21st Century Water Storage:

RECOMMENDATIONS FOR CALIFORNIA'S FUTURE

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Association of California Water Agencies
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Cover Photo: *San Luis Reservoir provides critical south-of-Delta storage for the State Water Project and the federal Central Valley Project.*

Page 1 Photo: *Gov. Jerry Brown signs legislation placing Proposition 1 on the November 2014 ballot. The measure includes $2.7 billion for the public benefits of water storage projects.*

ACWA's mission is to assist its members in promoting the development, management and reasonable beneficial use of good quality water at the lowest practical cost in an environmentally balanced manner.

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21st Century Water Storage: ACWA's Recommendations for California's Future

With passage of Proposition 1 on Nov. 4, 2014, California is poised to make significant investments in water projects and programs to improve the resiliency of the state's water system. The investments will be guided by the California Water Action Plan outlined by Governor Jerry Brown as part of an "all-of-the-above" strategy to meet our 21st century needs for both water supply reliability and enhanced ecosystem health.

The funding assistance provided by Proposition 1 sets the stage for the single-largest investment ever in California for programs such as water recycling, conservation, stormwater capture and groundwater cleanup. It also paves the way for California to make the most significant investment in water storage in a half-century.

The California Water Commission is charged with allocating $2.7 billion from Proposition 1 through a competitive public process to help fund water storage projects. These projects, which will be matched with other local and regional funds, will be critical to improving the operation of the state's water system and achieving the coequal goals of water supply reliability and enhanced ecosystem health. They also will be essential to meeting groundwater sustainability goals and enabling other regional and local water supply strategies.

As the Commission begins its important work, local water managers from around the state have developed several recommendations and a vision for the future of water storage in California. This document outlines those recommendations and a broader vision for water storage as a vital tool that will allow water managers to implement an "all-of-the-above" portfolio of strategies to contribute to the coequal goals of water supply reliability and enhanced ecosystem health.

As this document notes, water agencies in all regions of the state face critical water management challenges, including persistent drought, a growing population, increasingly stringent regulatory requirements and the effects of climate change. These challenges require comprehensive solutions and strategies, such as those outlined in the governor's California Water Action Plan and ACWA's Statewide Water Action Plan. Additional water storage capacity is an essential tool to allow water agencies to more effectively capture and manage water as they seek to implement comprehensive strategies.

Though specific requirements and opportunities vary by region, the need for additional storage capabilities is universal. New storage capacity built with seed money from Proposition 1 will work in tandem with investments in water recycling, stormwater capture, water conservation and desalination to create more robust local and regional water supplies that can better withstand future droughts and the effects of climate change.

ACWA believes the recommendations and vision articulated here will help California take advantage of this opportunity to invest in our water storage capacity as part of a comprehensive plan to build a more resilient water system and meet our 21st century water needs.

The storage funding included in Proposition 1 must be considered an initial down payment on the infrastructure investments that are needed to secure California's water future.

Water Storage in California

California relies on an elaborate network of water storage and delivery systems to supply cities, farms, businesses and the environment with adequate water year-round. The complex mix of natural and man-made features is one of the most ambitious and effective water management systems ever developed, with statewide, regional and local components that reflect the state's diverse geography, climates and economic needs, as well as the varied availability of water.

Precipitation in California varies widely — from place to place, from season to season, and from year to year. Wet years can bring the threat of floods, while dry years can reduce available water supplies and require the temporary drawdown of stored water. This unpredictable hydrology affects not only the amount of surface water available in a given year but also increases reliance on groundwater as a source of supply during dry years.

California's water storage and delivery infrastructure was designed to address this unpredictability, protecting communities from floods and capturing winter precipitation and spring snowmelt for delivery in the drier summer and fall months and to provide carry-over storage for future years. The existing system also has contributed to effective groundwater management by providing surface water to augment local supply sources and alleviate pressure on groundwater basins, preventing subsidence and recharging overdrafted groundwater basins.

Given California's highly variable hydrology, surface storage reservoirs, groundwater basins and the snowpack are critical to meeting the state's water needs. But there is evidence climate change is affecting the timing and pattern of snowmelt and runoff, upsetting the historical hydrology the current water system was designed to address. As the Department of Water Resources noted in the California Water Plan 2013 Update, warmer temperatures are melting the Sierra snowpack earlier in the year and driving the snowline higher, resulting in less snowpack to store water for Californians and the environment.

In addition, droughts are likely to become more frequent and prolonged in this century, while rainfall events will become more intense and flashy, possibly leading to more frequent and/or more extensive flooding.

These factors pose significant challenges for California's existing water system, and make investments in additional storage capacity imperative.

The Evolution of Water Storage Strategies

Strategies for storing water in California have evolved over time to reflect hydrology, population growth, economic activity and — in more recent years — regulatory policies and legal decisions.

Water storage strategies have evolved in response to historical hydrological patterns, the growth of California's population and economy, various state and federal policies and regulations, as well as legal decisions.

The earliest water storage projects (1850s to 1930s) were intended to meet the needs of local water users. Examples include surface storage reservoirs planned, designed and financed by local entities to provide water supply and flood control benefits. These storage projects typically were funded by private parties or local agencies and captured and utilized water resources within a single watershed for locally or regionally-defined purposes and service areas.

In the mid-20th century (1930s to 1970s), the state and federal governments began an era of developing statewide, backbone projects that dramatically expanded both the scale of storage facilities and the numbers of users benefiting from the projects. The Central Valley Project and State Water Project were constructed during this era as multi-watershed projects designed to capture and transport water from areas of relative water surplus to areas of relative water scarcity to serve new and expanded beneficial uses.

More recently (1980s to the present), storage projects have been planned, designed and operated primarily by local and regional water agencies to address water quality and supply reliability concerns as well as regulatory constraints. Recent local and regional projects have aimed to increase regional reliability through more effective management of imported and local supplies, typically in the form of off-stream storage and groundwater projects located closer to users and funded by local beneficiaries.

Though these recent projects have contributed significant benefits at the local and regional level, overall storage

Critical Management Challenges Facing California Water Agencies

California water agencies are facing unprecedented challenges, and existing water storage and management systems are being stressed beyond their limits. These challenges include:

- **Responding to Regulatory Changes and Continued Uncertainty:** Regulatory developments and legal decisions have significantly diminished the ability of water managers to utilize the full capacity of storage projects as originally envisioned and designed. Water agencies in many parts of the state are required to manage their systems to provide various benefits for ecosystems. In some cases, regulatory changes have resulted in significant reductions in water supply availability. Regulatory constraints on water system operations can diminish opportunities for project-specific efficiencies and system-scale integrated management.
- **Ensuring Dry Period Reliability:** California's precipitation patterns have always varied considerably year-to-year; there are few, if any, truly "average" years. The current drought has demonstrated the inability of existing facilities, management practices and regulatory institutions to ensure reliable water supplies even during relatively short periods of dry conditions.
- **Addressing Climate Change:** Climate change and changing precipitation patterns present water supply challenges in all regions of California. The anticipated reduction in Sierra snowpack — the state's "largest reservoir" — will create unprecedented supply reliability challenges for existing systems that rely on snowpack's storage functions. Additionally, increasingly intense peak flow events resulting from a hydrological shift toward less snow and more intense rainstorms will present flood protection challenges, impact the availability of surface storage capacity for supply purposes and decrease infiltration that would otherwise recharge groundwater basins. These changes will make it impossible for existing surface reservoirs and groundwater basins to capture and hold water supplies to meet needs with the same effectiveness as they did under past hydrological patterns.
- **Achieving Groundwater Sustainability:** As local agencies work toward the objective of groundwater sustainability as required by California's Sustainable Groundwater Management Act, limited surface water availability and various institutional and regulatory barriers impede the ability of these agencies to sustain water use at levels needed to support economic health. This challenge is particularly acute for agencies in areas that historically have experienced conditions of overdraft.
- **Maintaining and Upgrading Aging Physical Infrastructure:** The physical infrastructure used to store and manage water is aging, and must be maintained and/or upgraded to meet management and safety requirements.
- **Funding:** State and federal investments in water infrastructure, water management improvements, and ecosystem health are infrequent and unpredictable, and meeting the requirements of Propositions 26 and 218 can present challenges for water agencies' ability to generate the funds necessary to maintain and upgrade their systems.
- **Providing for a Growing Population:** As California's population continues to grow, water agencies remain responsible for providing reliable water supplies to meet the public's needs.

capacity in the state's backbone system — including the CVP and SWP — has not kept up with new and changing demands. California's existing water infrastructure has proven inadequate to meet the state's water needs in recent years, particularly in a multi-year drought, and water supplies available for urban and agricultural use have declined.

Water storage systems provide the foundation for California's diverse and highly productive economy. Today, many storage systems are managed in part to provide important benefits for ecosystems. Just as past investments reflected the needs of the time, the next generation of investment in water storage must be made with new considerations in mind. As this document notes, these investments will be critical to meeting our 21sts century needs, including achieving the coequal goals, meeting the state's groundwater sustainability goals and advancing the "all-of-the-above" portfolio of water management strategies essential to our future.

ACWA's Vision for 21st Century Water Storage

ACWA's vision for the future calls for revitalized water management systems across the state, with additional water storage enabling more effective implementation of an "all-of-the-above" portfolio of strategies to achieve the coequal goals of water supply reliability and enhanced ecosystem health. These systems include additional surface and groundwater storage assets designed and operated as elements of integrated statewide and regional water management systems.

As a consequence of reduced water supply availability and diminished water management flexibility, as well as the anticipated impacts of climate change, additional surface storage is imperative to enable the development of these integrated systems, which are characterized by the coordinated development and management of water resources. The development of comprehensive water solutions will require investment in surface and groundwater storage projects in all areas of the state, contributing a variety of functions that allow for enhanced integrated water management opportunities.

The development of more fully integrated statewide and regional water management systems with adequate storage assets is critical to meet the coequal goals of a reliable water supply and ecosystem health. Carefully planned and managed phased implementation of the various elements of this integrated water management vision, including new and more flexible regulatory approaches, can ensure that the coequal goals are achieved in a balanced manner. Implementation must be consistent with established water rights and contract terms, including area-of-origin protections.

Water agencies must play a central role in the planning, development, implementation and operation of a revitalized California water management system. Additionally, existing forms of regional collaboration and interagency coordination among local water agencies, such as Integrated Regional Water Management, should be expanded.

Additional Surface Storage to Capture And Manage More Variable Hydrology

Surface storage is able to quickly capture large quantities of runoff to preserve water supplies and manage flood risks.

Vision For The Future

By 2040, California's water storage infrastructure will provide the foundation for achieving the coequal goals of water supply reliability and enhanced ecosystem health. Surface and groundwater facilities will work in concert to provide the resilience needed to compensate for increasing climate variability and the expected reduction of the state's historic snowpack, and to improve flood management, support groundwater sustainability, provide for healthy urban and agricultural economies, and meet the needs of a growing population.

To achieve this vision, the following are necessary:

- Additional surface storage to capture and manage more variable hydrology;
- Increased utilization of groundwater storage, including through conjunctive use and banking;
- Enhanced operational flexibility and integration of infrastructure;
- Effective implementation of Integrated Regional Water Management; and
- New and more flexible regulatory approaches.

Accomplishing this will require actions and financial commitments by the federal and state governments and local agencies, as well as public-private partnerships.

Additional surface storage is necessary to adapt to current and anticipated changes in hydrology, particularly more intense rainstorms and diminished snowpack.

Surface storage is also essential to enable the development of more fully integrated statewide and regional water management systems. Surface storage assets contribute to the reliability of the state and federal water projects and local water supplies by allowing water to be captured and stored seasonally to meet both short- and long-term needs. Surface storage also uniquely provides other important benefits such as flood management capacity, holding space for supplies produced from local sources including water recycling and desalination, hydropower production, ecosystem benefits such as temperature management, in-stream flows and water quality for aquatic species, and recreational opportunities.

Surface storage also is a prerequisite to enhanced groundwater recharge and storage opportunities, including conjunctive use. Surface storage provides multi-purpose operational benefits that can help enhance the SWP and the CVP's ability to contribute to groundwater replenishment activities, while on a local and regional basis, surface storage projects can improve in-lieu and direct recharge capabilities to enhance conjunctive use.

Increased Utilization of Groundwater Storage, Including Through Conjunctive Use and Banking

Groundwater storage, particularly projects that can be used in an integrated manner with existing and new surface storage, can enhance local and regional water supplies. In addition to providing these local and regional benefits, groundwater storage can provide broader statewide benefits by providing additional water storage capacity, enabling expanded uses of existing surface and groundwater resources, and enhancing the flexibility of integrated statewide and regional water management systems.

Storing more water in groundwater basins is critical to successful implementation of the Sustainable Groundwater Management Act of 2014, and is an essential component of the broader goal of water supply reliability.

Conjunctive use refers to the coordinated and planned use of both surface water and groundwater resources to maximize the availability and reliability of water supplies to meet various management objectives. Conjunctive use of surface storage and groundwater is an essential component of integrated statewide and regional water management systems. Since surface water and groundwater resources can differ significantly in their availability, quality, cost and other characteristics, managing both resources together, rather than in isolation, allows water managers to utilize both to maximize total benefits.

Conjunctive use has been practiced for decades in California. In general, conjunctive use programs take advantage of available groundwater storage capacity to "bank" or store surface water through natural and/or artificial recharge for later extraction and use, as well as by using surface water "in-lieu" of (in other words, as a substitute for), pumping groundwater, thus enhancing the reliability of groundwater basins as a source of sustainable supply. In many areas, there are existing

Sustainable Groundwater Management Act of 2014

Landmark legislation enacted in 2014 commits California to locally controlled, sustainable management of the state's groundwater basins. The legislation, known as the Sustainable Groundwater Management Act of 2014, lays out a process and a timeline for local authorities to achieve the sustainability goal.

The legislation also directs the California Department of Water Resources to publish a report by the end of 2016 estimating the amount of water available for groundwater recharge in the state. Since water availability depends not only on wet season precipitation but also on the management and storage capabilities of surface water projects such as the CVP, SWP and regional water systems, the report is expected to inform the discussion of how additional storage facilities could help meet the sustainability goals under SGMA.

SUSTAINABLE GROUNDWATER
MANAGEMENT ACT

programs and significant future opportunities to enhance local supplies even further by utilizing storm flows and recycled water with appropriate safeguards to augment groundwater recharge from natural sources. Utilization of storm flows also can provide flood control benefits.

Well-planned conjunctive use programs not only enhance local and regional water supply reliability, but also can provide other benefits such as enhanced flood management, improved environmental water management, reduced reliance on the Delta to meet future water supply needs, and water quality improvements.

Enhanced Operational Flexibility and Integration of Infrastructure

In addition to additional surface storage and increased utilization of groundwater storage, infrastructure improvements that physically integrate and interconnect forms of storage can enhance operational flexibility, increase the reliability and efficiency of integrated statewide and regional water management systems, and allow for optimization of the multiple benefits served by storage. These infrastructure improvements include new projects and improvements to existing facilities.

Conveyance improvements are a vital component of integrated water management systems. Conveyance improvements provide expanded water system capacity during wet periods, allowing additional water to be placed in storage. Required conveyance improvements include a Delta conveyance solution as well as other assets that interconnect, either physically or through operational integration, existing and future supply infrastructure.

Effective Implementation of Integrated Regional Water Management

Integrated Regional Water Management includes a variety of water management strategies that can be used to diversify regional water supplies, improve water quality and reliability, enhance environmental stewardship and increase regional resilience to better cope with droughts, floods and other uncertain future conditions. These strategies include:

- **Demand management:** Conservation is a central element of water management in California. Increasing water use efficiency on a sustained basis, in some cases, enables water agencies to store conserved water.
- **Development of local supply sources:** Recycled water, stormwater and ocean and brackish desalination have the potential to create new water supplies using local resources that are protected from precipitation variability. Expanding local supplies can augment imported water supplies, reduce demand on locally stored supplies, provide additional water for groundwater replenishment and increase the flexibility of integrated water management systems.
- **Improved management of the state's headwaters areas:** California's forests and headwaters areas play a critical role in the state's water supply and management system. Better coordination and management of headwaters activities can result in a number of benefits, including improved water quality and water supply reliability downstream.
- **Water transfers:** Water transfers provide increased flexibility in meeting water supply and environmental needs, especially in dry years. Water transfers can contribute to expanded regional and statewide integrated water management opportunities and improve drought resilience.

New and More Flexible Regulatory Approaches

There are opportunities for state and federal agencies to better coordinate and streamline their activities related to water supply, reservoir operations, environmental regulation, flood protection and other water management functions. New and more flexible regulatory approaches are essential to reflect today's realities and new understandings of operational and ecosystem dynamics, particularly in light of climate change. Regulatory planning and project permitting processes must facilitate, rather than present obstacles, to the development of new storage infrastructure and integrated water management systems. Regulatory strategies that incorporate collaborative processes and recognize the coequal goals of water supply reliability and enhanced ecosystem health have the greatest likelihood of success.

In addition, state and federal investments in storage and integrated water management infrastructure should leverage local contributions and investments from other potential partners to maximize project opportunities. Public investment in planning processes and project studies can accelerate progress through the identification of investment benefits and beneficiaries. Demonstrating and protecting the return on investment in infrastructure is key to ensuring future public and beneficiary support for additional investment. Resource allocation decisions also should consider the ability of investments to integrate into, and serve as elements of, integrated water management systems.

Recommendations For Proposition 1 Implementation

Chapter 8 of Proposition 1

Under Proposition 1, a $7.545 billion bond measure approved by voters in November 2014, the California Water Commission ("CWC," or "Commission") is responsible for the allocation of $2.7 billion for the public benefits of storage projects.

The allocation of Proposition 1's funding for storage ("Chapter 8") will follow a process established by guidelines and regulations adopted by the Commission. **The following are ACWA's recommendations for the California Water Commission as it implements Chapter 8:**

1. **Ensure that Commission Actions Fully Implement Chapter 8:** Under Chapter 8 of Proposition 1, the CWC is charged with administering $2.7 billion for "public benefits associated with water storage projects that improve the operation of the State water system, are cost effective, and provide a net improvement in ecosystem and water quality conditions…" While Chapter 8 identifies five specific public benefits that must be quantified by regulation (ecosystem improvements, water quality improvements, flood control benefits, emergency response, and recreational purposes), the CWC's guidelines, regulations, and ultimate decisions must also reflect the language of Chapter 8 by including consideration how proposed projects improve the operation of the State's water system.

2. **Recognize that Storage Needs and Opportunities are Diverse in Scale, Location and Function:** Water agencies in all regions of the state are currently facing critical water management challenges. Storage needs and opportunities are widespread and diverse, both above and below ground. Many projects may meet the requirements of Chapter 8. Some projects of merit, however, will not be eligible for Chapter 8 funds and may need alternative funding sources. For example, some projects may not be able to demonstrate that they provide measurable improvements to the Delta ecosystem or to the tributaries of the Delta, as required by Chapter 8.

3. **Allocate Chapter 8 Funds Wisely:**

   a. **Leveraging Dollars & Cost Shares:** The CWC's guidelines and regulations should recognize a broad range of storage needs and associated benefits for the Delta in allocating Chapter 8 funds. The CWC should seek to use Chapter 8 funds to leverage the investment of other non-state funding sources in storage. The CWC should not, however, require its funding decisions to consider federal cost shares; while beneficial, a federal cost share is not required under Chapter 8.

   b. **Funding CALFED Projects:** Chapter 8 was intended, in part, to help fund large-scale storage projects that will improve the operation of the state's water

system. Several surface water projects that could provide broad benefits in the areas of water supply, water quality and ecosystem restoration have been studied extensively. These projects, known as the "CALFED projects" because they were identified in the CALFED Record of Decision in 2000, would contribute significant operational flexibility toward achieving the coequal goals, consistent with Chapter 8. ACWA believes Chapter 8 funding criteria should reflect the merits of these projects, and the Commission should provide substantial funding support to move them toward completion.

c. **Funding Other Projects:** Chapter 8 also was intended to allow other non-CALFED projects to compete for and receive Chapter 8 funds. These projects must demonstrate measurable benefits to the Delta ecosystem or to tributaries of the Delta. These projects may include storage in upper watersheds, surface storage projects that can contribute to groundwater sustainability and terminal surface and groundwater storage projects. Allocation of a portion of Chapter 8 funds to these types of projects also can contribute to improving the operation of the state's water system to achieving the coequal goals.

4. **Encourage Integration:** To meet the critical water management challenges facing California, the CWC should allocate Chapter 8's storage funding in a manner which will allow water agencies around the state to more effectively meet the coequal goals of water supply reliability and enhanced ecosystem health. The Commission's implementation of Chapter 8 should consider how storage projects can operate as key elements of an integrated "all-of-the-above" approach that includes statewide and regional infrastructure as well as local water supply strategies.

5. **Preserve the Water Commission's Authority and Discretion over Chapter 8 Funds:** The continuous appropriation of Chapter 8 funds to the Commission highlights the need for an open and transparent process as well as diligence in preserving the direct authority of the Commission over Chapter 8 funds. Accordingly, any expert panel established under the regulations or guidelines should not be delegated the authority to rank, recommend, or otherwise advise or decide on the merits of individual projects. The role of any expert panel should be limited to provide information to the Commission on the administrative aspects of project applications (for example, whether project applications meet established legal requirements), or on narrow technical issues associated with the development of the regulations and guidelines, such as the quantification or evaluation of non-monetizable benefits. Similarly, the Commission's inclusion of priorities and relative environmental values provided by the State Water Resources Control Board and Department of Fish and Wildlife in the regulations should not delegate or otherwise diminish the CWC's authority over Chapter 8 funds. Chapter 8 funding allocation decisions must be made solely by the California Water Commission.

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