CALIFORNIA

WATER PLAN

UPDATE 2013

Investing in Innovation & Infrastructure

Highlights

Secretary's Message

The *California Water Plan Update 2013* (Update 2013) continues the California Department of Water Resources' long-standing commitment to regularly assessing the state's water management challenges and opportunities. As I write this introductory message, the extreme drought gripping every corner of the state continues as a blunt reminder of this plan's importance. California's continued growth, our aging water management infrastructure, and the impacts of climate change all add to our collective challenges.

Water Plan updates traditionally set forth solution-oriented strategies for use by policy-makers, legislators, water district managers, taxpayers, and others concerned with the sustainable management of our water resources. Update 2013 is no exception. Built upon the work of hundreds of stakeholders of varied perspectives, Update 2013 seeks to create a common awareness of the risks we face and defines a roadmap to move us from plans to action. Update 2013 significantly advances the State's strategic roadmap by recommending actions that support three major themes: a call to redouble our efforts in a holistic water management approach, known as integrated water management; a call for governments at all levels to better align their efforts from data-gathering to regulation; and a call for much greater investment in our water resources systems.

Update 2013 is a comprehensive, long-term plan that complements Governor Brown's *California Water Action Plan*, released in January, which identifies key actions for the next five years to build reliability, restoration, and resilience into California's water resources. The actions — some already underway, while others are new proposals — aim to stabilize water supplies, reverse the decline of groundwater basins, improve water quality, restore ecosystems and wildlife populations, guard more effectively against flood damage, and secure water infrastructure against earthquakes and rising sea levels.

Region by region, strategy by strategy, *California Water Plan Update 2013* lays out our challenges and offers a clear path — with an emphasis on innovation, integration, and investment — toward a sustainable water future. This is not a path to be taken by California State government alone. This is an inclusive journey, and I look forward to working with you all along the way.

John Laird
Secretary for Natural Resources, Natural Resources Agency

Director's Message

The release of *California Water Plan Update 2013* (Update 2013) comes as severe drought leaves farms and communities across much of the state struggling to conserve and manage water supplies for basic needs. This drought is making news around the country and the world. Millions of Californians rank water as a top concern.

In crisis, there is opportunity. Even as we work to anticipate, mitigate, and document the effects of the current drought, we also must work with a longer view to build the relationships and policies that will help California survive the next inevitable drought — and flood — and safeguard the water supplies necessary to allow the state to thrive economically and ecologically.

Since 1957, the California Water Plan has served as the strategic plan for developing and managing the state's limited water resources. Update 2013 documents California's water management challenges and charts a strategic approach to moving forward, as with past updates, but it also echoes a call for action.

Update 2013 reflects the clear path Governor Edmund G. Brown Jr. forged with his *California Water Action Plan*. Released in January 2014, the five-year plan outlines a set of actions that together bring reliability, restoration, and resilience to California water resources, even as the state's population is expected to grow from 38 million to 50 million by 2049.

Three related themes distinguish Update 2013 from Update 2009. The past five years have only reinforced the value of integrated water management, and this plan closely examines the practices and policies that allow water managers to combine flood management, environmental stewardship, and surface water and groundwater supply actions to deliver multiple benefits across a region. Fundamental to that integrated approach is better alignment in the management of data, planning, policy-making, and regulation across local, State, tribal, and federal governments. Put simply, we need to do a better job of coordinating to achieve our goals.

Finally, Update 2013 features an in-depth discussion of principles and strategies for creating stable, effective sources of financing for water resources, so that funding is not haphazard or inconsistent, but instead encourages investment in innovation and infrastructure.

Drought is but one of many challenges facing California water resource managers today. Update 2013 seeks to create a common awareness of our many challenges. All Californians have a stake and must come together — from a planning and policy-making standpoint — to achieve balanced and effective solutions.

Mark W. Cowin
Director, Department of Water Resources

California Water Plan ▸▸ A Catalyst for Action

California Water Plan Update 2013 (Update 2013) is a resource and tool to guide investment priorities and legislative action and ensure resilient and sustainable water resources moving forward based on decades of scientific data and analyses, nearly 40 State agency plans, and the voices of hundreds of stakeholders. Update 2013 applies at statewide, regional, and local scales and serves to advise a diverse audience, including elected officials, planners and resource managers, tribal governments and communities, academia, and the general public. Consistent with State law, Update 2013 lays out recommendations rather than mandates.

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The California Water Plan

For almost 60 years, the California Water Plan (Water Plan) has served as the long-term strategic plan for informing and guiding the sound management and development of water resources in the state. With updates every five years, this plan reaffirms the State's commitment to integrated water management. It recognizes and reflects these five things every Californian should know:

Water is the Essence of Life for California.

Every living thing in the state, as well as our economy, depends on reliable, clean water to thrive. There are greater demands for water in our state than ever before.

California's Complex Water System is in Crisis.

Our interconnected system of water resources — natural and human made — is severely threatened on many fronts, with significant risks to our health, safety, economic well-being, and quality of life.

A Diverse Portfolio Approach is Required.

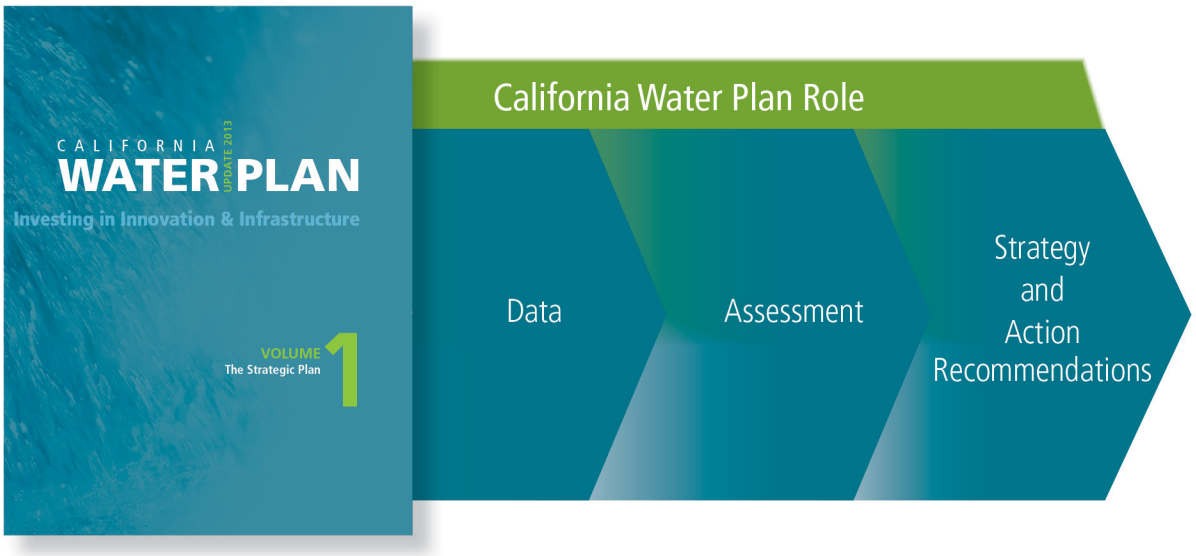
The complexity of our water resources systems and the associated risks demand a diverse set of actions and investment strategies. There is no silver bullet.

Solutions Require Integration, Alignment, and Investment.

Commitment to the integrated water management approach, alignment toward a common vision, and stable financing are essential to ensure future resiliency — the ability to adapt to change.

We All Have a Role to Play in Securing Our Future.

Decision-makers, resource agencies, water resource managers, interest groups, and water users at the State, federal, tribal, and local levels need to actively engage in the solutions.



▶ ▶ Promotes Integrated Water Management

Integrated Water Management Delivers Multiple Benefits

Integrated water management is a comprehensive and collaborative approach for managing water to concurrently achieve social, environmental, and economic objectives. In the Water Plan, these objectives are focused toward improving public safety, fostering environmental stewardship, and supporting economic stability. This integrated approach delivers higher value for investments by considering all interests, providing multiple benefits, and working across jurisdictional boundaries at the appropriate geographic scale. Examples of multiple benefits include improved water quality, better flood management, restored and enhanced ecosystems, and more reliable water supplies.

Update 2013 Helps Implement the Governor's Water Action Plan

Update 2013 is a key resource for implementing the Governor's Water Action Plan in a manner aligned with the State's long-term, strategic vision for water. The Action Plan describes 10 essential actions that represent the Brown Administration's priorities for the next five years (represented under "Investment Priorities" in the figure below). The Action Plan is informed by the more comprehensive suite of recommended strategies and actions in Update 2013.

Indicators are Effective Tools for Evaluating Resource Sustainability

Update 2013 proposes the use of sustainability indicators to evaluate progress and return on State investments. It also promotes analytical tools to (1) better integrate and align with other planning activities, (2) seek consensus on information needed to make good decisions, (3) build a common understanding of the water management system, and (4) improve transparency of Water Plan information. The Water Plan uses the collaborative approach to evaluate several resource management strategies that increase resilience in Central Valley water management (see pages 26-28).

Unfold to read how Update 2013 helps implement the **Water Action Plan**

A Resource for Implementing the Governor's Water Action Plan

This guide links two key State government plans: the Governor's Water Action Plan (Five-Year Plan) and the more long-term Update 20
10 priorities in the Five-Year Plan. The actions related to the 17 objectives in Update 2013 represent the alignment of nearly 40 State ag

Use this table to access more than 300 specific actions in Update 2013. The Update 2013 actions are presented topically by the 17 obje
and RMSs can be accessed in Volume 1, Chapter 8, "Roadmap for Action," and Volume 3, *Resource Management Strategies*, respective

Water Action Plan's 10 Essential Actions	Make conservation a California way of life	Invest in integrated water management and increase regional self-reliance	Achieve the coequal goals for the Delta	Protect and restore important ecosystems	Manage a prepare f dry perio
					How the 10 Essential Actions Are
Update 2013 Objectives (Volume 1, Chapter 8) *See foldout 11A-11B for an explanation of Update 2013 Objectives*	#2 – Use and Reuse Water More Efficiently	#1 – Strengthen Integrated Regional Water Management Planning #10 – Improve Data, Analysis, and Decision-Support Tools #17 – Improve Integrated Water Management Finance Strategy and Investments	#7 – Manage the Delta to Achieve the Coequal Goals for California	#4 – Protect and Restore Surface Water and Groundwater Quality #5 – Practice Environmental Stewardship #9 – Reduce the Carbon Footprint of Water Systems and Water Uses #14 – Public Access to Waterways, Lakes, and Beaches	#2 – Use and R Water More Eff #3 – Expand Conjunctive Management o Multiple Suppli #7 – Manage th Delta to Achiev Coequal Goals California #8 – Prepare Prevention, Res and Recovery P
Resource Management Strategies (Volume 3)	• Ag Water Use Efficiency • Urban Water Use Efficiency • Recycled Municipal Water • Outreach and Engagement • Economic Incentives • Water and Culture	All 30+ RMSs can enhance regional self-reliance, depending on where they are implemented and how the benefits are allocated.	All 30+ RMSs have the potential to help meet Delta coequal goals, depending on where they are implemented and how the benefits are allocated.	• Six RMSs involve water quality • Ag Lands Stewardship • Ecosystem Restoration • Forest Mgmt. • Land Use Planning and Mgmt. • Recharge Area Protection • Sediment Mgmt. • Watershed Mgmt. • Water and Culture	(Partial list) • Ag Water Us Efficiency • Urban Wate Efficiency • Recycled Municipal W • Conjunctive of Surface a Groundwate • CALFED/Loc Regional Su Storage
Cross-Cutting Objectives (Volume 1, Chapter 8)		• #10 – Improve Data, Analysis, and Decision-Support Tools • #11 – Invest in Water Technology and Science • #12 – Strengthen Tribal/State Relations and Natural Resources Management • #13 – Ensure Equitable Distribution of Benefits			

13. Linkages are shown between implementation actions in Update 2013 that advance one or more of the Governor's
gency plans and are well supported by the State's diverse stakeholder groups and opinion leaders.

ctives and related resource management strategies (RMSs) listed in the table. The specific actions behind the objectives
ely.

nd for ods	Expand water storage capacity and improve groundwater management	Provide safe drinking water and secure wastewater systems to all communities	Increase flood protection	Improve operational and regulatory efficiency	Identify sustainable and integrated financing opportunities
e Advanced in Update 2013					
euse ficiently of es ne e the for sponse, lans	#3 – Expand Conjunctive Management of Multiple Supplies (includes groundwater and surface storage)	#4 – Protect and Restore Surface Water and Groundwater Quality #12 – Strengthen Tribal/State relations and Natural Resources Management #13 – Ensure Equitable Distribution of Benefits	#6 – Improve Flood Management Using an Integrated Water Management Approach	#3 – Expand Conjunctive Management of Multiple Supplies #16 – Strengthen Alignment of Government Processes and Tools	#17 – Improve Integrated Water Management Finance Strategy and Investments
se r Use Vater Mgmt. nd er al/ rface	• Conjunctive Mgmt. of Surface and Groundwater • CALFED Surface Storage • Local/Regional Surface Storage • System Reoperation	Nearly all 30+ RMSs can help provide safe water and wastewater to all communities, depending on where they are implemented and how the benefits are allocated.	• Flood Management • Land Use Planning and Management • Sediment Management • Watershed Management • Urban Stormwater Runoff Management • Forest Management	• Conveyance Delta • Conveyance Regional/Local • System Reoperation • Water Transfers	

- #15 – Strengthen Alignment of Land Use Planning and Integrated Water Management
- #16 – Strengthen Alignment of Government Processes and Tools
- #17 – Improve Integrated Water Management Finance Strategy and Investments

PUBLIC SAFETY ENVIRONMENTAL STEWARDSHIP ECONOMIC STABILITY

Water

Benefits of Integration

Public Safety

- Provide safe drinking water.
- Ensure clean, safe water supplies.
- Reduce flood risk statewide.
- Improve water quality for fisheries and recreation.

Environmental Stewardship

- Improve watershed management.
- Restore terrestrial and aquatic habitats.
- Enhance Bay-Delta and degraded ecosystems.
- Raise awareness and increase stewardship.

Economic Stability

- Enhance the state's economic output.
- Contribute to job creation and security.
- Promote food production security.
- Provide stable funding for infrastructure.

Update 2013 lays out a comprehensive suite of actions intended to move California toward more sustainable management of water resources and more resilient water management systems. Ultimately, sustainability and resiliency need to be measured in terms of improved public safety (societal benefits), environmental stewardship (environmental benefits), and economic stability (financial benefits). All Californians depend on water for their well-being — including the myriad ways water supports California's $2 trillion economy and way of life.

The Essence of Life for California

A System in Crisis

Greater Drought Impacts — Unreliable Water Supplies

The well-being of all Californians has depended on the reliable storage and movement of large quantities of water throughout the state. It is now becoming increasingly difficult to move water great distances due to declining ecosystems (and related regulatory requirements), rising energy costs, and aging infrastructure. This is wholly apparent in the Sacramento-San Joaquin Delta (Delta). At the same time, the state's environment and economy are becoming increasingly susceptible to the effects of reduced water-supply reliability.

Competing Water Demands

California's changing and increasingly competing demands for water come from many sectors. All uses generally can be characterized as urban, agricultural, or environmental. The state's population continues to grow, and the trend has been toward faster growth in warmer inland regions. From 1990 to 2010, California's population increased from about 30 million to about 37.3 million. The California Department of Finance projects that this trend indicates a state population of roughly 51 million by 2050.

Increasing Flood Risk

Every Californian is exposed to the significant impacts that result from flooding, including disruption of commerce, response, and the secondary economic impacts that ripple through the state's economy (e.g., redirection of funding from other State government services).

Degraded Water Quality

The quality of groundwater and surface waters varies significantly throughout the state. Degradation has occurred and is continuing to occur in many locations naturally and as a result of human activities, further limiting usable supplies.

Declining Environmental Conditions

California has experienced decades of unacceptable habitat and species declines. The sustainability of habitats and the species they support are highly vulnerable to climate change, water quality degradation, land use decisions, and many other drivers.

Aging Infrastructure

California's water supply and flood protection systems, composed of aging infrastructure, have been further weakened by insufficient maintenance in some areas. State and federal governments have not implemented new large-scale infrastructure in decades.

Photos (top to bottom): low water level at Lake Oroville (October 2013), homes near levee show increasing flood risk, garbage dumped in a creek

Reduced Prosperity for Future Generations

Groundwater Depletion and Land Subsidence

Thirty million Californians rely on groundwater for a portion of their drinking water. Many water users in the Central Valley, particularly in the San Joaquin Valley and Tulare Lake areas, are turning to groundwater as surface supplies become less reliable, particularly surface supplies delivered through the Delta. From 2005 to 2010, 16.5 million acre-feet of groundwater were used on average to meet urban, agricultural, and managed wetland demands (or about 40 percent of their total demands). During this period, up to 13 million acre-feet of groundwater storage were depleted in these areas, more than enough to meet all urban water demands in California for one year. As a result, land subsidence rates of up to 1 foot per year have returned to some San Joaquin Valley localities heavily reliant on groundwater supplies. Between 1926 and 1969, subsidence exceeded 28 feet in one location 10 miles southwest of the city of Mendota, and over the past decade as much as 3.9 feet of subsidence occurred near Corcoran during a 3.5-year period. Additionally, several groundwater basins throughout California are contaminated with human-made or naturally occurring pollutants. The unsustainable use of groundwater in California and its critical importance to the state are described in detail in Volume 1, Chapters 2 and 3.

Delta Vulnerabilities

The Sacramento-San Joaquin Delta (Delta) is an expansive inland river delta and estuary in Northern California. It is also an essential water-supply conveyance hub for more than half of the state's population and much of Central Valley agriculture. However, most of the land in the Delta region is below sea level and is protected by 1,330 miles of levees that were not designed or constructed using modern engineering practices. These high stakes and vulnerable circumstances introduce great uncertainty and risk to Delta ecosystems and the state's water supplies.

Physical Variability and Social Diversity

California is often recognized as a land of extremes for its diversity of cultures, ecosystems, geography, and water resources. At the same time, California's various cultures, organizations, and individuals naturally assign different values and priorities to these related assets, services, and benefits. The water and flood systems face the dual threats of too little water to meet needs during droughts and too much water during floods. The physical and social realities within California do not allow for a one-size-fits-all approach to water management and planning. This can also make it difficult to build cohesive support for a particular direction or action across diverse stakeholders.

Photos (top to bottom): location of the greatest land subsidence in California (1925-1977), about 10 miles southwest of Mendota in the San Joaquin Valley; Chumash ceremonial leader performs a water blessing honoring tribal ancestry

How We Got Here

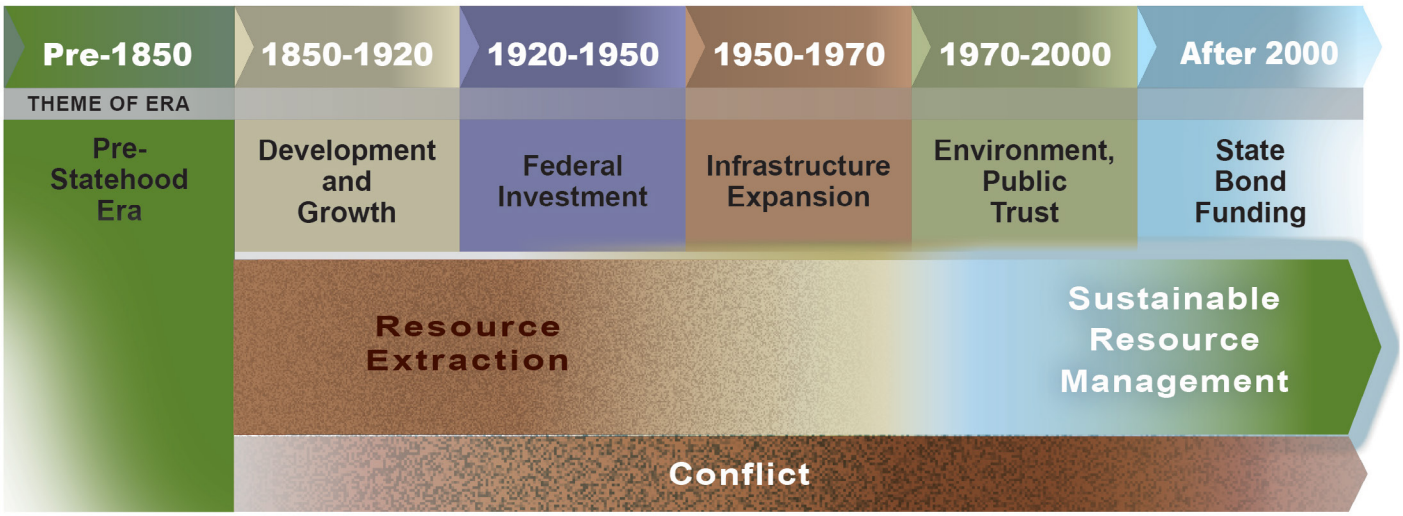
How Our Past Shaped the 21st Century

Pre-Statehood: Tribal Practices Promoted Sustainability

California's natural resources were carefully managed by Native American tribes, promoting sustainability to provide for the people for thousands of years. Tribal watershed management mimicked nature, enhancing the resources in many ways.

19th and 20th Centuries: Infrastructure Investments Promoted Growth and Economic Development

California invested in water and flood management infrastructure to promote growth and economic development in rural, suburban, and urban communities. This involved a period of resource extraction that led to a booming economy with benefits still enjoyed today, while at the same time creating a number of unintended consequences, including environmental degradation. Environmental laws and regulations were enacted in the latter part of the 20th century to help remedy the consequences and restore the environment.



21st Century: Multi-Benefit Programs Promoting Sustainable Results

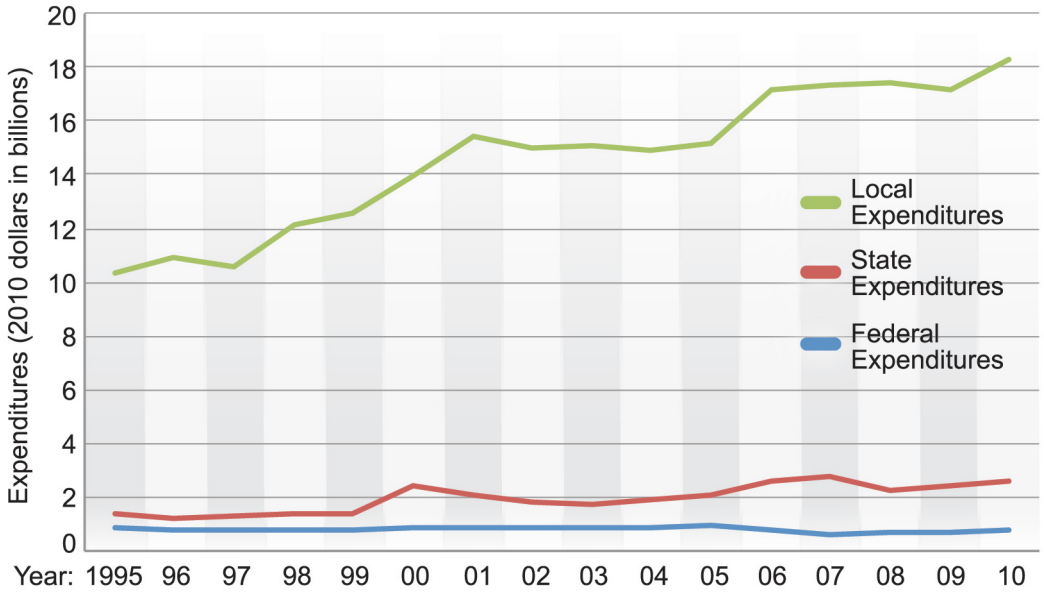
Today, we have a great opportunity before us. California can reduce resource conflicts by planning for more sustainable resource management. To accomplish this vision, State government needs to support interregional projects, provide environmental protection and enhancement, promote multi-benefit programs and projects with more sustainable outcomes, and ensure that disadvantaged communities have safe water and sanitation. (See "Roadmap for Implementing Integrated Water Management," pages 10 and 11.)

See Volume 1, Chapter 3, California Water Today.

Past Choices Shaped Today's Water Challenges

Unstable and Inadequate Funding Prevents the State from Managing Water Sustainability

Due to inadequate and unstable funding, California continues to rely on aging and outdated water supply and flood protection infrastructure and in some cases, outdated tools and technology. Inadequate funding in recent years has reduced the ability of the State government to fulfill its critical roles, namely: (1) providing State cost-sharing incentives at regional and statewide scales, (2) tracking performance to help ensure a good return on Californian's hard-earned and limited money, (3) ensuring safe and reliable water for all Californians, and (4) implementing and managing statewide systems and natural resources.



Despite significant local investments and State bonds, management of California's water resources remains underfunded.

Local entities, such as special districts, water districts, utilities, and cities, account for the largest portion of integrated water management expenditures, and this is expected to continue for the foreseeable future. Annual local expenditures statewide for 2010 totaled about $18 billion. Even with significant integrated water management investment by local agencies, the water management community reports that water projects at all levels of government are commonly underfunded.

Good stewardship of State government funds includes transparency, accountability, discipline to spend reasonably, clarity of purpose, and personal integrity by those entrusted with public funding. Additional, sustained resources are needed just to maintain our current quality of life. California needs to diversify its water financing strategies to meet investment needs. (See pages 16-19 for more durable and comprehensive funding solutions relative to State government's roles in integrated water management.)

See Volume 1, Chapter 7, Finance Planning Framework.

A Call to Action

Roadmap for Implementing Integrated Water Management

VISION & MISSION

Update 2013 provides a vision for more sustainable and reliable water resources and management systems. Mission statement describes collaborative efforts to prepare for California's most pressing statewide and regional water management issues and challenges.

7 GOALS

Seven goals set forth the desired outcomes of Update 2013.

10 GUIDING PRINCIPLES

Ten guiding principles express the core values and philosophies for making decisions about how the vision, mission, and goals will be achieved.

17 OBJECTIVES 300+ RELATED ACTIONS

Seventeen objectives and their 300-plus related actions are geared toward fulfilling the vision, mission, goals, and principles.

30+ RESOURCE MANAGEMENT STRATEGIES

More than 30 resource management strategies are described as tools for diversifying water portfolios and implementing integrated water management.

See Volume 1, Chapter 8, Roadmap For Action.

Unfold to read the details of
Water Plan's Strategic Plan

Three Themes of Update 2013

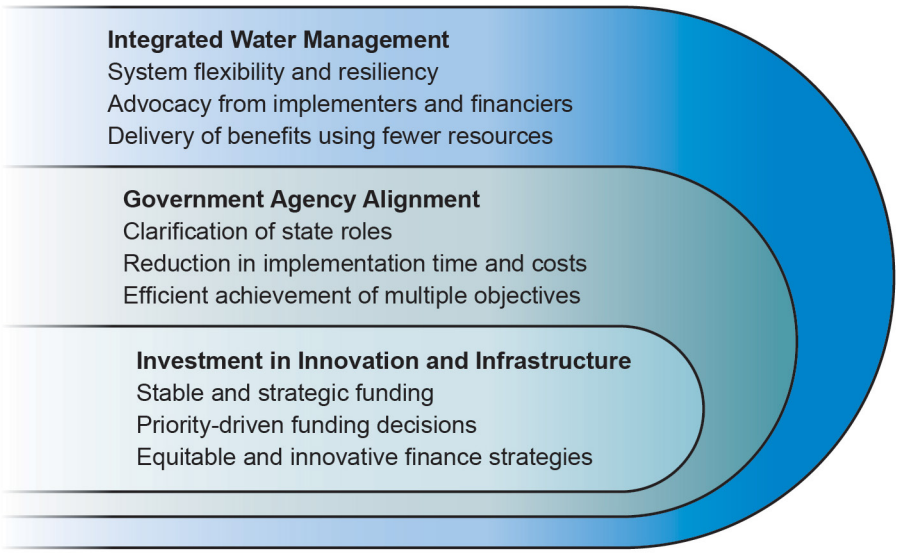
Update 2013 Advances Three Critical Themes

- **Commit to Integrated Water Management.**
- **Strengthen government agency alignment.**
- **Invest in innovation and infrastructure.**

Integrated water management provides a set of principles and practices that include strengthening government agency alignment through an open and transparent planning process. This leads to stakeholder and decision-maker support for investment in various aspects of resource management, such as innovation and infrastructure. Ultimately, integrated water management can expedite implementation through increased advocacy, as well as a greater number and variety of potential implementers and financiers. Integrated water management and integrated regional water management (IRWM) practices have made strides over the past 10 years, and Update 2013 promotes the continuation and expansion and improvement of these practices.

Fostering broader and better implementation of integrated water management will improve or restore expected levels of service within flood and water management systems statewide, while also improving system resiliency (the ability of systems to respond to and recover from significant stressors). Measurable objectives provide for accountability of public investment and transparency on the value that society will attain from investing in integrated water management initiatives.

Update 2013 calls for integration, alignment, and investment to improve public safety, foster environmental stewardship, and support economic stability.



See Volume 1, Chapter 2, Imperative to Invest In Innovation and Infrastructure.

Unfold to read the details of
Water Plan's Strategic Plan

California

Update 2013 sets us on a strategic path through the year 2050, by managing our water resources in a way that provides reliable and clean water supplies for all beneficial uses today and for generations.

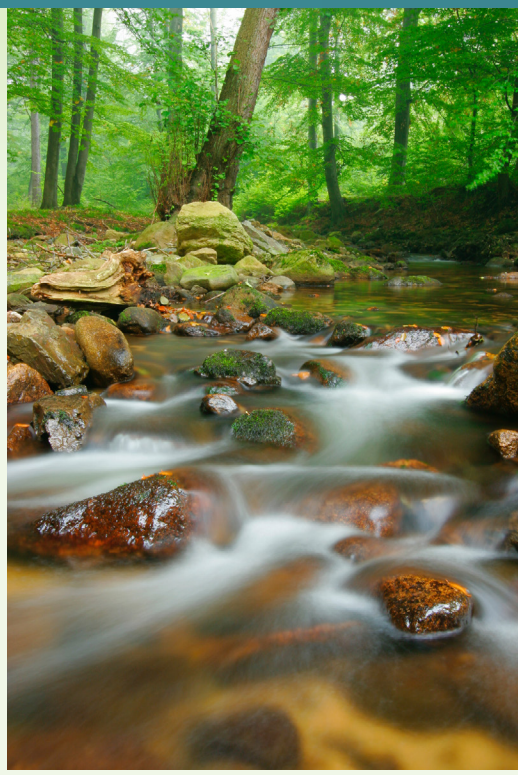
Vision

California has healthy, resilient watersheds and reliable and secure water resources and management systems. Public health, safety, and quality of life in rural, suburban, and urban communities are significantly improved as a result of advancements in integrated water management. The water system provides the certainty needed for quality of life, sustainable economic growth, business vitality, and agricultural productivity. California's unique biological diversity, ecological values, and cultural heritage are protected and have substantially recovered.

Goals

1. California's water supplies are adequate, reliable, secure, affordable, sustainable, and of suitable quality for beneficial uses, such as protecting, preserving, and enhancing watersheds, communities, cultural resources and practices, environmental and agricultural resources, and recreation.
2. State government supports integrated water resources planning and management through leadership, assistance, oversight, and public funding.
3. Regional and interregional partnerships play a pivotal role in California water resources planning, water management for sustainable water use and resources, and increasing regional self-reliance.
4. Water resource and land use planners make informed and collaborative decisions and implement integrated actions to increase water supply reliability, use water more efficiently, protect water quality, improve flood protection, promote environmental stewardship, and ensure environmental justice and public access to water bodies, in light of drivers of change and catastrophic events.
5. California is prepared for climate uncertainty by developing adaptation strategies and investing in a diverse set of actions that reduce the risk and consequences posed by climate change, as well as make the system more resilient to change and increase the sustainability of water and flood management systems and the ecosystems they depend on.
6. Integrated flood management, as a part of integrated water management, increases flood protection, improves preparedness and emergency response, enhances floodplain ecosystems, and promotes sustainable flood management systems.
7. The benefits and consequences of water decisions and access to State government resources are equitable across all communities.

Water 2050



Mission

Updating the California Water Plan provides federal, State, tribal, regional, and local governments and organizations with a continuous planning forum to collaboratively:

- Recommend strategic goals, objectives, and near-term and long-term actions that would conserve, manage, develop, and sustain California's watersheds, water resources, and management systems.
- Prepare response plans for floods, droughts, and catastrophic events that would threaten water resources and management systems, the environment, and property, as well as the health, welfare, and livelihood of the people of California.
- Evaluate current and future watershed and water conditions, challenges, and opportunities.

Guiding Principles

1. Manage California's water resources and management systems with ecosystem health and water supply and quality reliability as equal goals, with full consideration of public trust uses.
2. Use a broad, stakeholder-based, long-view perspective for water management.
3. Promote sustainable resource management on a watershed basis.
4. Increase system flexibility and resiliency.
5. Increase regional self-reliance.
6. Determine values for economic, environmental, and social benefits; costs; and tradeoffs so as to base investment decisions on sustainability indicators.
7. Incorporate future variability, uncertainties, and risk in the decision-making process.
8. Apply California's water rights laws, including the longstanding constitutional principles of reasonable use and public trust, as the foundation for public policy-making, planning, and management decisions on California water resources.
9. Promote environmental justice — the fair treatment of people of all races, cultures, and incomes.
10. Use science, best data, and local and traditional ecological knowledge in a transparent and documented process.

Photos (left to right, top to bottom): drought-tolerant Dahlia, watershed, DWR environmental scientist inspects tules on Sherman Island, young boy drinking clean water

See Volume 1, Chapter 8, Roadmap For Action.

Roadmap

Update 2013 advances **17 objectives** and 300-plus related actions to help California deal with a changing climate and other uncertainties and risks, and provide more adaptive and resilient ecosystems, water, and flood management systems.

1. Strengthen Integrated Regional Water Management

Strengthen IRWM planning and implementation to maintain and enhance regional water management partnerships and improve regional self-reliance.

2. Use and Reuse Water More Efficiently

Use water more efficiently with significantly greater water conservation, recycling, and reuse to help meet future water demands and adapt to climate change.

3. Expand Conjunctive Management of Multiple Supplies

Advance and expand conjunctive management of multiple water supply sources with existing and new surface and groundwater storage to prepare for future droughts, floods, and climate change.

4. Protect and Restore Surface Water and Groundwater Quality

Protect and restore surface water and groundwater quality to safeguard public and environmental health and secure California's water supplies for beneficial uses.

5. Practice Environmental Stewardship

Practice, promote, improve, and expand environmental stewardship to protect biological diversity, restore ecosystems, and sustain natural water and flood management systems in watersheds, on floodplains, and in aquatic habitats.

6. Improve Flood Management Using an Integrated Water Management Approach

Promote and practice flood management that reduces flood risk to people and property and maintains and enhances natural floodplain functions using an integrated water management approach.

7. Manage the Delta to Achieve the Coequal Goals for California

Manage the Delta as both a critically important hub of the California water system and as California's most valuable estuary and wetland ecosystem. Achieve the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

8. Prepare Prevention, Response, and Recovery Plans

Prepare prevention, response, and recovery plans for floods, droughts, and catastrophic events to help residents and communities, particularly disadvantaged communities, make decisions that reduce the consequences and recovery time of these events when they occur.

Numbering of elements in this strategic plan is for ease of reference and does not represent priority. Find details of the Water Plan's objectives and related actions in Volume 1, Chapter 8, Roadmap for Action.

for Action

9. Reduce the Carbon Footprint of Water Systems and Water Uses

Maximize the efficient use of California's surface and groundwater supplies through integrated policies and strategies that reduce the carbon footprint of water while meeting the needs of a growing population, improving public safety, fostering environmental stewardship, and supporting a stable state economy.

10. Improve Data, Analysis, and Decision-Support Tools

Improve and expand data management, analysis, and decision-support tools to advance integrated water management, given demographic, land use, climate, environmental, and institutional uncertainties.

11. Invest in Water Technology and Science

Identify, develop, and prioritize research needs for new technologies; advance development and implementation of existing and emerging tools, technologies and innovations; and encourage partnerships in water-related technology and science to promote more efficient, effective, and sustainable water resources management and a better scientific understanding of California's water-related systems.

12. Strengthen Tribal/State Relations and Natural Resources Management

Strengthen relationships with California Native American Tribes that acknowledge and respect their inherent rights to exercise sovereign authority and ensure that they are incorporated into planning and water resources decision-making processes in a manner that is consistent with their sovereign status.

13. Ensure Equitable Distribution of Benefits

Increase the voice of small and disadvantaged urban and rural communities in State processes and programs to achieve fair and equitable distribution of benefits. Provide access to safe drinking water and wastewater treatment for all California communities, and ensure programs and policies address the most critical public health threats in disadvantaged communities.

14. Protect and Enhance Public Access to the State's Waterways, Lakes, and Beaches

Protect and enhance public access to the state's waterways, lakes, and beaches for cultural, recreational, and economic purposes consistent with maintaining healthy ecosystems.

15. Strengthen Alignment of Land Use Planning and Integrated Water Management

Strengthen the alignment of goals, policies, and programs for improving local land-use planning and integrated water management.

16. Strengthen Alignment of Government Processes and Tools

Improve, align, and transform processes and administrative tools (incentives and oversight) — at all levels of government — used for water planning, public engagement, program/project implementation, and policy- and regulation-setting to advance integrated water management.

17. Improve Integrated Water Management Finance Strategy and Investments

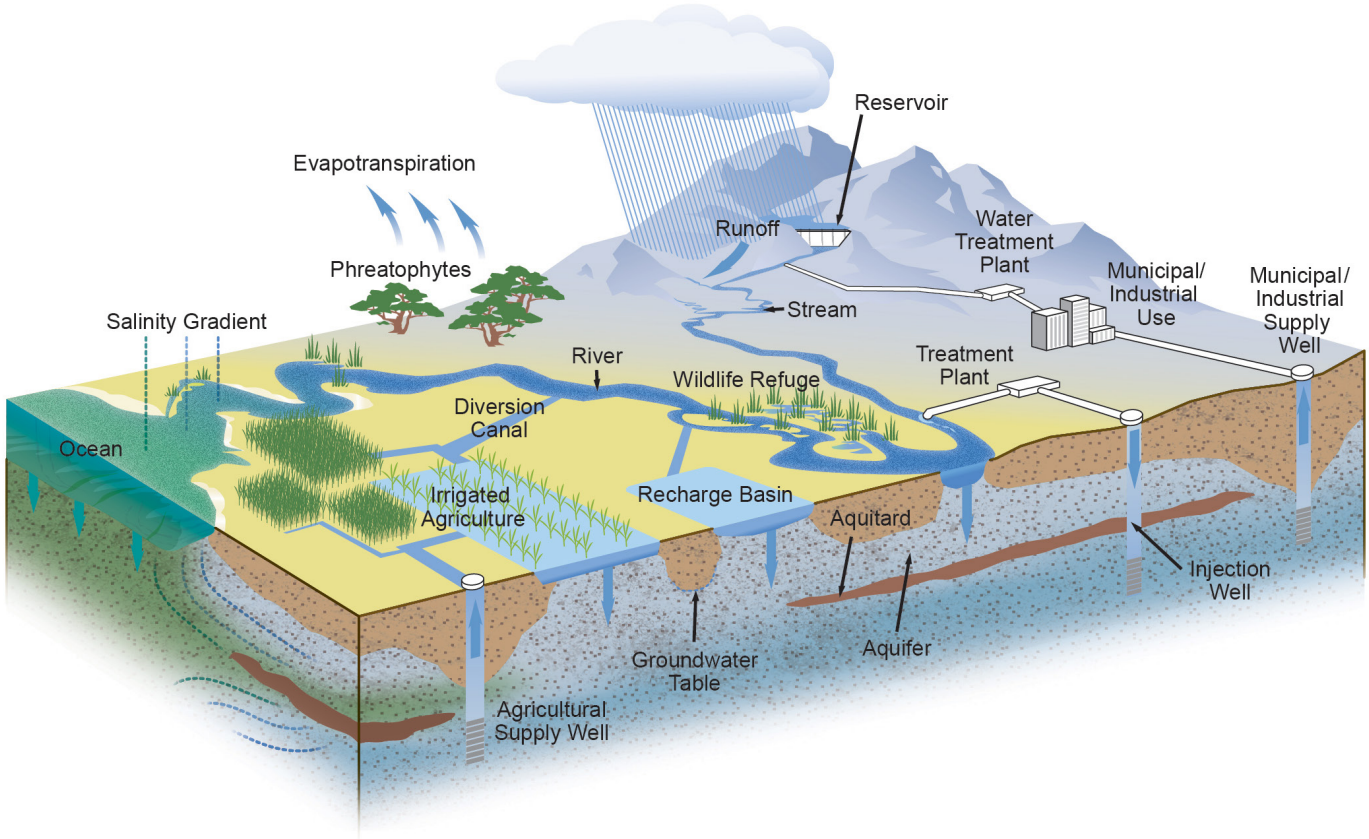
State government uses consistent, reliable, and diverse funding mechanisms with an array of revenue sources to support statewide and regional integrated water management activities. State government also makes future investments in innovation and infrastructure (green and gray) based on an adaptive and regionally appropriate prioritization process.

Theme One

Interconnected Systems Require Integrated Solutions

Update 2013 describes the scope, definitions, and desired outcomes that can guide development of integrated state and regional plans in a meaningful and measureable way. Update 2013 also clarifies State government's future involvement in integrated water management activities, including specific expected outcomes that were identified and defined in close coordination with a wide variety of stakeholders. These outcomes, in combination with the Shared Values for State Government Investments (page 18), can inform state investment priorities.

California's Water Resources Are Complex and Interconnected



See Volume 1, Chapter 2, Imperative to Invest In Innovation and Infrastructure.

▶ ▶ Commit to Integrated Water Management

Integration Delivers High Return on Investments

With Update 2013, the State is renewing its commitment to integrated water management. After promoting and applying the practice at the regional level over the last decade, stakeholders can now point to results that show value for continued public investment via the following actions:

- Maximize limited resources to provide for increased public well-being.
- Broaden support for projects to accelerate implementation.
- Improve or restore expected levels of service within flood and water management systems statewide.
- Improve system resiliency to respond to and recover from significant stressors.
- Use measurable indicators of return on investments.

Proven Results of Integrated Water Management

Improved system flexibility and resiliency to respond to and recover from significant stressors

The Folsom Dam Auxiliary Spillway Project is a $900-million cooperative involving the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Sacramento Area Flood Control Agency, and Central Valley Flood Protection Board, which will help the Sacramento region achieve a 200-year level of protection. By combining their efforts into a single project, the agencies will complete the project more quickly and at a lower cost.

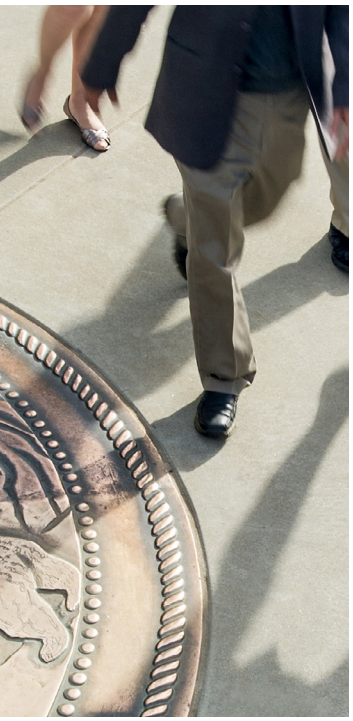
Broader support and increased advocacy for multi-beneficiary projects from potential implementers and financiers

Santa Rosa Urban Reuse Pilot Project leverages State funding to construct pipelines, pump stations, and filtration. Project benefits include improved water supply reliability, enhanced salmonid habitat as a result of reduced diversions from the Russian River, and water quality improvements resulting from reduced recycled water discharges to the Laguna de Santa Rosa and the Russian River.

Delivery of multiple benefits at a faster pace while using fewer resources than are typically required to implement single-benefit projects

The Santa Margarita Conjunctive Use Project provides for enhanced recharge of the groundwater basin beneath the Marine Corps Base Camp Pendleton in northern San Diego County. It also includes a seawater intrusion barrier that uses recycled water, a distribution system, and advanced water treatment facilities. This project will provide a new water supply of about 6,800 acre-feet per year for Camp Pendleton and Fallbrook Public Utilities District, and will resolve a long-standing water rights dispute between Fallbrook and the federal government.

Theme Two



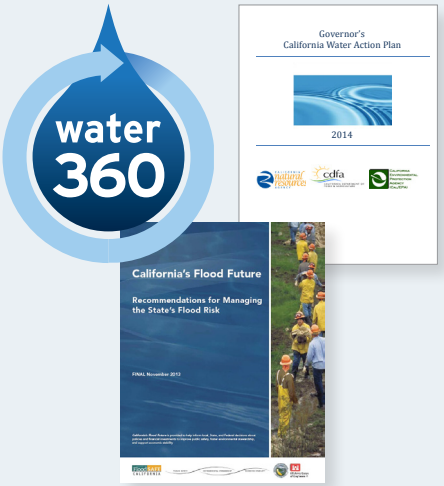
Agency Alignment Is Critical

Better aligned government agencies would expedite and reduce the cost of implementation of actions and help ensure efficient achievement of objectives. Multiple agencies must align their work to achieve maximum benefits, and the first step is to better understand the complexities. The second step is to establish principles and goals that will help focus and guide integrated efforts.

Principles for Improving Alignment

1. Increased coordination with all levels of government and agencies (federal, tribal, State, and local), stakeholder groups, private landowners, and others.
2. Increased effectiveness through leveraging of existing networks, relationships, and multi-agency venues.
3. Improved sharing of data, information, tools, and science among government agencies and academia.
4. Better alignment of planning, policies, and regulations across governments and agencies, as well as coordinated and streamlined permitting to increase regulatory certainty.

Progress in Strengthening Agency Alignment



CA Biodiversity Council

In February 2013, the California Biodiversity Council (CBC) adopted a resolution for *Strengthening Agency Alignment for Natural Resource Conservation*. The CBC was formed in 1991 to improve coordination and cooperation among the various federal, State, and local resource management organizations.

Water 360 Summit

In April 2013, DWR hosted an event in partnership with the Water Education Foundation, the California Water Commission, and 200+ other attendees and guest speakers. The summit brought together water leaders from many agencies and organizations to share experiences and ideas on how we can effectively align to provide sustainable water resources and services in the state.

▶ ▶ Strengthen Government Agency Alignment

Actions for Aligning Government Agencies

- Tribal, federal, State, and local government agencies should strengthen alignment among their data, plans, programs, policies, and regulations.
- State government should more effectively coordinate the work of multi-agency collaboratives, and utilize them to align and implement State water policies and promote integrated water management.
- State government agencies should hire, assign, or train staff with collaboration and conflict-resolution knowledge, skills, and abilities, whose primary job is to work with other federal, State, tribal, regional, and local agencies and organizations.
- Federal and State government agencies should use a more inclusive, collaborative, and outcome-based approach for setting consistent and aligned water policies and regulations that are regionally appropriate.
- The State should convene regulatory working groups, in collaboration with federal, tribal, and local governments, to improve and streamline regulatory review and permitting processes for implementing integrated water management projects more expeditiously.
- The California Department of Water Resources (DWR) should form an integrated water management technical committee to improve communication, cooperation, and collaboration among and between technical experts and government agency decision-makers, related to data collection, management, and exchange and analytical tool development and applications.

California's Flood Future

In November 2013, *Recommendations for Managing the State's Flood Risk* was developed in partnership with the U.S. Army Corps of Engineers and local flood agencies. This report provides a comprehensive look at flooding throughout the State and makes recommendations for future actions to reduce flood risk.

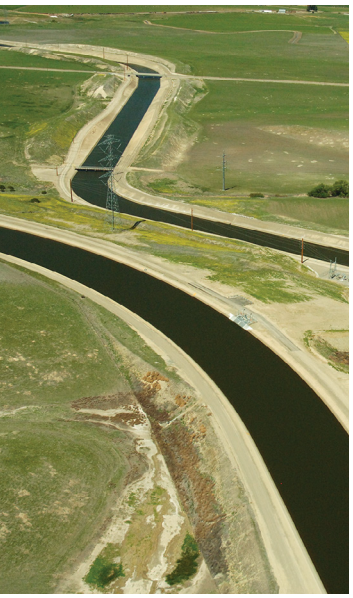
Interagency Drought Task Force

In December 2013, the governor formed a multi-agency Drought Task Force to review expected water allocations, examine and coordinate water conservation priorities, coordinate water transfers, and develop groundwater monitoring programs, where necessary.

Governor's Water Action Plan

In January 2014, a coordinated plan by California Natural Resources Agency, California Environmental Protection Agency, and California Department of Food and Agriculture identified 10 priority actions for the next one to five years that address urgent needs and provide the foundation for the sustainable management of California's water resources to achieve reliability, restoration, and resilience.

Theme Three ▶▶



California Aqueduct and Delta Mendota Canal intertie

Over the next decade, California needs **$200 billion** to maintain current levels of service and system conditions. California needs up to **$500 billion** in future investment over the next few decades to reduce flood risk, provide reliable and clean water supplies, and restore and enhance ecosystems.

Resiliency Requires Sustained Investment

Given the dire future circumstances described in "A System in Crisis" and other sections of this booklet, increasing levels of strategic investment in innovation and infrastructure are required just to maintain our current level of public safety, ecosystem conditions, and quality of life.

Innovation includes development of new analytical tools and other planning process improvements.

- Governance of State integrated water management improvements.
- Planning and public engagement improvements.
- Strengthening government agency alignment.
- Information technology (data and analytical tools) improvements.
- Water technology and science advancement.
- Implementation incentives.

Infrastructure includes structures and facilities that support human activities (gray) and natural infrastructure such as wetlands, riparian habitat, and floodplains (green).

Current Funding Methods Are Not Sustainable

Integration of resource management and planning has begun, but funding remains fragmented, unstable, and inefficient, which limits opportunities for further integration, per these examples:

- Annual local expenditures statewide have been about $18 billion (of which operations and maintenance [O&M] and regulatory compliance costs consume a large portion of local agency budgets).
- Annual State and federal expenditures are approximately $2 billion (of which very little is capital investment).
- Poor alignment among public agencies affects the ability to deliver cost-effective, multi-benefit projects.
- Taxpayer willingness and ability to support additional General Obligation (GO) bond financing.

▶ ▶ Invest in Innovation and Infrastructure

State Government Investments Add Value

State government is well suited to:

- Assist regions with what they cannot accomplish on their own.
- Help manage interregional, interstate, or international issues.
- Provide broad public benefits, including support for disadvantaged communities.
- Facilitate process improvement and government agency alignment.
- Provide regulatory oversight and alignment.
- Conduct statewide strategic planning.
- Provide data, information, decision support, modeling tools, and expertise.
- Conduct and coordinate public outreach and policy guidance.
- Facilitate systemwide water management.
- Advance promising water technologies.

The Water Action Plan Sets Investment Priorities

The Governor's Water Action Plan prioritizes State investments in innovation and gray and green infrastructure (described on page 16) for the next five years. It recognizes the need to identify sustainable and integrated financing opportunities as a critical first step for implementation, and calls on State agencies to remove barriers to local and regional funding for water projects, develop a water financing strategy, and analyze user and polluter fees. The Water Action Plan's 10 essential actions, reflecting the Brown Administration's near- and long-term priorities, are listed below in four funding categories as a framework for evaluating investments and allocating State funds and resources (see page 19 for recommended financing strategies).

Funding Categories	Water Action Plan Essential Action	
Water Supply Reliability	Make conservation a way of life.	Identify sustainable and integrated financing opportunities.
	Increase regional self-reliance and integrated water management across all levels of government.	
	Manage and prepare for dry periods.	
	Expand water storage capacity and improve groundwater management.	
Water Quality and Ecosystem Restoration	Protect and restore important ecosystems.	
	Provide safe water for all communities.	
Flood Management	Increase flood protection.	
Delta Management and Operation	Achieve the coequal goals for the Delta.	
	Increase operational and regulatory efficiency.	

Integrated Water Management in Action

Ground meadow restoration at Antelope Lake

Update 2013 Provides a Cornerstone for Finance Planning

Update 2013's Finance Planning Framework enables stakeholders to identify critical funding needs and issues, develop durable finance strategies, and identify reliable revenue sources. The Framework was developed with extensive stakeholder collaboration to guide future finance policies and strategies by providing:

- A logical structure for developing a comprehensive, well-supported finance plan.
- Steps for discussing multiple requirements, perspectives, and previously non-integrated financing information.
- A framework for stakeholders, collectively and in context, to consider the issues to be addressed and the decisions to be made.

Shared Values for Guiding State Government Investment

The Framework includes a dozen shared values to guide State investment decisions related to prioritization of State government investments, fiduciary responsibility, and beneficiary and stressor responsibility.

Prioritization of State Government Investments — Investment decisions will include equal regard for economic, environmental, and social criteria.

Fiduciary Responsibility — State government will be fiscally responsible with State funding.

Beneficiary and Stressor Responsibilities — Those receiving benefits or creating impacts pay for them.

Attributes of Future Finance Strategies

Future deliberations to develop a coordinated funding approach need to include these attributes:

- Improve cost effectiveness, efficiencies, and accountability.
- Avoid stranded costs and funding discontinuity.
- Leverage funding across State government agencies.
- Increase certainty of desired outcomes.

See Volume 1, Chapter 7, Finance Planning Framework.

Recommended Financing Strategies

Actions for Developing State Government Finance Strategies

- State government should continue to provide incentives for IRWM activities that achieve State goals or provide broad public benefits.
- State government should improve and facilitate access to federal and State public revenue sources.
- The governor and the Legislature should broaden the ability of (and create guidelines and limitations for) public agencies and tribes to partner with private agencies, entities, and organizations for integrated water management investments.
- State government should develop a more reliable, predictable, and diverse mix of finance mechanisms and revenue sources to continue to invest in integrated water management innovation activities and infrastructure (green and gray) that have broad public benefits, including General Funds and GO bonds.
- State government should reduce planning and implementation time frames and costs associated with integrated water management activities by clarifying, aligning, and reducing redundancies among State government agencies' policies, incentive programs, and regulations.
- The California Water Plan Update 2018 process will refine and advance the eight components of the Finance Planning Framework, as described in the "Next Steps" section of Volume 1, Chapter 7, "Finance Planning Framework."

Menu of Funding and Finance Alternatives

The Finance Planning Framework describes alternatives for developing a diverse and stable portfolio of revenues. Each potential revenue source is analyzed in Update 2013 with regard to the following considerations:

- Appropriate uses.
- Implementation feasibility.
- Key trade-offs.
- Current applications in California.

Potential Integrated Water Management Revenue Sources

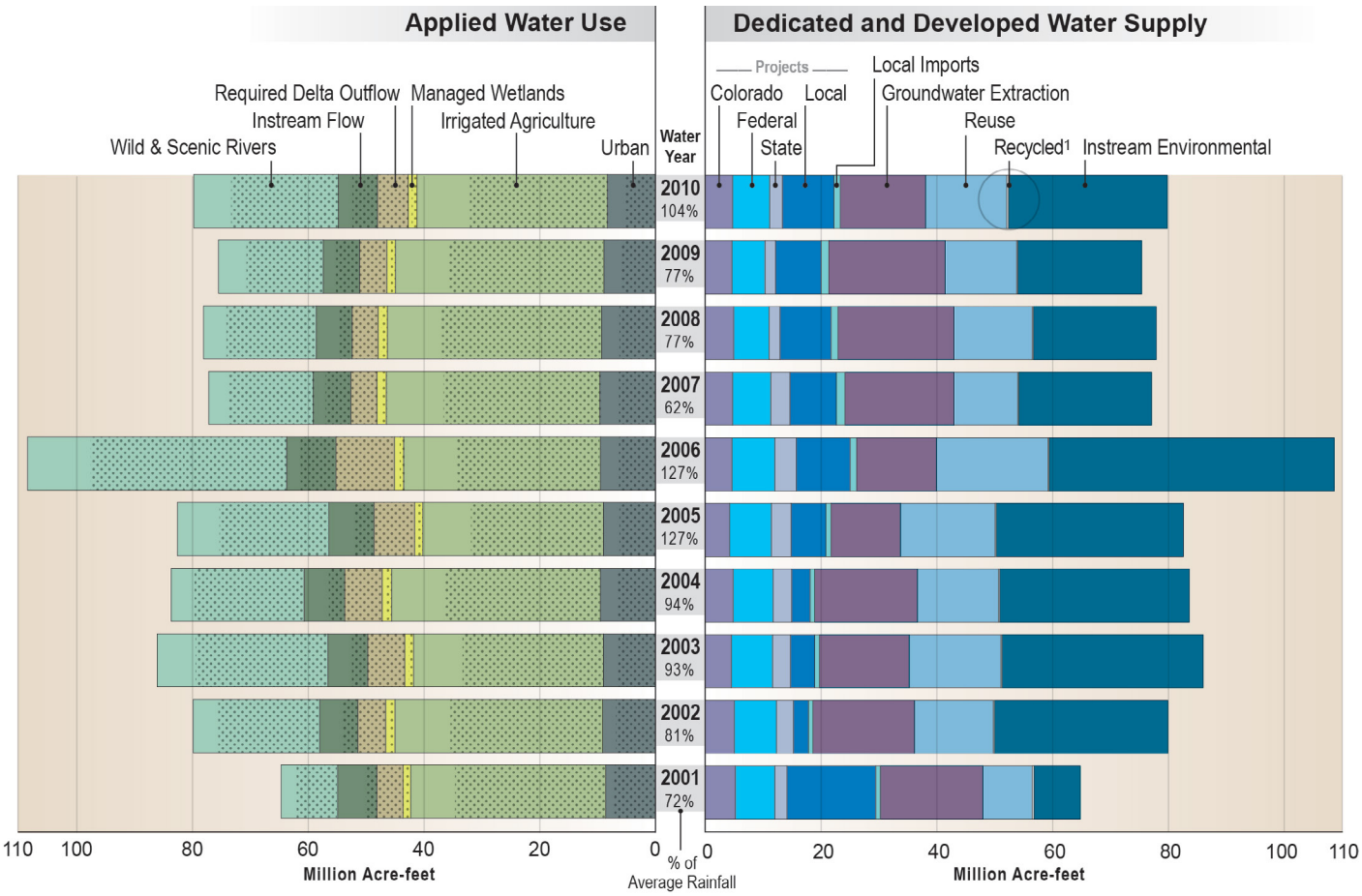
- State General Fund.
- General Obligation bonds.
- Revenue bonds.
- Assessment districts.
- User fees.
- Utility user tax.
- Impact fees.
- Mello-Roos special taxes.
- Private investors.
- Private-Philanthropic.
- Statewide water use fee* (conceptual).
- Public goods charge* (conceptual).

*Feasiblility, equity, and viability not established for these potential revenue sources

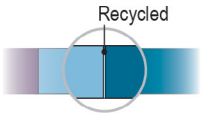
California Water Today

Statewide Water Uses and Supplies Are Highly Variable

California's water supplies vary from place to place, season to season, and year to year. The state's water users (environmental, agricultural, and urban sectors) have variable needs for the quantity, quality, timing, and place of use. Update 2013 developed water balances to show water uses and sources of water for the individual water years from 2001 through 2010 (shown in the figure below). This 10-year period included some moderately dry years, from 2007 to 2009, and wet years in 2005 and 2006, and demonstrates the state's variability with regard to water use and water supply. Some key insights from this information are that urban water uses are more adaptable to supply limitation, and groundwater use increases in drier years when surface supplies decline.



Stippling in bars **indicates depleted (irrecoverable) water use** *(water consumed through evapotranspiration, flowing to salt sinks like saline aquifers, or otherwise not available as a source of supply).*



[1] **Detail of bar graph:** *For water years 2001-2010, recycled municipal water varied from 0.2 to 0.7 MAF of the water supply.*

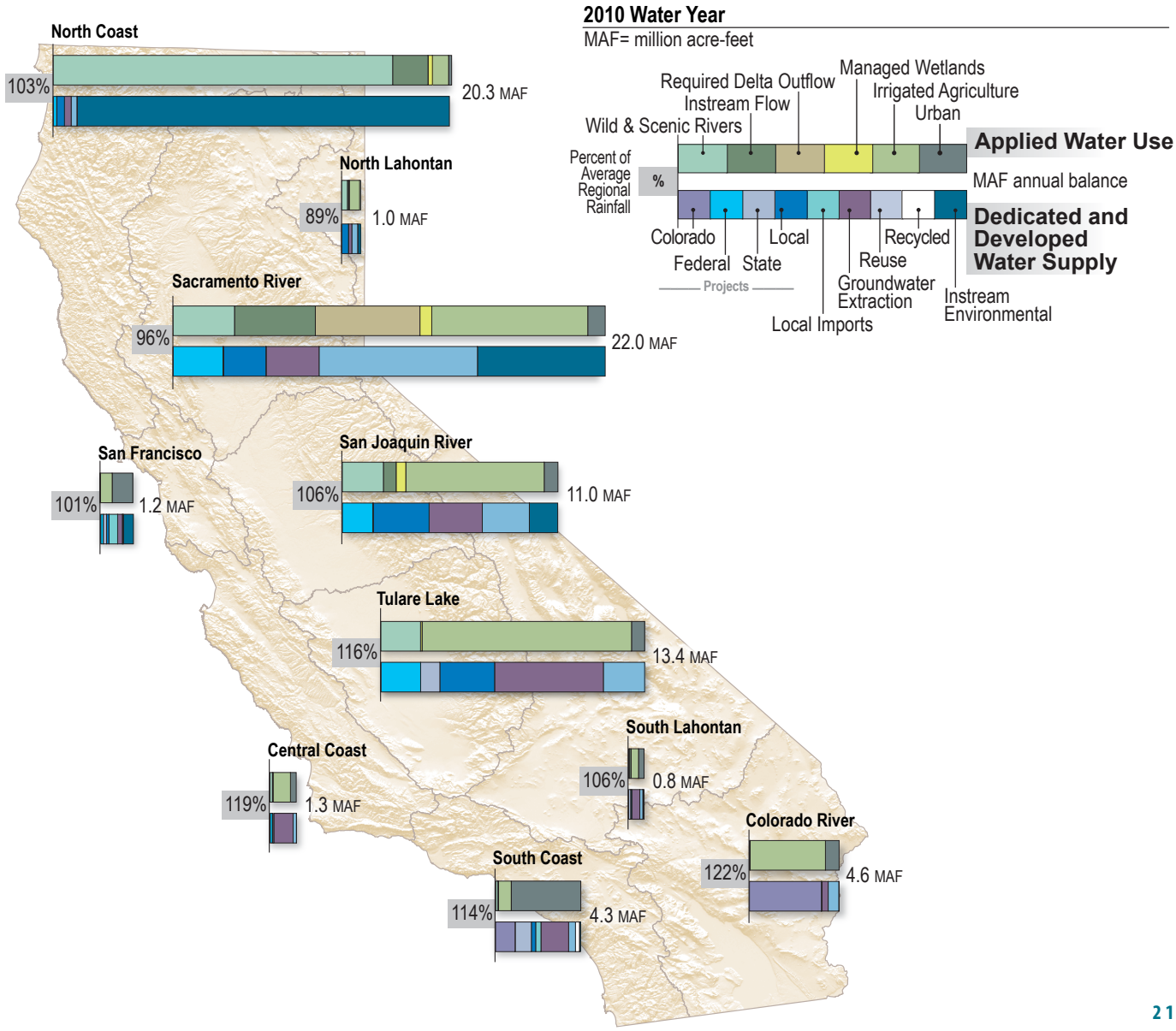
See Volume 1, Chapter 3, California Water Today.

Understanding How We Use and Supply Water

Regional Diversity Requires Regional Solutions

California has a variety of climates and landforms. The amount and variability of precipitation can change dramatically across California, such that statewide average information does not truly depict regional conditions. Each region has unique challenges in meeting agricultural, urban, and environmental water uses from year to year with available supplies.

In Update 2013, regional water portfolios provide annual water use and water supply balances for the 10 hydrologic regions and the Mountain Counties area for water years 2001 through 2010. The figure below depicts balances for the hydrological regions for water year 2010, considered an average year statewide. The figure shows the wide variety in regional water uses and supplies. Some regions are heavily reliant on a single source of supply to meet water uses, while others have a mix of supplies that can help them through dry periods.

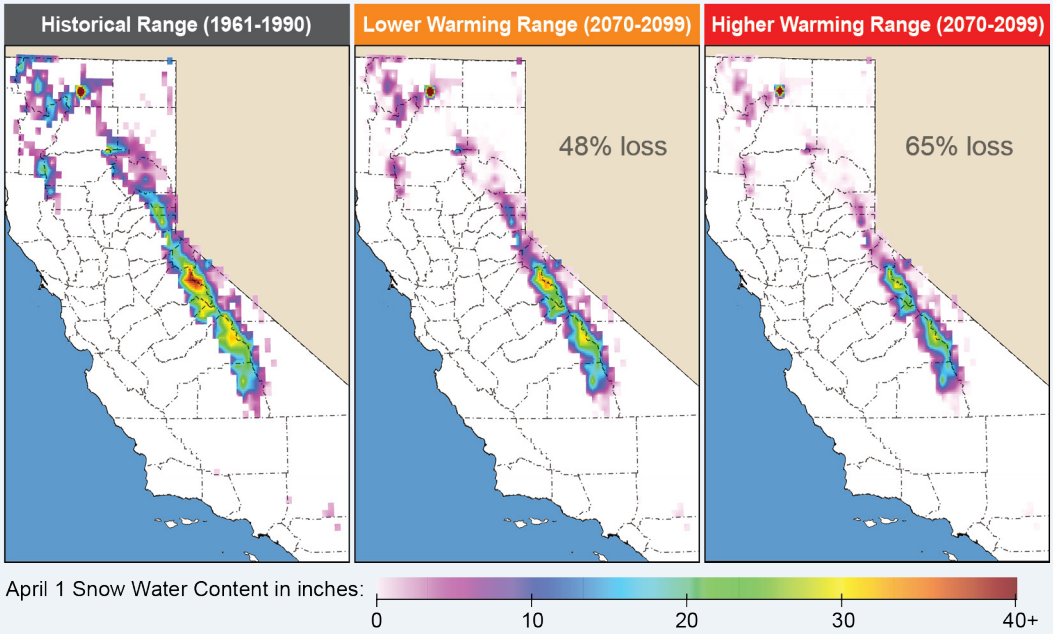


Climate Trends

Climate Change: A Costly Challenge for all Californians

California has undergone a warming trend over the past century, ranging between a 1.1 and 2.0 °F increase in year-round average temperatures. Summertime heat waves are increasing. Over recent decades, there has been a trend toward more rain versus snow in the total precipitation volume over the state's primary water supply watersheds, and the timing of runoff has shifted to earlier in the year. The water management community has invested in, and depends on, a system based on historical hydrology, but managing to historical trends will no longer work because historical hydrology no longer provides an accurate picture of future conditions.

California Is Losing Its Largest Surface Reservoir



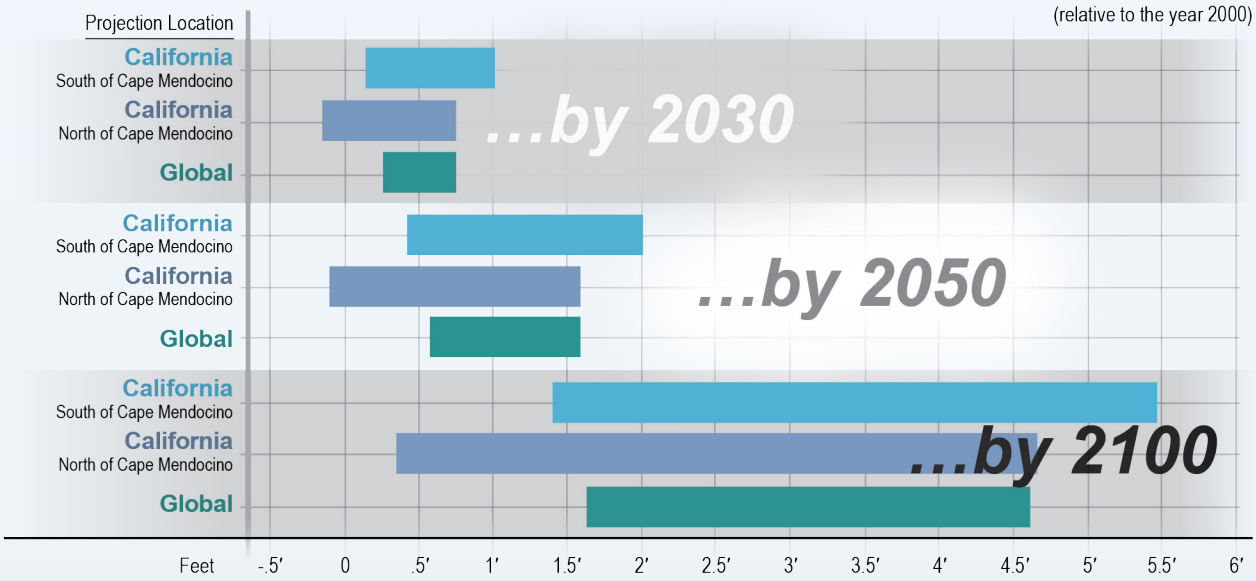
Historical and projected April 1 snow water content for the Sierra for lower and higher warming scenarios depicting the effect of human-generated greenhouse gases and aerosols on climate. By the end of this century, the Sierra snowpack is projected to experience a 48 to 65 percent loss from its average at the end of the previous century (Pierce and Cayan 2013).

- Sierra Nevada snowpack could be reduced by 48 to 65 percent by the end of the century. California relies on snowpack as a major water supply.
- Earlier runoff timing and increased water demand in a warmer climate could mean greater water scarcity.
- As water demands increase and the reliability of surface water is reduced, demands on groundwater are expected to increase.
- Increased flood risk resulting from warmer and stronger winter storms may affect the state's economy and public safety.

Already Affecting California's Water

Climate change creates critical challenges for California water resources management. Higher 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. Droughts are likely to become more frequent and persistent in this century. Intense rainfall events will continue to affect the state, possibly leading to more frequent and/or more extensive flooding. Storms and snowmelt may coincide and produce higher winter runoff, while accelerating sea-level rise will produce higher storm surges during coastal storms. Rising sea levels increase susceptibility to coastal and estuarine flooding and increase salt water intrusion into coastal groundwater aquifers and estuaries like the Delta. Together, higher winter runoff and sea level rise will increase the probability of levee failures in the Delta and other coastal areas. Sea level rise will also place additional constraints on management and water exports from the Delta.

Sea Level Rise Will Complicate the Way We Manage Water

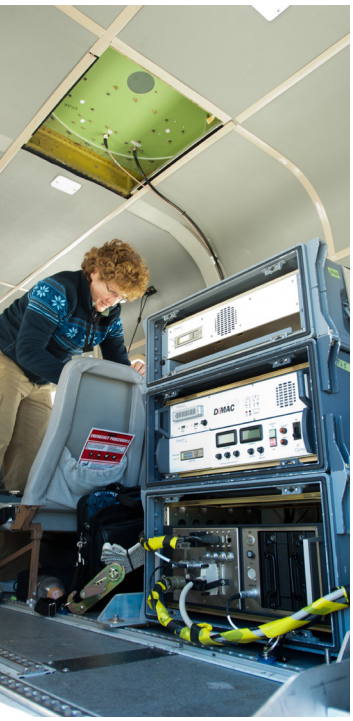


By 2050, sea level could rise between 0.5 and 2.0 feet along most of California's coastline. Potential impacts from sea level rise on the state include:

- Land use impacts in inundated areas.
- Increased stress on Delta and coastal levees.
- Increased salinity in coastal aquifers.
- Increased salinity in the Delta, which may require changes to water management of the Delta.
- Ecosystem impacts from higher air and water temperatures.

See Volume 1, Chapter 3, California Water Today.

Informed and Transparent Decisions



Staff inside NASA plane that collects atmospheric information on eastern side of Sierra mountain range

Effective Action Requires Informed, Common Understanding

Participants in California water planning and policy-making frequently operate from different sets of information, particularly regarding conditions, trends, and solution trade-offs, often prepared for disparate purposes. In most cases, the information is accurate but sometimes incomplete, drawn out of context, and grounded in fundamentally different assumptions. Overly broad assumptions are made from information prepared for specific purposes.

Update 2013 promotes the use of collaborative processes and technical enhancements consistent with its goals and objectives to assist decision-makers in moving California toward a more sustainable future. The Water Plan identifies three critical research areas where technical enhancements are needed to support integrated water management:

- Make technical enhancements collaboratively.
- Provide effective analytical tools.
- Improve data collection, management, and accessibility.

While extensive data affecting water management is collected by many federal, State, regional, and local programs, the information often resides in separate silos. There is a critical need for information sharing and management to support water policy decisions that provide a common and transparent understanding of water problems and potential solutions across many organizations. Achieving sustainability requires a transparent description of dynamic linkages between water supply, flood management, water quality, land use, environmental water, and many other factors. (See "Understanding The Water-Energy Nexus" on the next page for an example of interrelated resources whose effective management requires informed, common understanding.)

Institutions should work together to prioritize and align the collection of water resources information. Improvements in management of water resources information will make it easier for institutions to report, use, and analyze available information. As relationships between institutions improve, gaps in water management data will become more apparent and resources can be allocated to address those data gaps in the effort to improve the overall understanding of water in California. Integration of information should begin with the largest users or collectors of water information, including State government.

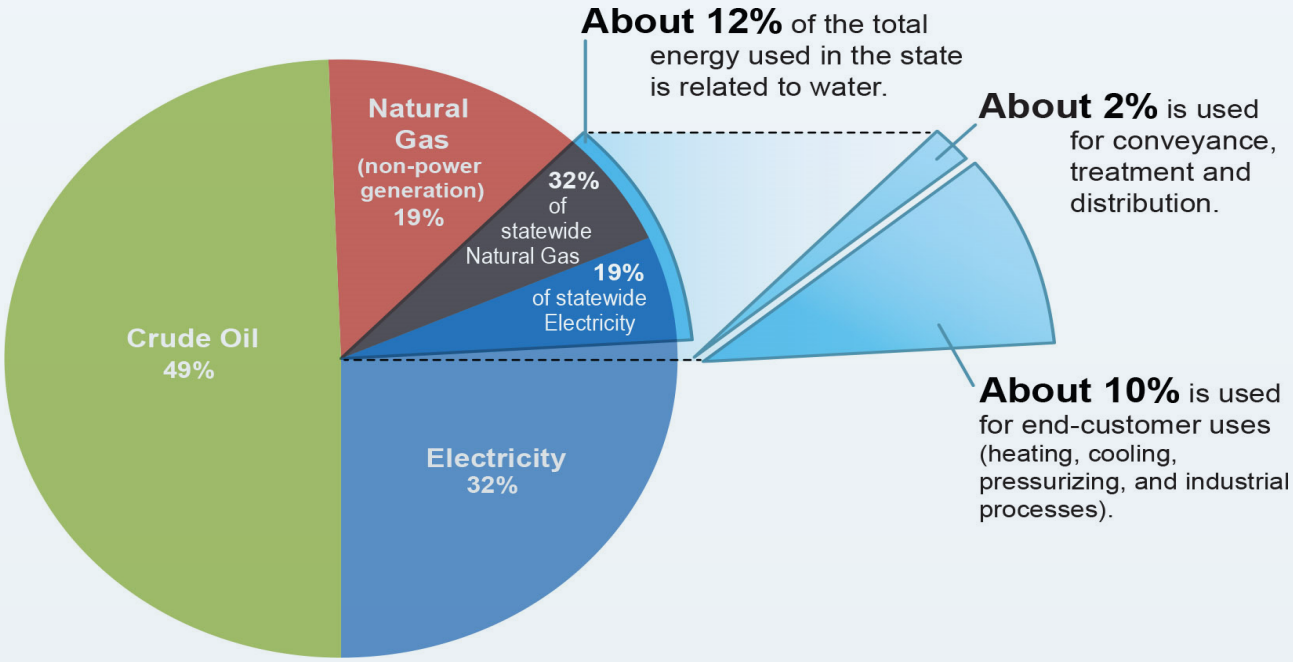
*In Volume 1, **Chapter 6** and **Chapter 8** contain several specific recommendations to improve water management decision-making.*

▶ ▶ Require Information and Understanding

Understanding The Water-Energy Nexus

Understanding the relationship of water and energy is important for decision-making with regard to the more efficient use of limited water and energy supplies to meet increasing future demands. Energy is used throughout the water sector to extract, convey, treat, distribute, and heat water. Water and energy have a complex relationship with multiple interdependencies, which is often referred to as the water-energy nexus. (The energy intensity of major water supplies is explored in Volume 2, *Regional Reports*.) Since energy usage leads to production of greenhouse gas (GHG) emissions, this information can support actions to reduce GHGs, an important State mandate to mitigate the effects of climate change.

Energy Use Related to Water



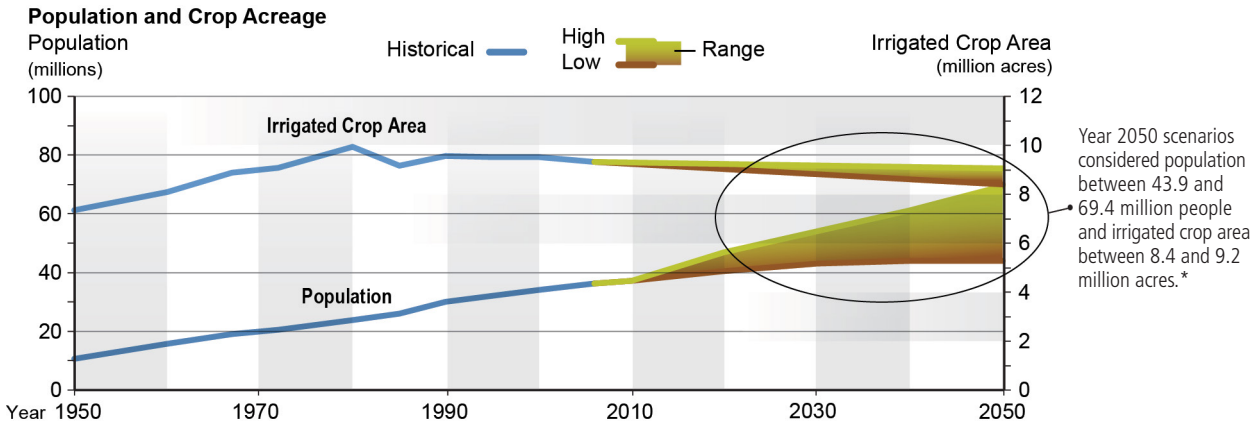
- Water is used by the energy sector, and energy is used by the water sector.
- The water-energy nexus provides opportunities for conservation of these natural resources, as well as reduction of GHGs.
- Customers have a large role to play in reducing energy and harmful greenhouse gases.

For detailed information on energy intensity of regional water supplies, see specific regional reports, Volume 2.

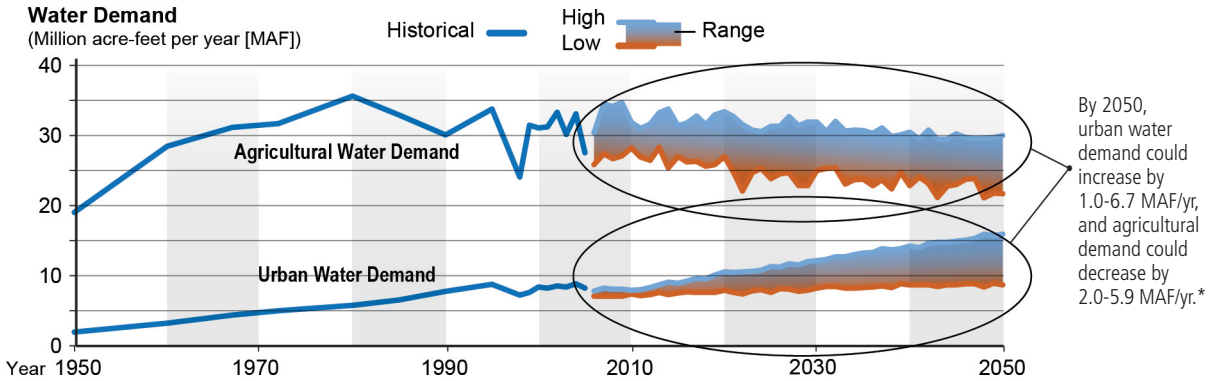
Water Scenarios 2050

Many Factors Will Shape Our Future

There is no way of predicting the future with absolute certainty, yet scenarios can help us plan for an uncertain future. Update 2013 looks at many plausible and very different future scenarios (or futures) through the year 2050 to consider uncertainty, risk, and resource sustainability. A number of factors that the water community cannot control — yet which affect future water demand for the urban, agricultural, and environmental sectors — were used to describe these future scenarios, factors such as population growth, land-use development patterns, and climate change.



Water managers must be prepared to respond to a wide range of possible future outcomes. The upper graphic shows historical irrigated crop area and population in California from 1950 to 2006 and their range through 2050 for the future scenarios considered in Update 2013. Alternative assumptions about population growth, as well as development density to accommodate this growth, would result in urbanization of some existing agricultural lands reflected in a reduction of irrigated crop area. Update 2013 uses these growth scenarios and many alternative scenarios of future climate to estimate a range of future urban and agricultural water demands shown in the lower graphic.



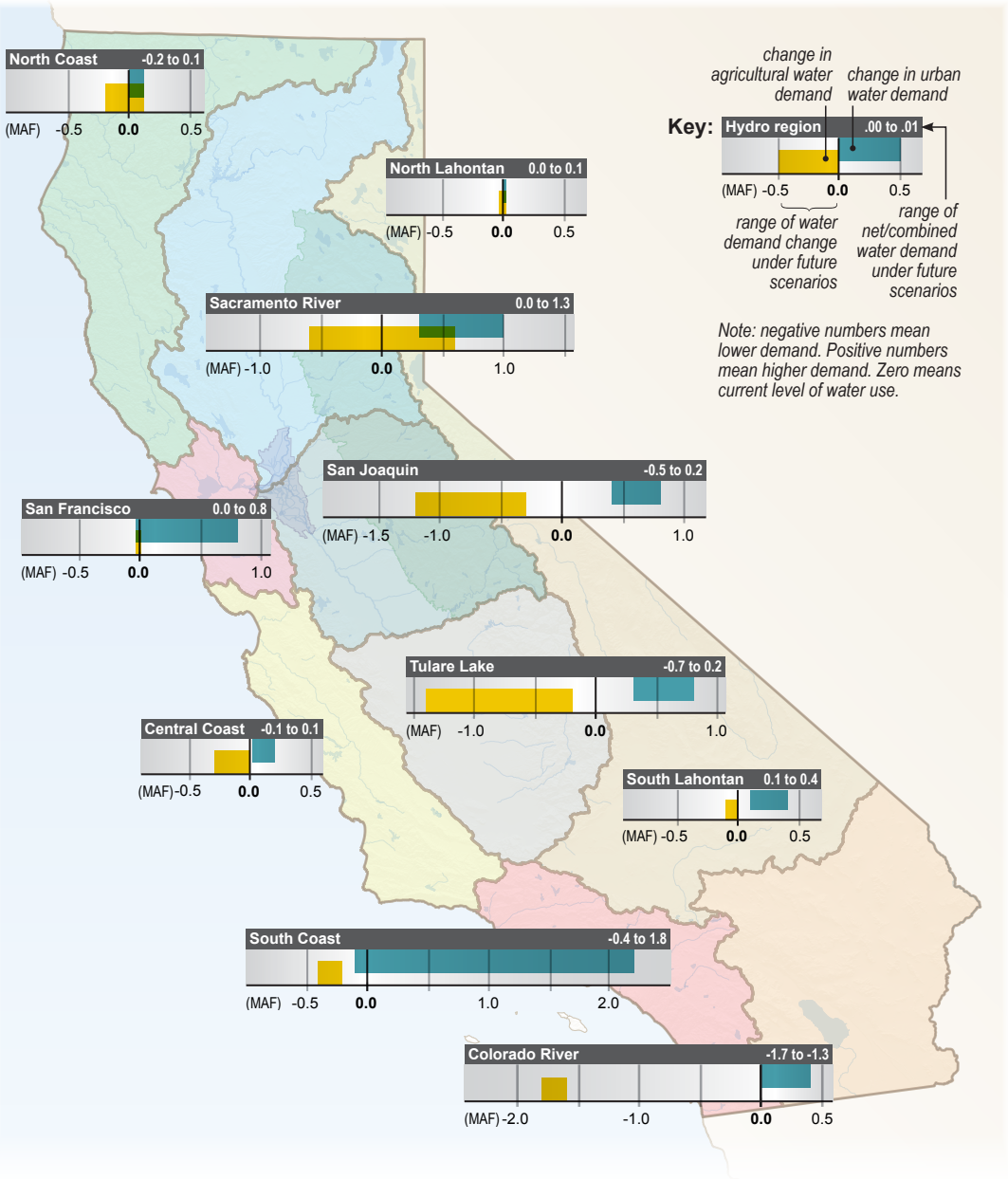
*Assuming no new actions or policies are implemented

Preparing for the Future

Water Scenarios Play Out Differently in the Hydrologic Regions

Future scenarios estimate great variability in future regional urban and agricultural water demands in response to uncertainties in population, irrigated crop acreage, temperature, and precipitation. This regional variability underscores the importance of regionally led initiatives and adaptable, regionally appropriate State government policies. IRWM, supported by flexible State government incentives, can deliver needed solutions.

Extreme Uncertainty in Future Regional Water Demands



Value of Public Investments

American and Sacramento Rivers

Value of Investments in Diversified Strategies

Update 2013 evaluated the vulnerabilities of the current water management system in the Central Valley by using 198 future growth and climate change scenarios to track conditions through 2050 — in particular, urban supply reliability, agricultural supply reliability, change in groundwater storage, and water for the environment. The result of this vulnerability analysis is labeled as Currently Planned in the figures on these two pages. The study finds that the agricultural sector in the San Joaquin River Hydrologic Region, and the urban and agricultural sectors in the Tulare Lake Hydrologic Region, are particularly vulnerable to many of the future climate and growth scenario conditions. Groundwater levels and environmental flows are also vulnerable.

Additional investments in urban and agricultural water-use efficiency, recycled water, conjunctive management/groundwater recharge, and storage can significantly reduce these vulnerabilities. The implementation of new environmental flows and groundwater storage targets improve outcomes; however, higher efficiencies and/or other management strategies are needed to maintain urban and agricultural water-supply reliability. The study estimated the cost of additional urban and agricultural water conservation and recycled water for several response packages (a high-level response is shown in figures).

Strategies to Increase Resilience in the Sacramento River Region

- Urban and agricultural supply reliability remains high across most futures that involve investments in water conservation and recycled water.
- Groundwater conditions improve with implementation of groundwater recovery strategies.

Increasing Resilience in the Sacramento Region[1]

Response Package	Urban Supply Reliability	Agricultural Supply Reliability	Change in Ground-water Conditions	Meeting New Ecosystem Flows	Average Annual Cost above Current Plan
Currently Planned	High	High	Medium	Medium	$0
+ Conservation + Recycling + Groundwater Recovery Targets + New Ecosystem Flow Targets	High	High	High-Medium	Medium	$300M

[1]Note that the cost of adding environmental flow requirements and groundwater reduction targets is not accounted for in the figure.

Using Data and Tools to Evaluate Performance

Strategies to Increase Resilience in the San Joaquin River Hydrologic Region

- Water use efficiency, conjunctive management, groundwater banking, and water recycling improve agricultural supply reliability with no declines in groundwater storage.
- The addition of environmental flows and groundwater recovery targets improves groundwater storage and achieves targeted flows for all futures.
- Additional water-use efficiency and conjunctive management help to improve supply reliability.

Chowchilla bifurcation structure, San Joaquin River

Increasing Resilience in the San Joaquin Region[1]

Response Package	Urban Supply Reliability	Agricultural Supply Reliability	Change in Ground-water Conditions	Meeting New Ecosystem Flows	Average Annual Cost above Current Plan
Currently Planned	High	Medium	High-Medium	Low	$0
+ Conservation + Recycling + Groundwater Banking + Groundwater Recovery Targets + New Ecosystem Flow Targets	High	High	High	High	$400M

Strategies to Increase Resilience in the Tulare Lake Hydrologic Region

- Urban supply reliability improves with investments in conservation, groundwater banking, and water recycling.
- Groundwater storage improves considerably with the implementation of groundwater recovery targets and more conservation.
- Agricultural supply reliability remains low (vulnerable) for all futures, and is highly dependent on groundwater conditions.

See Volume 1, Chapter 5, Managing an Uncertain Future.

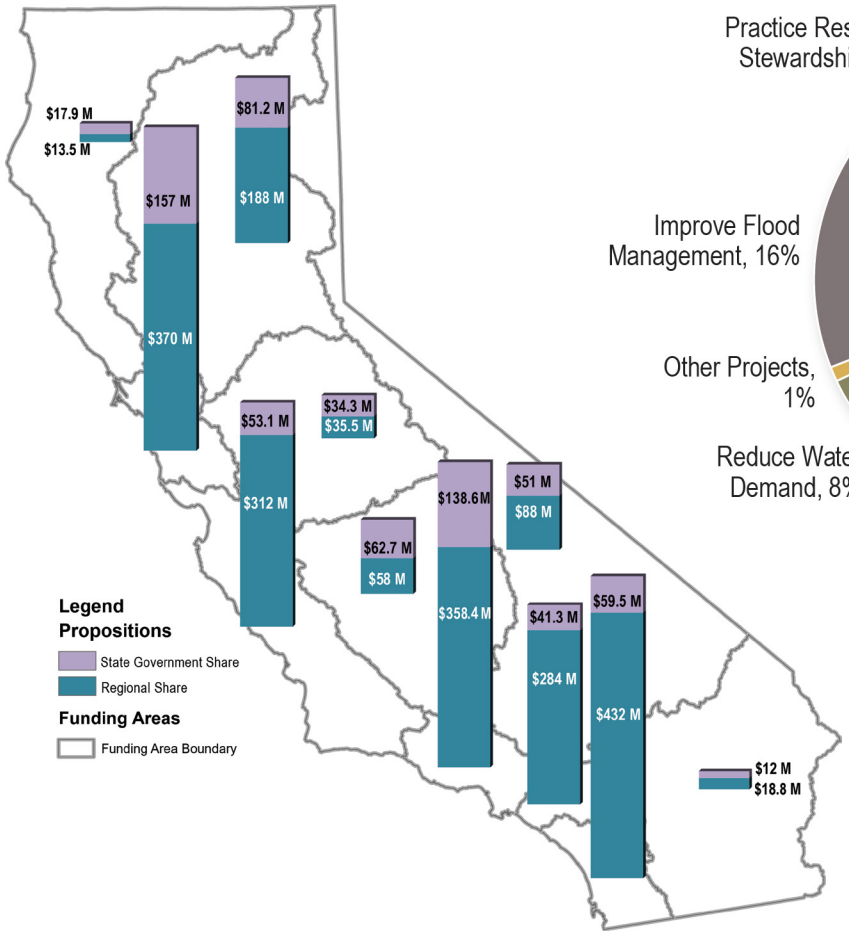
Increasing Resilience in the Tulare Lake Region[1]

Response Package	Urban Supply Reliability	Agricultural Supply Reliability	Change in Ground-water Conditions	Average Annual Cost above Current Plan
Currently Planned	Medium	Low	Low	$0
+ Conservation + Recycling + Groundwater Banking + Groundwater Recovery Targets	High-Medium	Low	High-Medium	$550M

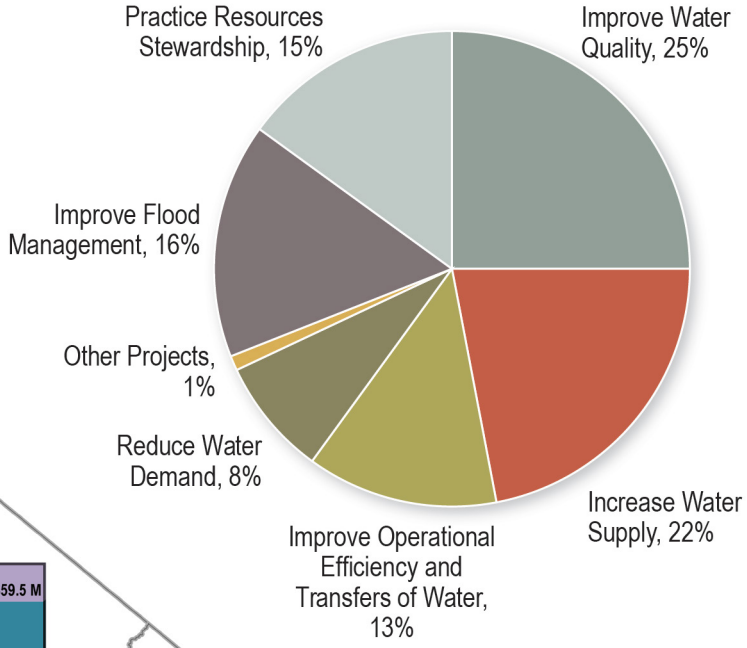
A Decade of Regional Investment

Thanks to voter-approved bond measures, Propositions 50, 84, and 1E, DWR has been awarding grants since 2002 to improve regional planning and on-the-ground projects that provide a wide range of benefits to California. Nearly $750M has been awarded and leveraged by regional water management groups, 37 comprehensive management plans have been completed, and about 562 projects have been funded. Benefits range from improving water quality to increasing water supply, protecting environmental resources, and improving flood management. DWR has awarded funds to a number of projects over the last decade, including water conservation/water use efficiency, agricultural and urban water management, and flood protection.

Investing in California's Regions

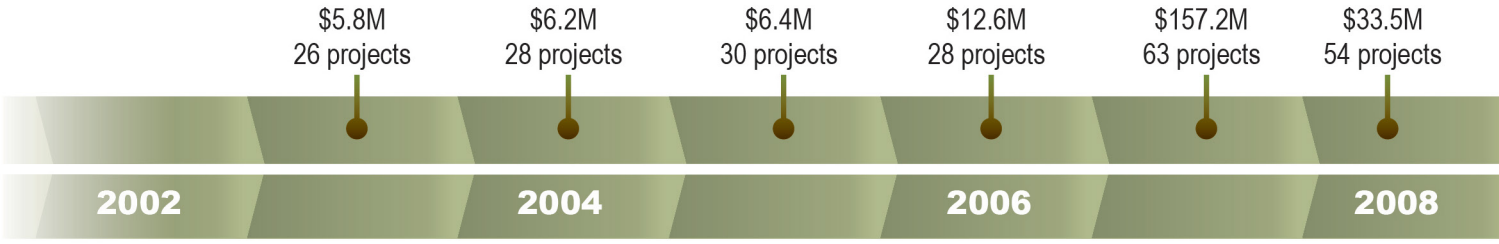


*Achieving Multiple Benefits**



*Types of projects implemented with IRWM and related grants.

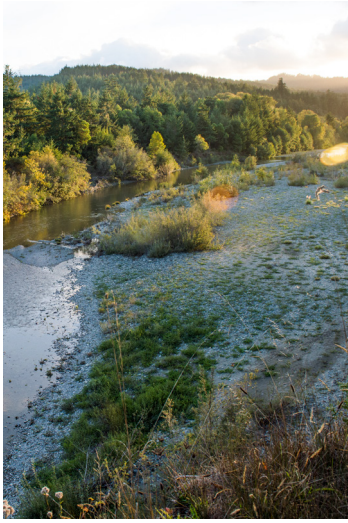
State IRWM and Related Grants



Regional Diversity Requires Regional Solutions

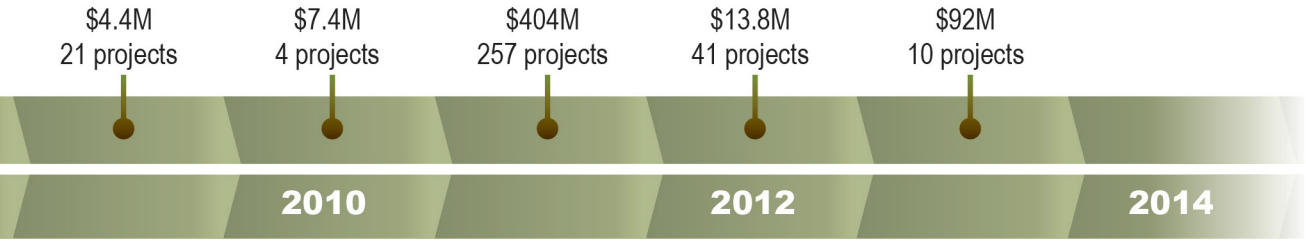
The water resource management challenges and, appropriately, the responses to these challenges vary throughout California. The 12 regional reports of Volume 2 provide State, federal, and tribal government officials, as well as resource managers and taxpayers, an insight into how regional variability manifests throughout California. These reports outline the "return on investment" to the voters and provide the water conditions, success stories, additional challenges, and future opportunities within each of the 10 hydrologic regions, as well as two areas of special interest — Mountain Counties and Sacramento-San Joaquin Delta.

Hydrologic Region Boundaries

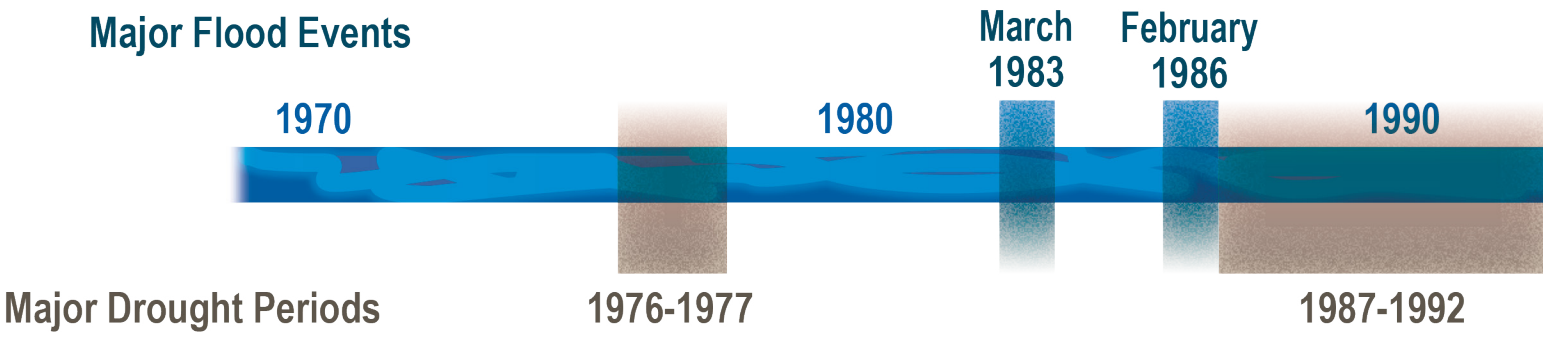


Eel River, North Coast

San Diego surfer



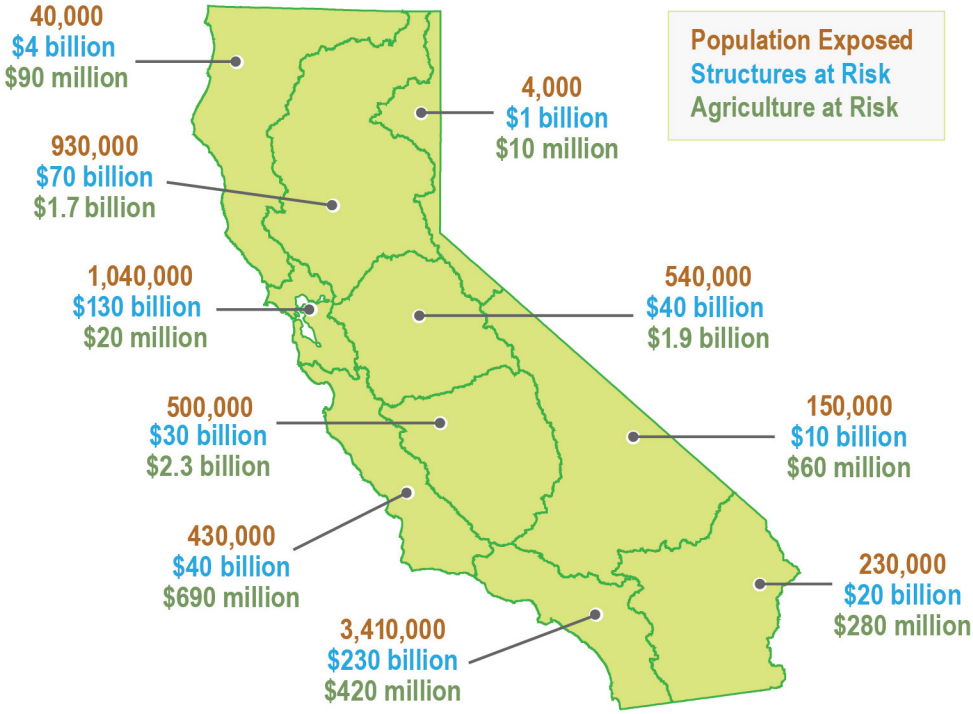
Delay at Our Own Peril ▶▶



California Water — Variable and Extreme

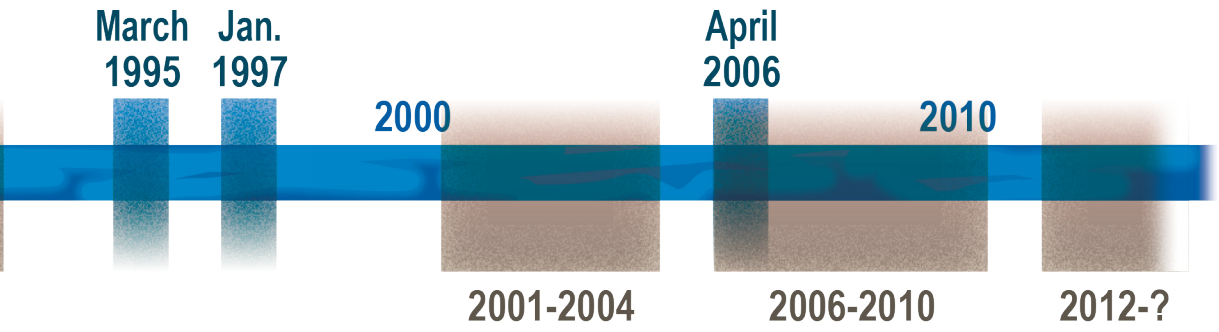
California water is highly variable and extreme, while public safety, environmental stewardship, and economic stability depend on predictable and reliable supplies. Nearly every year, the state faces either a drought or flood, sometimes in the same year. At the same time, regional water demands are expected to change, and flood and drought risks and impacts will be exacerbated by rising sea levels, reductions in snowpack, and more extreme river-runoff patterns. Poor alignment among public agencies affects the ability to fund and deliver efficient and economical multi-benefit projects. California needs sustained investment in innovation and infrastructure to avoid an unacceptable reduction in public safety, environmental stewardship, and quality of life for generations to come.

Seven Million People and $600 Billion in Assets in Floodplains



1997 flood, Yuba City area

Consequences of Deferred Action



Low water level at Folsom Lake (January 2014)

California Drought — More Frequent, Longer

Droughts are expected to occur more frequently and last longer in the future, thus exacerbating economic harm to urban and rural communities, loss of crops, potential for species collapse, degraded water quality, and extreme fire danger. Greater reliance on groundwater during dry years can result in increased pumping costs, stream depletion, groundwater overdraft, and land subsidence for many groundwater basins. At the same time, water users who have significantly improved their water use efficiency may find it challenging to implement additional water-use reductions during droughts.

Droughts are inevitable in California, but drought impacts don't have to be. Drought impacts are caused as much by a lack of preparedness (which we can control) as by dry conditions (which are beyond our control). It is important for everyone to understand that, unlike flood emergencies, droughts occur gradually and get worse over time. Also unlike flood emergency response actions (which can save lives and prevent damage in response to an event), there are very few drought responses that can significantly reduce damages once a drought is occurring. The most effective way to manage droughts is to begin aggressively implementing resource management strategies years before a drought occurs.

Droughts are inevitable in California, but drought impacts don't have to be.

Nonetheless, water supply reliability is vulnerable in many regions, particularly in those that depend on California's State and federal water projects, as a result of several factors. Those factors include growing population, lack of facility integrity (owing to severe vulnerability to earthquake risks and aging infrastructure), institutional conflicts or constraints, and declines in protected aquatic habitat and species. Some of the most notable effects became evident in February 2014, when, for the first time in history, estimated water deliveries from the State and federal water projects were expected to be zero. This reduced delivery is the amount of water needed to supply several million households for one year. To adapt to unreliable surface water delivery systems, water agencies rely more on groundwater, which in turn puts more pressure on groundwater aquifers and supplies that are already strained in many areas of the state.

Conclusion ▶ ▶ The Path Forward

Today's water managers must do more with less and demonstrate (and provide assurances regarding) the value of public and ratepayer financed actions. This is in response to the fact that Californians are increasingly feeling the effects of drought, economic instability, rising public sector debt, and uncertain public support (and ability to pay) for critical actions. This condition was, in part, spawned by insufficient and unstable State and federal investments and action over the past 20 years. California has become far too reliant on outdated infrastructure and technology that are no longer capable of meeting our changing needs. This practice places our future prosperity at risk, particularly if we do not act soon. Even if we begin to act immediately, Californians can still expect to pay more *and* incur greater flood risk, less water supply reliability, and more impaired water quality in the future. Old infrastructure is expected to fail more frequently and severely, and many of the state's ecosystems are on a trajectory of decline that is not easily recoverable. At the same time, future generations will be required to pay for decades of deferred infrastructure maintenance, as well as pay back the debt we have already accrued.

California has become far too reliant on outdated infrastructure and technology that are no longer capable of meeting our changing needs.

Recent investments, particularly at the local and regional level, have delivered value by helping manage current levels of flood and drought risks and ecosystem conditions. While this has provided a good down payment, further and more strategic investments are needed to ensure sustainable management of water resources and resilient water systems. The strategies and actions in Update 2013, if implemented, will help achieve those outcomes.

Update 2013 recognizes and reflects these five key messages:

- **Water is the Essence of Life for California.**
- **California's Complex Water System is in Crisis.**
- **A Diverse Portfolio Approach is Required.**
- **Solutions Require Integration, Alignment, and Investment.**
- **We All Have a Role to Play in Securing Our Future.**

Update 2013 provides a full description of California's water resources and planning, a call for action, and a recommended path toward sustainable water management. It was crafted with extensive collaboration; it represents matters of great importance and urgency to stakeholders, the public, and State government. The plan provides an actionable blueprint for California's water future. When combined with the Governor's Water Action Plan, the Update 2013 "Roadmap For Action" provides practical, well-reasoned, and critical decision support that can be readily implemented by the governor, Legislature, and water leaders. All Californians must learn more about the risks they face, and collectively support new investments in innovation and infrastructure to help improve public safety, the environment, and economic stability.

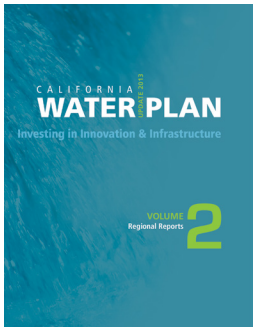
Update 2013 provides a full description of California's water resources and planning, a call for action, and a recommended path toward sustainable water management.

Navigating Water Plan Update 2013

Update 2013 includes a wide range of information, from a detailed description of California's current and potential future conditions to a "Roadmap For Action" intended to achieve desired benefits and outcomes. The plan is organized in five volumes — the three volumes outlined below; Volume 4, *Reference Guide*; and Volume 5, *Technical Guide*.

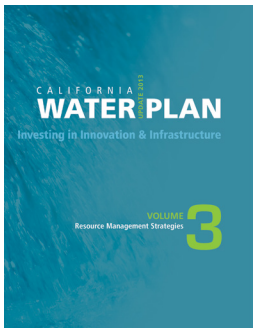
VOLUME 1, The Strategic Plan

- Call to action, new features for Update 2013, progress toward implementation.
- Update 2013 themes.
- Comprehensive picture of current water, flood, and environmental conditions.
- Strengthening government alignment and water governance.
- Planning (data, analysis, and public outreach) in the face of uncertainty.
- Framework for financing the California Water Plan.
- Roadmap for Action — Vision, mission, goals, principles, objectives, and actions.



VOLUME 2, Regional Reports

- State of the region — watersheds, groundwater aquifers, ecosystems, floods, climate, demographics, land use, water supplies and uses, governance.
- Current relationships with other regions and states.
- Accomplishments and challenges.
- Looking to the future — future water demands, resource management strategies, climate change adaptation.



VOLUME 3, Resource Management Strategies

Integrated Water Management Toolbox,
30+ management strategies to:

- Reduce water demand.
- Increase water supply.
- Improve water quality.
- Practice resource stewardship.
- Improve flood management.
- Recognize people's relationship to water.

All five volumes are available for viewing and downloading at DWR's Update 2013 Web site:
http://www.waterplan.water.ca.gov/cwpu2013/final/ or http://www.waterplan.water.ca.gov/cwpu2013/final/index.cfm.

If you need the publication in alternate form, contact the Public Affairs Office, Graphic Services Branch, at (916) 653-1074.

Integrated water management *is a comprehensive and collaborative approach for managing water to concurrently achieve social, environmental, and economic objectives. In the California Water Plan, these objectives are focused toward improving public safety, fostering environmental stewardship, and supporting economic stability. This integrated approach delivers higher value for investments by considering all interests, providing multiple benefits, and working across jurisdictional boundaries at the appropriate geographic scale. Examples of multiple benefits include improved water quality, better flood management, restored and enhanced ecosystems, and more reliable water supplies.*

Edmund G. Brown Jr.
Governor
State of California

John Laird
Secretary for Natural Resources
Natural Resources Agency

Mark Cowin
Director
Department of Water Resources

October 2014