Water Fix Policy Paper

Preamble

"Great interests were in active contention. The engineer who advocated a plan or measure seeming favorable to any one of these, was condemned by all others; and he who pursued any independent course, as to policy or works, was in favor with none of them; while the great public took no interest in the matter except to condemn anything which contemplated general taxation...The truth did not prevail where misrepresentation could be made to serve a desired selfish purpose, and blind prejudice was everywhere present."

William Hammond Hall, 1904
California's first water engineer, appointed in 1878

Californians have waged water wars for more than a century. Little investment has been made in water infrastructure since the days when Earl Warren and Pat Brown were governors of California. Since then, our population has more than doubled at the same time that we have become far more aware of the water needs of our environment. Our water crises have become more severe and will become even more so as a result of climate change, sea level rise, and continued population growth. The time has come for forging consensus, for Californians to shed parochial views and join together in pursuit of solutions that work for all regions and improve water supply reliability for all categories of water users: urban, agricultural, and environmental. The California Water Action Plan released in January by Governor Brown's administration is a welcome step in the right direction. It acknowledges California's current reality:

> *"There is broad agreement that the state's water management system is currently unable to satisfactorily meet both ecological and human needs, too exposed to wet and dry climate cycles and natural disasters, and inadequate to handle the additional pressures of future population growth and climate change."*

We fully support the holistic goals proposed in the Water Action Plan: conservation, regional self-reliance and integrated water management at all levels of government to better manage demand; storage, conveyance, ground water management, and increased operational and regulatory efficiency to give us the flexibility to manage around the uncertain precipitation patterns nature has given us; actions to protect and restore important ecosystems, increase flood protection, and provide safe water to all communities. The Delta Stewardship Council Delta Plan establishes policies and recommendations to advance a similarly integrated approach to achieving the Two Co-Equal Goals for the Sacramento-San Joaquin Delta while protecting the unique values of the Delta as an evolving place.

What is different about this policy proposal?

First, it is a call to action. The administration has characterized the Water Action Plan as "aspirational." It states challenges and goals but timelines and a financing plan should be added. This policy paper attempts to move California closer to an implementation plan. No water system in the world has been studied as much as California's water system. We urge that action begin now and that our political leadership put a stake in the ground calling for completion of all the critical components of the Water Action Plan by 2030 and leaders in all arenas work to forge the agreements and consensus to get things done.

California's approach to water management over the last few decades has been crisis-management. While we don't know for sure when the droughts will occur, we know with certainty that they will come. We muddle through each painful crisis, and then wait for the next one to occur. This third year

of drought is demonstrating the substantial consequences of California's failure to invest sufficiently in water infrastructure.

We understand that addressing all components of a comprehensive "Water Fix" for California will be expensive, but there is no more important infrastructure for the state, and the concept of "beneficiary pays" enables us to begin implementation immediately. As is the case for all major infrastructure undertakings, all of the financing will not be identified from the get-go, but we can begin implementation based on funding that is accessible if political leadership is effectively exercised. Important discussions are underway now about additional funding to help pay for the public benefits of the required investments.

Second, we strongly support concurrent advancement of all components of the solution. Historically, stakeholder groups have advanced their preferred component, leaving others concerned about implementation of other parts of the solution. A key element to maximizing the benefits to be achieved from investments in all of these components is to move them all forward as expeditiously as possible as a comprehensive, integrated whole, which will more quickly further achievement of the Two Co-Equal Goals than will fragmentary implementation. We understand that funding availability will influence timing of implementation for each component, but political leadership can help earn stakeholder trust and propel action by ensuring resource allocations to all components, demonstrating a steadfast commitment to convergence of all components by 2030. While all agree that a comprehensive approach is needed, differences remain regarding how to ensure integrated action, implementation, and operations. Some participants maintain that reliable linkages and commitments are needed to achieve results. Others are concerned that linkages and commitments will only ensure that implementation will bog down and nothing will be accomplished. Additional work is needed to bridge these different perspectives.

Third, and perhaps most important, this policy paper is an effort to help forge consensus. The participants in the "Water Fix" discussions leading to the development of this paper included a diverse group of stakeholders from across the state: the general managers of water agencies in the Bay Area, Delta, San Joaquin Valley, and Southern California; the Association of California Water Agencies (ACWA) and Northern California Water Association (NCWA); the Delta Vision Foundation and The California Partnership for the San Joaquin Valley; County Supervisors from Contra Costa, Sacramento, Solano, and Yolo counties and a prominent civic leader from San Joaquin County; and environmental organizations. While not signatories to this document, representatives from the California Department of Water Resources and the California Department of Fish and Wildlife participated in some of the discussions leading to the development of this document.

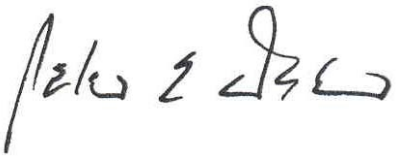
This is an at-will collaboration. Our names and affiliations are appended to this preamble. The group came together because California's water system is now in a chronic state of crisis and the array of solutions that must be implemented will take the better part of the next two decades to complete. The group sought to find common ground on the actions that must be taken to ensure water security for the State for the balance of this century. As a consequence of these conversations, we now share a better understanding of each other's needs and a commitment to solutions that work as well as possible for all of us. We entered into these discussions knowing how difficult it is to reach 100% consensus, particularly on a subject as complex and controversial as California water. At the end of each monthly meeting, we took a vote to determine if we should continue the discussions. Every vote was unanimously supportive of continuation. In the end, all but four of the participants agreed to sign on to this policy proposal.

When this policy paper was nearing completion, the group asked that it be reviewed by a panel of distinguished Californians with extensive experience on water matters. The list of review panel members is also appended to this preamble.

Signatories

(Affiliations for identification purposes only)

We, the undersigned, support the "Points of Agreement" listed in Chapter 3 of this report and urge the Governor, the President, the California Legislature, the California Congressional delegation, and Federal officials to provide leadership, direction, and accountability to ensure a comprehensive "Water Fix" for California is implemented consistent with the Points of Agreement and the integrated actions described herein. A comprehensive "Water Fix" plan would propel the Governor's California Water Action Plan into actual "action," with specific actions, timetables, funding sources, assurances, and accountability provisions. We have worked together to address this challenge and will continue to work with each other, within our organizations, and with others to advance coordinated, comprehensive actions for the state. At stake are California's environment, economy, and quality of life and their value to the nation.



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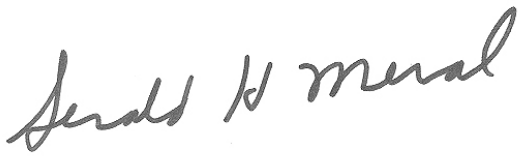

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The following individuals provided important review comments during the development of this policy paper.

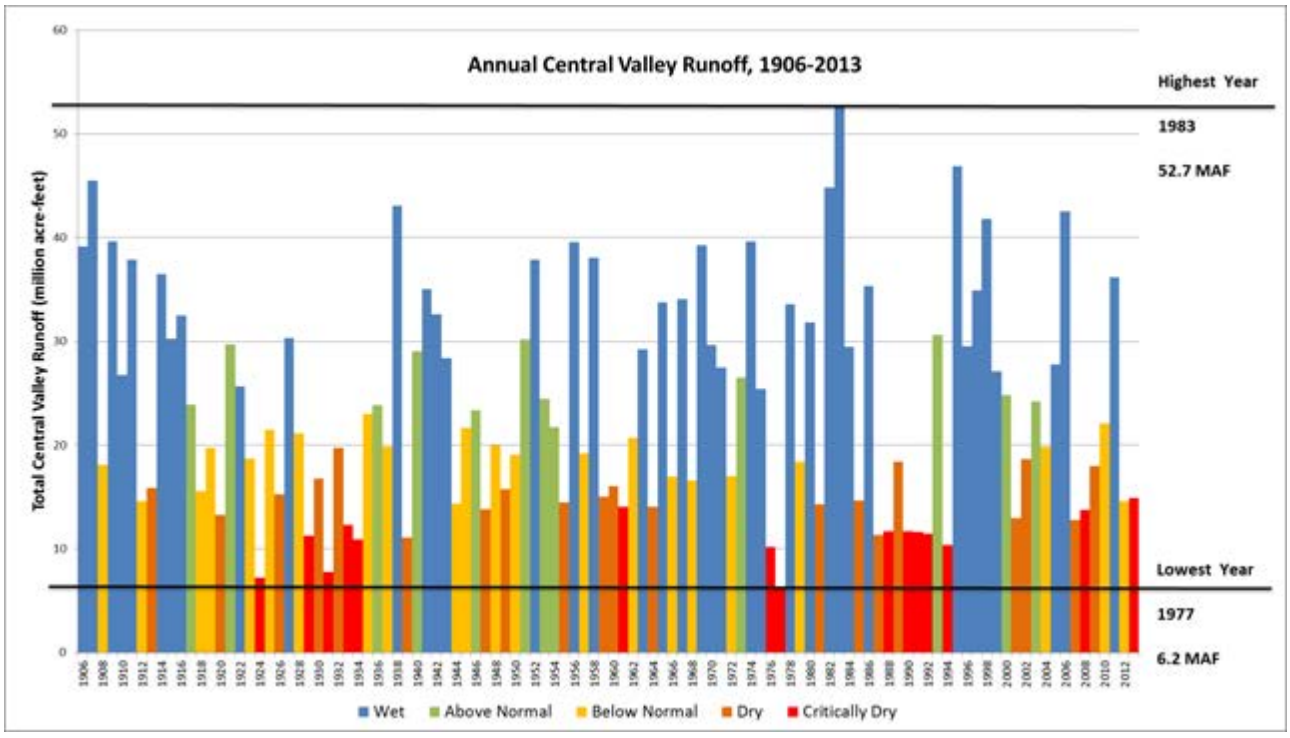
- William Reilly, Former Director, U.S. Environmental Protection Agency
- John Coleman, President, Association of California Water Agencies
- Dr. Jerry Meral, Natural Heritage Institute
- John Kirlin, Delta Vision
- Ellen Hanak and Dr. Jeffrey Mount, Public Policy Institute of California
- Dr. Peter Moyle, University of California at Davis

Water Fix Policy Paper

Executive Summary

California's water challenges are daunting but not insurmountable. There would likely be enough water to go around in most years if the State had sufficient facilities to capture, convey, and store a lot more water in wet times than is physically possible today and all water users are efficient and sustainable in their water use in all years, particularly in areas where groundwater use is currently unsustainable. As shown in Figure 1 below, only about 3 years out of every 20 are "Normal" with the balance being either "wet" or "dry." Note that the Central Valley runoff in the year of greatest precipitation (1983) was nearly nine times higher than the year of lowest precipitation (1977). That is an extraordinary range. Note also that "dry" and "wet" years can come in bunches. The State experienced an eight-year drought between 1987 and 1994 (with only one year slightly above "normal"). Immediately following this drought period, the State experienced five consecutive years of water abundance between 1995 and 1999. Climate change is expected to exacerbate this pattern: wet periods will be wetter (bigger storms) and dry periods may be drier and longer, so historical records may not provide an accurate forecast of future runoff.

Figure 1 – Central Valley Runoff, 1906-2013



(DWR, http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

While in many individual years there is not enough managed water for all needs, California precipitation, averaged over a long-term period, provides sufficient water to meet reasonable needs for drinking water, ecosystem protection, and economic uses (provided we make a continuing commitment to continued water use efficiency improvement, conservation and appropriate demand management programs).[1] Conflicting demands—particularly between fish and farms—arise most frequently during times of low rainfall. Ironically,

[1] Average statewide runoff is approximately 70-75 million acre-feet (MAF) per year. Statewide net water use is approximately 63 MAF for urban, agricultural, and environmental needs (Department of Water Resources, September, 2013)

in some dry years, a higher percentage of water is exported from the Sacramento-San Joaquin Delta watershed than during wet years. The necessary facilities don't exist to take greater advantage of an abundance of water in wet periods and reduce conflicts related to diverting water from the Delta watershed in dry years. The challenge—and opportunity—is to construct the essential infrastructure to capture significantly more water in wet times, fill reservoirs and groundwater storage above and below the Delta, and manage both supply and demand to get through times of low rainfall. This would leave more water in the Delta during dry periods when it is most needed for the fish. To facilitate this common-sense approach, more integrated modeling is needed to determine how much water can be collected and stored in years of abundance and how, over time, that can help recover critically overdrafted aquifers, particularly in the Central Valley.

In 2009, the California Legislature established new policy direction for water management in the Sacramento-San Joaquin Delta, the heart of the state's water management systems. The legislation established the Two Co-Equal Goals for managing the Delta:

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

This policy paper outlines the issues, agreements, and actions to move California forward to resolve long-standing conflicts and achieve the Two Co-Equal Goals. We propose actions to address three broad strategies:

- Invest in Water Management and Water Use Efficiency.
- Build a Fully Integrated Water Infrastructure System.
- Implement a Coordinated Operating and Regulatory Structure.

CHAPTER 1 describes the purpose of this policy paper: to articulate a comprehensive solution developed and supported by a diverse group of stakeholders and to call on political leadership to move to implementation with the urgency that the situation demands. There is no question that some compromises and flexibility will be required, but there are solutions that meet the essential needs of all regions.

CHAPTER 2 provides a primer on the Delta, its critical role in supplying water to two-thirds of all Californians, how it has evolved as a result of human activity over the last 160 years and as societal demands have changed, and what needs to be done to modernize the system to serve California's needs for the next several decades. The status quo is unsustainable. For more than two decades California has lurched from water crisis to water crisis, and, as will be described later in this paper, there is strong reason to expect future crises will be longer and deeper.

CHAPTER 3 describes the ten "Points of Agreement" reached by the signers of this policy paper, agreements that guided the drafting of this paper.

1. California precipitation, averaged over a long-term period, provides sufficient water to meet reasonable needs for drinking water, ecosystem protection, and economic uses. The problem is that precipitation is highly variable year-to-year and current infrastructure is unable to capture available surpluses in wetter periods to help carry the state through drought.
2. The water resources of the state, including surface and groundwater, need to be managed more efficiently and in a more integrated way to achieve multiple benefits. California's aquatic ecosystems are highly stressed and/or collapsing, in part due to flow alteration, loss of physical habitat, introduction of non-native species, and pollution caused by human activity.
3. All parties want to achieve the co-equal goals, while protecting and enhancing the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.
4. The current water system does not and cannot achieve the co-equal goals because it does not offer the flexibility to store water when it is abundant and move it to where it is needed when it is needed in a way that is consistent with the achievement of the co-equal goals.

5. Improved Delta conveyance alone will not entirely address the co-equal goals; a comprehensive plan of integrated actions is required to achieve them.
6. Moving water through the Delta is complex and highly controversial. All of us agree that the status quo on conveyance is not sustainable. Some of us think that Improved Through-Delta Conveyance alone can be the solution. Others of us conclude that Dual Conveyance, which includes both Through-Delta Conveyance and a new isolated component, is necessary. To resolve the longstanding conflicts regarding conveyance, measures to improve through-Delta conveyance and investments in new storage to improve flexibility of water operations and water management should be pursued expeditiously while dual conveyance continues through its decision process.
7. Improved water management and a sustained commitment to continuous improvement in water use efficiency in all regions are necessary to increase system flexibility and reduce conflicts resulting from scarcity.
8. Protection and enhancement of headwaters areas is needed to increase retention, contribute to system flexibility, and adapt to climate change.
9. It is vitally important that the proposed system solution consider the economic interests of every affected region and costs are allocated based on the benefits received, including general public benefits, e.g., environmental enhancement and meeting drinking water needs of disadvantaged communities.
10. Any solution to achieve the co-equal goals must be developed consistent with the public trust, state and federal environmental requirements, water rights, and area of origin protections.

CHAPTER 4 offers a straw-man proposal for the implementation of the principles stated in Chapter 3. It begins with a summary of the existing policy framework that guides action and implementation now, including the Delta Plan, Bay-Delta Water Quality Control Plan, and Central Valley Flood Protection Plan. Chapter 4 describes the strategies and actions and quantifies some of the outcomes needed to solve California's water issues. It is intended to focus and advance development of a comprehensive action plan to be developed by the Governor's administration, focused on three major strategies:

(1) **Invest in water management and water use efficiency to reduce demand and increase system flexibility.** Californians must commit to improve water efficiency and sustainability and to reduce reliance on the Delta in meeting future water supply needs. Groundwater overdraft must be reversed in areas where it is affecting other users or public infrastructure. All regions that depend on water from the Delta watershed must improve surface and groundwater storage and management, water use efficiency, recycled water use, stormwater management, desalination, and other water management tools to increase self-reliance and support system flexibility to achieve the Two Co-Equal Goals. Recent measures adopted at the State and federal level in response to the current drought will help advance this strategy.

(2) **Implement a fully integrated California water system.** California's existing water infrastructure places the Two Co-Equal Goals in direct conflict because there is little flexibility in the timing or location of water flows through the Delta. California must invest in the necessary infrastructure to collect water when it is abundant and have flexible systems to convey it to where it is needed, when it is needed. And it must begin to implement such a system with the urgency the situation demands. There are five key components to such a system:

- **Natural Watersheds** – Up to two-thirds of the State's developed water supply is derived from natural watersheds in the headwaters areas of northern California and the Sierra Nevada. Better forest and watershed management can increase water retention, promote healthy ecosystems, reduce fire risk, and offset some impacts of climate change.
- **Surface and Groundwater Water Storage** – California needs more surface and groundwater storage, north and south of the Delta, to collect water in years of abundance to minimize impacts in "dry" years. Several large water storage projects have been studied since 2000, but only one has moved beyond studies. Action must be taken to reverse the unsustainable overdrafting of California's natural aquifers, particularly in the San Joaquin Valley.

- **Conveyance** – Delta conveyance has been extensively studied by the California Department of Water Resources (DWR) and other agencies. The focus of these studies has been on ways to improve how water is conveyed to reduce conflicts between human water use and ecosystem health. While there is remaining controversy about how much water can be conveyed and how it should be conveyed (see Chapter 4), the signatories to this Policy Paper agree that the current conveyance system in the Delta is unsustainable.
- **Levee and Floodplain Improvements** – Levees and floodplains in and near the Delta are critical for protecting people, land uses, ecosystems, infrastructure, water supply, and water quality. These facilities and areas can be designed and managed to serve both ecosystem and economic functions and support multiple benefits. Irrespective of whether conveyance occurs exclusively through the Delta or through a dual conveyance system, there are critical "strategic" levees in the Delta on which California's water system will continue to depend.
- **Delta Ecosystem Restoration** – Numerous projects have been identified to protect, restore, and enhance Delta ecosystems. Some of these projects are required as part of permits for water diversions or as mitigation for other activities in the Delta (e.g., levee improvements). These and other projects are part of the Delta Plan and other restoration plans. In the last 15 years, little on-the-ground progress has been made restoring the Delta ecosystem.

  Also included in Chapter 4 is a description of the actions that need to be taken to minimize and mitigate impacts from infrastructure construction.

(3) **Implement a coordinated operating structure to achieve the Two Co-Equal Goals.** Multiple agencies are involved in managing California's water systems. Building the comprehensive water infrastructure system California needs will not deliver optimal results unless these agencies make coordinating their activities and managing the water infrastructure consistent with the Two Co-Equal Goals a priority and standard of performance. A coordinated operating structure to implement "more in wet and less in dry" will require close cooperation among operators, regulatory agencies, and local water managers; early involvement on Delta projects with representatives of the five Delta counties; improved transparency of storage, diversions, operations, and management actions; and consistent, effective enforcement of policies and requirements.

CHAPTER 5 describes the policies, institutions, and finances that must be put in place as a foundation for action. Operational parameters must be established to ensure all water systems are operated consistent with the Two Co-Equal Goals. Ecosystem management must consider the interaction between the multiple species that inhabit the Delta. Implementation timelines must demonstrate a commitment to act with the urgency the situation demands. A comprehensive water bond should be put before the voters this year as a vehicle to support the "all of the above" approach articulated in the California Water Action Plan. Because specific beneficiaries rather than the general public are anticipated to pay 50% to 60% of the estimated $40 to $45 billion required for comprehensive implementation, reliable assurances to ensure those investments result in their expected benefits are critical. Institutional agreements must reinforce commitments and build trust among diverse interests and beneficiaries. Progress and performance must be transparent and reported regularly to increase accountability. Leaders and champions must step forward from all corners to make integration and implementation work.

CHAPTER 6 is a call to action. No estuary has been studied as much as the Delta. This policy paper has emphasized infrastructure because it takes time to build and the State has not made necessary investments for more than a generation. Water storage projects have been studied since before the turn of the century. Conveyance options have been evaluated for decades. California is already in crisis. Further analysis and procrastination will not help. California will remain vulnerable while the problem will only get worse. The solutions are sufficiently understood. We know enough to act and adapt as we learn more. Ultimately, only real-world adaptive management and rigorous monitoring will provide the answers to achieve the Two Co-Equal Goals. Political leadership, built on the broad areas of consensus described herein, is urgently needed to move to implementation.

Things do not happen. They are made to happen….

Nothing could be more disastrous for this country than for the citizens of one part of the state to feel that everything they have is theirs and that it should not be shared with the other citizens of this state….That is the way to stand still….

Progress represents the combined will of the American people, and only when they are joined together for action, instead of standing still and thinking that everything that had to be done has been done. It's only when they join together in a forward movement that this country moves ahead and that we prepare the way for those who come after us….

President John F. Kennedy at the Groundbreaking Ceremonies for San Luis Dam, 1963

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Chapter 1. Purpose and Intent

The current drought in California, coupled with the deep differences statewide about the Administration's Bay Delta Conservation Plan (BDCP), has brought needed attention from policy makers at the State, Federal, regional and local levels to the critical water issues California must address. What are these issues?

- California's current water management system is unsustainable for both people and the environment. Fish populations have crashed and are not recovering. Groundwater basins are increasingly overused. Reservoirs are no longer able to store enough supply to reliably meet the needs of people and the environment during dry years. During wet years, floods threaten lives, property, and habitat.
- California's state and federal projects, which complement regional water systems, were planned when California's population was only 17 million people. The population is now more than twice that size and likely to be 50 million people by 2050.[2]
- Californians take for granted that water will flow whenever the faucet is turned on. The 2014 drought highlights the water supply risks for communities and farms. Californians need to act now to reduce future risks.
- The ecosystem of the Bay-Delta Estuary, through which water is conveyed to almost two-thirds of all Californians, has been stressed to the breaking point. A healthy Delta ecosystem is an indispensable part of any solution to California's water challenges.
- California agriculture, which is dependent on a reliable supply of water, provides food and produce for the state and nation, employs 2.5 million Californians on farms and in related support industries, and generates the fifth highest contribution to state exports ($13.8 billion of a total of $168 billion in 2013)[3]. The current drought may cause as much as 20% of California farmland to be fallowed, causing supply reductions for some foods and higher prices for consumers.
- Surface water shortages and increased local demands have caused groundwater levels in some areas of the San Joaquin Valley to decline significantly over the last 70 years, creating subsidence issues that threaten some of the very infrastructure on which the State's economy depends.
- Inconceivably, some Californians today do not have access to safe drinking water in their homes. In many rural and urban areas, the costs for treating water to meet water quality standards is unaffordable, which precludes the use of what would otherwise be available supplies.
- California weather is highly variable, with years of water abundance and years of severe water shortages. The current drought may be a preview of future conditions as climate change and more variable weather patterns put more stress on California's water management system.
- Precipitation occurs mostly in the northern third of the state, while the largest water needs are in the southern two-thirds of the state, where the largest share of the population and agricultural activity are located.
- There are insufficient facilities to capture water when it is abundant, convey it south of the Delta, store it, and recharge underground aquifers ("water banking") to reduce exports during the "dry" years, providing benefit to both people and the environment.
- California's water storage and conveyance systems, designed and built in the mid-20th Century prior to the enactment of environmental protection statutes, cannot meet California's water and ecosystem management needs today.

Californians have fought water wars for generations—pitting regions against each other —and argued endlessly about priorities for environmental, agricultural, and urban uses. However, measured over a long period, California has sufficient precipitation to serve the reasonable needs of all regions and categories of water users and the environment. The Sacramento-San Joaquin Delta and watershed are the focus of much of these conflicts. However, the Delta is interconnected with water management for much of the state, so fixing the Delta will only work if all aspects of our water management system are improved.

[2] California Department of Finance, http://www.dof.ca.gov/research/demographic/reports/projections/p-1/.
[3] U.S. Department of Commerce, International Trade Administration, http://www.trade.gov/mas/ian/statereports/states/ca.pdf

It's time for those water wars to stop, which is why a group of leaders from across the State have come together to find common ground. Readers of this document will find that the diverse stakeholders who have signed on to this Policy Paper agree on the framework for the solutions that must be implemented.

Solution Framework and Vision

In 2009, the Legislature and the Governor established a legislative framework for addressing decades of conflict. The 2009 Delta Reform Act calls for attainment of Two Co-Equal Goals: (1) Protecting, restoring and enhancing the Delta ecosystem; and (2) Providing a reliable supply of water for Californians. In addition, the law requires that the Two Co-Equal Goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

The essential elements of a viable solution are not nearly as complicated as many would like to make them. Aquatic ecosystems need sufficient water at the right time and temperature along with adequate habitat and food supply to promote healthy fish and wildlife populations. Families, farms, and factories need reliable water to support and grow communities and the economy. All water users must be smart and efficient about using and reusing water. Construction and operation impacts of new infrastructure on landowners and communities must be minimized or mitigated to the extent practicable. Solutions must respect and comply with water rights, area of origin protections, and water quality requirements. The solution requires an integrated strategy of conservation, construction, and operational flexibility to meet the challenges ahead.

The signatories of this Policy Paper envision a future when the Two Co-Equal Goals are achieved, as represented by a healthy Delta ecosystem with self-sustaining fish populations and sufficient water quality and water supplies available for all purposes, while the Delta is sustained culturally and economically. This vision will be accomplished by working together to improve California's water management system such that water is captured, conveyed, and stored in wetter periods and during dry periods more water is left in the rivers and Delta for the environment when most needed.

California needs leadership, action, and investment to meet statewide needs and achieve the Two Co-Equal Goals. The core components of a workable "Water Fix" for the Delta and California include five categories of both near-term and long-term actions:

- **Conservation and Water Use Efficiencies**. Continuously improve regional water management and self-reliance in areas that depend on water from the Delta watershed, through water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination.
- **Water Storage**. Capture and store large volumes of water when precipitation is abundant so it can be employed where and when it is needed for the benefit of all species, including humans. Storage needs to take place in California's natural watersheds, underground aquifers, and surface reservoirs above and below the Delta.
- **Conveyance**. Improve Delta conveyance to move the necessary volumes of water during "wet" periods to avoid stressing the system during "dry" periods. Improved conveyance must reduce adverse impacts to the Delta ecosystem, seismic risks, and impacts of sea-level rise.
- **Ecosystem Restoration**. Protect, restore, and enhance ecosystems in the Delta and its watershed to support healthy, self-sustaining populations of fish and wildlife.
- **Delta as Place Protection**. Protect and enhance infrastructure and operations in the Delta and beyond to meet water quality requirements, reduce flood and earthquake risks, improve economic conditions, and facilitate regional economic investment.

For all the complexity of California's water issues, these core components have been part of every major plan to fix the Delta and address statewide water management needs, including the CALFED Bay-Delta Program (2000), Delta Vision Strategic Plan (2008), the 2009 water legislation package, the Delta Stewardship Council Delta Plan (2013), and more recently the Association of California Water Agencies Statewide Water Action Plan (2013) and the Governor's California Water Action Plan (2014). All these plans, however, have resulted in little action to date.

Obstacles and Solutions

It is essential that a realistic schedule to implement the Core Components be developed and agreed upon that includes a timetable for observable progress and commitments to fund implementation. The principal legal basis for implementing such a framework is already in place. So why has there been so much controversy about how to implement this framework?

Disconnected Actions Won't Work. Many proposals have been made that would address part of the problem, but leave stakeholders understandably concerned about how other parts of the solution would be addressed. If the needs of all regions and categories of water users are to be met, California needs a comprehensive, integrated water system.

Implementation is Complex. While the solution framework is simple, implementation is not. For example, for lack of political will, partnerships, and integrated analysis, storage projects identified by the CALFED Program before the turn of the century remain "under study." Some environmental reviews for programs and projects run to tens of thousands of pages.

Water Efficiency is Critical, But Not Sufficient. Water is a precious resource and infrastructure is expensive. We would not burden users with the high water costs of water supply development if we can avoid them through increased conservation and water-use efficiencies. The signers of this document affirm that building infrastructure must be accompanied by a concurrent commitment to water use efficiency and development of alternate water supplies, but these strategies alone will not solve California's water needs.

Delta Conveyance is Controversial. Moving water through the Delta is complex and highly controversial. All of us agree that the status quo on conveyance is not sustainable. Some of us think that Improved Through-Delta Conveyance alone can be the solution. Others of us conclude that Dual Conveyance, which includes both Through-Delta Conveyance and a new isolated component, is necessary. To resolve the longstanding conflicts regarding conveyance, measures to improve through-Delta conveyance and investments in new storage to improve water operations should be pursued expeditiously while dual conveyance continues through its decision process.

Everyone is Responsible. Some stakeholders want to restore California to a past state that is unattainable. Others want to ignore the changes in public values since our major water systems were built. We can stipulate that mistakes have been made in the past and our environmental awareness has evolved, but the question is not how we re-do the past but where we go from here to reconcile and satisfy human and environmental needs.

Address Impacts. Affected communities are understandably concerned about the impacts of infrastructure construction. All infrastructure projects cause impacts. Every effort must be made to avoid, minimize, and mitigate construction impacts appropriately in advance of or concurrently when they occur.

Provide Responsible Funding. Going forward, infrastructure and ecosystem restoration must be paid for on the principle of "beneficiary pays," recognizing that landowners, water users, businesses, and the general public all benefit from these investments and each must pay its share.

Implement Operational Protections. Stakeholders are understandably concerned about how the system would be operated during dry years and normal years, and even at different times during any given year, to protect the environment, water quality, and beneficial water uses.

Respect Laws and Policies. Compliance with water rights and area of origin protections is a foundational principle. Legally reliable commitments must be put in place to ensure operation of the system in a way that is consistent with achievement of the Two Co-Equal Goals and existing legal protections.

Act Now. There are some who feel that more study of the Delta ecosystem is required before solutions are implemented. The Delta is by far the most studied estuary on the planet. Several years of additional study, without action, will not remove all uncertainty, but will exacerbate the state of crisis that already affects California's water system.

Adapt as We Learn. We must move quickly to act on the knowledge we have and adapt as we learn more.

There is another reason why implementation has proved difficult. Decades of water wars have spurred emotional polarization and distrust among stakeholders. This Policy Paper describes the policies, institutions, and funding needed to move forward. Beneficiaries must be confident their ratepayers will receive the expected benefits of infrastructure and related investments. All stakeholders must be assured that new infrastructure will be managed and operated in a manner consistent with the Two Co-Equal Goals. Assurances and or new regulatory processes must be negotiated with the State and Federal agencies and be grounded in robust adaptive management.

This Policy Paper represents consensus among a broad set of leaders across California on the path forward on California water issues. It is a call to action for leadership, investment, cooperation, and accountability to expeditiously refine and implement integrated near-term and long-term solutions to California's most important natural resource and economic growth challenge. Specifically, we urge the Governor and his administration to take the California Water Action Plan to the next level – to develop a comprehensive "Water Fix" plan for California, with specific actions, timetables, funding sources, assurances, and accountability provisions. The proposals included in Chapter 4 and Chapter 5 are intended to give readers an idea of what such a plan might look like, but we do not want to be one more of the many polarized voices on the subject of California water. We are open and receptive to better ideas. The cost estimates in the report are rough and will remain so until a plan is fully developed, but readers will want to have an idea of how much such a plan might cost and how it might be funded. What is important is that the State develop the implementation strategy with the urgency the situation demands, and that implementation of the plan begin in 2015 and conclude not later than 2030.

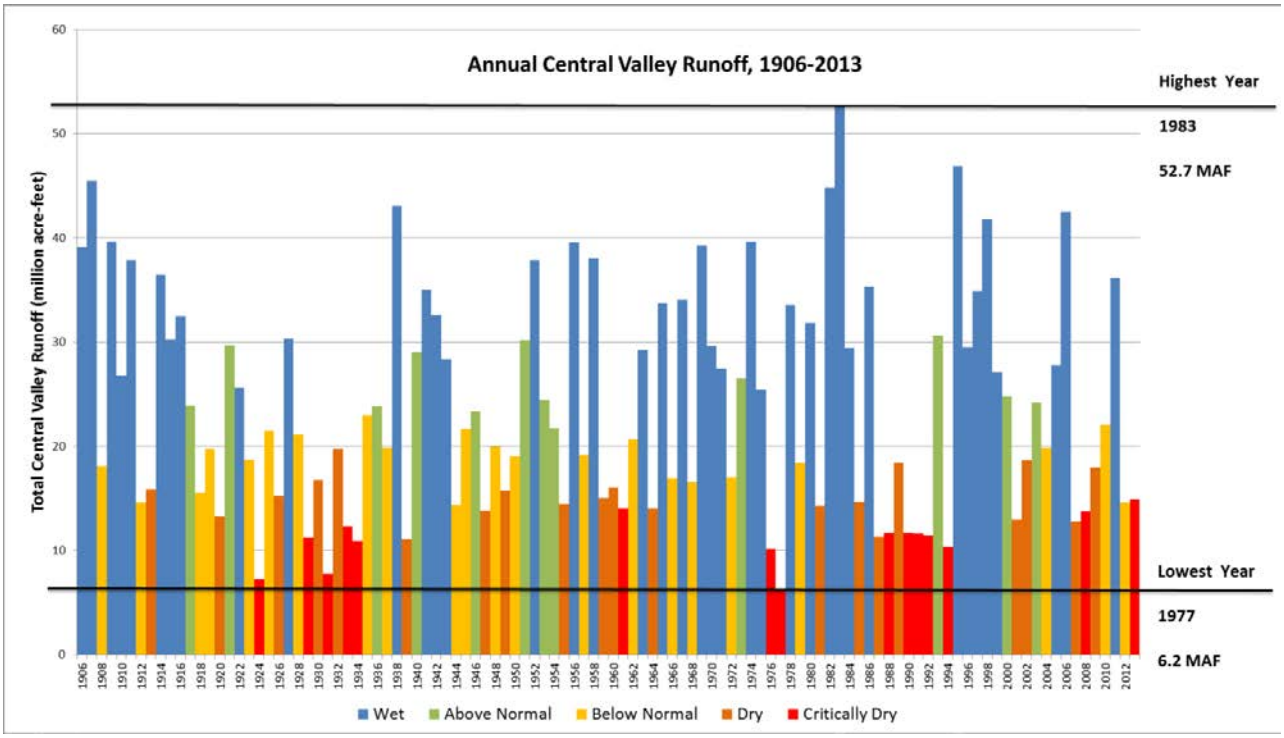
Most Californians cannot devote the time to understand these complex water and natural resource issues. Instead, they rely on trusted messengers to help shape their opinions. That is why the signers of this Policy Paper have chosen to speak out. It is our hope that many other trusted messengers will join us in advancing a "Water Fix" that works for all Californians.

Chapter 2. Role of the Delta

California's water history is long and contentious. Nowhere is that more true than in the Sacramento-San Joaquin Delta and watershed. Since the Gold Rush in the 1850's, California's economy and population have grown, increasing urban and agricultural water use. Today, on average, 43 million acre-feet (MAF) are needed annually to meet the statewide needs of people and the economy and approximately 41 MAF are managed for the environment. These needs are met with a wide variety of water sources, including local water bodies, reservoirs, and groundwater supplies (53.4 MAF), imported supplies from the Colorado River and other local projects (5.8 MAF), and water deliveries from the State and Federal water management facilities, which are primarily located in the Sacramento San Joaquin Delta watershed and Trinity River basin (10.7 MAF). Approximately 13.3 MAF of the State's surface water is reused (Department of Water Resources, September, 2013).

The Delta and its watershed are also part of the largest estuary on the west coast of the Americas. It is home and migratory pathway for hundreds of important fish, bird, and wildlife species and habitat that depend on the Delta for water, food, and shelter. These resources also need water to sustain healthy populations.

Figure 2 – Central Valley Runoff, 1906-2013



(DWR, http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

Precipitation in California is highly variable. Each year is typically wet in the winter and dry in the summer. Total annual precipitation and runoff varies greatly from year to year, with frequent floods and droughts (Figure 2). Since 1900, California has experienced nine large-scale, multi-year droughts (Department of Water Resources, Fall 2012, p. 4). In addition, most of California's precipitation falls in the northern third of the state (north and east of Sacramento), while most of the water demand is in the southern two-thirds of the state.

In the future, climate change is widely expected to bring bigger, wetter, warmer storms with heavier rain and less snow and potentially longer, drier periods.

Meeting California's water needs is a monumental challenge, but not insurmountable. California's existing water management system and water demands lead to conflicts in meeting the needs for people and the environment. Improved water management infrastructure, along with continuous efforts to improve water use efficiency and develop alternate supplies, can reduce these conflicts and better provide water when and where it is needed.

The Delta Watershed and Water Supply for California

The Sacramento-San Joaquin Delta and watershed is the heart of California's water management system. The watershed, and the water management infrastructure within it, provides some or all of the water supplies for more than two-thirds of California's population and approximately 8 million acres of the most productive agricultural lands in the world (Figure 3). The water supply system helps support virtually every aspect of California's $2 trillion economy, the ninth largest in the world.

Figure 3 – Delta Watershed and Areas Receiving Delta Water

(Delta Stewardship Council, 2013)

Conflicts have intensified among competing demands for water supply and water quality for urban, agricultural, and environmental uses. These conflicts are most evident in dry years and even more so during multi-year droughts, such as being experienced now. California's water management system, mostly constructed between 1930 and 1965, was designed to provide reliable water supplies, but the system must be improved to meet California's 21st century needs. Water diversions from the Delta and upstream in the watershed remain relatively high in dry years, a critical time, stressing the environment.

The Delta Ecosystem

Since 1850, human activities have substantially modified the Delta and its watershed and used its water resources to serve societal objectives to the point where today the ecosystem does not function effectively for many important species.

From the 1850s through the 1930s, more than 400,000 acres of Delta fish and wildlife habitat were converted to farmland and urban uses (Figure 4) (Thompson, 1957). Only about 3 percent of historical Delta tidal wetlands remain today (Whipple, Grossinger, Rankin, Stanford, & Askevold, August, 2012).

Dams were built on rivers in the upper watershed for water supply, flood protection, and water quality protection. Levees and ship channels were built along rivers in the valley for water supply, flood protection,

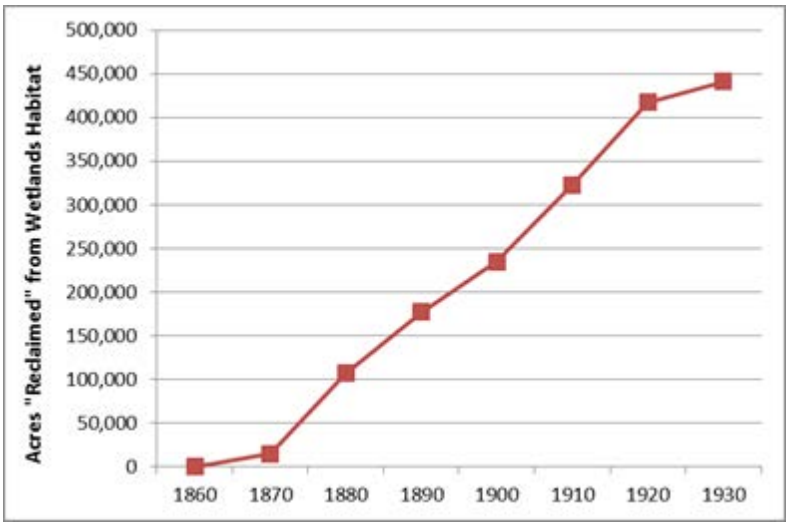
and shipping. These actions blocked access to spawning and rearing habitat for fish and reduced wetland areas for birds and other wildlife.

Shipping, boating, and other activities introduced non-native species that prey on or out-compete native species, take over habitat, or alter food webs (Table 1).

The capture and use of water for urban and agricultural uses has reduced flows into and out of the Delta. Reduced flows at critical times for fish (such as dry years) have, like the factors outlined above, also altered the ecosystem to the detriment of native species in the Delta and Delta watershed. Today, the ecosystem is failing for preferred species. The following species are listed as threatened or endangered under State or Federal endangered species laws:

- Delta smelt (Federal and State, 1993)
- Longfin smelt (State, 2009)
- Central Valley spring-run Chinook salmon (Federal and State, 1999)
- Sacramento River winter-run Chinook salmon (Federal and State, 1994 and 1989)
- Central Valley steelhead (Federal, 1998)
- Green sturgeon (Federal, 2006)

Figure 4 – Cumulative Reclaimed Acres in the Delta



(Thompson, 1957, p. 238)

Table 1 – Exotic Species Established in the San Francisco Bay and Delta (1998)

Taxonomic group	Number of species		
	In salt or brackish water	In fresh water	Total
Seaweeds	6	0	6
Vascular plants	12	18	25
Protozoans	8	0	8
Sponges	5	0	5
Cnidarians	16	1	17
Flatworms	0	9	9
Nematodes	0	1	1
Annelids	15	8	21
Mollusks	27	3	30
Arthropods	51	11	60
Entoprocts	1	1	2
Bryozoans	9	0	9
Tunicates	8	0	8
Fish	6	29	30
Amphibians	0	1	1
Reptiles	0	1	1
Mammals	0	1	1
Total	**164**	**84**	**234**

Organisms that reproduce in both fresh and salt or brackish waters, or that move between them as a regular part of their life cycle (anadromous and catadromous species), were counted in both environments. Other organisms were counted in the environment in which they reproduce. (Cohen & Carlton, 1998)

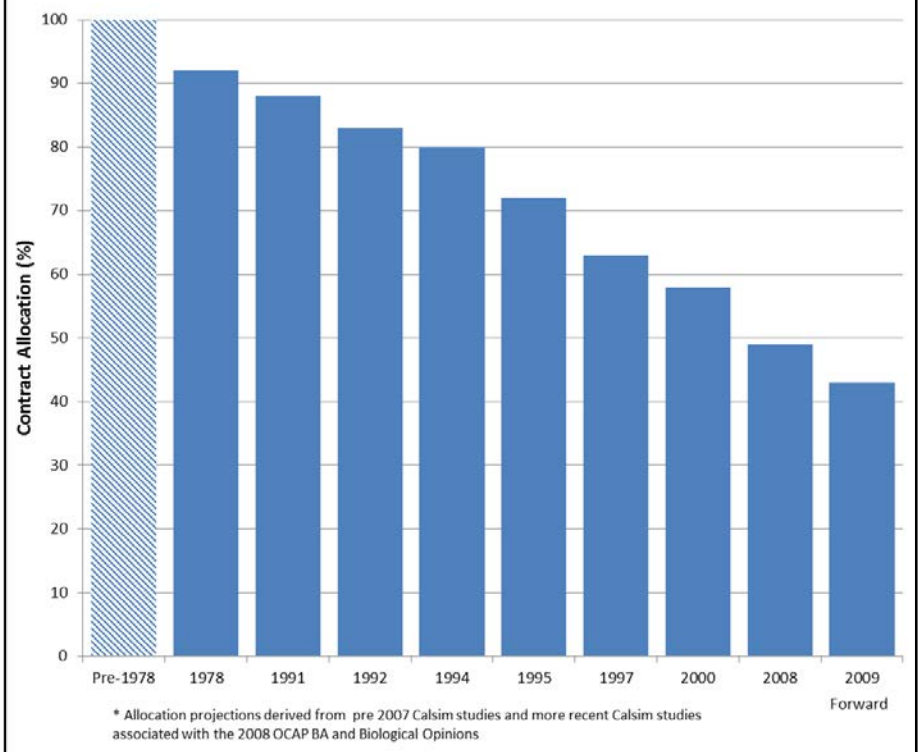
Delta Land Uses, People, and Towns

Over the years, the Delta has developed as a unique and distinct region with a cultural history based primarily on an agricultural economy, with increasingly important business resulting from tourism and recreation. Like other areas of the state, the agricultural economy depends on quality water supplies and access to support services, food processing, and transportation. The Delta tourism and recreation economy stems largely from access to boating, hunting, fishing, and birding activities that depend on a healthy ecosystem. The towns in the Delta are important centers of commerce, residential communities, and historical attractions for the region. Bordering the Delta are the business and population centers of Sacramento, Stockton and eastern Contra Costa County. The Delta is also crisscrossed with critical infrastructure for the California economy, including energy storage and transmission, water supply, and transportation. The 1100-mile network of Delta levees

protects the people, communities, economy, ecosystem, and water, energy, and transportation systems in the Delta.

The Delta region is faced with numerous risks and challenges as the future unfolds. Proposed changes in the water management system and habitat restoration are likely to result in conversion of existing land uses. Changes in flow into the Delta, diversions from the Delta, earthquakes, and sea-level rise could affect salinity and other water quality parameters for agricultural or urban water users in the Delta. Without continued maintenance and improvement, many Delta levees could fail from floods, earthquakes, or other causes, flooding people and property and increasing salinity in the Delta.

Figure 5 – CVP South of Delta Agricultural Service Contract Allocation, Long-term Forecast



Since 1978, the long-term average south of Delta agricultural service contractor Central Valley Project water allocation has been reduced from nearly 100% to 43%.

Pre-1978 – Generally full allocation except in critically dry years when allocation is 75% minimum

1978 – State Water Resources Control Board Decision 1485

1991 – Endangered Species Act - Winter Run Salmon Temperature Control

1992 – Central Valley Project Improvement Act - Refuge Supply Increase (Level 2) / Refuge Supply Shortage Provision

1994 – Endangered Species Act - Delta Smelt Biological Opinion

1995 – Bay Delta Accord (Adopted as D-1641 in 2000) / Clean Water Act

1997 – Anadromous Fish Restoration Program – CVPIA B2

2000 – Trinity River Restoration Plan

2008 – Delta Smelt Biological Opinion

2009 – Salmon Biological Opinion

(Boardman, October, 2013)

Delta Water Supply

Through the 1960s, water management policy was driven by human ingenuity to capture and move water for human uses. As a result, Californians approved and built a world class system designed to manage floods and survive multi-year droughts by storing water in reservoirs in the mountains and foothills of the Central Valley, building flood bypasses, and transporting water to agricultural and urban areas.

Over the past 30 years, increased recognition of limited water supplies, coupled with growing awareness and concern for the environment, have changed public policy and how State and Federal agencies manage the system to meet multiple needs.

In response to this new ethic of water responsibility, laws and regulations have been enacted to promote water use efficiency, protection of water quality, and restoration of fish and wildlife habitat and populations. Stored water supplies previously dedicated for urban and agricultural water uses have been reallocated for environmental purposes and the state population has increased. These water management changes have resulted in reduced water supply reliability for many water users. For example, Central Valley Project agriculture service contract allocation reliability in the San Luis Unit has been reduced by almost 60% since

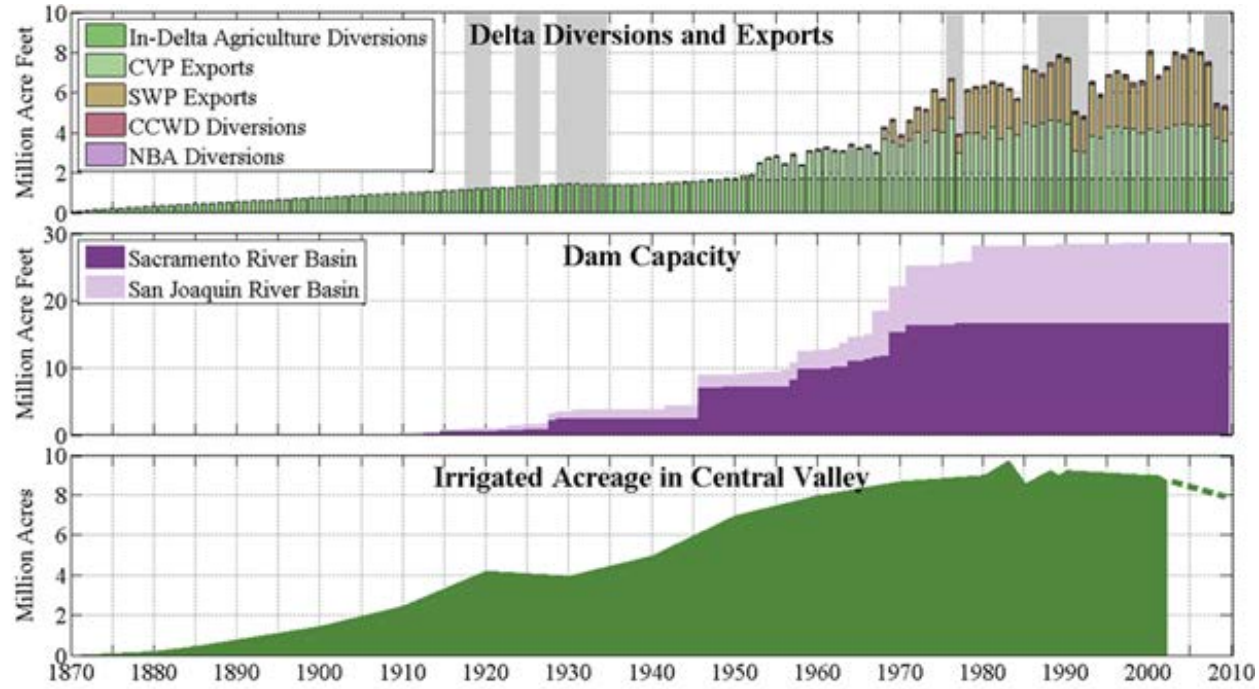
1977 (Figure 5). For State Water Project contractors, the Department of Water Resources (DWR) reports a long-term average decrease in south Delta water exports of approximately 350,000 acre-feet per year (about 12% of 2.9 million acre-feet). Table 2 shows the range of forecasted additional changes in Delta exports resulting from the effects of climate change on the State Water Project. Figure 6 shows the historical changes in water management in the Delta watershed.

Table 2 – Estimated Average, Maximum, and Minimum Annual SWP Exports (TAF/year)

	Existing (2013)	Future (2033)	Change	Percent Change
Average	2,612	2,468	-144	-6%
Maximum	4,431	4,121	-310	-7%
Minimum	671	762	91	14%

(Department of Water Resources, December, 2013)

Figure 6 – Historical Changes in Water Management in the Delta Watershed



(Contra Costa Water District, February, 2010)

Many areas of the state have responded to shortages resulting from increased municipal, industrial, and agricultural needs and from the required return of water supplies for the environment by improving local and regional water management and water use efficiency. As a result of improved water efficiency, statewide urban water use since 1990 has remained relatively constant, in spite of an increase in population of more than 7 million people. Over that same time period, the total number of irrigated acres of farmland has remained relatively constant; statewide water use for irrigation has increased slightly, along with productivity and yields.

In spite of improved water use efficiency, the water management system is still on the brink of failure. Floods continue to pose a high risk for people and property in very wet periods and reservoirs do not have sufficient capacity to carry California through a three-year drought.

Water Quality

Delta water quality is important for both human and environmental needs. The Bay-Delta estuary is a dynamic ecosystem where freshwater from rivers and streams meets and mixes with salt water from the ocean. However, the extent of salinity intrusion into the Delta is a concern for drinking water and agricultural uses that depend on the Delta. Increased salinity is a drinking water concern, in that it creates unpalatable water and shortens equipment life. Most importantly, however, bromide (a component of salinity) creates harmful byproducts when Delta water is treated for use as drinking water. Higher levels of salinity in irrigation supplies can reduce crop production and accumulate in the soils.

Salinity in the Delta is subject to natural variations in both time and space and is strongly influenced by freshwater inflow from the rivers, salinity from San Francisco Bay waters, and tidal action in the Bay and Delta. Human intervention has altered Delta flows and the extent of salinity intrusion. European colonization initiated a period of large-scale changes to the landscape and water flows, which cumulatively tended to increase Delta salinity. These changes include deforestation, dams, hydraulic mining, agricultural diversions and return flows, marshland reclamation, Delta channelization, and inter-basin movement of water. Paleoclimatic studies indicate that the Delta is generally saltier now than at any time in the past 2,500 years (Malamud-Roam & Ingram, 2004). Analysis of Delta salinity monitoring since the early 1900s shows that since the middle of the 20th century, salinity rises in the Delta earlier in the year than previously, and stays high longer than previously (Contra Costa Water District, February, 2010). These altered conditions, which may intensify in the future with climate change, will make salinity management to satisfy the requirements of various beneficial uses more challenging. Rising sea levels are expected to exacerbate these changes as tidal surges will become more difficult to repulse and salinity intrudes further into the Delta.

Other water quality concerns for the Delta include organic carbon, nutrients, chemical contaminants, heavy metals (e.g., mercury) and algae. As urban areas and agriculture have grown in the Delta watershed, discharges and runoff have increased or mobilized these constituents. For the ecosystem, some of these constituents provide benefit (organic carbon and nutrients in the appropriate quantities) and some have adverse impacts (chemicals and mercury). Many of these constituents are a concern for drinking water supplies from the Delta. Organic carbon creates harmful byproducts in the treatment process, especially when salts are also present; nutrients can increase the growth of algae or shift the composition to more harmful species of algae; and algae itself causes physical problems at water intakes and water treatment plants, noxious tastes and odors in drinking water, and can release substances toxic to both marine life and humans. Concentrations of nutrients, harmful algae, and algal byproducts have been increasing over the last decade. Algae and algal byproducts are likely to further increase with climate change due to increased temperatures.

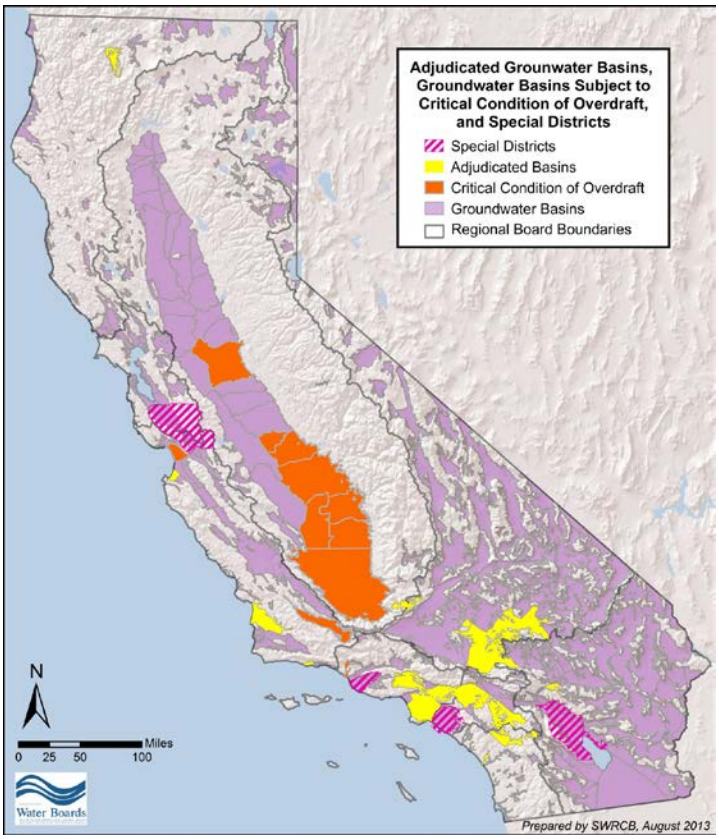
Groundwater Management

Many areas of the state rely on groundwater to meet local needs, particularly in the San Joaquin Valley. In dry years, groundwater provides as much as 40 percent of the state's water needs and 60 percent in some areas (Department of Water Resources, October, 2003). In some areas, past practices have resulted in overuse of groundwater basins, called overdraft (Figures 7 and 8). In recent years, new wells and increased pumping to make up for surface water shortages have placed further demands on groundwater resources. Many groundwater basins are not recovering, even in wet periods. As groundwater levels decline, deeper wells are needed to reach water supplies. In some areas, overdraft causes land to subside (settle), which can damage flood channels, pipelines, and other structures on the surface.

Groundwater contamination from agricultural, industrial, and residential practices in many areas affects public health. Remarkably, thousands of people who rely on groundwater in some of these areas do not have safe drinking water. Many of these areas are disadvantaged communities with limited resources to address critical needs. Without resources and appropriate oversight, these public health issues will persist.

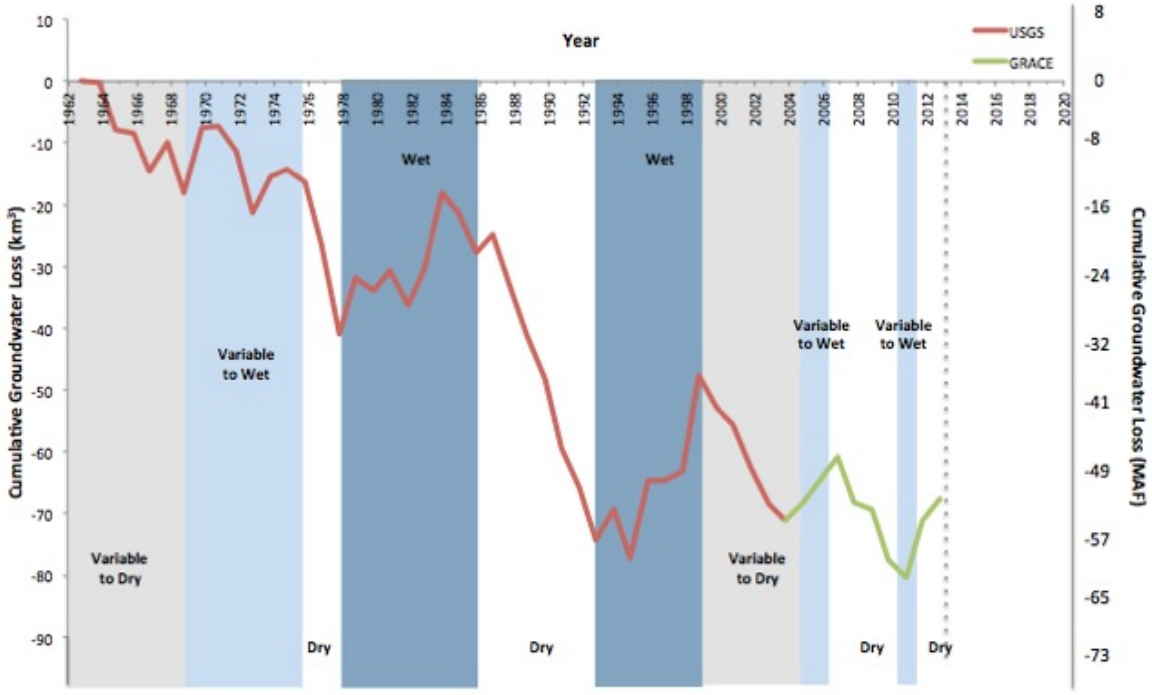
Today, groundwater resources are repeatedly stressed to the point where they are unable to sustainably buffer against drought, and subsidence is a growing problem.

Figure 7 – Groundwater Basin Management and Overdraft



Special districts are authorized to implement groundwater replenishment activities. Adjudicated basins are where the courts have determined the groundwater rights and oversee usage.

Figure 8 – Cumulative Central Valley Groundwater Loss, 1960-2013



(UC Center for Hydrologic Modeling, University of California, Irvine, February, 2014)

Water System Vulnerability

California's water management system is vulnerable and will not meet the needs for people and the environment now or in the future without significant investments to increase flexibility and capacity.

Drought – The current three-year drought is causing significant disruption to communities and agriculture. Given historical and projected precipitation patterns, California should have a more flexible and resilient water management system to support people and the environment.

Climate Change – Precipitation will likely be more variable in the future. It is predicted that wet periods will be wetter (bigger storms) and dry periods may be drier and longer. With warmer temperatures, the Sierra snowpack, the State's most important reservoir, is expected to shrink. The California snowpack already decreased by about 10 percent in the 20th Century from its historical average and is projected to decrease by a total of 25 to 40 percent by 2050, a loss of 3.75 to 6 million acre-feet of "storage." (Department of Water Resources, December, 2013) The water management system must adapt to these changes and compensate for that lost storage capacity.

Delta Water Quality – Gradual or sudden changes in the Delta will likely change Delta water quality. Sea-level rise will increase salinity, population growth and other upstream changes may increase pollutants, and levee failures from earthquakes or floods may draw salinity into the Delta, alter habitats, or limit water conveyance . The water management system must be made resilient to these impacts.

Today, our water management system lacks flexibility and resiliency to prepare for and respond to these threats, which are real today and likely to increase in the future.

Planning and Implementing Solutions

Meeting the Delta challenge and addressing California's water needs is a "wicked problem" of immense complexity.[4] Thousands of diverse individuals and organizations have an interest in how water is managed. Over the past 40 years, visionary water leaders have developed and agreed on integrated, long-term plans to meet the needs of California. However, action and implementation have stalled and failed as interests and institutions battle over priorities, funding, science, law, and policy.

Today, our institutions are paralyzed. A conspicuous lack of political will is the major obstacle to meeting California's current and future water challenges.

The Status Quo is Unsustainable

Commitment to action begins with the recognition that California cannot remain static and immobilized in its approaches to water management.

- Population will continue to grow.
- Fish and wildlife will continue to suffer.
- Water quality will continue to decline.
- Climate change and sea-level rise will compound the stress.
- Floods, drought, or earthquakes will break the system.
- Public health, drinking water, and food supplies will be at risk.
- The economy will take a big hit.
- Crisis response will be costly and inefficient.
- Inaction and underinvestment are not responsible options.

Action and progress must be purposeful, integrated, and forward-thinking. No single solution will address the challenge. Everyone will have to change.

[4] "Wicked Problem: A problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize. The term "wicked" is used to denote resistance to resolution, rather than evil. Moreover, because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems." (http://en.wikipedia.org/wiki/Wicked_problem)

Chapter 3. California Water Fix Coalition Points of Agreement

The following are the agreements that form the basis of the policy and action recommendations embodied in this Policy Paper.

1. California precipitation, averaged over a long-term period, provides sufficient water to meet reasonable needs for drinking water, ecosystem protection, and economic uses. The problem is that precipitation is highly variable year-to-year and current infrastructure is unable to capture available surpluses in wetter periods to help carry the state through drought.
2. The water resources of the state, including surface and groundwater, need to be managed more efficiently and in a more integrated way to achieve multiple benefits. California's aquatic ecosystems are highly stressed and/or collapsing, in part due to flow alteration, loss of physical habitat, introduction of non-native species, and pollution caused by human activity.
3. All parties want to achieve the co-equal goals, while protecting and enhancing the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.
4. The current water system does not and cannot achieve the co-equal goals because it does not offer the flexibility to store water when it is abundant and move it to where it is needed when it is needed in a way that is consistent with the achievement of the co-equal goals. Improved water management and water use efficiency in all regions is necessary to help balance needs of the Delta.
5. Improved Delta conveyance alone will not address the co-equal goals; a comprehensive plan of integrated actions is required to achieve them.
6. Moving water through the Delta is complex and highly controversial. All of us agree that the status quo on conveyance is not sustainable. Some of us think that Improved Through-Delta Conveyance alone can be the solution. Others of us conclude that Dual Conveyance, which includes both Through-Delta Conveyance and a new isolated component, is necessary. To resolve the longstanding conflicts regarding conveyance, measures to improve through-Delta conveyance and investments in new storage to improve flexibility of water operations and water management should be pursued expeditiously while dual conveyance continues through its decision process.
7. Improved water management and a sustained commitment to continuous improvement in water use efficiency in all regions are necessary to increase system flexibility and reduce conflicts resulting from scarcity.
8. Protection and enhancement of headwaters areas is needed to increase retention, contribute to system flexibility, and adapt to climate change.
9. It is vitally important that the proposed system solution consider the economic interests of every affected region and costs are allocated based on the benefits received, including general public benefits, e.g., environmental enhancement and meeting drinking water needs of disadvantaged communities.
10. Any solution to achieve the co-equal goals must be developed consistent with the public trust, state and federal environmental requirements, water rights, and area of origin protections.

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Chapter 4. Direction for the Future

What might a path forward look like based on the agreements in Chapter 3?

The policy framework for action has been established. The *Delta Vision Strategic Plan* described the integrated long-term vision, strategy, and actions to address California's needs and achieve the Two Co-Equal Goals of water supply reliability and ecosystem restoration in the Delta. The 2009 Delta Reform Act and companion legislation established the legislative framework and state policy for achieving the Two Co-Equal Goals, while protecting and enhancing the Delta as an evolving place (see sidebar).[5] The legislation included important components regarding water use efficiency, ecosystem restoration, water conveyance and storage, water quality, Delta levees, and economic sustainability for the Delta.

Since the 2009 water legislation, several important plans have been developed to further define the framework for action and implementation. The Delta Stewardship Council's *Delta Plan* outlines a path to advance the Two Co-Equal Goals while protecting and enhancing the Delta as an evolving place (see sidebar, next page). The *Central Valley Flood Protection Plan* outlines actions to protect people and property from floods and begins local and regional coordination to define specific projects. The *California Water Plan Update 2013* provides a statewide overview of all programs and initiatives to integrate water management to maximize benefits and efficiency. The State Water Quality Control Board is updating the *Bay-Delta Water Quality Control Plan*, which sets overall water quality objectives for the Delta and Central Valley. Recently, the Governor's *California Water Action Plan* provided a broad outline for an integrated approach to address California's water needs.

Both the legislation and the Delta Plan identified specific categories of infrastructure investments to improve California's water management system. However, action and progress on these necessary physical improvements has lacked an integrated approach and been entirely too slow. It is now time to act on these plans.

Two Co-Equal Goals

In 2009, the legislative package of water reforms, including the Delta Reform Act, established the Two Co-Equal Goals for the Delta as State policy:

"Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. (Section 85054)

The policy of the State of California is to achieve the following objectives that the Legislature declares are inherent in the coequal goals for management of the Delta:

(a) Manage the Delta's water and environmental resources and the water resources of the state over the long term.

(b) Protect and enhance the unique cultural, recreational, and agricultural values of the California Delta as an evolving place.

(c) Restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem.

(d) Promote statewide water conservation, water use efficiency, and sustainable water use.

(e) Improve water quality to protect human health and the environment consistent with achieving water quality objectives in the Delta.

(f) Improve the water conveyance system and expand statewide water storage.

(g) Reduce risks to people, property, and state interests in the Delta by effective emergency preparedness, appropriate land uses, and investments in flood protection.

(h) Establish a new governance structure with the authority, responsibility, accountability, scientific support, and adequate and secure funding to achieve these objectives. (Section 85020)

[5] Congress established the Two Co-Equal Goals as Federal policy for the Delta in PL 112-74, Section 205, "The Federal policy for addressing California's water supply and environmental issues related to the Bay-Delta shall be consistent with State law, including the co-equal goals of providing a more reliable water supply for the State of California and protecting, restoring, and enhancing the Delta ecosystem."

This policy paper proposes actions and performance outcomes to address three broad strategies:

- Build a Fully Integrated Water Infrastructure System
- Implement a Coordinated Operational Structure
- Invest in Water Management and Water Use Efficiency

While all three strategies must be advanced concurrently, infrastructure is the long-lead item. Sustained action and implementation are needed over the long term to improve California's water management infrastructure. Drought conditions will drive immediate actions, but near-term, mid-term, and long-term infrastructure improvements must be sustained through variable water years and political administrations to avoid further declines or potential catastrophic failures.

Specific qualitative and quantitative outcomes are the best tool for focusing actions on expected results and adjusting implementation as results and conditions change. The following identifies suggested actions and specific, quantifiable outcomes for critical infrastructure to be implemented over the next 15 years, pending further technical, environmental, and economic feasibility analysis. The outcomes are followed by process and timing outcomes to guide action and decision-making over the 15-year timeframe. These suggestions are intended to focus and advance development of a comprehensive "Water Fix" plan.

The Delta Plan

The 2013 Delta Plan, which includes the policies and recommendations to advance the Two Co-Equal Goals, while protecting and enhancing the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place, outlined six broad areas for action:

- *In order to improve and secure our water supply, while taking pressure off the Delta, we must use water more efficiently in cities and on farms, and develop alternative, usually local, sources.*
- *We must also get much better at capturing and storing the surplus water that nature provides in the wettest years, building reserves that can be drawn on in dry ones.*
- *To revitalize the Delta ecosystem, we must provide adequate seaward flows in Delta channels, on a schedule more closely mirroring historical rhythms: what the Plan calls natural, functional flows.*
- *We must also bring back generous wetlands and riparian zones in the Delta for the benefit of fish and birds.*
- *To preserve the Delta as a place, we must restrict new urban development to those peripheral areas already definitely earmarked for such growth, while supporting farming and recreation in the Delta's core.*
- *And we must floodproof the Delta, as far as feasible, mainly by improving levees and by providing more overflow zones where swollen rivers can spread without doing harm.* (Delta Plan Executive Summary)

1. Build a Fully Integrated Water Infrastructure System

California needs a fully integrated water infrastructure system that provides the flexibility to adjust to the wide fluctuation in the state's precipitation pattern and the timing of diverse needs and demands. Such an integrated system must enable the state to store water when it is abundant and convey it to where it is needed, when it is needed, particularly in "dry" years, to enable achievement of the Two Co-Equal Goals. Because it could take up to 20 years to construct such an integrated infrastructure system, action and implementation must start now. Following are the key infrastructure categories that must advance.

a. Natural Watersheds – Up to two-thirds of the State's developed water supply is derived from watersheds in the headwaters areas of northern California and the Sierra Nevada, mostly above major dams. Many of these areas will continue to lose water storage and retention capacity as climate change shrinks the snowpack. Wildfires also threaten California's water management systems and water quality. Studies are increasingly showing that better forest and watershed management can increase water retention, promote healthy ecosystems, reduce fire risk, and offset some impacts of climate change. One recent study concluded that active forest management could increase water yields by as much as 16 percent and delay spring snowmelt by days or weeks (Bales, et al., November, 2011). Investments in watershed management can increase water supplies for human and environmental purposes from the Sierras to the sea.

Desired Outcome. Improve water retention in headwaters areas for the Delta to increase water supplies for human and environmental uses.

1. Capture and retain at least 250,000 acre-feet of annual long-term yield in headwaters areas through improved management of mountain meadows, forests, watershed, and reservoirs.[6]

b. Surface and Groundwater Water Storage – California's water management system needs more flexibility to achieve the Two Co-Equal Goals. The current system is limited in its ability to capture water when it is abundant and move it to where it is needed in a manner that also protects and enhances ecosystem function and fish populations. This concept of improved infrastructure to provide "more in wet and less in dry" water management flexibility is a core strategy for achieving the Two Co-Equal Goals. The overall goal is to expand and integrate surface and groundwater storage facilities to increase system flexibility, take advantage of underused surface and groundwater storage capacity, and improve operations for both ecosystem function and water supply reliability.

Substantial infrastructure improvements are needed to provide flow for fish at the right time and temperature, reduce the impacts of water conveyance operations, and meet the needs of California for municipal, industrial, and agricultural water uses. Several large water storage projects have been studied since 2000. The California Water Commission, Delta Stewardship Council, and Association of California Water Agencies are surveying local and regional water districts to identify small to medium sized water storage projects that could improve water management. Local water districts across the state are studying and implementing projects to improve groundwater storage. Recent attention on groundwater overdraft and contamination in the San Joaquin Valley is highlighting the need for projects to improve groundwater management and conjunctive use capabilities.

State and Federal funding is critical for the public benefits of water storage, including fisheries and habitat management, water quality, flood management, and recreation. The 2000 CALFED record of decision authorized study of several major storage projects above and below the Delta. These storage projects have been planned and designed to increase water supply reliability and provide public benefits to the water management system. The cost of these storage projects has been estimated at $7.5 to $8 billion. Current policy anticipates that up to 50 percent of the project costs would be allocated to public benefits. Therefore, to make these storage improvements to the system would require $3 to $4 billion in public funds. Water users would pay for water supply benefits of storage projects.

Desired Outcomes. Increase water storage in all regions to increase management flexibility to capture flood flows for all uses and reduce diversions at critical times for the environment.

1. Capture and store additional annual long-term supplies in surface, groundwater, and floodplain storage upstream of the Delta to replace snowpack storage lost as a consequence of climate change and improve water supply for environmental, urban, and agricultural needs.[7]

2. Capture and make available additional dry-year yield in surface and groundwater storage in the San Joaquin Valley, Bay Area, and Southern California to allow for reduced diversions from the Delta and its tributaries in dry years when conflicts with environmental needs are greatest.[8]

c. Conveyance – Delta conveyance has been extensively studied by DWR and other agencies. The focus of these studies has been on ways to improve how water is conveyed through the Delta to reduce conflicts

[6] As an example, the CA Water Plan Update 2013 notes, "Based on the limited available information and a reasonable range of assumptions, meadow restoration in the Sierra Nevada could increase the amount of groundwater retained in meadows by 50,000 to 500,000 acre-feet (af) annually." (Department of Water Resources, September, 2013, pp. 23-6, Vol. 3)

[7] The Department of Water Resources forecasts that California will lose 3.75 to 6 MAF of snowpack by 2050 compared to historical average as a result of climate change (Department of Water Resources, October, 2008, p. 4). Additional storage is needed to replace this storage, particularly in wet years, and to provide water management flexibility to meet environmental, municipal, industrial, and agricultural water needs.

[8] This outcome is designed to identify and develop sufficient groundwater and surface water storage downstream of the Delta to store enough water from wet years to meet water needs from the Delta for one year. Actual operations would be different.

between municipal, industrial, and agricultural water use and ecosystem health. While there is remaining controversy about Delta conveyance and diversions, the signatories to this Policy Paper agree that the Delta conveyance infrastructure must be improved to address current conflicts and future risks and changes. A brief summary of perspectives regarding the through-Delta conveyance and dual conveyance approaches is included at the end of this chapter.

Additionally, local conveyance systems must be constructed to ensure water can be moved in an efficient manner that maximizes beneficial use at an affordable cost.

Desired Outcomes. Improve Delta conveyance to protect important fish species, improve flow for ecosystem needs (match amounts and timing of flow with physical habitat), improve water supply and water supply reliability, and protect water quality, consistent with the Two Co-Equal Goals and regulatory requirements.

d. Levee and Floodplain Improvements – Levees and floodplains in and near the Delta are critical infrastructure for protecting people, land uses, ecosystems, infrastructure, water supply, and water quality. These facilities and areas can be designed and managed to serve both ecosystem and economic functions better and support multiple benefits. Studies by the Department of Water Resources and the Delta Protection Commission identified risks and needs for levee improvements. Irrespective of whether conveyance occurs exclusively through the Delta or through a dual conveyance system, there are critical "strategic" levees in the Delta on which California's water system will continue to depend. Priority must be given to ensure these levees are improved and properly maintained.

Levee maintenance and improvement is ongoing in the Delta and Central Valley to address deficiencies and reduce risks to people, property, and infrastructure. Analyses are underway at the Central Valley Flood Protection Board and Delta Stewardship Council to identify levee projects and State investment priorities for the Central Valley and Delta, respectively. Projects to expand or improve floodplains for joint use for flood management, fish or bird habitat, and farming are being developed through the Central Valley Flood Protection Plan, BDCP, and current water diversion permits. Continuous investment and improvement of levee and floodplain infrastructure is needed to protect and enhance the Delta ecosystem, water supply reliability, and the Delta as an evolving place.

Levee improvement and floodplain projects should be funded consistent with the beneficiary pays principle (see Chapter 5). State and Federal funding is critical for the public benefits of levee and floodplain projects, including fisheries and habitat management, water quality, flood management, and recreation. Recent funding for Delta levee improvements has come primarily from Proposition 1E, but this funding is nearly exhausted. Additional public funds are needed to advance levee improvement projects, particularly those that provide multiple benefits of flood protection, infrastructure security, and environmental restoration, consistent with the investment priorities identified by the Central Valley Flood Protection Board and Delta Stewardship Council, in cooperation with other State agencies.

Desired Outcomes.

Improve Delta levees to reduce risks for people, property, and infrastructure.

1. Complete investigations and decisions to prioritize strategic island and levee investments in the Delta.
2. Complete flood protection levee improvements for small residential communities in the legal Delta, consistent with the identified State investment priorities.
3. Complete seismic resiliency improvements to levees protecting water supply conveyance in the Delta, consistent with the identified State investment priorities.
4. Complete investigations of island, levee, and channel improvements or modifications to provide ecosystem and water quality benefits.

Improve floodplains to provide flood protection, environmental benefits, and water retention.

1. Implement physical, management, and operational improvements in the Yolo Bypass and Sutter Bypass to enhance joint use of the bypass for flood management, agriculture, wildlife, and fish habitat.
2. Complete the San Joaquin River Flood Bypass.

e. Delta Ecosystem Restoration – Numerous projects have been identified to protect, restore, and enhance Delta ecosystems. Some of these projects are required as part of permits for water diversions or as mitigation for other activities in the Delta (e.g., levee improvements). These and other projects are part of the Delta Plan, Suisun Marsh Plan, CALFED Ecosystem Restoration Plan, and other restoration plans to reverse the detrimental impacts of human activities, restore more natural habitats, and promote healthy populations of native species. Improved management of flows (timing, temperature, pulses, etc.) is also an important part of Delta ecosystem restoration. Other infrastructure investments, such as storage and conveyance, will increase system flexibility and environmental flow management capabilities to improve ecosystem flows when implemented within a more coordinated operating and regulatory structure (see below).

Desired Outcomes. **Implement immediate and near-term habitat restoration projects** to improve ecosystem function and begin adaptive learning. The Biological Opinions for CVP and SWP operations require restoration of at least 8,000 acres of intertidal habitat and 17,000 to 20,000 acres of floodplain habitat in the Yolo Bypass and lower Sacramento River (Delta Stewardship Council, 2013). The Suisun Marsh Plan describes restoration of 5,000 to 7,000 acres of tidal marsh and protection and enhancement of 44,000 to 46,000 acres of managed wetlands over a period of 30 years (by 2044) (Bureau of Reclamation, November, 2011). The habitat restoration schedule from the proposed BDCP anticipates approximately 153,000 acres of habitat protection and restoration over a period of 40 years. During the first 15 years, the program proposes approximately 30,000 acres of tidal habitat restoration, 33,000 acres of natural communities protection and restoration, and 5,000 acres of other habitat restoration (these acres do not include floodplain habitat activities in the Yolo Bypass). The BDCP also identifies up to approximately 26,000 acres of planned restoration activities in progress now that could be credited to one or more of the requirements and plans listed above (Department of Water Resources, November, 2013, pp. 6-3 and 6-14). Based on these plans and programs pilot studies must accelerate to confirm ecosystem benefits and project-level environmental reviews must be completed promptly to identify and mitigate potential land and water quality impacts. Regardless of the final decision-making regarding BDCP, substantial action and implementation should be completed within 15 years to begin establishing habitats of sufficient size and interconnectivity to increase species abundance and support food web productivity. This implementation is identified as critical interim targets for habitat restoration to protect and enhance native species in the Delta and Suisun Marsh. The habitat targets shown in Table 3 represent an approximate compilation of existing plans to demonstrate the scale of implementation and adaptive management.

Table 3 – Interim Habitat Restoration Targets	
Habitat Restoration Type (acres unless noted)	**15-Year Target**
Natural Communities Protection and Restoration	30,000-40,000
Tidal Wetland Restoration	15,000-30,000
Seasonally Inundated Floodplain Restoration	10,000-20,000
Other Habitat Restoration	3,000-5,000
Channel Margin Enhancement (miles)	10
Total	**58,000-95,000**
These targets are based on a synthesis of the required and planned restoration described above.	

2. Invest in Water Management and Water Use Efficiency

Infrastructure improvements alone will not do the job; continuous commitment and investment to improve water use efficiency and develop alternate local supplies is also necessary. Many water agencies have demonstrated that investment in all options for water use efficiency and integrated regional water management increases management flexibility to meet water supply needs. All regions must commit to similar efforts and demonstrate improved efficiency and regional water management that increases sustainability, reduces reliance on water from California's natural systems at critical times, and increases system flexibility to meet the needs of both people and the environment. State and regional investments in water use efficiency, water recycling, advanced water technologies, and regional coordination and management help meet regional needs and increase regional self-reliance.

Desired Outcomes. Improve regional water supply portfolios to reduce reliance on the Delta in meeting California's future water supply needs through at least a six-year drought. All regions that depend on water from the Delta watershed should improve surface and groundwater management and storage, water use efficiency, recycled water use, stormwater management, desalination, and other water management tools to increase self-reliance and support system flexibility to achieve the Two Co-Equal Goals.

1. Achieve state water use efficiency targets for each region and set targets for further improvements in urban and agricultural water use efficiency.
2. Achieve local and regional groundwater sustainability to increase dry year water supply reliability and regional self-reliance, through improved groundwater management and monitoring, expanded conjunctive use, demand management, and treatment/remediation where appropriate.
3. Establish regional targets and implement actions to add at least one-million acre-feet of new reclaimed water production statewide by 2020 and two million acre-feet by 2030.[9].
4. Establish regional targets and improve stormwater management to increase stormwater capture and use by 500,000 acre-feet by 2020 and one million acre-feet by 2030.[9]
5. Establish regional targets and increase desalination of brackish water and seawater to improve water supplies and water quality.
6. Provide safe drinking water supplies for communities that currently rely on groundwater that does not meet drinking water standards.

Reduce contaminants that adversely affect water quality for urban, agricultural, and environmental purposes. All Californians should receive drinking water that meets State and Federal drinking water standards. Efforts and expenditures should increase to treat and/or reduce and control contaminants that adversely affect surface waters and important groundwater basins.

[9] http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2013/rs2013_0003_a.pdf.

1. Develop local and regional approaches to ensure that people receive drinking water that meets State and Federal drinking water standards.
2. Control point source discharges in the Central Valley that adversely affect the Delta.
3. Manage urban and agricultural non-point source runoff to reduce contaminants.

3. Implement a Coordinated Operating and Regulatory Structure

The Delta is a complex, multi-species ecosystem of both terrestrial and aquatic habitats, with important interactions among them. New facilities and habitat alone are not sufficient to fix the Delta and meet California's needs. New infrastructure must be operated and managed to achieve multiple goals and benefits. Improved coordination of operations and multi-benefit management and regulatory strategies will increase efficiency and effectiveness in achieving the overall goals for the Delta and California. State and federal water agencies must better align their policies and work together seamlessly to optimize outcomes. California congressional representatives, with the support of the State, should seek to ensure maximum discretion and flexibility in operations of federally-owned water infrastructure to further the achievement of the co-equal goals through increased oversight, direction, and legislation if necessary. Transparency and accountability are critical for managing a complex system and building trust among all interests.

The concept of investing in the creation, restoration, and protection of habitat and fostering improvements to overall ecosystem function to enhance foundational ecological processes and thus strengthen the biological building blocks for multiple species is widely supported by science and policy. However, implementing such a multi-species, ecosystem approach has proved challenging with some populations on the brink of extinction. A consistent, integrated ecosystem approach is needed from regulatory agencies, management agencies, landowners, water users, and others to ensure that functioning aquatic and terrestrial habitats address all of the stressors in the Delta.

Desired Outcomes.

Coordinate surface storage, groundwater storage, and conveyance operations and increase transparency of operations to improve flexibility, efficiency, resilience, and accountability.

Operate new and existing facilities to achieve the Two Co-Equal Goals by better aligning water operations and fisheries releases to more natural flow patterns, physical habitat, and fish life cycle needs.

Consistently pursue multi-species, multi-stressor management strategies and regulatory processes to maximize sustainable ecosystem function.

Integrate and coordinate habitat restoration to create a mosaic of connected corridors and habitats to increase sustainability and resiliency.

Implementation Timing and Sequencing

While planning and project evaluation are underway across California in each of these critical water infrastructure and operational categories, action and accomplishments have been slow. For example, State and Federal planning and design for water storage projects and ecosystem restoration projects have been underway for 15 or more years. Projects are complex, with a wide variety of interested and affected parties, multiple benefits and impacts, and varied or uncertain funding sources. The State and stakeholders have been unwilling or unable to move from planning to implementation.

No single category of infrastructure will meet California's needs. Concurrent investment and action is needed in natural watersheds, surface and groundwater storage, water conveyance, levee and floodplain improvements, habitat restoration, and water management and efficiency. All of these categories of action and investment are needed if California is to manage its highly variable water supplies consistent with The Two Co-equal Goals. Together, they create a system that would be more efficient and effective than the sum of its parts. California needs to be moving ahead on all of these fronts now, not later. All of the participants noted that there has not been sufficient leadership, commitment, and resources dedicated to implementing new storage (surface and underground), levee improvements, improved conveyance, habitat restoration, and other

actions to ensure integrated solutions and operations consistent with the Two Co-Equal Goals. Commitments are needed to ensure that all of these infrastructure improvements are implemented as expeditiously as possible to avoid a future catastrophe or system failure and that the improvements result in benefits for California's economy and ecosystem.

Urgent action is needed to avoid further conflicts and decline in the Delta and risk to California's water management system and economy. The critical infrastructure described above will take several more years to design and longer to implement. However, efforts to implement these critical infrastructure actions have often been stymied by differing views among policy makers and stakeholders regarding the sequence and timing of actions. Some people believe that all efforts in certain areas should be fully complete before other actions are undertaken. Others envision a different sequence of actions. For example, some think that new storage must be in place before or concurrently with improved Delta conveyance to meet Delta objectives. Others state that existing and new storage have limited value without improving Delta conveyance. The sequential approach has led to the current situation, inadequate action and implementation in almost all areas and a water management system that cannot meet the needs of people and the environment. Therefore, the following implementation objective guides action and progress:

Accelerate planning, design, permitting, and construction activities for concurrent implementation of the critical infrastructure improvements in habitat restoration, water storage, conveyance, levees, and floodplains, with the aim of completing a comprehensive system not later than 2030.

1. Coordinate and integrate infrastructure planning and design across habitat restoration, water storage, conveyance, levees, and floodplains to identify efficiencies and improvements.
2. Forge local, regional, State, and Federal consensus, agreements, and commitments to accelerate implementation.
3. Complete construction of the infrastructure necessary to meet the objectives identified above by 2030.
4. Whenever possible, implement near-term actions, such as Delta levee improvements, water operations changes, and groundwater storage, to make progress toward the Two Co-Equal Goals.

Infrastructure Mitigation

All infrastructure projects have adverse impacts. Every effort should be made to avoid, minimize, and mitigate adverse impacts. Therefore, the following mitigation objectives apply for infrastructure investments:

Involve county and local governments early in infrastructure planning and design and mitigation development to avoid or minimize impacts and optimize mitigation.

Whenever possible, **use public lands and acquire lands for new infrastructure from willing sellers**.

Identify impacts and develop appropriate mitigation for landowners, communities, and others affected by infrastructure construction and operations.

1. Provide appropriate compensation to landowners and local governments for economic impacts resulting from infrastructure projects.
2. Facilitate regional economic investment for affected regions.

Infrastructure construction and operations to improve water supply reliability, ecological health, and other beneficial objectives are likely to affect farmland and other economically productive areas. It is reasonable to consider mechanisms to address the resulting loss in economic value.

To address potential economic impacts, it is necessary to consider the direct, indirect, and induced economic effects of such projects on the economy of affected jurisdictions. The following four strategies have been used to address economic impacts for other similar projects and programs.

Property Acquisitions. Provide fair market value compensation for any property interests conveyed to facilitate a project.

Localized Operating Impacts. Compensation for annual (or less frequent) impacts to productivity to the extent the lands remain in agricultural (or other) use. Impacts could occur from land fallowing, changed water quality, or other impacts of operation and implementation.

Generalized Impacts. This strategy contemplates creation of a local agricultural sustainability fund that would be administered by the affected jurisdiction for the purpose of providing loans, grant matching funds, and other support for agriculturally-related enterprises.

Tax Revenue Impacts. Provide payments-in-lieu-of-taxes for local tax and assessment revenues affected by land purchases and reduced agricultural activities.

These strategies provide appropriate economic compensation and mitigation. Compensation for property acquisition has well established procedures for determining compensation and completing payments. Implementing the other three strategies will require direct negotiations to determine appropriate compensation levels, sources of funds, and agreements or contracts.

Positions Regarding Delta Conveyance

Conveyance improvements to achieve the Two Co-Equal Goals remain controversial. Some support a solution that relies solely on shoring up the existing through-Delta system, while others have concluded that dual conveyance, which includes both through-Delta conveyance and adding a new isolated component, is the only way to achieve the Two Co-Equal Goals.

Those who support a through-Delta only solution have legitimate concerns. They are concerned that an isolated component would reduce the State's commitment to strengthening and maintaining strategic in-Delta levees. They are concerned that improved conveyance without a concurrent commitment to added storage cannot solve the problem. They worry about how governance of the system would be structured to respect and protect Delta interests, particularly regarding water quality. They are concerned that the operational limits imposed by regulations will not be honored at all times. And they are concerned that there will be construction and on-going economic impacts to the Delta that would not be adequately mitigated. Some who are willing to concede that dual conveyance might be needed think that all through-Delta options, water efficiency, and storage improvements should be implemented before any commitment is made to dual conveyance.

Others point out that no viable solution has been put forward to achieve the Two Co-Equal Goals that doesn't include dual conveyance. After many years of analysis, the California Department of Water Resources has concluded that making necessary improvements to the through-Delta only system in furtherance of the Two Co-Equal Goals would actually result in significantly more serious adverse ecosystem impacts on the Delta habitat and increased loss of agricultural lands than moving to dual conveyance (Department of Water Resources, November, 2013). The California Department of Fish and Wildlife has maintained since the 1960's that "current diversions in the south Delta are probably the worst thing you can be doing for managing water within the Delta" and a north Delta intake "would allow for flexibility in managing water diversions to significantly reduce fishery impacts"[10]. Proponents think dual conveyance will become increasingly important to allow for the capture of high flows resulting from a climate-changed hydrology. The Public Policy Institute of California has concluded that isolated conveyance "is a necessary component of a long-term solution that serves economic and ecosystems objectives co-equally" (Lund, et al., Comparing Futures for the Sacramento-San Joaquin Delta, 2008, p. xv), and that "the combined effects of continued land subsidence, sea level rise, increasing seismic risk, and worsening winter floods, make continued reliance on the Delta levee system imprudent and unworkable over the long term" (Lund, Hanak, Fleenor, Howitt, Mount, & Moyle, Envisioning Futures for the Sacramento-San Joaquin Delta, 2007, p. xvi). While dual conveyance proponents support new storage, they think that without new conveyance capability in the Delta, existing storage will continue to be significantly underutilized, as would any new storage developed in the future.

[10] *CDFW presentation to Santa Clara Water District, Maven's Minutes, November 25, 2013 (http://mavensnotebook.com/2013/11/25/mavens-minutes-santa-clara-valley-water-district-workstudy-session-dfws-carl-wilcox/).*

These differences in viewpoints about conveyance are best resolved through the ongoing Bay Delta Conservation Plan process. However BDCP resolves the issue, the signatories to this paper all agree with the following:

- The status quo with respect to conveyance is unsustainable.
- All solutions will require improved management of water flows to and through the Delta.
- Investment in strengthening strategic levees in the Delta is critical.
- Conveyance and storage must be part of an integrated system that provides enhanced flexibility to capture and move water to where it is needed when it is needed for environmental, agricultural, and municipal needs.
- Governance must be structured to ensure transparency and accountability to achieve the Two Co-Equal Goals.
- Economic mitigation must be included as part of the cost of all infrastructure components.
- Risk abatement is a necessary driver of the solution.
- New conveyance facilities are not a substitute for pursuing the full gamut of water management tools available to California – including new surface and groundwater storage, continuous improvements in water use efficiency, further conservation efforts, alternative local water supplies, enhanced recycling, and stormwater capture.
- Finally, time is of essence because every day of delay extends the water supply vulnerability of California's trillion dollar economy and increases the cost of implementation.

Chapter 5. Assurances, Accountability, and Action

Building infrastructure is no simple proposition. Major infrastructure such as reservoirs, bridges and tunnels, and even ecosystem restoration projects, can take 20 to 40 years from concept to completion. Along the way, dozens of issues and challenges have to be addressed. The good news is that since the 1970s, numerous studies and evaluations have been completed of water infrastructure and ecosystem restoration to address problems in the Delta and help meet California's water needs. What is needed now is a commitment to implementation and the mechanisms to assure integrated action.

The inherent challenge in implementing solutions for the Delta and California water management is that integrated solutions include many diverse, interrelated projects and programs. Historically, efforts to implement integrated solutions have collapsed as leaders and stakeholder interests disagree about the sequence of actions or pick individual components to advance or oppose. The whole is greater than the sum of the parts, but the dis-integration of the approach is worse for everyone. Therefore, ***how*** the integrated program is implemented is at least as important as ***what*** the program components are.

Trust and accountability are critical for accelerating progress on the critical infrastructure and water management actions described in this policy paper. Each interest must be assured that the full benefits of the integrated approach will be achieved, impacts addressed, and uncertainties considered. Commitments, assurances, and accountability are the mechanisms for advancing the whole.

The following are initial commitments, assurances, and accountability issues for advancing solutions for the Delta and California water management identified by the participants. Significantly more work is needed to continue these discussions to further refine and implement commitments and assurances that reinforce accountability.

Operating an Integrated Water Management System

California's water management system is highly interconnected and managed by hundreds of water managers within a complex set of laws and regulations governing water rights, environmental protection and restoration, flood management, and water quality. Coordination and integration of these operations is one of the major challenges in achieving a "Water Fix." Water operations of new and existing water management facilities for the Delta (and by extension the Delta watershed) must be consistent with the Two Co-Equal Goals, which begins with better definition and outcomes for Delta ecosystem restoration and for water supply reliability for each region that depends on the Delta watershed. For the ecosystem, water management facilities can be operated better to align water operations and fisheries releases to more natural flow patterns, physical habitat, and fish life cycle needs resulting in improved aquatic habitats and more efficient water use for the environment. For water supply reliability, new and existing facilities can be operated to capture more water in wet periods and reduce diversions from natural systems in dry periods, reducing conflicts with environmental needs.

Implementing an integrated water management system to achieve the Two Co-Equal Goals will depend, first and foremost, on capable, robust institutional capacity to act and adapt. Current institutions have not demonstrated they possess sufficient resources or the capacity necessary for managing and implementing the integrated strategies outlined in this paper, and especially so with the urgency the situation demands. Additional work is needed to ensure that State and Federal agencies and other implementing entities have the resources and capacity to focus decisions, take effective actions, and achieve intended results.

Improving operations to achieve the Two Co-Equal Goals will also require operational parameters and information management to track and report on water management actions related to flows, diversions, storage, and transfers. Modeling, pilot testing, and revised requirements will be needed to adapt water management operations to maximize benefits for the Two Co-Equal Goals, flood protection, and other policy objectives.

Managing and Decision-Making for Multiple Species

State and Federal regulatory and water management agencies, water users, landowners, and other interests must identify and implement mechanisms to prioritize, encourage, and facilitate multi-species ecosystem management and decision-making in regulatory processes, project implementation, and water operations. Improved interagency coordination in applying the multi-species approaches allowed under the State and Federal Endangered Species Acts is an important first step. Beyond better agency coordination, however, the present regulatory apparatus must evolve beyond the imposition of species-by-species metrics that simply cannot be reconciled with the prerequisites of flexibility and adaptation implicit in the multi-species ecosystem model. Further steps are needed to refine and reinforce biological goals and objectives that define sustainable, interconnected ecosystems that will promote healthy populations of important native and migratory species. The regulatory agencies must expeditiously approve and permit the projects, plans, and programs formulated to achieve those goals and objectives.

The California Legislature and Congress should consider specific guidance legislation to State and Federal agencies for implementing a multi-species ecosystem management strategy for the Delta. Such legislative direction could clarify the policy intent for the Delta to make all efforts to prioritize and implement a multi-species ecosystem management strategy, consistent with existing laws. Additional management direction may also be needed within regulatory agencies to reinforce and coordinate an ecosystem, multi-stressor approach over single-species protection.

Risk and uncertainty of outcomes is inherent in Delta actions, so adaptive management is a cornerstone of Delta ecosystem management. Ultimately, a multi-species approach is desirable and it must be planned and adopted with a robust adaptive management structure as the best tool to manage the unforeseen and/or to address a lack of measurable progress toward species recovery.

The Delta Plan outlines the policy and implementation framework for the science of adaptive management. However, across the country, adaptive management programs have failed to adapt to new information and analysis because institutions lack the structure and capacity to act on new information. This inability to adapt policy decision-making to new science and understanding is the likely barrier for effective adaptive management for the Delta. Three elements are needed to support adaptive action and decision-making:

- **Maintain independent regulatory authority, flexibility, and institutional capacity** to make decisions (and change them if necessary) at minimal cost to improve results and performance.
- **Define outcomes and performance measures** to provide explicit progress and results framed such that policy makers can understand and act on changes.
- **Ensure public transparency and accountability** of information, analysis, and recommendations such that policy options and decisions are evaluated and vetted.

Furthermore, barriers and constraints to adaptive management decision-making must be reduced. For example, collaborative decision processes and extensive environmental reviews of each adaptive decision will ensure that beneficial adaptation will not happen. Improved mechanisms for transparency and performance reporting are needed to quickly identify when and how adaptation is needed.

Funding Strategies for Implementation

Water infrastructure is critical to California's economic, environmental, and social goals. California water management agencies spend more than $30 billion per year to deliver supplies, prevent water pollution, provide flood protection, and manage aquatic ecosystems. Increasing recognition of environmental needs and a growing population have increased demand. Investment in conservation and water use efficiencies has and will continue to help offset that demand growth, but not enough to avoid the painful consequences and vulnerabilities cited in this paper or to prepare us for a future of deeper and more prolonged droughts. There are no inexpensive fixes. Additional infrastructure will come at a cost to ratepayers. Tough, expensive choices will need to be made by policymakers. Decision-avoidance will only add to the cost by dedicating more resources to crisis-management until durable solutions are implemented.

State priorities and policies are affirmed and only become meaningful through funding decisions that implement policies and match priorities. Initiatives and projects that are funded get done. If the actions proposed under the three broad strategies described in this document are to be implemented, a funding plan must be in place, and it must be a plan that engenders trust with stakeholders and can garner support throughout California. Every element of the Governor's comprehensive California Water Action Plan must be accounted for in the funding plan, and the beneficiary pays principle (see sidebar) should be applied to allocate costs. Mitigation funding and assurances must also be included.

Considerably more work needs to be done to fully flesh out a funding plan. An educated guess is that the total funding required to implement this plan over the next 15 years is in the range of $40 to $45 billion.

- Much of this funding, perhaps 50% to 60%, will come from specific user beneficiaries rather than the general public—primarily for conveyance and storage projects, provided there are reliable assurances that these beneficiaries will receive the expected benefits to be derived from their investments in such infrastructure.
- Approximately 25% can come from the water bond currently under discussion—primarily to cover watershed/ecosystem restoration, drinking water and wastewater projects for disadvantaged communities, strategic levee enhancements, support for integrated regional water management and alternate water supplies, and the public benefits of added storage, including fisheries and habitat management, water quality, flood management, and recreation. The public must receive assurances that these public benefits will be achieved concurrently with benefits for water users.
- The balance can be sourced from a combination of local, State, and Federal sources to fund all elements of the California Water Action Plan, including watershed management, levee maintenance, floodplain management, groundwater management, regional self-reliance, and conservation and water use efficiency projects. The Governor's 2014-15 budget includes $619 million to begin implementing the California Water Action Plan, including $473 million for regional water management. State general obligation bonds have also been an important source for leveraging local and Federal funds. For example, in 2007 and 2008, the State Water Resources Control Board granted $180 million in Proposition 50 funds to support 104 integrated water management projects in 10 regions. Local and regional entities

Beneficiary Pays Principle

"Beneficiary Pays" has been an important principle of Delta water resources planning since at least 1995. The principle is simple in concept, but has proven difficult to implement. In concept, beneficiary pays means that those who benefit from a project or program should pay proportionally for the benefits received. Beneficiaries can be either public or private.

Public Benefits include those goods or services from a project or program that are available to everyone or where a specific beneficiary cannot be identified. Examples of public benefits include ecosystem restoration, programs to address legacy impacts of past practices (when responsible entities are not readily identified), and the availability of recreation facilities (even if a fee is charged for specific use).

User Benefits are those goods and services from a project or program that can be directly or indirectly attributed to a specific organization or class of beneficiaries. For example, water supplies developed for urban or agricultural users would be private benefits because the water is delivered to an entity for its use (even if the entity is a public agency).

The **Polluter or Stressor Pays Principles** are two additional subsets of user beneficiaries who receive benefits from the permitted contamination or stress of a natural resource. For example, wastewater treatment plants are a permitted discharge of pollutants to water bodies and pay for programs to reduce or mitigate the effects of those discharges.

For more information, see white papers on responsible public investments by the California Urban Water Agencies, http://www.cuwa.org/current.html.

contributed an additional $307 million to these projects.[11] In 2014, DWR awarded $153 million of Proposition 84 funds for 138 local projects with a total estimated cost of $800 million (local and Federal funds will pay for the difference). Comparable amounts need to be included in future budgets.

We urge the administration to develop a funding plan this year to guide and enable implementation of the California Water Action Plan, sooner rather than later, including establishing a process to develop the requisite and reasonable assurances required by beneficiaries to participate in funding the various components of the comprehensive plan.

Other Actions and Commitments to Build Trust

One clear conclusion of the discussions leading to development of this Water Fix policy paper is that trust among the various interest involved with the Delta and California water issues is in short supply. While the discussions have been valuable for increasing understanding among participants regarding interests and positions, the subject of commitments and assurances requires government leadership and continued trust-building among stakeholders. Almost all participants expressed interest in continued discussions. Much more work is needed to develop sufficient relationships and commitments to advance a comprehensive water fix and minimize costly and unproductive conflict and litigation. Therefore, we urge the Governor and his Administration, to undertake and facilitate a process to develop mutually acceptable assurance mechanisms related to implementation, mitigation, operations, and other issues. Such a process should be based on an integrated analysis of California's water management considering the actions and recommendations outlined in this policy paper.

Progress and Performance Timeline and Accountability

Progress and performance accountability is critical for advancing programs and projects that have a history of inadequate implementation. The general policy framework is largely in place. Now, the Governor's administration, in partnership with stakeholders, must identify and implement progress and performance objectives for concurrent implementation. These objectives must be immediately followed with concise and mutually acceptable responses to reinforce performance and accountability (actions and consequences).

Leaders and Champions

This paper is a call for leadership from State and Federal elected officials—particularly the Governor and the President—to advance a comprehensive, integrated approach to water management and ecosystem restoration. However, local, regional, and statewide leaders and champions for action and funding for the comprehensive approach are needed from local government, business, labor, academia, environmental interests, and water managers. The signatories to this paper are committed to working with leaders and champions from all interests and perspectives to resolve conflicts, get things done, and achieve the Two Co-Equal Goals.

[11] State Water Resources Control Board, www.waterboards.ca.gov/board_info/agendas/2014/mar/030414_10.pdf.

Chapter 6. Conclusions

Many of us have spent the last several months trying to address the very serious impacts of the current drought and will continue to do so, but we have taken the time to engage in the development of this policy paper because we do not want to repeat past mistakes. We cannot continue to lurch from crisis to crisis and pit regions and interest groups against each other when many actions are available to help prevent that pattern from recurring time and again.

The California Water Action Plan provides the broad outlines of a game plan. It needs to be transformed from an aspirational agenda into an implementation plan of real action. Such a plan must be developed this year. Full-scale implementation can and should begin within the next 12 months, with a goal of completing implementation by 2030.

Consistent with the 2009 Delta Reform Act, the plan must serve both the ecological and human needs of our state. It must give us much more flexibility to manage highly variable wet and dry climate cycles that are characteristic of our state; enable us to address better the challenges of climate change and the needs of a growing population; better manage flows at the right time and temperature for the environment, lessen our vulnerability and increase our resiliency to natural disasters; reverse the unsustainable overdrafting of our aquifers; and avoid, minimize, or mitigate the impacts of implementation. It is presumptuous to think that we have all the answers to devise a perfect plan, but we know enough to begin to implement a very good plan and adapt as we learn more.

Anticipated funding sources must be identified in such a plan. Our state's economy, ecology, and social well-being are so dependent on water that we cannot afford *not* to invest in it. The question is not whether we invest, but whether we do so in response to crises of growing proportion or with a thoughtful plan and clear performance metrics before the next crisis is staring us in the face.

Measures to engender trust and ensure accountability must also be part of such a plan. Each of the many interested stakeholders must be confident that the full benefits of an integrated approach will be achieved, impacts addressed, and uncertainties considered.

This policy paper is a call to action. It provides evidence that diverse stakeholders with a wide range of interests can come together behind common sense solutions. But we are conscious of our limitations in implementing solutions. We will continue to work with each other and intend to expand our reach to many others, but development and implementation of a plan of this complexity requires political leadership and unwavering commitment from the State and Federal governments.

We, the undersigned, urge the Governor, the President, the California Legislature, the California Congressional delegation, and Federal officials to provide leadership, direction, and accountability to ensure a comprehensive "Water Fix" for California. We have provided some recommendations regarding what such a "Fix" might look like, but more important, we think the opportunity exists today to forge consensus and pursue a viable approach to improving statewide, long-term water security and sustainability that has eluded California for more than three decades.

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