate losses to those subject to flooding through flood insurance (S/L).** The assessment should evaluate potential options and cost effectiveness of a State insurance program in comparison to the NFIP to assess the relative ability to mitigate losses to those subject to flooding through flood insurance.
- **Continue to work with the Agricultural Floodplain Ordinance Task Force (S/L).** The State will continue working with this task force to identify and recommend policies and actions that minimize impacts and preserve agriculture while facilitating the wise use of floodplains. The State will continue to work with the task force to develop the Agricultural Floodplain Ordinance Task Force Report.



- **Seek establishment of post-disaster agricultural recovery programs (S/F/L).** Recognizing that a majority of the SPFC system is maintained by rural and agricultural LMAs, it is important to quickly address the economic sustainability of any area impacted by a flood disaster. Post-disaster agricultural recovery programs are a key mechanism to helping these communities recover after a flood event. Furthermore, keeping areas subject to periodic flooding in agriculture prevents future risk intensification.
- **Seek support for post-disaster habitat recovery programs (S/F).** The State and federal governments should continue to promote programs that recognize the importance of prime habitat for aquatic and riverine species. For example, FEMA has supported recovery in the Yolo Basin Wildlife Area in the past.
- **Partner with FEMA to increase investments in non-structural actions (S/L).** The State should partner with FEMA to seek increased investments in non-structural actions by working with FEMA and Cal OES on multi-hazard mitigation planning (included in recommendations to address the residual risk management flood management policy issue).
- **Track land use changes and flood management system improvements to assess whether life loss and property damage risks are increasing or decreasing (S/L).** The State, in partnership with local agencies, should track new areas of residential and commercial development within SPFC floodplains and the improvements to the flood management system within these areas to assess whether life loss and property damage risks are increasing or decreasing.

Recommendations for Residual Risk Management

Issue Summary: Flood risk can be reduced, but never eliminated. Commitment to enhanced resilience and public awareness falls short in many areas.

Near-Term Milestone: Link the CVFPP related climate change activities to other ongoing State and Federal climate change assessments, seek augmentation for activities to promote risk communication widely, and provide resources to bolster flood emergency management programs.

Recommended Actions:

- **Convene a State-sponsored climate change task force to charter climate change evaluations using the best available science (S/F).** The uncertainty associated with climate change has the effect of increasing flood risk over time. To understand this increased risk, the State will use the best available science. The climate change task force would advise how best to account for climate change in different levels of planning versus design; this could inform the development of a technical work plans considering further climate change analyses.
- **Complete a climate change vulnerability assessment at a system scale to identify the anticipated change in physical extent of SPFC floodplains during the design life of future State cost-shared investments (S/F).** As mentioned above, the uncertainty associated with climate change has the effect of increasing flood risk over time. Further, the physical extent of SPFC floodplains may change with changing climate scenarios. To understand how the physical extent of SPFC floodplains may change, the State will undertake a climate change vulnerability assessment. This assessment could be shared with the State team responsible for preparing the Safeguarding California report.
- **Provide the climate change hydrology and sea-level rise methodology used in the CVFPP to the USACE for review (S/F).** The State will share the results from the USACE's review with researchers and others to provide for transparency of the CVFPP analyses.
- **Promote activities that manage residual risk through implementation of the CVFPP, such as public awareness campaigns and flood risk notifications (S/F/L).** The goal of public awareness campaigns is to motivate people to take individual actions to protect themselves: to develop personal evacuation plans, to prepare supplies and provisions for a flood emergency, and to insure themselves against flood damages. Public awareness campaigns, flood risk notifications, and flood emergency preparedness and response programs offer opportunities to empower communities and individuals to take steps to further reduce residual risk. Awareness campaigns can also increase overall willingness to support flood system improvements.
- **Partner with FEMA and Cal OES to seek increased investments to promote multi-hazard mitigation planning (S/F/L).** Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. It is most effective when implemented under a comprehensive, long-term mitigation plan. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage. The State will work with FEMA to develop FEMA-approved hazard mitigation plans, a condition for certain types of non-emergency disaster assistance.



- **Promote activities that manage residual risk through implementation of the CVFPP, such as flood emergency preparedness and response management (S/F/L).** A program to assist local agencies in preparing flood response plans, regional communication tools, and processes for emergency response operations will help address slow increases in residual risk over time. The State will continue investment in the Flood Risk Notification Program, where DWR notifies property owners within SPFC Levee Flood Protection Zones (LFPZs) and coordinates with federal, State, and local partners to provide information about flood risks. The State and local agencies should develop/improve flood emergency management plans, including evacuation plans, for populations in deep floodplains protected by the SPFC. The State may continue investment in flood emergency training and exercises with local agencies and reservoir operators at the local, State, and federal levels.
- **Consider resiliency of actions related to the SPFC in providing outcomes in future Updates to the CVFPP (S/F/L).** The State may assist local and federal planning efforts related to the SPFC by actively participating in development, assessment, and refinement of proposed actions.

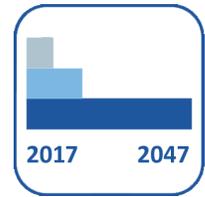
Recommendations for Hydraulic and Ecosystem Baselines and Program Phasing

Issue Summary: Current regulatory practices hinder the ability to obtain credits for benefits of improvements made early in a long-term program to offset impacts that may occur later in the program, complicating phased implementation of CVFPP multi-benefit improvements.

Near-Term Milestone: Utilize the FSSR as a vehicle to document and update understanding of physical conditions related to the SPFC more broadly, updated by DWR every 5 years.²

Recommended Actions:

- **Convene workgroups to determine the legal and institutional mechanisms whereby the systemwide structural elements of the CVFPP can be implemented over multiple decades, accounting for local and regional benefits and impacts (S/F/L).** This could include developing the methods of analysis, thresholds of significance, the legal and institutional frameworks needed to establish hydraulic and ecosystem baselines for tracking benefits and impacts, addressing early implementation actions not yet accounted for, and accounting for, and managing, the incremental and cumulative effects of large-scale structural improvements over time. Actions may include new State and federal legislation, long-term interagency contracts, memoranda of understanding (MOU), new institutions or authorities, and long-term monitoring of system performance. For example, establishing appropriate hydraulic and ecosystem baselines is an important component of system- or watershed-scale planning, for which federal authority is being considered in proposed WRDA legislation. It is important to note that as projects move forward together, hydraulic impacts and advanced mitigation should be tracked separately, and analysis performed at a regional scale.
- **Collect information on the status of proposed and existing projects for use in updating the CVFPP and its supporting documents (S/L).** CVFPP supporting efforts such as the RFMPs were useful in identifying potential management actions for the 2017 CVFPP Update. It is recommended that the RFMPs be continued, to the extent sufficient resources allow.
- **Track and report changes in hydrologic and sea level rise conditions and subsidence over time through updates to the Flood System Status Report (S/L).** California Executive Order B-30-15 calls upon State agencies to consider life cycle analysis and climate change impacts in their investment decisions. The climate change information collected will help support future updates of the CVFPP and land use and residual risk management recommendations.



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² Although establishing hydraulic and ecosystem baselines will be the initial focus, baselines for other benefits and impacts (such as flood damages, life loss, water supply, and others) may also be considered.



Recommendations for Operations and Maintenance of the Flood System

Issue Summary: Underfunding and complex, time-consuming permits lead to a backlog of deferred maintenance and greater risk to life and property.

Near-Term Milestones: Utilize improved O&M cost and value tracking systems to inform administrative actions by regulatory agencies that improve the overall efficiency of existing O&M activities.

Recommended Actions:

- **Work toward securing sufficient and reliable annual funding for proper long-term operations and maintenance (S/L).** The State will continue to invest in existing programs that provide funding for O&M activities, such as the Deferred Maintenance Program, Flood System Repair Project, and Delta Subventions Programs. For example, in 2016, DWR allocated \$100 million for LMAs and DWR to address deferred maintenance, particularly pipe penetrations in the SPFC. Finally, the State will work to develop a sustainable program through State legislation to ensure adequate annual funding for operations, maintenance, and minor repair activities. It is important to note that routine operation and maintenance is considered a shared local responsibility of the State and LMAs. The federal government does not contribute to these activities.
- **Support a framework for regional conservation and efficient regional-scale permitting strategies for long-term O&M activities (S/F/L).** With support from federal and local partners, the State would continue to develop and implement efficient regional-scale permitting strategies to enable routine O&M activities. In addition, regional conservation planning would continue as part of the updates to the CVFPP and its supporting documents. Efforts for programmatic permitting may be advised or coordinated through the CVFPB's committees.
- **Create a tracking system of O&M investments and outcomes to demonstrate the value that LMAs attain for their investments (S/L).** DWR should create a database of information on completed activities, associated costs, and data in a Geographic Information System that can be used to track O&M activities in the SPFC. The database could also be used by the State and LMAs to document value and prioritize future O&M activities.
- **Evaluate the feasibility of initiating a regionally based multiple-objective O&M program in the SPFC to efficiently integrate flood system maintenance practices with ecological uplift (S/F/L).** A multiple-objective O&M program, leveraging work completed for the CVFPP Conservation Strategy and other CVFPP supporting documents, is a promising potential solution to the issue of conflicting regulatory requirements and continued degradation of the SPFC and riparian and aquatic ecosystems in the Central Valley. The State could evaluate how such a program could be structured and implemented at the SPFC scale, including potential legislative improvements.

- **Develop an SPFC annual subventions program for LMAs not already covered by the existing Delta Levees Maintenance Subventions Program to proactively maintain the SPFC facilities to current State and federal standards, recognizing that all SPFC levees are a part of a broader system (S/F/L).** The State should evaluate, in coordination with the USACE and LMAs, how the State could provide levee maintenance subventions to LMAs outside of the Sacramento–San Joaquin Delta using the Delta Levees Maintenance Subventions Program as a model. This effort would include the identification of potential funding sources to sustainably support an SPFC subventions program.

Recommendations for Development of Multi-benefit Projects

Issue Summary: Ineffective institutional frameworks have hindered implementation of multi-benefit actions.

Near-Term Milestone: Seek establishment of an implementable framework to facilitate design and construction of multi-benefit projects that addresses funding, interagency collaboration, regulatory mechanisms, long-term O&M, mitigation, and tools and methods for monitoring and tracking progress toward ecosystem vitality, economic stability, and other societal benefits.

Recommended Actions:

- **Seek additional funding sources to incentivize multi-benefit projects (S/F/L).** Consistent with the California Water Action Plan, the State will seek additional funding sources to incentivize the planning, design, implementation and long-term management of multi-benefit projects.
- **Explore regional-scale and long-term permitting mechanisms for implementation and maintenance of multi-benefit projects (S/F/L).** The State, in coordination with federal and local partners, will continue to explore regional-scale and long-term permitting mechanisms for projects (and their maintenance) that will allow multi-benefit projects to be more efficiently and effectively implemented and managed, including integrated permitting with overlapping habitat improvement projects or programs. Efforts for programmatic permitting may be advised or coordinated through the CVFPB's committees.
- **Collaborate with stakeholders to explore and advance implementation of Safe Harbor Agreements (S/F/L).** The State would collaborate with agricultural stakeholders and resource agencies to explore and advance the implementation of Safe Harbor (and State-listed species through Voluntary Local Program) Agreements.
- **Facilitate processes with USACE for modifying SPFC facilities to allow addition of other project purposes (S/F/L).** CVFPB and DWR would work with USACE to facilitate processes for making modifications to SPFC facilities that would allow the addition of other project purposes and/or facilitate the incorporation of multiple benefits to the flood system.
- **Continue coordination with federal and State agencies on levee and channel vegetation policy and research (S/F/L).** The CVFPB and DWR would continue coordination with federal and State agencies on levee and channel vegetation policy and research.



- **Identify policies and laws which may need updating or revisions to support adaptive management of multiple benefits (S/F/L).** In cooperation with the USACE and LMAs, the State would identify those policies and laws which may need updating or revisions to incorporate habitat and sensitive species management best management practices (BMPs), and appropriate hydraulic and ecosystem performance indicators to support adaptive management of flood management infrastructure, ecosystem processes, and habitats.
- **Make mitigation banking programs more efficient and effective (S/F/L).** DWR, in coordination with resources agencies, can utilize mitigation banking programs to procure mitigation credits for SPFC improvements. By tracking transactions with banks and the status of the mitigation banks, these programs can be more efficient and effective.
- **Monitor and track outcomes of multi-benefit projects over time (S).** By tracking and quantifying the outcomes of multi-benefit projects via future updates to the FSSR, the benefits of investments at regional and system scales can be better understood.
- **Refine the CVFPP Conservation Strategy's tools and processes to support planning, design, permitting, and implementation of multi-benefit projects (S/L).** The State should support future updates to the RFMPs to use these tools to identify ecosystem restoration opportunities.
- **Support updates to the RFMPs that incorporate other multi-benefit water management opportunities identified through other planning activities, such as water supply, water quality, groundwater management, recreation, and education (S/L).** Consistent with the California Water Action Plan, the State should work with RFMPs to leverage other programs to achieve multiple benefits and secure funding coming from diverse sources.
- **Support better integration of IWM and flood management planning to promote multi-benefit projects that may include water supply, water quality, groundwater management, recreation, and education components (S/F/L).** The State is committed to an IWM approach, which promotes system flexibility and resiliency to accommodate changing conditions. Consistent with the California Water Action Plan, the State will seek additional funding sources to incentivize the planning, design, implementation and long-term management of multi-benefit projects that may enhance water supply (surface water and groundwater), protect water quality, and provide recreational and educational opportunities.

Recommendations for Effective Governance and Institutional Support

Issue Summary: Overlapping authorities and conflicting mandates can complicate flood system improvements and maintenance, and are partially the result of existing governance structures, which are inadequate to support the broad range of actions included in the CVFPP.



Near-Term Milestone: Contingent upon resources being provided for future updates to the RFMPs, the State will facilitate a governance study to examine existing flood governance, identify overlapping authorities, and propose meaningful reconciliation between and among local, State, and federal levels of government.

Recommended Actions:

- **Provide assistance (technical or funding) to local agencies to advance regional governance within their regions (S/L).** A wide variety of governance mechanisms (such as special districts, joint powers authorities, and memoranda of understanding, etc.) are available to regions to best meet specific local and regional needs. The State will encourage local agencies to determine for themselves which regional governance structures are most appropriate to facilitate project implementation.
- **Continue a dialogue between federal, State and local agencies with responsibilities for public safety, resource management, and permitting to reconcile differing regulatory frameworks (S/F/L).** The goal of the dialogue is to identify actions for multi-benefit outcomes within the flood system that are more cost-effective, efficient, and successful, which may require legislative action to achieve.
- **Prepare a roles and responsibilities appendix to the SPFC Descriptive Document that includes authorities and institutional challenges, and makes specific recommendations to improve flood management efficiencies across all levels of government (S).** By documenting the roles and responsibilities of all institutions responsible for managing the SPFC, overlapping authorities and gaps in authorities can be identified. This would support meaningful reconciliation between and among local, State, and federal levels of government to improve and better manage the system.
- **Continue coordination with State resource agencies to effectively manage State resources (S/L).** For example, the State Department of Fish and Wildlife is to implement effective O&M for managed wetlands to increase bird populations and wetland habitat in the Pacific Flyway in accordance with the North American Wetlands Conservation Act.
- **Continue to support disadvantaged communities in participating in RFMPs and future updates of the CVFPP (S/L).** The State is committed to the continued support of disadvantaged communities consistent with the Governor's Water Action Plan through facilitating their continued participation in planning efforts at all planning scales and, to the extent feasible based on available resources, providing assistance to them for project implementation.



Recommendations for Coordination with Federal Agencies

Issue Summary: Federal agencies share responsibility for flood management, but complicated coordination, policies, funding, and approvals slow progress.

Near-Term Milestone: In coordination with local entities, the State will engage federal agencies to implement projects and address policies affecting flood management in California, including clarifying requirements for obtaining Section 408 permits, vegetation management policy strategies, and establishing a FEMA flood zone for agricultural communities.

Recommended Actions:

- **Continue to work closely with USACE (S/F/L).** Key elements of the State’s strategy for coordinating with USACE include the following:
 - ▶ Coordinate and collaborate on planning, implementation, and operation of system improvements to achieve sustainable and integrated flood management.
 - ▶ Communicate and coordinate on development and implementation of federal and State policies and legislation affecting flood management in California.
 - ▶ Provide input to federal legislation, such as the biennial WRDA that provides federal authorization for potential changes to the SPFC.
 - ▶ Continue to work with USACE to clarify requirements for alterations to the SPFC through Section 408.
 - ▶ Work with USACE to reauthorize federal projects to incorporate multiple benefits, where feasible.
 - ▶ Continue to pursue compatibility between State and federal vegetation management policies, emphasizing risk prioritization and the imperative function of levee vegetation relative to the requirements of the Federal Endangered Species Act.
 - ▶ Foster interagency coordination and collaboration through leading the USACE California Silver Jackets Program.³
 - ▶ Work with USACE and LMAs to reevaluate project purposes for SPFC projects, considering facility removal or abandonment, modifications, and/or updates to assurance agreements, O&M manuals, and reservoir operations control manuals to provide different purposes as needed.

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³ USACE California Silver Jackets Program: Silver Jackets teams in states across the country bring together multiple state, federal, tribal, and local agencies to learn from one another and apply their knowledge to reduce the risk of flooding and other natural disasters in the United States and enhance response and recovery efforts when such events do occur. <https://silverjackets.nfrmp.us/Home/About-The-Silver-Jackets-Program>

- **Continue to work closely with FEMA (S/F/L).** Key elements of the State’s strategy for coordinating with FEMA include the following:
 - ▶ Provide technical assistance to local communities under the NFIP.
 - ▶ Continue to engage FEMA to help provide grants to local agencies and citizens for applicable nonstructural risk mitigation actions.
 - ▶ In partnership with the Agricultural Floodplain Ordinance Task Force, identify and implement strategies to allow FEMA to establish a FEMA flood zone for agriculturally based communities, which would allow for replacement or reinvestment in infrastructure needed to sustain existing agricultural use in floodplains.
 - ▶ Continue to engage FEMA and Cal OES on emergency response and disaster assistance/recovery.

- **Continue to work closely with the Bureau of Reclamation (S/F/L).** Key elements of the State’s strategy for coordinating with Reclamation include the following:
 - ▶ Continue coordination with the San Joaquin River Restoration Program (SJRRP) where there is a flood management nexus (e.g., may result in repairs or improvements to SPFC facilities).
 - ▶ Continue partnership with the Yolo Bypass Fish Passage and Improvement Project (Bi-Ops) through multi-benefit project implementation efforts in the Yolo Bypass.
 - ▶ Provide technical and funding resources for multi-purpose reservoir flood storage and operations studies (such as F-CO and F-IO) recognizing the nexus of flood management, environmental outflows, water temperature, recreation, hydropower, water quality, and water supply benefits.
 - ▶ Initiate conversations with Reclamation and its cost-share partners about greater coordination between the flood management community and Reclamation planning studies for their relevance to future updates to the CVFPP.

- **Continue to closely coordinate with federal resource agencies (S/F/L).** Key elements of the State’s strategy for coordinating with federal resources agencies include the following:
 - ▶ Increase the operational and regulatory efficiency of the Central Valley flood management system. To achieve this, the State will coordinate with resource agencies seeking to develop and implement regional-scale permitting strategies, and will seek legislative improvements to existing regulatory processes at the State and federal levels to facilitate regulatory compliance for O&M activities and make more efficient use of limited local, State, and federal funding resources.
 - ▶ Coordinate preparation and review of updates to the FSSR with federal and State resource agencies.



Recommendations for Funding

Issue Summary: Insufficient and unstable flood management funding has led to delayed investment and greater risk to life and property.

Near-Term Milestone: Seek increased General Fund dollars and reutilize the function of the Sacramento and San Joaquin Drainage District to conduct assessments to increase the State's ability to more reliably fund ongoing activities. Demonstrate the need and appropriateness for a new flood-focused GO bond to fund capital improvements that reduce flood risk across the Central Valley. A new flood-focused GO bond should only be pursued after existing flood-focused GO bonds are committed.

Recommended Actions:

- Continue to closely coordinate with State agencies and other partners, to generate State funding and support for CVFPP's flood investments.
 - ▶ **Seek increased appropriation from the State general fund and pursue general obligation bonds (S/L).** It is recommended that appropriations from the State general fund for Central Valley flood management increase from the \$40M currently expected to \$190M annually by the end of the 30-year period. General obligation bonds could be used to fund some of the more critical flood risk reduction projects, including the completion of the Yolo Bypass expansion. The CVFPP funding plan recommends pursuing flood management funding in three bond issues. The first issue of \$2.5 billion would be targeted for the 2020 election, the second issue of \$2.5 billion approximately a decade later, and the third issue of \$2.5 billion a decade after that.
 - ▶ **Evaluate the viability and effectiveness of reutilizing the Sacramento and San Joaquin Drainage District (S/L).** The Sacramento and San Joaquin Drainage District is currently in the California Water Code to fund capital projects. It has been nearly 80 years since this district generated revenue. Within the next few years, the CVFPB and DWR could evaluate the viability of the district to conduct assessments. The evaluation should involve local stakeholder input and cover topics such as benefits, funding, capacity, and legal constraints. This analysis should conclude what level of assessment is viable and what legislative changes would be necessary to allow generated revenue to be used for capital and ongoing investments. The CVFPP funding plan assumes this mechanism would begin in approximately 2020 and could potentially generate \$25M/year by the end of the 30-year period.
 - ▶ **Evaluate the viability and effectiveness of establishing a State river basin assessment (S).** IWM is the focus of this type of assessment, and the State should develop a watershed approach to managing and funding projects. For example, a river basin assessment would return money to the watershed, to be shared across the IWM activities. DWR should develop criteria, in coordination with local stakeholders, for the evaluation of the viability and effectiveness of this potential funding mechanism for implementation of the CVFPP. The CVFPP funding plan assumes that this mechanism could begin in Phase 2 and potentially generate \$25M/year by the end of the 30-year period.

- ▶ **Evaluate the viability and effectiveness of establishing a State flood insurance program (S).** Following the evaluation of the statewide flood insurance as described in the floodplain and land use management recommendations, a new approach to insurance could potentially generate funds to reduce flood risk while providing the same level of financial protection as offered by the NFIP. The CVFPP funding plan assumes that \$12M/year of potential revenue from this mechanism could begin in Phase 2. A State flood insurance program could use a portion of the premiums to reduce flood risk by contributing funds for flood management system repairs, improvements, and flood risk mapping and notification. Another version of this could be a local basin-wide insurance program. This could potentially be a companion program with a Statewide Flood Insurance Program. Any new program should also consider insurance for agricultural properties. All of these potential uses of funds from a State flood insurance program would need to be further evaluated. Criteria for the evaluation should be developed in close collaboration with affected stakeholders.
- ▶ **Track outcomes from flood investments to demonstrate value (S).** Outcomes from local, State, and federal investments should be tracked to demonstrate the value of their actions through annual progress reports. These reports can help inform updates to the California Water Plan and California’s Five-year Infrastructure Plan.
- ▶ **Commit to annually updating California’s Five-year Infrastructure Plan (S).** DWR will provide the necessary annual budget information regarding flood system ongoing and capital investments to the California Department of Finance for incorporation into the California’s Five-year Infrastructure Plan, which compiles all infrastructure needs, including water, flood, transportation, and others, across the State. Incorporate infrastructure life-cycle analysis per California Executive Order B-30-15.
- Continue to closely coordinate with federal agencies and other partners, to generate federal funding and support for CVFPP’s flood investments.
 - ▶ **Establish a strategic, integrated flood management approach for California’s Central Valley (S/F/L).** A strategic, integrated approach that emphasizes cooperation across all levels of government is required. This would require USACE programmatic authorities to conduct project budgeting and planning on a systemwide/watershed basis to streamline the time and reduce the costs incurred by all levels of government in managing California’s flood risks. This should reduce transactional costs and avoid redundancy in programs. This recommendation would stretch the spending for State operations, planning, and performance tracking. This should also include federal funding for IWM science and services. DWR should continue to support language in upcoming federal water infrastructure legislation that would authorize the USACE, in coordination with other federal, State, and local agencies, and NGOs, to develop watershed-based flood-risk planning and budgeting for projects across multiple communities and regions. Similar programs include the Greater Mississippi River Basin, the Comprehensive Everglades Restoration Program, and the Chesapeake Bay Program.

- ▶ **Seek Congressional Support of State-sponsored projects in federal water infrastructure legislation (S/F/L).** The State should seek Congressional support for State-sponsored flood risk reduction and ecosystem restoration projects in federal water infrastructure legislation. Several State-sponsored flood risk and ecosystem restoration projects would benefit from continued Congressional support.
- ▶ **Seek guidance clarification for USACE project credit usage (F).** The State will seek guidance clarification from USACE for implementing Section 1020 of the WRDA 2014 (Water Resources Reform and Development Act of 2014), as modified by WRDA 2016 (Water Infrastructure Improvement for the Nation Act of 2016) Section 1166. The guidance clarification could help the State submit a comprehensive plan requesting transfer of excess credit prior to completion of specific studies and projects consistent with the CVFPP. This would help maximize the leveraging of local dollars.
- ▶ **Support integration of federal and State floodplain management policies (S/F).** To prevent continued risk intensification in deep floodplains, the State supports integration of federal and State floodplain management policies to facilitate consistency. Ongoing trends for urbanization behind levees originally intended only for rural flood protection have brought the issue of risk intensification in deep floodplains in California to the forefront. As part of this, the State should seek Congressional support for USACE and FEMA to develop plans and encourage additional investments in rural flood risk management. This should include risk awareness, easements, ecosystem restoration, as well as sustaining agriculture in the floodplain.
- ▶ **Seek Federal support for flood risk reduction and for ecosystem improvements in rural areas (S/F/L).** Bringing more federal dollars to the Central Valley for flood risk reduction and ecosystem improvements in rural areas will likely have to take a different approach in how projects are approved or selected. It is typically very difficult to meet the benefit-cost ratio requirements for these types of projects using current guidelines. Current guidelines tend to favor projects in an urban area. The State supports USACE developing a project funding approach that takes into account more of the qualitative and other non-monetary benefits to support land productivity for agricultural and ecosystem purposes. The approach could also recognize that support of agriculture helps prevent risk intensification in rural areas.
- ▶ **Support annual contribution to the 2017 refined SSIA portfolio (S/F/L).** To implement the 2017 refined SSIA portfolio within 30 years would require a federal contribution of 36% (mostly through USACE), ramping up to \$260 million per year. This would require the State to effectively lobby the federal government for inclusion into federal water infrastructure legislation on an ongoing basis and secure annual appropriations from USACE. The State would also seek funding available from United States Department of Agriculture (USDA) at current levels through NRCS.

- Continue to closely coordinate with local agencies and other partners, to generate local funding for CVFPP investments. If more revenue is requested from the federal and state governments, local governments would also need to raise additional revenue to meet increased O&M and their cost-share requirements.
 - ▶ **Pursue a coordinated effort to amend Proposition 218 (S/L).** There have been many attempts to amend Proposition 218 requirements so that flood control can be treated similar to water, sewer, and sanitation utilities. A coordinated effort could make the process of raising assessments for flood control agencies similar to other utilities. Additionally, local flood risk awareness campaigns and accomplishments reporting have been effective in increasing local support for funding flood management system improvements.
 - ▶ **Increase assessments to meet cost-share requirements (L).** Local agencies may increase their assessments to meet cost-share requirements for the proposed projects and their share of O&M.

4.5.2 Outlining Work Plans to Address Flood Management-Related Policy Issues

To address the flood management policy issues described in this CVFPP Update, a reasonable number of issues and a consistent structure were needed to enable development of work plans to drive CVFPP implementation progress. These work plans should outline the implementation framework for each issue recommendation presented in Section 4.5.1. The work plans should include a description of what actions would be taken, who would lead or participate in the action (State, federal, and local partners), and when the action would be initiated and completed. Work plans would define a path for activities for State, federal, and local partners to lead to the next CVFPP Update. A conceptual work plan template is shown in Figure 4-13, depicting coordinated activities, timing, milestones, and responsible agencies to address the policy issue.

Based on the lessons learned during RFMP scoping, these policy work plans will need to be flexible to accommodate developments that have not been anticipated in this CVFPP Update. Staff and funding resources will be needed to effectively advance these efforts. By providing appropriate resources delays can be minimized or avoided in achieving the milestones and recommendations described above (see Section 4.5.1).

Figure 4-13. Conceptual Flood Management-Related Policy Issues Work Plan Template



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4.5.3 Focusing on Investment and Cooperation into the Future

The CVFPP planning process has brought together many stakeholders and flood management-related efforts in the Central Valley. Many of the planning efforts that informed this 2017 CVFPP Update were prepared in close coordination with State, federal, and regional partners and guided by a robust, multi-year stakeholder engagement process that began in 2012. As part of this process, the 2012 SSIA has been refined to develop the 2017 refined SSIA portfolio, which refines the set of actions associated with each physical and operational element in the 2012 SSIA. These additional actions were identified as part of the many technical studies that have contributed to a greater understanding of the system and its opportunities.

With the large investment recommended for implementation of the CVFPP, updating funding mechanisms is the single most important aspect to raising the funding required to improve the SPFC over the next 30 years. To be as efficient as possible with limited funding, a strategic, integrated approach that emphasizes cooperation across all levels of government is required. All cost-sharing partners will be asked to contribute significantly more than they have in the past, as historical revenue sources would only be able fund approximately 20% of needed flood system investment. Consideration should be given to ways to increase landowner participation in expanded ecosystem service markets. For more information, see Section 3.2.5. It is the intent of the CVFPP to promote multi-benefit projects within the flood system. Ongoing project examples include the Bear River setback levee and the Three Amigos habitat area. Examples being planned in cooperation with landowners are the Paradise Cut and Yolo Bypass expansions. Yolo Bypass multi-benefit improvements are planned to include widening the Fremont and Sacramento weirs, fish passage over Fremont Weir, and flood-season rearing of juvenile salmon.

The State would like Congress to support State-sponsored flood risk reduction and ecosystem restoration projects in the WRDA and to enable USACE and FEMA to focus on more proactive participation in State and local efforts. In addition, annual appropriations from the State general fund should be increased in the near term, and new funding mechanisms and three precedent-setting general obligation flood bonds must be secured in the longer term, to fund, in part, the contributions by multiple State agencies to flood management projects. The CVFPP may consider making a recommendation to the Legislature to provide sources of funding for the array of multi-benefit elements of the CVFPP. While more revenue is required from federal and state governments, local governments will also need to raise additional revenue through mechanisms such as Proposition 218 and any future amendments to that proposition, to increase investments in O&M and provide local cost-shares.

Updating funding mechanisms is the single most important aspect to raising the funding required to improve the SPFC over the next 30 years.

Moving towards the next CVFPP Update, the CVFPB and DWR will continue to build upon the improved collaboration and public outreach that has occurred to date for the 2017 CVFPP Update, including the RFMPs, work groups, and advisory committees, and other communications and engagement that was completed as described in Section 2.3. Subsequent collaborative efforts led by the CVFPB and DWR to support the next CVFPP update may consider (1) channel maintenance requirements and design profiles (e.g., 1955/57 profiles), (2) environmental and hydraulic baselines, and (3) development and implementation of a transparent process, independent from environmental permitting, that applies the CVFPP Conservation Strategy and measurable objectives for both ecosystem uplift and improved flood management to assess and track the contribution of future projects to a functional flood system.

The CVFPB may consider establishing a committee similar to the CVFPP Conservation Strategy Advisory Committee to evaluate how to improve permitting, reduce the cost of and time required to obtain permits, and improve ecosystem functions and habitats. This committee could address the following:

1. Integration of the CVFPP Conservation Strategy's measurable objectives
2. Leveraging projects within and across regions to collectively achieve multiple benefits
3. Leveraging of new legislation such as AB 2087 (Regional Conservation Investment Strategies)
4. Applying new tools for quantifying and crediting project benefits
5. Identifying additional needs for permitting improvements and the pathways to implement them
6. Permitting of pilot projects, applying innovative approaches and refining them, including:
 - a. evaluation of the potential to establish regional plans as Regional Conservation Investment Strategies (RCISs) under AB 2087,
 - b. quantification of estimation of regional plan contributions to CVFPP Conservation Strategy measurable objectives ecosystem vitality outcomes along with other multi-benefit outcomes, and
 - c. identification of specific regional plan proposed regional projects as potential case studies for innovative permitting.

Consideration should also be given to the lessons learned from regional advanced mitigation projects and the Central Valley Habitat Exchange, as it continues to develop. Successfully realizing an improved system for permitting projects will require a collaborative effort to successfully permit a suite of pilot projects that can help establish new permitting pathways and procedures, uncover and resolve issues and obstacles, and demonstrate success and the benefits associated with a new approach.

To the extent funds are available, it is recommended that the State continue to fund the RFMPs to assist in formulation of potential flood projects, including multi-benefit elements and support for measurable objectives. Additional effort is needed for regional collaboration in order to further develop and refine estimated contributions to ecosystem objectives from regional-scale actions and progress toward measurable objectives, in coordination with the State (see Section 3.1.6). The RFMPs have proven extremely valuable in the development of the 2017 CVFPP Update. In order to assist in future updates, it would be very beneficial for the State to continue to provide funding to the extent available to the RFMPs or LMAs, especially for those that engage in corridor management plans and project development. An additional State cost-share may be appropriate for disadvantaged communities.

Demonstrating an appropriate return on investment to broader public interests is key to raising and sustaining needed State and Federal funds for implementation of the 2017 refined SSIA portfolio. To accomplish this, the State is committed to improving its ability to assess progress and track investments in future CVFPP updates. Characterizing a management action's ability to contribute to the CVFPP goals and provide societal value is an essential first step toward this commitment. Furthermore, tracking the effectiveness of past actions to achieve intended outcomes is critical to prioritizing funding and implementation activities. The success of our collective actions since 2007 has reduced the potential for significant life loss in California's deep floodplains. The CVFPP updates represent a proactive approach to mitigating consequences of major flood events of a scale like Hurricane Katrina in 2005. This update has refined the path that was set by the 2012 CVFPP for the necessary call to action; however, there is still tremendous shared responsibility and effort across all levels of government that must occur within the Central Valley to implement the CVFPP. The 2022 CVFPP Update will continue the progression toward an effective, resilient, and sustainable flood management system.