



The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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WATER STORAGE IN CALIFORNIA

DECISION TIME FOR NEW WATER STORAGE IS FAST APPROACHING

by Bill Swanson, PE, MWH, now part of Stantec (Walnut Creek, CA)

INTRODUCTION

The growth that California experienced over the past 100 years was largely made possible by the construction and operation of water storage projects that capture and move water from source areas to population centers, industry, and agricultural users. An era of rapid reservoir construction in the early- to mid- 20th century came to an end as reservoirs became subject to regulatory requirements that limited their operation and water managers made investments in local and regional water management solutions. But a new period of reservoir construction is upon us, prompted by the CALFED Bay-Delta program and facilitated by State bond funding.

After several years of rigorous study, decision time is nearing for major surface water storage projects in California. During the next two years, major decisions will be made at the Federal, State, and local levels on the construction of expanded or new reservoirs. This article discusses the progression of large surface water storage projects recommended by the CALFED Record of Decision, and highlights the challenges facing their implementation. Topics addressed include: the historical development of reservoirs in California; how reservoir operations have adapted to support ecosystem requirements; the CALFED Storage Program; the process and timeframe for distribution of state bond funding to finance public benefits of new water storage; and other drivers that may motivate local and regional water users to consider investments in expanded surface and ground storage.

BACKGROUND

California is often referred to as “the hydraulic society” in recognition of the complex and inter-connected water management infrastructure that serves the State. Water has shaped California’s past, continues to shape its present, and will help define its future. A series of dams and reservoirs, pumping plants, canals, aqueducts and pipelines provide the backbone for an integrated state-wide water management system. Storage performs a crucial role in managing California’s water — it transforms the highly variable supply to meet the quantity, timing, and location of demands for a vast array of uses. The storage of water changes the timing and quantity of natural supplies to more closely meet human needs and provides flexibility in managing water supplies.

Water storage projects developed in California during the early- and mid- 20th century promoted vigorous economic growth by providing water supply, flood protection, hydroelectricity, recreation opportunities, and the environmental protections required at the time they were envisioned. However, many of these facilities, developed prior to the passage of Federal and California environmental protection laws, were not designed, constructed, or operated as integrated water management systems.

California Storage

Reservoir Capacity

Storage & Delivery Projects

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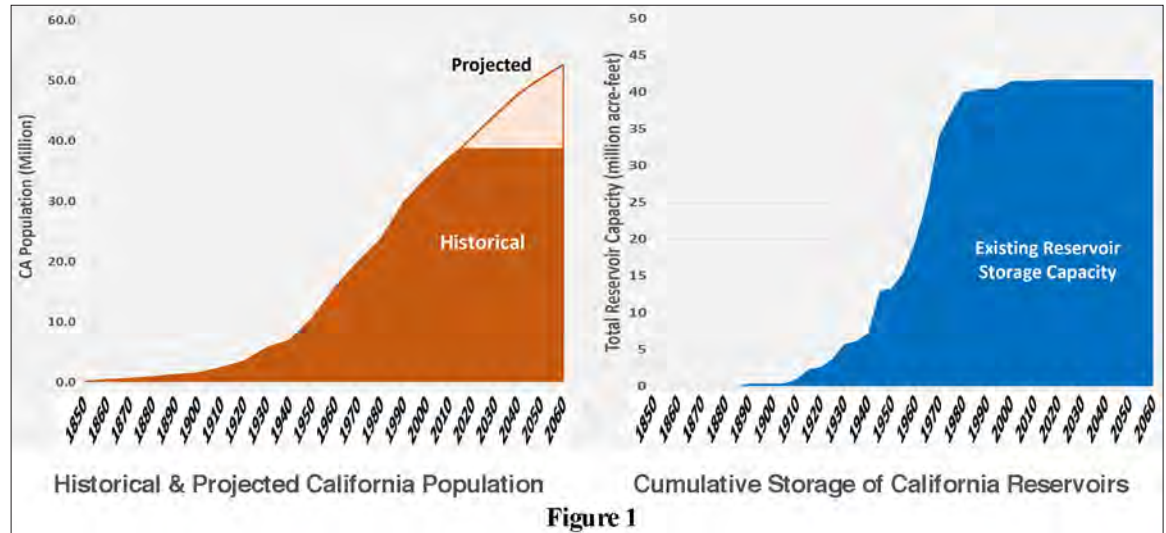
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Reservoir construction in California began in the late 1800's, with the most intense era occurring between about 1940 and 1980. During this period, statewide cumulative reservoir capacity increased from less than eight million acre-feet (MAF) to nearly 40 MAF — a five-fold increase. At the same time, the population roughly tripled, swelling from less than eight million to over 23 million. The population of California is now about 39 million and is projected to grow to over 52 million by the year 2060 (see California Department of Finance Demographic Research Unit, 2013. *Report P-1, State and County Population July 1, 2010-2060 (5-year increments)*). January), as shown in Figure 1.



California now has about 1,400 regulated surface water reservoirs with a total storage capacity of nearly 42 MAF. These reservoirs are owned and operated by a mix of federal, state, and local agencies for multiple purposes. Overall, the statewide water system includes many local, state, and federal projects that encompass: dams and reservoirs; hydropower plants; canals; water diversion structures; groundwater recharge basins; extraction wells; water banks; and other water-related water management infrastructure.

The two largest water storage and delivery projects in the state, the Central Valley Project (CVP), operated by the US Bureau of Reclamation (Reclamation), and the State Water Project (SWP), operated by the California Department of Water Resources (CDWR), are located in the Central Valley. Both projects capture surface water in Northern California reservoirs and convey released water through the Sacramento-San Joaquin River/San Francisco Bay Delta (Delta) to large pumping plants that send water south through the San Joaquin Valley and, in the case of the SWP, to Southern California, as illustrated in Figure 2.

The CVP consists of 20 reservoirs, 11 power plants, and more than 500 miles of canals and aqueducts, with a total storage capacity of more than 11 MAF. Project purposes include: flood management; navigation; provision of water for irrigation and domestic uses; fish and wildlife protection, restoration, and enhancement; water quality; power generation; and recreation. The SWP consists of: 34 storage facilities, reservoirs, and lakes; 20 pumping plants; four pumping-generating plants; five hydroelectric power plants; and about 700 miles of open canals and pipelines. The SWP's purpose is to store and distribute water for agricultural, municipal, and industrial uses in Northern California, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and Southern California. Other SWP functions include flood management; water quality maintenance; power generation; recreation; and fish and wildlife enhancement (see California Water Commission, 2015. *Water Storage Investment Program Goals, Objectives, and Principles* (Water Bond, Chapter 8) — *Final*, July).

CVP and SWP deliveries supplement local surface water and groundwater supplies and provide water to nearly four million acres of irrigated farmland and over 25 million people. Since the 1970's, the operations of the CVP and SWP have been integrated through the Coordinated Operations Agreement (COA), which was finalized in 1986. The Agreement between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project was authorized by PL 99-546 in 1986. See also CDWR, 2014a. *System Reoperation Study Phase 2 Report. Strategy Formulation and Refinement*. February.

The California Water Plan Update for 2013 reports that in an average water year — such as 2010 — the total water used in California was just over 40 MAF, of which about 23 MAF (58%) is from surface water and about 15 MAF (38%) is from groundwater (CDWR, 2014b. *California Water Plan Update 2013*. Bulletin 160-13. Volume 1 – The Strategic Plan). Both surface water storage and groundwater storage are critical to meeting the State's water needs, and in many areas, they are operated conjunctively.

California Storage



EVOLVING REGULATION & PHYSICAL CONSTRAINTS

Over the past several decades, operating guidelines for the CVP, SWP, and other storage projects have profoundly changed in response to environmental requirements and as water use patterns changed in response to a growing population and implementation of other local and regional water management actions. This physical system is governed by a complex set of rules that set the operational priorities for water management. Requirements include: regulations established pursuant to the federal Endangered Species Act (ESA) for Chinook salmon and Delta Smelt, the federal Clean Water Act (CWA), and other federal legal requirements; senior water rights; water right settlements and exchange agreements; water contract provisions; water transfer agreements; and other requirements. The cumulative effect of regulatory

Operating Guidelines

California Storage

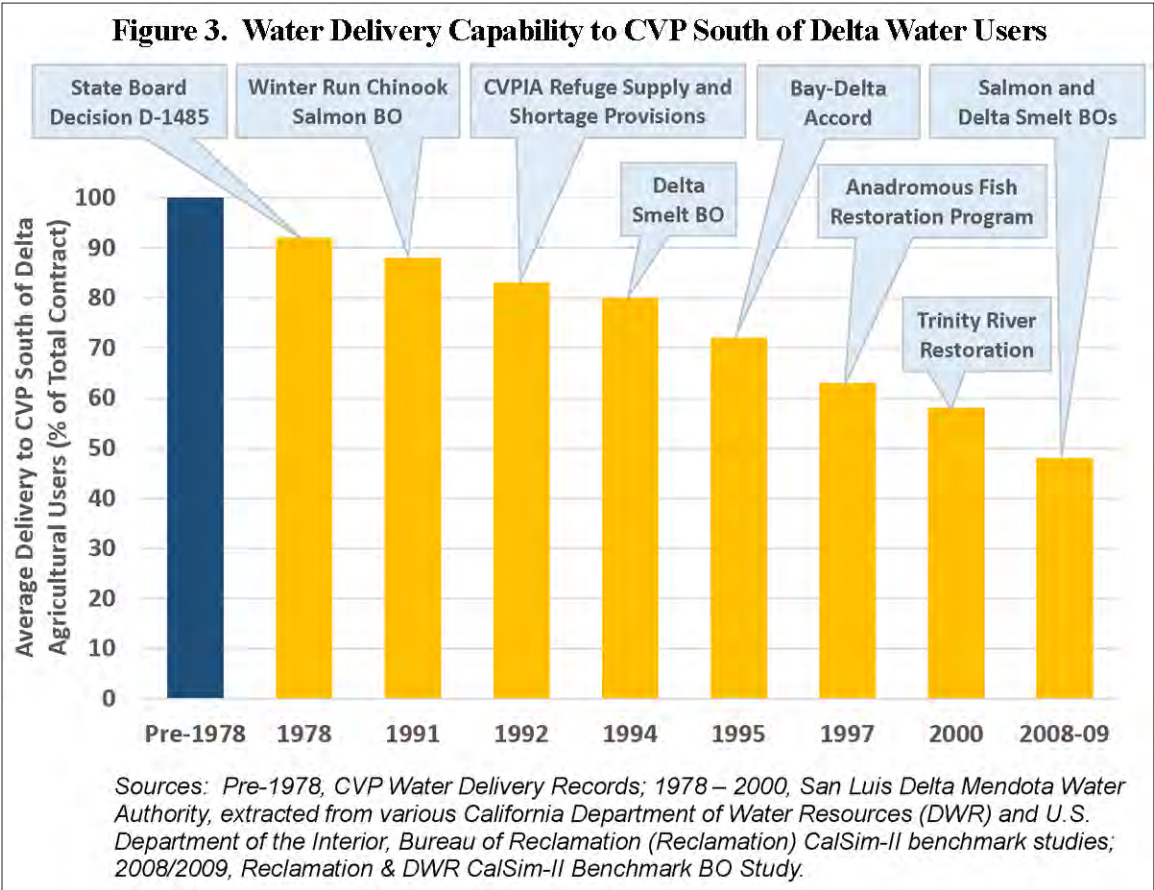
CVP Delivery

Groundwater Limits

Long-Term Strategy

Reservoir Sites

actions has reduced the delivery capability of the CVP and SWP, particularly to water users south of the Delta. The most vivid illustration of this is shown in Figure 3, which depicts the effect of successive regulatory actions on the average delivery capability to south of Delta CVP agricultural water users.



California has approximately 850 MAF to 1.3 billion acre-feet of groundwater in storage. However, much of this is of poor quality or too deep to be economically extracted for drinking or agricultural use and only a small portion is within the reach of extraction wells. Hence, only a small portion of California’s total combined surface water and groundwater resources can be managed to meet the timing, location, quantity, and quality requirements for human and environmental needs.

Given these and other exigencies, it is readily apparent that the importance for *integrated operation* of the state-wide water system, groundwater resources, and local projects is greater than ever.

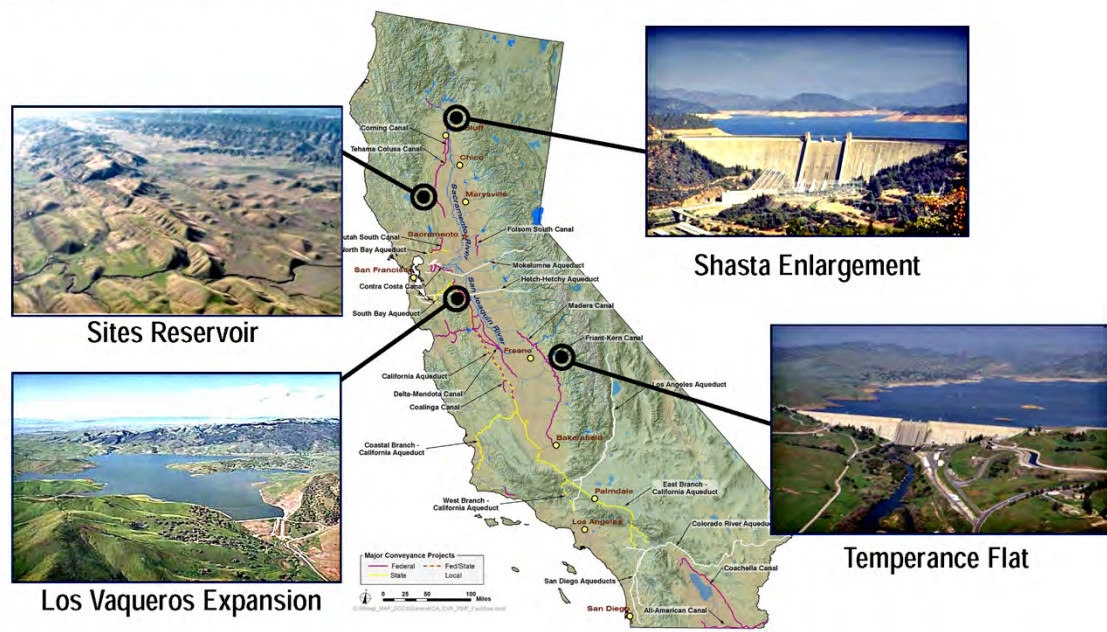
THE CALFED WATER STORAGE PROGRAM

In 1995, a consortium of State and Federal agencies initiated the CALFED Bay-Delta Program to develop a comprehensive, long-term strategy to provide reliable water supplies to California cities, agriculture, and the environment while restoring the overall health of the San Francisco Bay-Delta Estuary. The CALFED Record of Decision (ROD) in 2000 recommended numerous actions to address state-wide water use efficiency, ecosystem improvements to the Delta watershed, levee strengthening in the Delta, and water storage in the Central Valley — both surface water and groundwater. An initial review of over 50 potential reservoir sites led to a selection of five projects to be evaluated in greater detail, including: enlarging Shasta Lake; constructing a new off-stream reservoir north of the Delta (commonly referred to as Sites Reservoir); constructing in-Delta storage through the inundation of four Delta islands; enlarging the then recently-completed Los Vaqueros Reservoir in Contra Costa County west of the Delta; and increasing the storage of San Joaquin River water by enlarging Friant Dam (Millerton Lake) or other equivalent actions. Feasibility and environmental compliance efforts have progressed for the four projects — shown in Figure 4.

California Storage

Project Investigations

Figure 4. On-Going CALFED Surface Water Investigations



Evaluations

The CALFED ROD identified objectives for each storage project, in recognition of their locations and distinct needs that each could address. Feasibility studies began in 2003, with Reclamation leading the evaluations of Shasta Enlargement and San Joaquin Storage, CDWR leading the evaluations of In-Delta Storage and Sites Reservoir, and Contra Costa Water District leading the evaluation of expanding the then recently-completed Los Vaqueros Reservoir with assistance from Reclamation. Regular coordination between Reclamation and CDWR on the CALFED storage program led to the development of a set of common tools and assumptions to provide consistency in project evaluations.

While the CALFED storage projects were being evaluated over the past several years, baseline conditions that affect the project formulation and benefits have changed, new groundwater management requirements have been implemented, and funding for State participation has been made available. For example, all of the ongoing CALFED storage projects would affect the Delta to some degree, either to convey stored water from Northern California reservoirs or through modified operations. Progress on all studies has been affected by changing Delta regulatory conditions. When studies began, Delta regulatory conditions in place in 2004 were used as a baseline for operational evaluation. In 2008 and 2009, the US Fish and Wildlife Service and the National Marine Fisheries Service issued updated biological opinions (BOs) for the protection for Delta Smelt and Chinook salmon, respectively. Several measures contained in the BOs, including reasonable and prudent alternatives (RPAs), are based on real-time conditions. Their simulation in the analytical tools presented considerable challenges. The updated model was applied to the feasibility studies to reflect the revised baseline, which affected project benefits and triggered changes to operational objectives.

Reclamation is coordinating with storage program stakeholders to identify potential cost-sharing partners and alternative sources of funding. Memoranda of Understanding (MOUs) are in place between Reclamation and local entities for Temperance Flat Reservoir, Sites Reservoir, and Los Vaqueros Enlargement, and an agreement in principal is in place for Shasta Enlargement. Additional feasibility, cost allocation, and environmental compliance may be needed to identify and recommend locally-preferred alternatives for these projects. The locally-preferred alternatives will form the basis for local financial commitments and funding applications pursuant to Chapter 8 of California Proposition 1 (discussed below).

A summary of the four surface water storage projects, and their status, follows.

Shasta Enlargement

Shasta Lake is the largest reservoir in California, located on the Sacramento River below its confluences with the McCloud and Pit rivers. A 602-foot tall dam forms Shasta Lake, which has a storage capacity of about 4.5 MAF. The feasibility study and Environmental Impact Statement (EIS) evaluated alternatives to enlarge the reservoir by increasing the height of the dam between 6.6 and 18.5 feet. An 18.5 foot raise would avoid relocation of a combined Union Pacific Railroad and Interstate 5 bridge that crosses the reservoir and increase the storage capacity of Shasta Lake by up to 634 thousand acre-feet (TAF).

Funding

Shasta Lake

<div data-bbox="134 174 318 262">California Storage</div> <div data-bbox="118 296 339 331">Shasta Purposes</div> <div data-bbox="121 436 336 506">McCloud River Free-Flowing</div> <div data-bbox="128 787 329 821">Sites Purposes</div> <div data-bbox="168 1100 285 1134">Benefits</div> <div data-bbox="134 1417 323 1486">Los Vaqueros Purposes</div> <div data-bbox="139 1558 318 1627">2012 Enlargement</div> <div data-bbox="157 1768 302 1837">Expansion Study</div>	<p>The project would involve raising the height of Shasta Dam by adding concrete mass and raising the top of a temperature control facility that allows for selective withdrawal of water from the reservoir into the hydropower plant. Shoreline infrastructure (including roads, bridges, buildings, and recreation facilities) would be relocated and/or replaced. Improvements downstream from Shasta Dam (including riparian, floodplain, and side channel restoration, and gravel augmentation) would be implemented to enhance habitat for aquatic species, particularly salmon. The additional storage capacity would be operated to enhance flow and temperature conditions in the Sacramento River for fishery objectives and to provide additional water supply, particularly during dry years.</p> <p>The McCloud River is not formally designated as a national or state Wild and Scenic River. However, Section 5093.542 of the California Public Resources Code specifies that the McCloud River should be maintained in its free-flowing condition, and its wild trout fishery protected, from 0.25 miles below McCloud Dam downstream to the McCloud River Bridge (located within the existing limits of Shasta Lake). Consequently, participation by the State of California in the feasibility study has been limited. The US Department of the Interior transmitted the final feasibility Report to Congress in July 2015 without a recommendation for construction due to outstanding issues needing resolution prior to recommendation. Outstanding issues included the need to identify non-Federal cost-share partners and develop an operating plan.</p> <p>Sites Reservoir</p> <p>Sites Reservoir would be a new off-channel reservoir located west of the Sacramento River in Colusa County, approximately 10 miles west of the town of Maxwell, California. It is being evaluated by CDWR, Reclamation, and the Sites Reservoir Joint Powers Authority (JPA), a public agency formed specifically for the project development. The project could enhance water management flexibility in the Sacramento Valley by reducing water diversion from the Sacramento River during critical fish migration periods and increasing the reliability of water supplies. It can also provide storage and operational flexibility for other CVP and SWP facilities, helping the overall water system adapt to changing requirements.</p> <p>A storage capacity ranging from 1,200 TAF to 1,800 TAF would be created through the construction of up to 11 dams that would contain water in a valley currently in agricultural production. Water would be conveyed to Sites Reservoir from the Sacramento River through two existing canals (Tehama-Colusa and Glenn-Colusa canals) and a pipeline from a new diversion and release facility on the Sacramento River. Water would be pumped into and released from the reservoir using a pumping/generating plant.</p> <p>The Sites Reservoir project is being developed with a focus on improving water supply, ecosystem restoration, and water management resiliency. Potential benefits include: increased water supply reliability for municipal and industrial users, agriculture, and wildlife refuges; ecosystem enhancement actions to improve instream and Delta fish survival; water quality improvements for Delta water users and estuarine species; flexible hydropower generation to support renewable energy sources such as wind and solar; recreation opportunities at the new reservoir and improved recreation at existing reservoirs; and local flood damage reduction. Proposed operations focus on water needs during dry and critically dry years. A final feasibility study and associated environmental compliance documentation is planned to be completed in 2017.</p> <p>Los Vaqueros Reservoir Enlargement</p> <p>Los Vaqueros Reservoir is an off-channel reservoir in Contra Costa County that was constructed and is owned and operated by Contra Costa Water District (CCWD). The original reservoir was completed in 1998 with a capacity of 100 TAF and included a new screened intake located in the Delta. The project was designed and operated to provide improved water quality, supply reliability, and emergency storage to CCWD. The CALFED ROD recommended enlarging Los Vaqueros Reservoir up to a capacity of 500 TAF to extend these benefits to other water users in the Bay Area and potentially beyond.</p> <p>As the feasibility study to enlarge the reservoir progressed in the 2000's, CCWD proceeded with the development of an additional screened intake in the Delta, which was completed in 2010. CCWD then enlarged Los Vaqueros Reservoir to 160 TAF by raising the dam about 35 feet. The enlarged reservoir, completed in 2012, provides greater operational flexibility to achieve CCWD water quality and supply reliability objectives, and increases emergency supply.</p> <p>The implementation of these modifications to the Los Vaqueros Project required revision to the planning baseline for evaluating reservoir enlargement under the CALFED Program. Studies to further expand Los Vaqueros to a capacity of 275 TAF are continuing. These studies are focused on: increasing water supply reliability (municipal and industrial (M&I) and emergency); environmental water management; recreation; and water quality benefits. An expansion would involve raising the dam further and potentially constructing additional conveyance infrastructure to connect the reservoir directly to the South Bay Aqueduct to expand water supply reliability and water quality benefits to other Bay Area water users. A final feasibility study and associated environmental compliance documentation is planned to be completed in 2017.</p>
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<div data-bbox="142 176 318 264">California Storage</div> <div data-bbox="120 300 342 365">Temperance Flat Dam</div> <div data-bbox="123 474 337 504">2006 Settlement</div> <div data-bbox="159 684 305 749">Settlement Goals</div> <div data-bbox="134 1035 326 1100">Natural Runoff Mimic</div> <div data-bbox="159 1314 302 1379">Objectives Revised</div> <div data-bbox="144 1665 318 1730">Hydropower Impact</div> <div data-bbox="134 1839 326 1904">Wild & Scenic Designation?</div>	<div data-bbox="378 147 690 174">Temperance Flat Reservoir</div> <div data-bbox="378 176 1531 417"> <p>The Upper San Joaquin River Basin Storage Investigation evaluated 22 potential reservoir sites and sizes to select Temperance Flat Reservoir with a dam located at river mile 274, in the historic San Joaquin River channel at the approximate mid-length of Millerton Lake. Temperance Flat dam would be about 665 feet tall and would form a reservoir with a storage capacity of about 1.3 MAF, increasing the combined capacity of Millerton Lake and Temperance Flat to about 1.8 MAF. The CALFED ROD indicated that storage of additional San Joaquin River water supplies could support restoration of the San Joaquin River, facilitate greater conjunctive management in the region, and improve the quality of water delivered to urban water users.</p> </div> <div data-bbox="378 422 859 449">San Joaquin River Restoration Settlement</div> <div data-bbox="378 451 1531 665"> <p>In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC) filed a lawsuit challenging the renewal of the long-term water service contracts between the United States and the Central Valley Project (CVP) Friant Division contractors. After 18 years of litigation, a Stipulation of Settlement (Settlement) was reached in September 2006 by the Settling Parties and subsequently approved by the Court. [For description of the Settlement and associated implementation under the San Joaquin River Restoration Program (SJRRP) see Gasdick & Gidding, <i>TWR</i> #76; see also Dunning, <i>TWR</i> #33 regarding the San Joaquin Settlement.]</p> </div> <div data-bbox="378 669 963 697">THE SETTLEMENT IS FOUNDED ON TWO PARALLEL GOALS:</div> <div data-bbox="378 699 1531 940"> <p>RESTORATION GOAL: To restore and maintain fish populations in good condition in the mainstem of the San Joaquin River below Friant Dam to the confluence of the Merced River (approximately 150 miles downstream), including naturally reproducing and self-sustaining populations of salmon and other fish.</p> <p>WATER MANAGEMENT GOAL: To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the release of Interim and Restoration flows provided for in the Settlement. Implementation of the Settlement will reduce CVP Friant Division water supplies by nearly 20 percent if no water management goal actions are taken. Impacts would be greatest in wet years when deliveries replenish groundwater for this conjunctive use region.</p> </div> <div data-bbox="378 945 860 972">The Settlement Effect on Temperance Flat</div> <div data-bbox="378 974 1531 1249"> <p>The Settlement and subsequent Federal legislation authorizing its implementation in 2009 affected the analysis of Temperance Flat Reservoir. The Settlement established a flow regime for San Joaquin River restoration, and required that a set of guidelines be developed to define operational priorities and water accounting methods. The flow regime includes flow targets under the range of hydrologic conditions that have occurred over the past century that generally mimic the natural runoff pattern. That pattern is characterized by high flows in the spring, base flows through the summer, a minor pulse flow in the fall, and base flows in early winter months. The Settlement reduced the available water supply that can be developed by Temperance Flat Reservoir, particularly during wetter years when inflow that otherwise would have been available for storage is required to be released to meet restoration flow objectives.</p> </div> <div data-bbox="378 1251 1531 1526"> <p>At the time the restoration flow guidelines were being developed, the Temperance Flat study focused on the physical aspects for facilities and verified field conditions and refined designs. Once the SJRRP established an operating plan that was accepted by all Settling Parties, planning for Temperance Flat Reservoir could resume. The first action involved revising the project objectives to be compatible with the Settlement and remain consistent with the CALFED ROD. The revised objectives include: increasing water supply reliability and system operational flexibility for agricultural, M&I, and environmental purposes in CVP San Joaquin Valley areas, and other regions of California; and enhancing water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.</p> </div> <div data-bbox="378 1528 1531 1650"> <p>Reclamation evaluated a set of alternative operations of Temperance Flat Reservoir/Millerton Lake to deliver water to the Friant Division using existing canals, and to other CVP and SWP water users through river releases that would be diverted at a downstream location. The analyses show that both water supply and ecosystem restoration can be realized using the same water supply.</p> </div> <div data-bbox="378 1652 1531 1894"> <p>The development of Temperance Flat Reservoir would inundate two existing hydropower plants owned and operated by Pacific Gas and Electric as part of the Kerckhoff Power Project. Mitigation measures to address power generation and remaining losses will be included as part of the Temperance Flat project. Recently, the US Bureau of Land Management found that the reach of the San Joaquin River between Kerckhoff Dam and the first downstream powerhouse is eligible for Federal designation as a Wild and Scenic River and recommended this reach for Congressional designation in the National Wild and Scenic Rivers System. A Wild and Scenic designation of this reach would preclude development of Temperance Flat Reservoir.</p> </div> <div data-bbox="378 1896 1531 1986"> <p>Reclamation prepared a draft feasibility report and circulated a Draft EIS for public review during 2014 and is completing review and approval of final versions of both documents. Interior plans to release the final feasibility report to Congress during 2016.</p> </div>
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California Storage

Conjunctive Management

Operational Flexibility

Surface Water Storage

Water Action Plan

Sustainability

Climate Change

Groundwater Declines

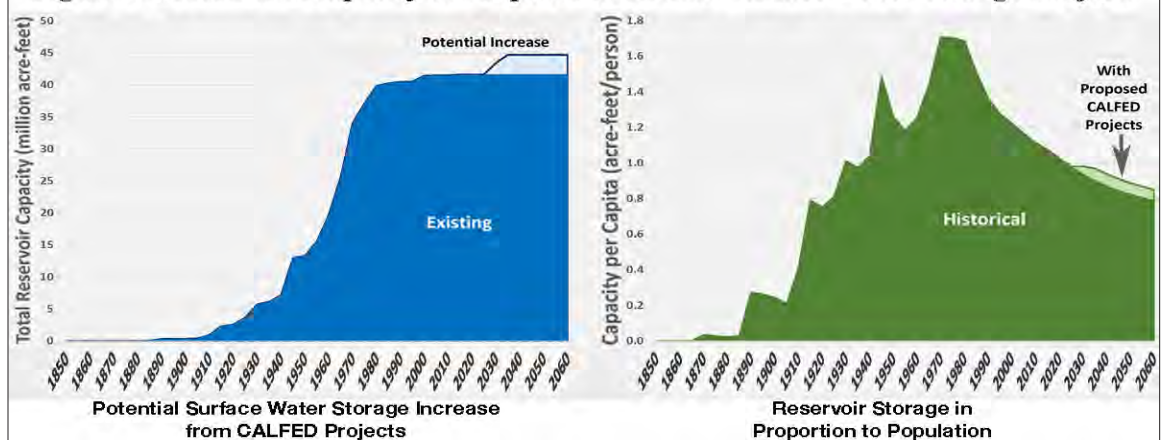
Groundwater Storage

The CALFED ROD recommended that groundwater storage projects be developed in addition to the surface water storage projects described above. A total of one MAF of additional managed groundwater storage capacity was recommended, although no specific projects were identified at the time. Interest in developing groundwater projects that could be operated conjunctively with surface water storage is high, particularly with the availability of funding through Proposition 1 and recent passage of the Sustainable Groundwater Management Act, as discussed later in this article.

How the CALFED Storage Projects Can Affect Water Management

The four CALFED surface water storage projects would increase the total surface water storage capacity in California by just over three MAF, but would not be implemented in isolation. As shown in Figure 5, this would represent a relatively modest increase to the existing total storage capacity, however it would be valuable in improving operational flexibility for the state-wide system. As also shown, historical development in California was propelled in part by the large available capacity of surface water reservoirs in comparison to population. The greatest amount of storage on a per capita basis occurred in the late 1970s as the SWP and other major projects were completed. Since that time, population growth and operational regulations have profoundly changed the management of surface water and groundwater reservoirs to produce a more integrated system. The operations of projects that once delivered water on a relatively consistent basis have become more coordinated with regional and local storage projects (surface water and groundwater) and the supplies are becoming more integrated with local water management actions — such as conservation, stormwater management, reuse, desalination, and cleanup of contaminated groundwater. New surface water storage can be implemented only if it can be demonstrated to increase the flexibility in managing a complex system that must meet a variety of needs and adapt to future uncertainty.

Figure 5. Additional Capacity of Proposed CALFED Surface Water Storage Projects



The California Water Action Plan

The 2014 California Water Action Plan articulated a series of actions to meet three broad objectives: more reliable water supplies; the restoration of important species and habitat; and a more resilient and sustainably managed water resources system (supporting water supply, water quality, flood protection, and environmental objectives). These objectives are aimed at better withstanding inevitable and unforeseen pressures in the coming decades. The ten recommended actions will move California toward more sustainable water management by:

- providing a more reliable water supply for farms and communities;
- restoring important wildlife habitat and species; and
- helping the state's water systems and environment become more resilient.

The Water Action Plan recognized the need to expand the state's surface water and groundwater storage capacity, including large and small projects. More storage will aid in adapting to the effects of drought and climate change on water supplies for both human and ecosystem needs. Climate change is expected to bring more frequent drought conditions and could reduce by half California's largest natural storage system — the Sierra snowpack — as more precipitation falls as rain rather than snow, and as snow melts earlier and more rapidly. Additional storage will also help in managing groundwater basins to reverse alarming declines in groundwater levels that could lead to irreversible land subsidence, poor water quality, reduced surface flows, ecosystem impacts, and the permanent loss of capacity to store water as groundwater (see California Department of Food and Agriculture, California EPA, 2014. *California Water Action Plan: Actions for Reliability, Restoration and Resilience*. January).

California Storage

Public Benefits

The California Water Action Plan acknowledges that demand for water goes well beyond water supply and flood management, the traditional purposes for which California's major reservoirs were built. Today, and into the future, water storage is expected to also help provide widespread public and environmental benefits. These benefits include: seasonal fish flows; improved water quality; water cool enough to sustain salmon; and increased flexibility to meet multiple demands, especially in increasingly dry years. As a result, the financing of additional water storage in California should reflect not just specific local benefits, but also these broader public benefits.

PROPOSITION 1 – THE 2014 CALIFORNIA WATER BOND

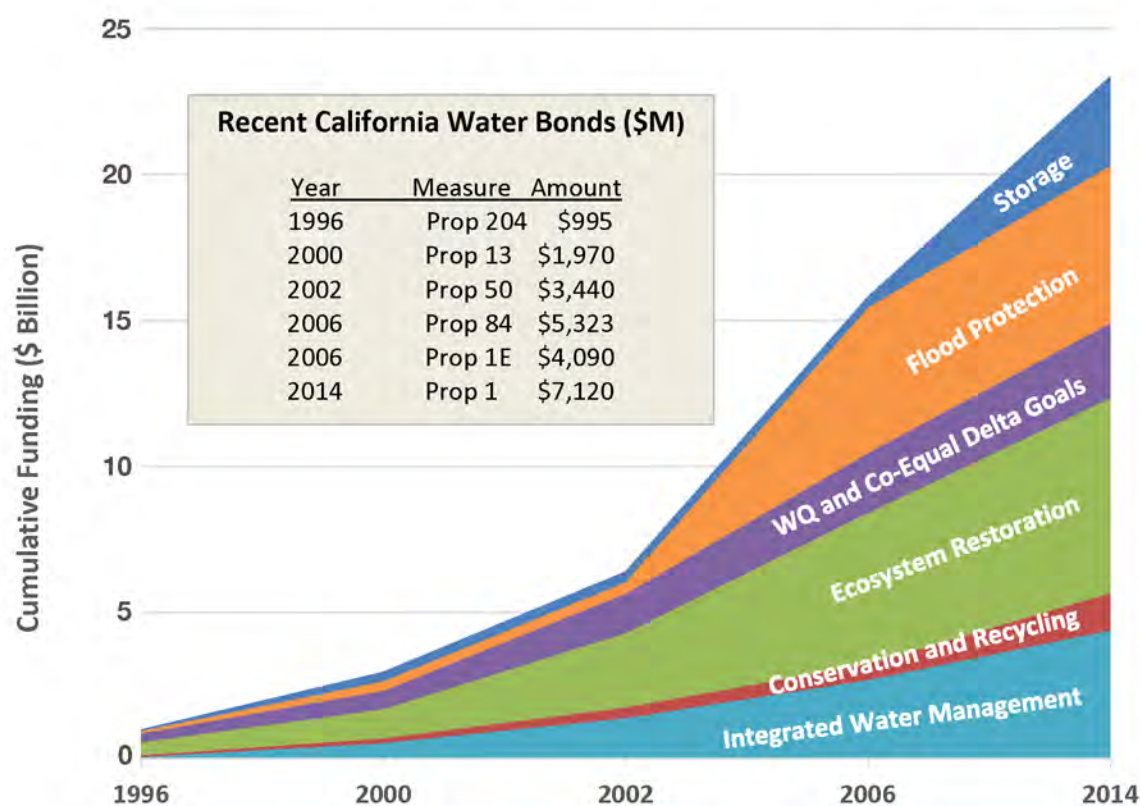
Water Bond

In November 2014, California voters overwhelmingly approved Proposition 1, the *Water Quality, Supply, and Infrastructure Improvement Act of 2014*, affirming the need for a safe and reliable supply of water to support the State's economy, environment, and quality of life. Development of this bond was a long and arduous process. In 2009, the State legislature passed a bond measure for \$11.14 billion that was planned to be placed on the 2010 ballot. Financial conditions in 2010, and again 2012 caused the legislature to delay placing the measure before the voters. In 2014, the legislature passed a replacement measure that authorized about \$7.1 billion of new funding and re-directs about \$400 million of previously authorized but unspent funding from other measures. The priorities for Proposition 1 closely align with those identified in the Water Action Plan. See "*The Making of California's Water Bond*" Brandt & Rendon, TWR #134.

Bond History

California has a long history of passing state bond measures to promote water management improvements, dating back to 1960 to finance construction of the SWP. As shown in Figure 6, Proposition 1 is the latest in a series of recent state bond measures that provided over \$23 billion for wise water management. Each bond measure includes funding for multiple objectives and directs the use of funds at both state-wide and local levels. Similar to previous State water bond measures, Proposition 1 requires a commitment of local funding, thereby stimulating significantly greater investment in system-wide water management improvements than would be possible through local measures alone.

Figure 6. Summary of Recent California State-Wide Water Bonds



<div data-bbox="142 180 318 264">California Storage</div> <div data-bbox="131 300 329 331">Public Benefits</div> <div data-bbox="157 443 303 506">Emergency Response</div> <div data-bbox="131 753 329 819">Environmental Benefits</div> <div data-bbox="157 1001 303 1064">Investment Program</div> <div data-bbox="142 1278 318 1310">Project Goals</div> <div data-bbox="168 1770 292 1833">WSIP Schedule</div>	<p>Proposition 1 includes \$2.7 billion for the public benefits that can be provided by water storage projects. Public benefits include: ecosystem improvement; water quality improvement; flood protection; emergency response; and recreation. Public benefits can be provided by multi-purpose storage projects that also provide non-public benefits, such as water supply and hydropower benefits that are paid by the users.</p> <p>Chapter 8 of Proposition 1 defines the public benefit categories and sets qualifying criteria. Ecosystem restoration benefits include measurable improvements to the Delta ecosystem or its tributaries. Measurable ecosystem changes may include: beneficial effects that result from changing the timing of water diversions; improving flow conditions; temperature improvements — or other benefits that contribute to restoration of aquatic ecosystems and native fish and wildlife.</p> <p>Emergency response includes water supplies and flows for dilution and salinity repulsion following a natural disaster or act (such as Delta levee failure or terrorism). Emergency water supply could be used to repel salinity if released from an upstream reservoir or to meet water demands that could not be satisfied with Delta supplies because of catastrophic damage.</p> <p>The legislation also specifies that Chapter 8 funds can provide no more than 50 percent of the total capital cost of a project and that ecosystem benefits must constitute at least 50 percent of the funded benefits. In addition, applicants for bond funding must have commitments for 75 percent of the remaining capital costs. Proposition 1 funds cannot be used for operations and maintenance costs.</p> <p>Water Storage Investment Program</p> <p>The authorizing legislation for Proposition 1 assigns the California Water Commission (Commission) responsibility for distributing Chapter 8 (storage) funds based on a competitive basis. The Commission is required to consult with the California Department of Fish and Wildlife, the State Water Resources Control Board (State Board), and the California Department of Water Resources, to develop and adopt by regulation, methods for quantification and management of public benefits described in Section 79753 by December 15, 2016. The regulations shall include the priorities and relative environmental value of ecosystem benefits as provided by the Department of Fish and Wildlife and the priorities and relative environmental value of water quality benefits as provided by the State Board.</p> <p>The Commission will fund the public benefits of eligible water storage projects through the Water Storage Investment Program (WSIP). The WSIP will support the California Water Action Plan and its call for a safe and reliable supply of water to support the State's economy, environment, and quality of life. It is being developed in an open, transparent, fair, and cost-efficient manner, with the objective to maximize the sound and responsible investment of public dollars. The Commission is working with a broad array of stakeholders including: water agencies; conservation organizations; tribal governments; public agencies; and communities throughout the state to develop the regulations and guidelines for the WSIP.</p> <p>The Commission will select projects for funding on a competitive basis based on expected return for public investment. Eligible projects must provide measurable benefits to the Delta ecosystem or its tributaries.</p> <p>ELIGIBLE PROJECTS INCLUDE THE FOLLOWING TYPES (<i>see California Water Commission, 2015</i>):</p> <p>SURFACE STORAGE PROJECTS identified in the CALFED Record of Decision, with the exception of projects that are prohibited by the California Wild and Scenic Rivers Act</p> <p>GROUNDWATER STORAGE PROJECTS and groundwater contamination prevention or remediation projects that provide storage benefits</p> <p>CONJUNCTIVE USE AND RESERVOIR REOPERATION PROJECTS</p> <p>LOCAL AND REGIONAL SURFACE STORAGE PROJECTS that improve the operation of water systems in the state and provide public benefits</p> <p>One of the first steps in developing the WSIP was an initial scoping survey in early 2015 to collect cursory information about potential water storage projects from project proponents that may request Proposition 1 funding. The survey requested general agency information and project information, such as: project type; anticipated completion dates for feasibility studies and environmental documentation; permit requirements; potential public benefits provided; project cost; and potential funding partners. Response to the survey was strong, with nearly 100 potential surface water and groundwater storage projects identified throughout the state. In response to a recent request for concept papers that provide more detail on possible projects, the Commission received over 40 responses from potential applicants. The WSIP will be implemented over many years on a schedule with the following anticipated major milestones:</p> <p>By December 15, 2016, the Commission will develop and adopt by regulation methods for the quantification and management of the public benefits of water storage projects (Water Code § 79754).</p> <p>By March 2017, the Commission will release draft project solicitation and evaluation guidelines for the Water Storage Investment Program and conduct meetings to consider public comments before finalizing the guidelines.</p> <p>After December 15, 2016 and before January 2022, the Commission will select projects through a competitive public process that ranks proposed projects based on expected return of public investment.</p>
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California Storage

Multiple Actions

Groundwater Regulation

Local Power

The Commission has encouraged potential project applications to develop a plan for multiple projects and actions that can maximize the benefits of new storage. Plans should identify groundwater banking, water conveyance, water treatment, watershed management, and other projects or actions that would enhance or be enhanced by new storage. Some related projects may also be eligible for funding through other chapters of Proposition 1. Where possible, applications should demonstrate how additional storage and related projects can provide benefits to disadvantaged communities.

Sustainable Groundwater Management Act

Groundwater is a critical water resource in California, providing long-term supply and an important buffer against drought shortages. Groundwater use is largely unregulated in many areas of California, and its overuse has led to severe declines in groundwater levels in many places, particularly in the Central Valley.

In 2014, California's severe and ongoing drought helped spur the passage of the Sustainable Groundwater Management Act (SGMA), the first-ever state-wide effort to comprehensively measure and manage groundwater (*see* Moon, *TWR* #128; Aladjem, *TWR* #135). SGMA is a package of three bills (AB 1739, SB 1168, and SB 1319) that create a framework for sustainable, local groundwater management for the first time in California history. It is based on a recognition that groundwater management in California is best accomplished locally. Local agencies will have the power to assess the conditions of their local

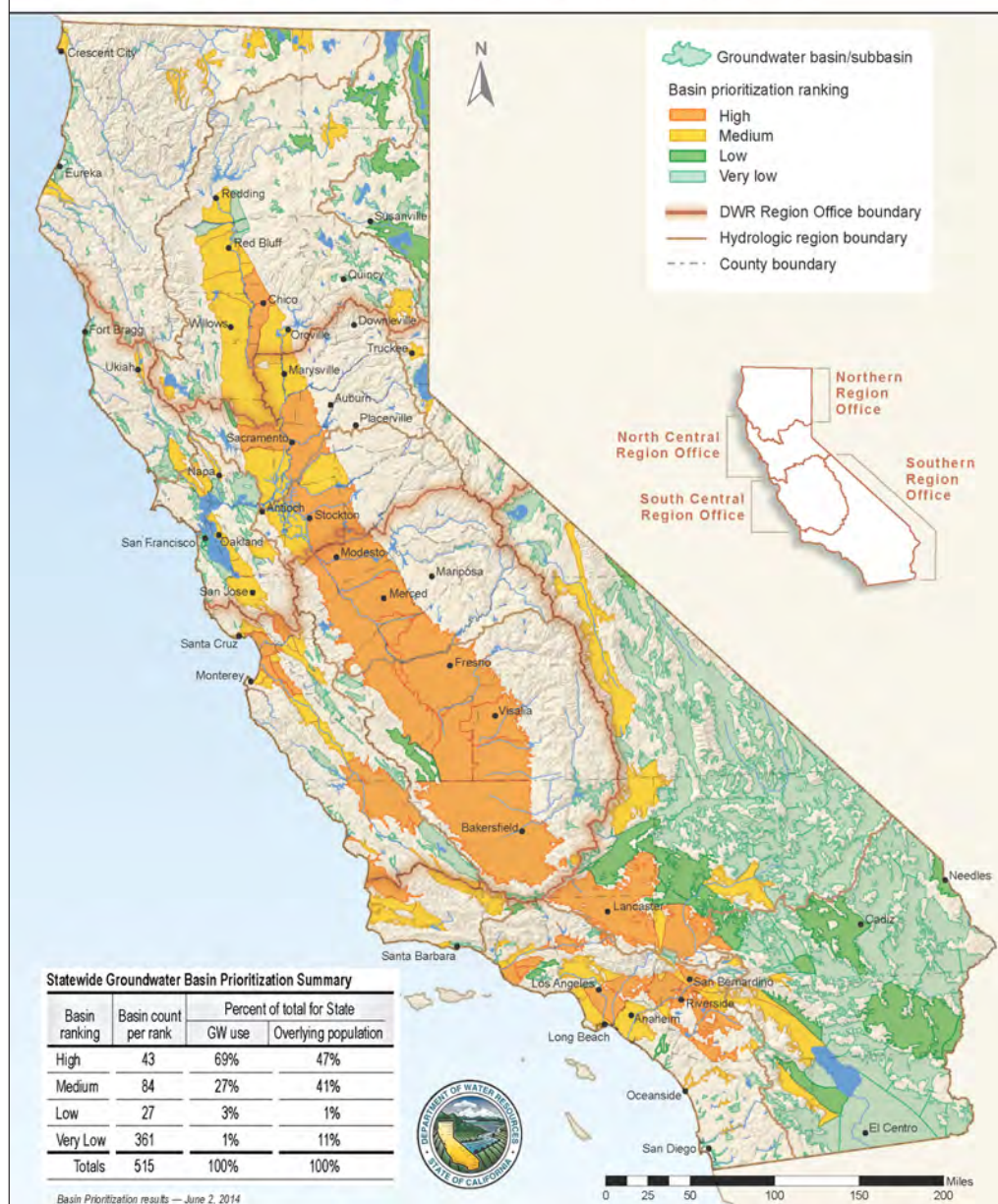
groundwater basins and take the necessary steps to bring those basins in a state of chronic long-term overdraft into balance.

SGMA requires local agencies to achieve sustainability within 20 years. It establishes minimum standards for sustainable groundwater management, provides local groundwater agencies with the authority and tools necessary to sustainably manage groundwater, and allows for state oversight and intervention if locals do not act.

SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) that will develop and implement Groundwater Sustainability Plans (GSPs) for basins that are designated medium or high priority. GSPs must consider all beneficial uses and users of groundwater in the basin, have measurable objectives, and include interim milestones that ensure basin sustainability. A GSA may be a local agency, combination of local agencies, or a county may establish a GSA.

As shown in Figure 7, many high and medium priority groundwater basins are located in the Central Valley, particularly in the San Joaquin Valley. The water management benefits of additional surface water will be of interest to GSAs to help achieve sustainability objectives.

Figure 7. Groundwater Basin Priorities under SGMA



California Storage

"Sustainable Yield"

Dramatic Changes

Important Decisions

Author

Bill Swanson

will be

Moderator

for the Session:

"Expanding Surface

Water Supplies"

at upcoming

California Water

Conference

Oct 25 & 26

in LA

Sustainable yield for a groundwater basin is defined as the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing one of the following undesirable results:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

CONCLUSIONS

Water management in California has changed dramatically from the time that most surface water storage was planned and constructed. Operating rules to address ecosystem needs, in combination with increased water demands, have reduced the operational flexibility needed to adapt to changing hydrologic, climatic, and environmental conditions. Over the past few decades, local projects designed to increase local supplies and reduce direct reliance on the state-wide water systems have helped fill the gap caused by reduced system-wide flexibility.

During the next two years, important decisions will be made that will affect long-term water management in California. The expansion of surface water and groundwater storage as envisioned by Proposition 1 will improve the operational flexibility of state-wide water systems to provide both public and non-public benefits. The recent requirements to develop and implement plans for groundwater sustainability will cause some water users to consider the value of new water storage projects differently. As water users consider their interest in making significant investments in new water storage, they also will be concerned about the outcome of decisions on the California Water Fix, a plan to construct tunnels below the Delta would affect the role and benefits of storage.

In their evaluation of applications for Proposition 1 funding to finance public benefits of new storage, the California Water Commission will consider the interdependent value that water storage provides in combination with other water management investments. In light of the recent and on-going drought in California, the public will expect decisions to be made quickly.

FOR ADDITIONAL INFORMATION

BILL SWANSON, PE, MWH, now part of Stantec.

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Bill Swanson, PE, serves as the Global Practice Leader for Water Resources for MWH, now part of Stantec. He has supported the US Bureau of Reclamation, California Department of Water Resources, US Army Corps of Engineers, and many local water agencies in California in the evaluation of water storage, both surface water and groundwater. He leads inter-disciplinary teams in evaluating proposed changes to water management systems, including modified operations and new infrastructure to achieve multiple objectives, such as increased water supply reliability, flood protection, ecosystem restoration, hydropower generation, and recreation. Recently, he directed the consulting team in the evaluation of Temperance Flat Reservoir and provided review and strategic advice in the evaluation of enlarging Shasta and Los Vaqueros reservoirs. He also led the consulting team in preparing the San Joaquin River Restoration Program EIS/EIR, which addressed actions to re-establish naturally-producing and self-sustaining salmon in the San Joaquin River downstream from Friant Dam. Bill is located in northern California in the MWH Walnut Creek and Sacramento offices and is a registered professional engineer in California and Texas.

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THE COLUMBIA RIVER PROGRAM



FORECASTING WASHINGTON STATE'S WATER FUTURE ON THE PROGRAM'S TENTH ANNIVERSARY

by Dan Haller, P.E., Aspect Consulting

With Foreword by G. Thomas Tebb, LHG, Director, Office of Columbia River

Stalemate

Office of
Columbia River

Forecast

Collaborative
Success
Elements

FOREWORD

The 1990's and early 2000's in Washington State was a time of regulatory uncertainty, litigation, and debate over the fate of available water supply in the Columbia River. Fractured stakeholder positions were ill-equipped to address emerging water supply issues such as climate change, declining groundwater, and the tension between Endangered Species Act (ESA) listed salmon recovery goals and out-of-stream economic prosperity desires. In 2006, the political stalemate broke in a landmark decision creating Washington's Office of Columbia River (OCR). See www.ecy.wa.gov/programs/wr/cwp/crwmp.html. OCR's mission was to aggressively pursue the development of water supplies for instream and out-of-stream uses. Fast forward to 2016, the 10-year anniversary of OCR. Although significant water supply challenges remain — including: a severe drought in 2015 and more frequent droughts expected with climate change; uncertainty over Columbia River Treaty negotiations; declining groundwater; and tighter budgetary purse strings — the outlook in Washington is largely positive and collaborative. OCR continues to produce real, beneficial, results. Into this context, OCR is releasing its Long-Term Supply and Demand Forecast (2016 Forecast) — predicting water supply and demand through 2035, and advancing policy changes that can help it adapt and succeed in the future.

How did Washington influence this transformation? What is it about OCR that succeeded when other hopeful efforts dissolved? Answers lie in the bold structure of the authorizing legislation and personal efforts of individuals in many key organizations and governments who set aside old enmities in the face of a new collaborative opportunity.

KEY ELEMENTS CONTRIBUTING TO OCR SUCCESS INCLUDE:

- **MISSION CLARITY:** OCR's authorizing legislation (Revised Code of Washington (RCW) 90.90) contained a dual-benefit mission statement — i.e., water supply projects should benefit both instream and out-of-stream uses. This allowed formerly polarizing advocates of one position to collaborate with others for mutual benefit. Specific problems were also assigned to OCR to solve, including declining groundwater in the Odessa area (a Columbia Basin Project area in Eastern Washington dominated by potato and other row crops), improved flows for fish, improved reliability for interruptible water users, and new water supplies for pending water right applicants who had been waiting for 20 years for their applications to be processed.
- **ROBUST FUNDING:** The Legislature authorized \$200 million in bond authorizations for capital expenditures over 10 years, and 15+ staff to administer the program. This level of funding offered the potential for more real water supply improvement in the short-term than what could be found in continued litigation and conflict. It also allowed OCR to balance short-term "wins" with long-term investments in studies and planning efforts that are just now bringing more significant water supplies to completion.
- **CLARITY IN FUNDING AND BENEFICIARIES:** Under RCW 90.90, 2/3rds of the funding had to be used for storage projects and 1/3rd for any other project type that could improve water supply. For storage projects, 1/3rd of the water had to be used for instream flow and 2/3rds for out-of-stream uses. These basic ground rules short-circuited debates that could have otherwise created the same conflict and malaise that preceded OCR's creation, and allowed rapid acceleration into project development.
- **CREATION OF A DIVERSE POLICY ADVISORY GROUP (PAG):** The Columbia River PAG was created by OCR within one month of the effective date of the Legislation as an advisory body to OCR. Comprised of state and federal agencies, local government, Tribes, municipal and irrigation organizations, and environmental groups, this diverse group advises OCR on project development and policy initiatives. Over the last ten years, the PAG has become a collaborative forum to address future water supply in Washington. OCR built trust with the PAG by listening to their input and adapting their investments. Early visions by OCR included a single large dam supply solution, which was not well received by the PAG. Today's OCR investment strategy includes a mix of surface and aquifer storage, conservation and pump exchanges, water banking, and infrastructure improvements. See www.ecy.wa.gov/programs/wr/cwp/cr_pag_2006.html.

Columbia Program

Success Elements

"Aggressive" Pursuit

Adaptation

2016 Forecast

Climate Change & Snowpack

"Re-Timed" Supply

Key Policy Issues

- **CULTURE CHANGE:** The Legislature's mandate that OCR "aggressively pursue the development of water supplies" created a management and staff-level imperative to solve problems. Rarely has an adjective (aggressively) been so discussed in policy forums about what the Legislature intended. The results, however, speak for themselves. "As of January 1, 2016, OCR has added almost 376,000 ac-ft [acre feet] of water to Eastern Washington's water supply at a cost of \$506 per ac-ft." (*see* www.ecy.wa.gov/programs/wr/cwp/cr_overview.html)



- **ACCOUNTABILITY:** Finally, to balance the expanded mission and funding, the Legislature required long-term water supply and demand planning on a five-year basis to ensure OCR was investing wisely, and adapting to changing water supply conditions (*see* www.ecy.wa.gov/programs/wr/cwp/cr_07leg rpt.html). OCR produced its first Forecast four months after the legislation passed and estimated at least another million acre-feet of water supply might be needed in the next 20 years. As OCR updated its Forecasting efforts in 2011 and 2016, those estimates of demand have steadily increased as modeling efforts have been refined, as our understanding of instream flow deficits for fish recovery improve, and as new emerging demands like declining groundwater come into focus.

The 2016 Forecast was a year and a half long effort that combined field measurements, state-of-the-science economic, crop, climate, and water right modeling techniques, to tell the story of Washington's water future and guide future capital expenditures. "The Water Supply and Demand Forecast is a powerful investment tool for Washington State. It helps describe where demand for water exists, the relative magnitude of instream versus out-of-stream demand, and how our local and regional water supply is likely to change in the future. This helps OCR direct water supply project development in areas where we can be most successful in ensuring a reliable water supply for Washington." Tom Tebb, OCR Director.

In broad terms, this year's forecast estimates that changing climate will affect availability and demand for water throughout Columbia River Basin, and will influence how water will be managed in the basin over the next 20 years. In Washington State, mountain snowpack is the engine that makes the crops, habitat, and communities thrive — storing valuable winter water and then releasing it into streams and canals when farms, fish, and domestic needs are at a peak. This year's forecast confirms that this cycle is being "re-timed," suggesting that overall seasonal shifts in timing of water supply and demand will be a dominant issue, and will likely require area-specific management and adaptation strategies in the future. The droughts of today are likely the average water conditions we will face in the future.

By embracing the comprehensive instream and out-of-stream vision of OCR's mission statement, the 2016 Forecast predicts that water supply needs by 2035 will climb to more than 15 million acre-feet, mostly associated with instream demands relative to State-adopted minimum instream flow rules. The water supply is available to meet this demand — OCR isn't creating water. It can be re-timed from largely spring water supply availability to summer/fall demand when both instream and out-of-stream suffer from diminishing supplies, hotter weather, and warmer water.

OCR recognized that understanding and meeting these demands requires both project development and regulatory tools. To that end, it expanded the 2016 Forecast to look at several key policy issues.

KEY 2016 POLICY ISSUES INCLUDED:

- **DECLINING GROUNDWATER:** OCR's emerging understanding of the "hidden demand" associated with declining groundwater, the risk it poses to those who formerly believed their underground water supply to be "forever-firm," and the conjunctive nature of impacts on surface water, prompted it to include declining groundwater demand in the 2016 Forecast.
- **WATER BANKING:** Over the last 10 years, water banking in Washington saw explosive growth from two to two dozen water banks trying to solve local and regional water supply challenges. OCR recognizes that reallocating water rights to new demand is a key tool in its toolbox and studied how banks are currently operating and how they can be improved in the future.
- **IMPROVED CROP MODELING (METRIC):** OCR continues to evaluate ways to improve crop modeling, since agricultural water use represents the largest consumptive use portion of the demand budget. METRIC, which stands for Mapping EvapoTranspiration at High Resolution and Internalized Calibration — was developed to calculate evapotranspiration using Landsat satellite images. OCR piloted whether METRIC

Columbia Program

Cost-Sharing

State Forecast

can aid in predicting future agricultural crop use. It also is potentially adapted to evaluating farm-level cross stress, alternatives to diversionary metering, and water right adjudications.

- **EFFECTS OF USER-PAY PROGRAMS:** The Legislature authorized OCR's water supply development projects to include cost-share elements with end users. In order to ensure its developing water supply at the appropriate market rate, OCR surveyed water right applicants to understand their willingness to participate in new water supply projects.
- **STATE WATER FORECAST:** OCR's scope covers about 2/3rds of Washington State. The remainder of Western Washington also had ongoing planning efforts at the local and regional levels. However, these efforts are not aggregated into a comprehensive State Water Forecast. OCR evaluated whether its Columbia River Basin Program modeling efforts could be adapted to the entire State by 2021.

INTRODUCTION

This article will now summarize the methodology and results from the 2016 Forecast, assembled by a team of scientists from OCR, Washington State University, the Washington Water Research Center, the University of Utah, and Aspect Consulting. Results presented are draft and a public comment period ran through July 20, 2016, along with Statewide workshops to gather public input. OCR will publish a final 2016 Forecast to the Washington State Legislature on November 15, 2016.

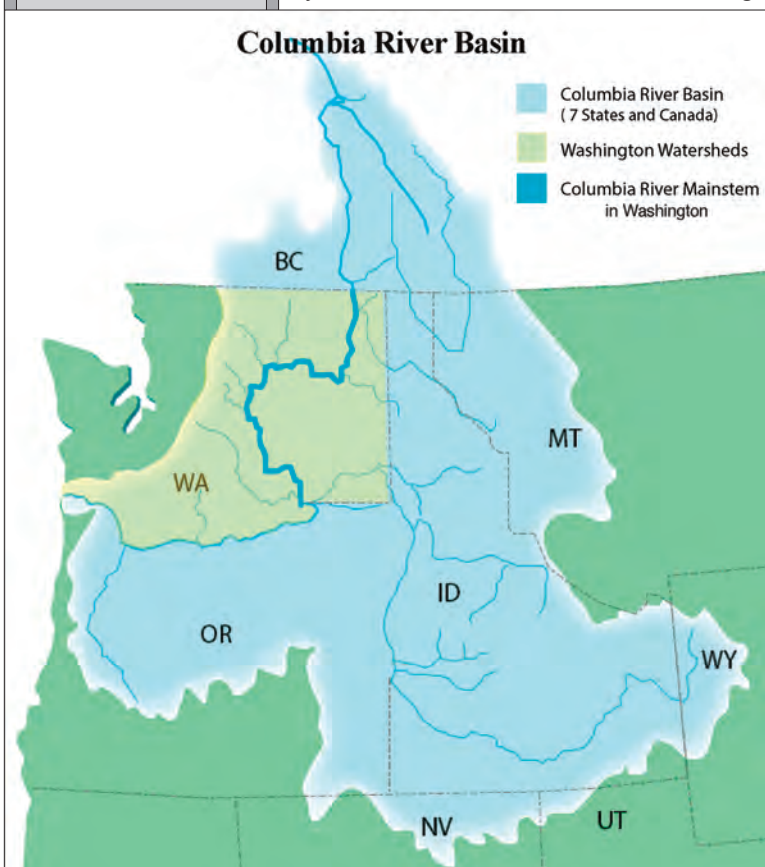
The fourth largest watershed in North America, the Columbia River Basin spans seven US States and British Columbia. It is a primary source of water supplies for Eastern Washington.

OCR FORECAST SCOPE

THE 2016 FORECAST INCLUDES THREE TIERS OF REVIEW:

- **REGIONAL REVIEW** that predicts water supply and demand changes across the entire Columbia River Basin watershed at a coarse scale based on physical, crop, and climate models.
- **WATERSHED-BASED REVIEW** in Washington that integrates local watershed and municipal planning information, and a stakeholder survey, of key government, Tribes, and planning entities. Additionally, local water right curtailment information was integrated that helped shape demand responses to limitations in supply for both adopted instream flow rules and local priority "calls" for water by senior water users for each of eastern Washington's 34 Water Resource Inventory Areas (WRIAs), from the Canadian border to Bonneville Dam.
- **COLUMBIA RIVER MAINSTEM-FOCUSED REVIEW** that integrates reservoir operations of dams along the Columbia, interruptible water right holders on the Columbia, Columbia River Treaty considerations, and the changing effects of tributary supply contributions due to climate change. (Under the terms of the Columbia River Treaty, either Canada or the United States can terminate most of the provisions of the Treaty on or after September 16, 2024, with a minimum ten years' written advance notice. Unless it is terminated, most of the provisions of the Treaty continue indefinitely. The terms for flood control under the Treaty, however, will change automatically in 2024. See www.crt2014-2024review.gov/Files/Columbia%20River%20Treaty%20Review%20_revisedJune2014.pdf).

Columbia River Basin



Office of Columbia River Water Resource Inventory Areas



Columbia Program

2011 Forecast

2016 Computer Model

Supply & Irrigation Demands

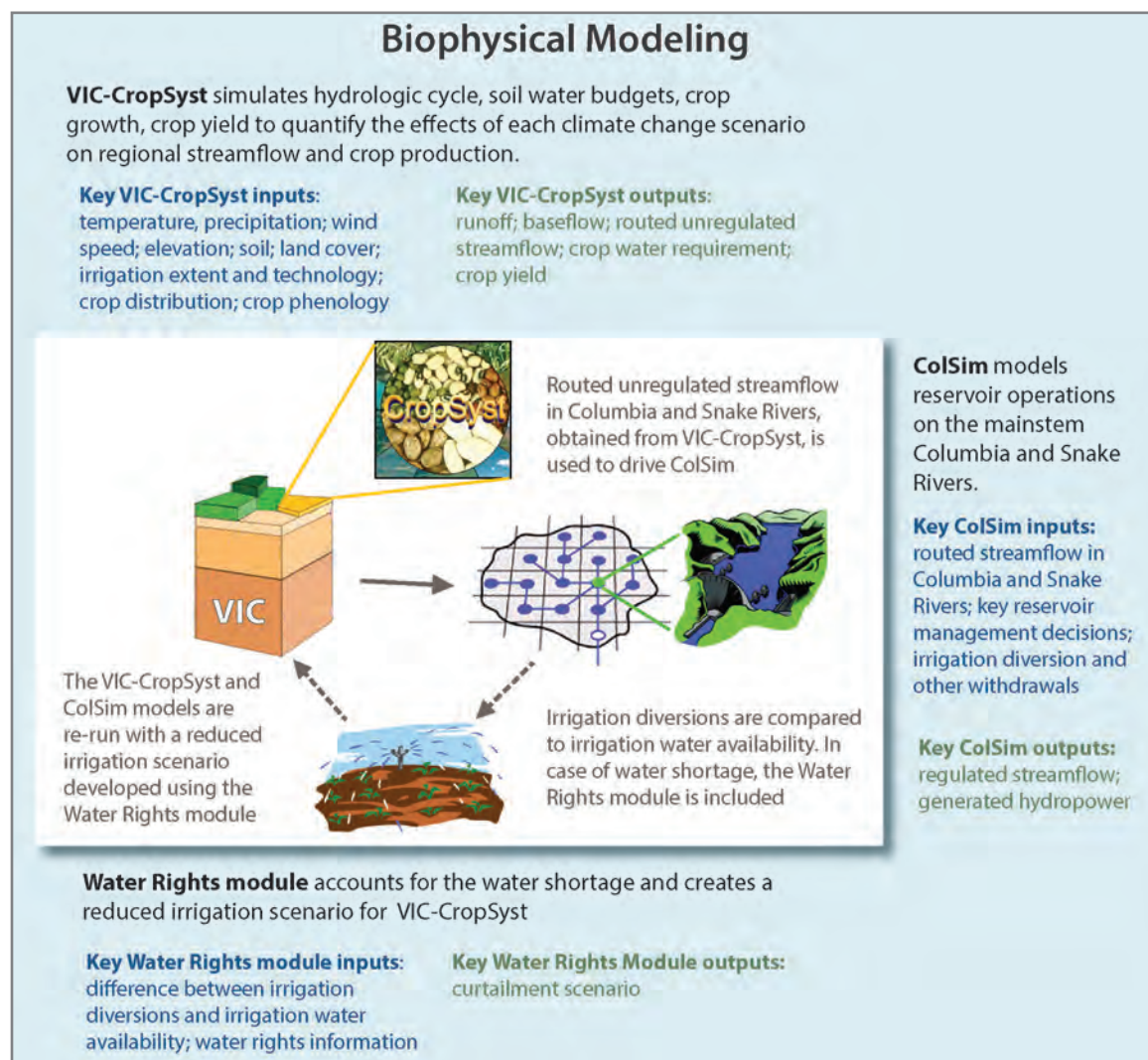
Demand Forecast Methodologies

FORECAST REPORT METHODOLOGY

The first Forecast was required to be completed only four months after the OCR legislation became effective in 2006. This initial Forecast used existing data and summarized other planning forecasts (e.g. USGS, OFM, water right applications on file with OCR) to estimate water use in Eastern Washington through 2025.

A different approach was taken in the 2011 Forecast. Then, for the first time, a computer-based model was employed to forecast water supply and demand, incorporating the impacts of climate change, future regional and global economic conditions, and state-level water management actions. This Forecast also quantified water supply and agricultural, municipal, and hydropower demands for water in 2011, and projected supply and demand in 2030. This represented a major integrated effort that laid the foundation for future forecasts.

The 2016 Forecast Team simulated surface water supply and agricultural irrigation demands with an integrated computer model that captures the relationships between: climate; hydrology; water supply; irrigation water demand; crop productivity; economics; municipal water demand; and water management for three different geographic scopes within the Basin — as shown on the following figure.



Municipal, hydropower, and instream flow demands are not coupled to the biophysical model and each had its own methodology. Municipal demands were forecasted by relying on planning documents filed by public water systems, as well as consulting other regional and State level planning estimates for domestic uses. Hydropower uses were forecasted by relying on planning documents published by the Northwest Power and Planning Council, and consultations with Bonneville Power Association and Columbia River public utility districts. Instream flow demands were forecasted by evaluating the amount of water needed to meet State adopted instream flow rules for a variety of drought years experienced in Washington between 1981 and 2011.

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Climate Change: Economic Impacts

Draft results of the 2016 Forecast suggest that supply will change significantly in Washington, predominantly due to climate change. “By integrating climate, hydrologic, crop, reservoir, economic, and water right curtailment models, we are able to predict how changes in climate may affect water supply and demand throughout Washington State. In many snowpack dependent watersheds in Washington, changes in supply are forecasted to result in more supply in spring and less in the summer. Climate change in combination with farmer selection of different crops due to market conditions could result in a range of demands for water (both increasing and decreasing) depending on changes in rainfall seasonality, evapotranspiration of existing crops, changes in crops grown, increased water right curtailment, and potential new water supply development by OCR. Understanding the potential economic impacts of climate change will help Washington adapt its water supply investments and regulatory policies to minimize adverse effects of a changing water supply.” Dr. Jennifer Adam, Washington State University, Civil and Environmental Engineering, 2016 Forecast Team.

KEY FINDINGS INCLUDE:

- Average annual increase in water supply at Bonneville Dam in south central Washington (lower Columbia River after all major tributaries have entered the river) could be on the order of +11.7%.
 - A decrease in supply of -10.6% is expected from June to October.
 - An increase in supply of +28.6% is expected from November to May.
- Demand shifts due to climate change and cropping changes could be on the order of -14.1% between July and October, and +6.1% between March and June.

A comparison of results from the 2011 Forecast to the Draft 2016 Forecast is shown in the following table.

Water Use or Need	2011 Forecast Estimated Volume (acre-feet)	2016 Forecast Estimated Volume (acre-feet)
Projected changes in Irrigation Demand ^a	170,000	-301,300 to -242,200
Projected changes in Municipal and Domestic Demand (including municipally-supplied commercial)	117,500	80,000
Projected changes in Hydropower Demand ^b	0	35,000 to 75,000
Water Use or Need to be Met with Surface Supplies		
Unmet Columbia River Instream Flows	13,400,000	13,400,000
Unmet Tributary Instream Flows ^c	500,000	659,918
Unmet Columbia River Interruptibles	40,000 to 310,000	40,000 to 310,000
Yakima Basin Water Supply (pro-ratables, municipal/domestic and fish)	450,000	450,000
Alternate Supply for Odessa	164,000	155,000
Declining Groundwater Supplies (other than in the Odessa Subarea) ^d	N/A	750,000

^a As described in this report, the overall decrease in agricultural water demand by 2035 is due to a combination of two factors: climate change and forecasted changes in crop mix. The climatically driven portion of this decrease is due to projected wetter overall climate by 2035, as well as most of the crops grown regionally being able to more efficiently use their water when atmospheric carbon dioxide concentrations are higher. The additional decrease attributable to changes in crop mix are due to the projected increase in acreage under crops with lower water demands.

^b Estimates of hydropower demand are based on a very coarse conversion of energy projections to ac-ft of water needed to produce it. In addition, this value is for the entire Columbia River Basin. Due to the coarse nature of the estimate, allocating some portion of this volume to Washington State could not be achieved at this time.

^c The main reason for the increase in unmet tributary instream flows between the 2011 and 2016 estimates is the addition of a new watershed. The Spokane River adopted instream flows between these two estimates, explaining the increase in unmet flows.

^d The evaluation of areas experiencing groundwater decline was not part of the 2011 Forecast.

2011 / 2016 Comparison

Agricultural Demand

The drop in agricultural demand represents a base scenario where irrigated acreage is held constant, and human responses to climate change are not predicted, such as the potential for double-cropping to take advantage of a longer growing season in the future. Additionally, the base scenario does not reflect water supply development by OCR by 2035 that may allow for acreage increases, and associated new demand. The final report due by November 15, 2016 will include alternate capacity scenarios that will forecast a range of possible outcomes for the agricultural demand sector.

Columbia Program

Declining Groundwater: Risks

DEMAND FROM DECLINING GROUNDWATER

In both the 2006 and 2011 Water Supply and Demand Forecasts, groundwater supplies were presumed not to be limiting when supplying water rights, mainly due to the availability of existing information on areas of groundwater decline and modeling constraints. In the 2016 Forecast, nine areas of Washington State with groundwater declines documented by the Washington State Department of Ecology (Ecology) and the United States Geologic Survey were evaluated. “The 2016 Water Supply and Demand Forecast included a state-of-the-science investigation of declining groundwater areas in Eastern Washington. We assembled water level monitoring data, groundwater model information, and water user information to understand what areas are at risk to a future water supply that will be less reliable than it is today. In most areas, both supply-side (e.g. aquifer storage and recovery) and demand-side (e.g. conservation) opportunities exist to reduce this risk. These are the kinds of water supply investments that OCR has collaborated with counties and local water purveyors to make to reduce the economic, public health, and environmental risks posed by declining groundwater.” Tim Flynn, Principal Hydrogeologist, Aspect Consulting, 2016 Forecast Team. In total, OCR estimates that at least 750,000 acre-feet of water right holders rely on groundwater supplies that are in decline. These supplies are used for: local homes and public water supplies; irrigated agriculture; and industry. They are at times linked to critical streams with adopted instream flow provisions.

OCR concluded that greater efforts are needed to evaluate declining groundwater in the 2021 Forecast.

OCR-LED GROUNDWATER EVALUATION EFFORTS COULD INCLUDE:

- GREATER MONITORING of the declining groundwater areas through expansion of current water level measurement in wells.
- PUBLIC OUTREACH to water right holders in declining groundwater areas to incentivize demand-side conservation measures.
- STATE AND COUNTY GOVERNMENT REVIEW of existing policies and regulations to determine their sufficiency in these areas to protect public water supplies and prevent economic consequences.
- OCR INVESTMENT IN WATER SUPPLY PROJECTS that could stabilize, reverse, or off-set declining groundwater supplies.

For the 2021 Forecast, the effect of groundwater declines on future demand will most likely be modeled through expanding the existing water right curtailment model to account for groundwater curtailments. Washington State is a prior appropriation state. Therefore, future groundwater declines could result in “calls” from senior-most groundwater users on more-junior well users to ensure that senior users receive the water covered under their water rights. Some surface-and-groundwater bodies are conjunctively managed in Washington watersheds, which means that surface-to-ground and ground-to-surface water right calls are also possible. By coordination with OCR and Ecology water masters and stream patrolmen, the potential physical and economic effects of new or increased curtailment calls from declining groundwater can be evaluated.



Curtailment “Calls”

Expanded Water Banking

WATER BANKING TRENDS IN WASHINGTON AND WESTERN STATES

The 2016 Forecast investigated what can be learned from water banking in Western States and the rapid emergence of water banks in Washington to help fulfill OCR’s water supply development mission. Water banks allow people who face water use restrictions to purchase mitigation credits to allow continued water use. Water banks are an emerging critical tool needed to help address the complexities of water management — including: drought risk; surface water-groundwater interactions; and legal and regulatory disputes and restrictions over water use — thereby allowing scarce water resources to be allocated more efficiently. “Water banks in Washington have increased from two to two dozen in the last 10 years due to new regulatory requirements like groundwater closures, clarifications on mitigation standards from the Washington State Supreme Court, and economic opportunities in the private sector to maximize the value of water right transactions. By studying how banks operate, how many transactions are processed, and

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Banking Improvements

Mitigation Criteria

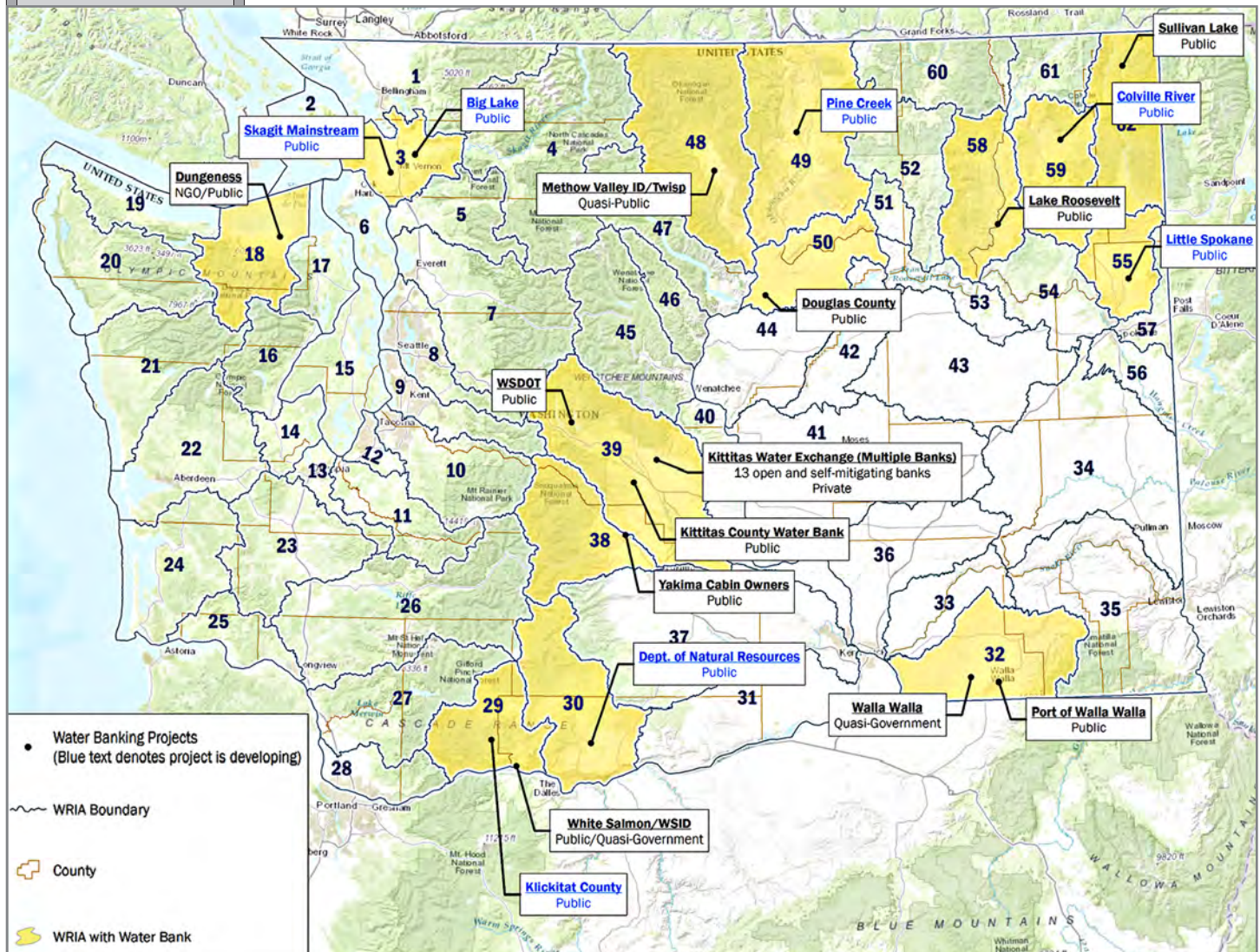
Options Contracts

the price at which water is being sold, we can predict the value of water in different areas of Washington. By interviewing water bankers and users of water banks, we hope to better understand where banks are working well, and how legislative and policy changes might improve their operation.” Melissa Downes, Technical & Policy Lead, Office of Columbia River, 2016 Forecast Team.

The Forecast Team surveyed Western States, as well as operators, buyers, and sellers of water rights from Washington water banks, to investigate numbers of transactions and water costs, and opportunities for regulatory improvements that could improve water banking in the future.

RECOMMENDATIONS FOR WATER BANKING IN WASHINGTON IN THE DRAFT 2016 FORECAST INCLUDE:

- **CLARIFY PUBLIC INTEREST CRITERIA** necessary for forming a water bank, since Ecology resources would be used to administer it. As currently structured, each new water bank creates new unfunded obligations on Ecology that detract from other legislatively-prioritized work, and Ecology does not distinguish between large and small banks, public and private banks, multi-user or single-user banks, or the beneficial uses or other public interests supplied by a bank.
- **SEEK LEGISLATIVE CLARITY** on mitigation criteria for streamlined bank operation. Mitigation criteria are currently in flux due to recent Washington State Supreme Court cases (*Swinomish v. Ecology* and *Foster v. Ecology*).
- **IDENTIFY FINANCING MECHANISMS** appropriate for water banking, to provide Ecology cost-recovery for bank formation and operation to prevent delays in forming banks in critical water supply areas.
- **IDENTIFY CRITERIA FOR BANKS** whose operation depends on water rights originating from outside the watershed to prevent unintended economic impacts on the area of origin.
- **EXPLORE ALTERNATIVES TO CONVENTIONAL PERMITTING AND MONITORING** for small water uses that drive bank costs up, including for metering and certified water right examinations.
- **EXPLORE ALTERNATIVE CONTRACTING OPTIONS**, such as computer-aided transactions and options contracts for water to streamline bank operations.



Columbia Program

Agricultural Use

"METRIC" Modeling

Crop Water Use

Consumptive Use

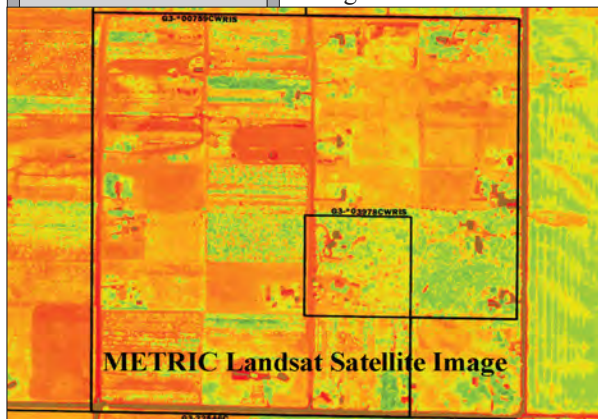
METRIC CROP DEMAND MODELING

PILOT APPLICATION IN WASHINGTON STATE

Agricultural water use largely corresponds to evapotranspiration (ET) — i.e., the sum of evaporation from the ground plus transpiration from plants. The aggregation of ET values across a watershed can be used to calibrate the integrated models used in the 2016 Forecast. ET is usually estimated using data from weather stations and making assumptions on stages of crop growth. Stages of crop growth vary significantly across a watershed, though, due to factors such as soil, management, and topography.

To address this problem, a model — METRIC, which stands for Mapping EvapoTranspiration at High Resolution and Internalized Calibration — was developed to calculate ET using Landsat satellite images. This model has been successfully used in Idaho, California, New Mexico and other regions to monitor water rights, quantify net ground water pumping, and to determine irrigation uniformity. "The use of METRIC provides broad policy opportunities within Washington, including improved agricultural demand forecasting, ways to evaluate crop stress, improvements in watershed level water budgets, alternatives for farmscale water measurement, and verification of existing water rights in adjudication. By piloting METRIC in 3 key watersheds in Washington, we learned that METRIC can be a new tool for helping understand and manage water supply and demand in Washington." Dr. Michael Barber, University of Utah, Civil and Environmental Engineering, 2016 Forecast Team.

The first objective of this exploratory project was to develop and calibrate METRIC to estimate crop water use in three pilot watersheds in Eastern Washington: Okanagan, Walla Walla, and Yakima. Publicly irrigated land and cooperating farms agreed to install weather stations on their property and participate in the pilot. A major drawback in using Landsat images for METRIC is that the satellite provides images every 16 days, or less frequently if some images are blocked by clouds. The second objective, therefore, was to develop an algorithm to compare crop water use between CropSyst (the crop production model used in the 2016 Forecast) and Landsat-derived-METRIC. If the use values were consistent, this would allow the crop model to estimate crop water use between the dates for which images are available. CropSyst could then be used to model scenarios with changes in irrigation practices, crop management, crop rotations, and to evaluate the effects of changes in water supply (e.g. curtailments) on crop water use during droughts.



THE FORECAST TEAM CONCLUDED THE FOLLOWING IMPORTANT OUTCOMES OF THIS MODULE:

- CropSyst, if well-parameterized, can estimate accurately crop growth.
- The METRIC model is now developed and calibrated for Eastern Washington using freely or generally available software (Python and ESRI ArcGIS functions).
- Comprehensive modeling of the crop water use across Washington's WRIAs can improve model estimates of consumptive use in future long-term supply and demand forecasts.
- METRIC can fill in gaps where direct diversionary water measurement is not available, or may be able to be used in lieu of direct measurements with similar accuracies.
- METRIC can be applicable for water right adjudication support, similar to efforts in Idaho.

Cost Recovery

Economic Evaluations

Fee Structure

USER-PAY REQUIREMENTS ON WATER PERMITTING: EFFECTS

Participation rates of applicants in water supply development cost-recovery programs effects the ability of Ecology to recover the costs of providing these services and is a price signal for future investments. Over the last ten years, Ecology and OCR have offered six programs that included different kinds of cost-recovery user-pay responsibilities. These programs ranged from investments in surface storage projects, water right leases, water service contracts backed by water right purchases, and recovery for permitting costs. "Washington has offered numerous water supply and permitting cost recovery programs in the last 10 years, at different price points, and with different terms, conditions, and qualifying criteria. Participation decisions of applicants to date provide a basis for understanding the value of water and the conditions that are likely to attract applicants to participate. Through a combination of economic evaluations and direct interviews with applicants, we are able to better understand how OCR can tailor future water supply programs to meet forecasted demand." Dr. Jonathan Yoder, Director, State of Washington Water Research Center, 2016 Forecast Team.

FEE STRUCTURE VARIANTS INCLUDED:

- A one-time processing fee for water supply development and permitting.
- Annualized payments for a new water right permit.
- Annualized payments for leased water.
- Individualized mitigation supplied by applicants without State-based program fees.

The objective of this study was to better understand the importance of program characteristics, including fee structure, on program participation decisions. A survey was delivered to individuals who

Columbia Program	<p>chose to or declined to participate in the different target programs, obtained from OCR's water right application database. The survey data acquired from an original sample of 800+ individual applicants was evaluated statistically to identify the most important determinants of program participation, and to estimate the price-responsiveness of potential participants. Some individuals contacted the Forecast Team directly and provided qualitative feedback that was also useful in understanding applicant responses.</p>
Survey	<p>To date, 168 of 859 initial survey requests have been completed, for a response rate of 19.5%. This is a relatively low response rate, though not uncommon in social science surveys such as this. Additional outreach is on-going and will be reported in the final Forecast in November.</p>
Permitting Payments	<p>PRELIMINARY RESULTS PROVIDED IN THE DRAFT 2016 FORECAST INCLUDE:</p> <ul style="list-style-type: none"> • PAYING FOR WATER SUPPLY DEVELOPMENT OR PERMITTING MAKES SOME PROJECTS UNFEASIBLE. In the 1990's, filing a water right application typically cost \$10 and Ecology provided staff to investigate and process the water right for that charge. No cost recovery of the value of the water was assessed. Cost recovery for permitting under current statutory requirements can be as much as \$20,000 (see http://leg.wa.gov/jlarc/AuditAndStudyReports/Documents/WaterConservancy.pdf). Cost recovery for OCR water supply development ranges from \$35 to \$60 / ac-ft / year as an annualized cost for permanent supplies (see www.ecy.wa.gov/programs/wr/cwp/permitting.html).
Time Delays	<ul style="list-style-type: none"> • THE TIME PERIOD BETWEEN APPLYING FOR A WATER RIGHT AND RECEIVING A PERMIT MAKES SOME PROJECTS UNFEASIBLE. Current processing times for new water rights in Washington are typically at least a year, even if a project qualifies for priority processing and is fully mitigated. Some applications have been on file with Ecology for more than 20 years. During that time, property may have changed hands several times, project feasibility may change, and other factors may make a project untenable, that would have been originally feasible.
Eligibility Constraints	<ul style="list-style-type: none"> • SOME PARTICIPANTS WOULD HAVE PARTICIPATED BUT WERE NOT ELIGIBLE. Each of OCR's supply projects had unique program constraints based on how they were developed. Some were limited to certain purposes of use (e.g. the Lake Roosevelt supply program did not allow for agricultural irrigation, only municipal and industrial uses). Some were limited geographically (e.g. the Sullivan Lake water supply program was limited to six counties in northeast Washington). As a result, some applicants' choice on participation was made on factors other than cost of water.
Regulatory Driver	<ul style="list-style-type: none"> • A REGULATORY DRIVER AFFECTS PARTICIPATION. Some applicants could not complete their project or continue an existing water use unless they participated, irrespective of the cost of the program. For example, in the Yakima basin in central Washington, a curtailment order issued in the Acquavella Adjudication Court would have forced cabins, camps, and other small water uses that relied on springs to stop using water during drought in favor of senior irrigation rights. Many of these users participated in the "Cabin Owners Water Bank" backed by a senior water right acquired by Ecology, which allowed them to continue using water during drought years.
Watershed Planning	<p>Other conclusions on how charging for water supply affected permitting will be provided in the final report, following the close of the survey period and an economic analysis of the data.</p>
Planning History	<p style="text-align: center;">STATE WATER FORECAST</p> <p>Local watershed planning in Washington started in 1997, with varying success. In some watersheds, the plans resulted in stakeholder collaboration and agreement on both out-of-stream needs and adoption of instream flow rules. In other watersheds, the process was less successful in bringing together coalitions and achieving consensus-based supply and demand solutions. In 2006, the Legislature required OCR to integrate water supply and demand forecasting for Eastern Washington and the entire Columbia River Basin, and harmonize it with local watershed planning efforts. The resulting forecasts provided coverage for watersheds without a plan, extended the momentum of successful plans, and informed water supply development. However, increasing demands on water are not limited to Eastern Washington. The purpose of this investigation was to assemble information on available data, studies, and plans in Western Washington, and evaluate the potential for a State Water Forecast in 2021.</p> <p>"Washington State has a rich planning history at both the local and state levels, including local watershed plans, municipal water system plans, county growth management plans, and the OCR Water Supply and Demand Forecast for Eastern Washington. Currently these planning efforts are only aggregated in Eastern Washington, so there is value in looking at how moving towards a State Water Forecast in 2021 would help better inform us about statewide implications of a changing water supply. The 2016 Forecast took a step in this direction by compiling a resource library of foundational planning information, evaluating whether data sets used in the existing models are available statewide, and identifying issues unique to western Washington that should be considered in a statewide plan, such as tidal effects, rainwater use, water reclamation and reuse." Dave Christensen, Program Development Section Manager, Ecology Water Resources Program, 2016 Forecast Team.</p>
Primary Data Sets Useful	<p>Based on an investigation of the extent of model data sets and assumptions, the Forecast Team concluded that the primary datasets used as inputs to the integrated models used in Eastern Washington do extend to Western Washington. The existing modeling framework developed for Eastern Washington could be used to forecast water supply and agricultural demand across Washington State, and a process similar</p>

Columbia Program

Livestock Use

Conjunctive Use

Reuse

to that used in Eastern Washington can be used to forecast municipal and hydropower demands. However, some areas needing further analysis were also identified.

SOME DIFFERENCES REQUIRING ADDITIONAL INVESTIGATION INCLUDE:

- Tidal effects in coastal WRIs are currently not accounted for.
- Some small farm acreage estimates are missing in the Washington State Department of Agriculture land cover dataset that would need to be estimated.
- Livestock consumptive use, not accounted for in the current model, is a large fraction of agricultural water demands in certain WRIs.
- WRIA-specific groundwater/surface water interactions may be more important, as groundwater accounts for a higher proportion of water withdrawals.
- Western Washington has a greater percentage of smaller WRIs than in eastern Washington.
- Water reclamation/reuse occupies a greater percentage of municipal demand.

The 2016 Forecast benefits from a broad stakeholder outreach foundation as the third iteration of this effort. Integrating to a State Water Forecast necessarily will require a broad public, agency, and stakeholder outreach strategy to identify data gaps, integrate local and regional planning goals, and leverage existing planning expertise.

NEXT STEPS

The Office of Columbia River will continue to utilize the 2016 Forecast as an investment tool for future water supply projects. This fall, OCR will incorporate comments received during the public review period, and prepare the final report for submittal to the Washington State Legislature on November 15, 2016. Some of the recommendations outlined in the 2016 Forecast will require additional funding to implement, which OCR will consider as it prepares its biennial budget requests. Others are policy or legislative in nature, and the OCR Policy Advisory Group will be a sounding board for prioritizing these initiatives.

The prospect of changes to the Columbia River Treaty are being closely watched. [RE: Treaty *see* Miller, *TWR* #101, Bankes & Cosens, *TWRs* #105 & #129, Christensen, *TWR* #125, and Light, *TWR* #133.] No other event could more significantly alter how OCR directs its resources, manages its portfolio of water supply projects, and invests in new projects moving forward.

OCR is nearing the end of its initial \$200 million dollar bond authorization (\$7 million remains unallocated), and providing a source of stable funding for the program moving forward is an important initiative. However, the remaining factors that create the stability and strength of the program remain, including clarity in policy direction and a robust stakeholder support system.

Acknowledgements

The 2016 Water Supply and Demand Forecast is the work of over a dozen scientists and water resource professionals from the Department of Ecology, Washington State University, the Washington Water Research Center, University of Utah and Aspect Consulting — led by Dr. Jonathan Yoder and Dr. Jennifer Adam.

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AG / CWA

AGRICULTURE & THE CWA

RULING IN *DUARTE NURSERY V. ARMY CORPS* CONCERNING FOR LANDOWNERS

by Tiffany Dowell Lashmet, Texas A&M Agrilife Extension (Amarillo, TX)

Editors' Introduction: The following article originally appeared in July on the excellent online blog "Texas Agriculture Law" (see <http://agrilife.org/texasaglaw/>) — which covers legal issues, including myriad water issues, affecting agriculture in Texas. It has been updated and minimally edited to better fit our format with the much appreciated help of the author.

INTRODUCTION

In the last few years, we have seen an increased focus on the regulatory reach of federal jurisdiction over agricultural lands, with the new Waters of the United States (WOTUS) rule and related court decisions [see Glick, *TWR* #149]. A recent trial court decision from the Eastern District of California should be extremely concerning to landowners across the country. At issue, was the federal Clean Water Act (CWA) and agricultural operations.

BACKGROUND

In 2012, Duarte Nursery (Duarte) purchased 450 acres land in Tehama County, California with the intent to farm the land, initially by sowing winter wheat. The property, north of Sacramento, consists of rolling grassland. Prior to 1988, the land had been farmed, but from 1988 until the Duarte purchase in 2012, the land had been used for grazing. Due to the clay soil, water collects after rainfall in what are referred to as "vernal pools."

Duarte hired a local wheat farmer to plant, care for, and harvest wheat on the property. The farmer was instructed to till the soil 12 inches or less, and did so using a Case IH tractor and a Wilcox ripper with 36-inch shanks. He was told to avoid vernal pools on the land. The farmer avoided some, but not all, of the vernal pool areas, but none of the pools were destroyed.

In November 2012, a US Army Corps of Engineers (Corps) employee drove by the property and observed farming activities and equipment present. He took photographs of what he believed to be a CWA violation. He returned again in December and observed tilling of the land. He then contacted the owner of Duarte Nursery to inform him that the tilling activities required a permit under the CWA. Duarte argued it did not need a permit as it was avoiding areas considered wetlands and, therefore, "waters of the United States."

In February 2013, the Corps sent a cease and desist letter to Duarte. The letter stated that the Corps believed Duarte discharged dredged or fill material into waters of the United States without a permit as required by CWA Section 404. Specifically, the discharge allegedly occurred into "seasonal wetlands, vernal pools, vernal swales, and intermittent and ephemeral drainages."

In March 2013, Duarte's counsel responded to the letter, seeking any and all documentation used by the Corps to support the allegations that Duarte was in violation of the CWA. They also pointed out that CWA Section 404 exempted certain agricultural activities.

Eventually, the case was transferred to the US Environmental Protection Agency (EPA) for enforcement.

In October 2013, Duarte filed suit against the Corps, alleging due process violations. In response, the Corps filed a counterclaim alleging violation of the CWA by Duarte.

CLEAN WATER ACT PROVISIONS

The federal CWA essentially provides that a landowner may not discharge a point-source pollutant (Section 402) or dredge and fill material (Section 404) into a "water of the United States" without obtaining the proper permit from EPA or the Corps. There are important agricultural exceptions to both CWA Section 402 and CWA Section 404. See "*Clean Water Act Basics*" at: <http://agrilife.org/texasaglaw/2015/09/02/clean-water-act-basics/>.

TRIAL COURT DECISION

At the end of June, 2016, the trial court issued its opinion in this case (full opinion available at: <http://agrilife.org/texasaglaw/files/2016/07/Read-full-opinion-here.pdf>).

First, the trial court discussed a technical issue of whether this case was properly filed based upon the cease and desist letter, or whether a "final agency action" was required based on the federal Administrative

Federal
Jurisdiction

Tilling

Corps'
Observation

Cease & Desist

Clean Water Act:
Ag Exceptions"Final Agency
Action"

<div data-bbox="138 178 321 220">AG / CWA</div> <div data-bbox="147 325 311 394">Due Process Claim</div> <div data-bbox="118 569 341 604">CWA Violations</div> <div data-bbox="155 674 303 743">Individual Liability</div> <div data-bbox="162 919 298 989">Pollutant Discharge</div> <div data-bbox="159 1165 300 1234">Navigable Waters</div> <div data-bbox="139 1304 318 1373">"Substantial Nexus" Test"</div> <div data-bbox="129 1514 328 1583">"Point Source" Applicability</div> <div data-bbox="147 1688 313 1757">Agricultural Exception</div>	<p>Procedures Act (APA). The Court sided with Duarte on this issue, finding that no "final agency action" was necessary because the nature of the challenge was constitutional. Regardless, the court reasoned, the plaintiffs had sufficiently shown that a CWA cease and desist letter was sufficient "final agency action" under the APA. Thus, the court had jurisdiction to hear the case. [For more about a recent US Supreme Court decision on the issue of final agency action and the CWA, <i>see</i> Glick, <i>TWR</i> #149.]</p> <p>Second, the court reviewed Duarte's due process claim. In order to succeed on a due process case, the plaintiff must show: (1) deprivation of a constitutionally protected liberty or property interest; and (2) a denial of adequate procedural protections. Duarte argued it had a protected property interest in the land and its use for wheat farming. The Corps argued that a cease and desist letter did not constitute "deprivation" of an interest. The court sided with the Corps on this issue, finding that there was no deprivation based upon the letter. "The Army Corps would have had to request the EPA or the DOJ [federal Department of Justice] to bring an enforcement action to actually enforce the CWA. The Army Corps has sought enforcement now by filing its counterclaim to this action. However, enforcement had not occurred at the time the plaintiffs received the C&D [cease and desist] letter." Without actual deprivation of a protected property interest, the due process claim must fail. Summary judgment was entered for the Corps on this issue.</p> <p>Third, the court turned to the Corps' counterclaim, alleging that Duarte violated the CWA. The court addressed numerous sub-issues in analyzing this counterclaim.</p> <p>THESE SUB-ISSUES INCLUDED:</p> <p>INDIVIDUAL LIABILITY: Even if Duarte Nursery could be held liable for violating the CWA, Duarte argued that its President, John Duarte, could not be held personally liable, as he did not personally discharge any pollutant. The court sided with the Corps on this issue, applying the "Responsible Corporate Officer Doctrine" (RCOD). Although the CWA definition of "person" does not expressly include corporate officers, the trial court determined that the RCOD should apply and that a corporate officer with authority over the allegedly illegal activities should not escape liability merely by delegating tasks to others. Because John Duarte was in charge of the farming activities — even though he did not personally farm the land — he is a responsible corporate officer.</p> <p>DISCHARGE OF A POLLUTANT: The court held that by plowing the land, Duarte discharged dredge and fill material, which is a "pollutant" into a water of the United States. The court looked to EPA regulations where "fill material" was defined as "rock, sand, soil, and clay" and considered a pollutant. Likewise, regulations define "dredged material" as the addition, including redeposit other than incidental fallback, of dredged material, into water of the US. From these regulations and prior cases, the court held that it "is clear that 'soil' is a pollutant." Thus, because the farmer caused the soil to move during tilling by creating furrows and ridges and the soil was redeposited into a water of the United States, the plowing discharged a pollutant.</p> <p>NAVIGABLE WATERS: The court then turned to an issue that has been in the news frequently as of late, namely: is the Duarte property a "water of the United States?" The court applied the approach from the plurality and concurrence in the <i>Rapanos</i> case to determine whether this property was a water of the US. (Note: The court did NOT analyze this under the new EPA rule defining waters of the United States, because that rule has been stayed by the 6th Circuit and is not currently in effect in the United States.) The court applied the "substantial nexus test" stating that if wetlands have a significant effect on the chemical, physical, and biological integrity of the nearby navigable waters, they are a water of the US. Here, investigations showed that the Duarte property "collect and hold water during significant rain events...prior to filtering into downstream waters" and that "the wetlands and water on-site are hydrologically connected...and help to moderate flood flows due to storm events..." Thus, the court explained that because the "wetlands within the Property have physical connections to Coyote Creek, a tributary of the navigable waters of the Sacramento river," the wetlands on the property constitute a water of the US.</p> <p>POINT SOURCE: Next, the court determined that using a plow to disturb soil constitutes a point source discharge. The CWA applies only to point source discharges (as opposed to non-point source discharges), which are defined as "any discernible, confined, and discrete conveyance...from which pollutants are or may be discharged." The court reasoned that that tractor and plow (called a "ripper" by the opinion) constitute a point source.</p> <p>AGRICULTURE EXEMPTION: Finally, the court analyzed the applicability of the agriculture exemption to this case. CWA Section 404 provides that "normal farming activities such as plowing, seeding, cultivating, minor drainage, and harvesting for the production of food, fiber, and forest products or upland soil and water conservation practices..." are exempt from the CWA. To fall within this definition, the activities must be part of an "established (i.e. on-going) farming operation." "An operation ceases to be established when the area on which it was conducted has been converted to another use or has lain idle so long that modifications to the hydrological regime are necessary to resume operations." Further, "plowing" is defined as "all forms of primary tillage, including moldboard, chisel, or wide-blade plowing, discing, harrowing, and similar physical means used on a farm, forest or ranch land for the breaking up, cutting, turning over, or stirring of soil to prepare it for the planting of crops." It does not include redistribution of soil which changes a water of the US to dry land. Additionally, a permit is</p>
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AG / CWA**"Established"
Farming****CWA Violation****Vernal Pools****Tangential
Connection
Concerns****Plowing Lapse****Tiffany Dowell**

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required if the farming practice is part of an activity whose purpose is to convert an area of the waters of the United States into a use to which it was not previously subject, where the flow or circulation of waters of the United States may be impaired or the reach of such waters reduced."

Applying this exception, the court found that there was no "established" or "ongoing" farming activity. Evidence showed that the land had not been farmed from 1988 to 2012. During that time, the land had been used for grazing. The court stated that it was "not persuaded that, after nearly twenty-four years of no activity that meets the applicable definition of farming, the tillage and planting of wheat by plaintiffs can be considered a continuation of established and ongoing farming activities." Additionally, the court found that aerial photos showed the wetlands "impacted by the tillage and planting activities," specifically showing "substantial changes in the hydrological regime" which is prohibited by the exemption. Thus, the agriculture exemption does not apply.

In summary, the court explained that the plowing equipment did not avoid all wetlands on the property, the equipment moved dirt from around and in the wetlands before redepositing it into the wetlands, the wetlands have a "significant nexus" to Coyote Creek, which is a tributary of the navigable Sacramento River, and tillage was not part of an established and ongoing farming operation. Thus, Duarte was required to have a federal permit in order to plow the wetlands and the plowing/ripping without a permit was a violation of the CWA.

CONCERNS FOR AGRICULTURE

For the last several years, agriculture has been hearing horror stories of what could happen if the CWA were to be broadly applied. This case, unfortunately, seems to be an example of several of those concerns coming true.

First, the basic idea that a landowner would be told that he could not plow ground to sow wheat on his own property, alone, is a shocking idea to most farmers and landowners in the United States. Adding more concern to this is the extremely high potential fines for a CWA violation. Fines can be assessed at as much as \$37,500/day.

Second, this case illustrates the reach of the current definition of "waters of the United States," and many fear the new definition currently stayed pending litigation is even broader. In this case, there was no navigable stream running across or even near the property. Instead, the court found jurisdiction to exist based on intermittent flows and vernal swales that were hydrologically connected to a nearby creek, which in turn eventually dumped into a navigable river. Keep in mind, this was not swampland — the seasonal swales and vernal pools existed only after storms. This type of tangential connection is the exact concern that so many expressed about the new definition of a water of the United States. How far reaching is the CWA? What about playa lakes in Texas? Where do jurisdictional waters end and privately owned land begin? How can a well-intentioned producer know for sure? These questions remain unanswered.

Third, the extremely narrow application of the agricultural exception to CWA Section 404 is also concerning. Despite the EPA touting the agricultural exceptions as offering protections to farmers and ranchers, when it is narrowly construed, those protections do not apply. In this case, the activity at issue was plowing a field, one of the most basic agricultural activities. Here, despite the fact that the property had been grazed for agricultural purposes for the last 24 years, the exception did not apply because it not had not been plowed and farmed during that time.

Fourth, this case is not likely going away. Although this case is only a trial court decision and is only binding in California, it is certain that the EPA and Corps will cite this decision in cases across the nation. Duarte has sought the right to file an immediate appeal to the United States Court of Appeals for the Ninth Circuit. After a decision there, certiorari could be sought at the United States Supreme Court. Given the importance of this issue, it is unlikely that we have seen the end of this case.

CONCLUSION

The trial court opinion addressed issues of liability only, and did not address any fines that may be levied by the Corps. If the trial court decision is upheld, it is likely that Duarte may face steep fines for failing to obtain the necessary permit. Duarte has filed a motion for reconsideration of the judge's decision or, alternatively, certification for an interlocutory (essentially an immediate) appeal to the United States Court of Appeals for the Ninth Circuit.

This decision likely leaves landowners scratching their heads. One of the major difficulties with the Clean Water Act is the lack of clarity for agricultural operators who seek to use and maintain their privately owned and maintained farms and ranches. There are, unfortunately, very few clear answers as to what may or may not be determined to fall under the purview of the Clean Water Act and jurisdiction of the federal government.

FOR ADDITIONAL INFORMATION:

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Full *Duarte Nursery v. Army Corps* opinion available at: <http://agrilife.org/texasaglaw/files/2016/07/Read-full-opinion-here.pdf>

WATER BRIEFS

CAPTURE & REUSE**US****GRAYWATER & STORMWATER**

On July 6, *Using Graywater and Stormwater to Enhance Local Water Supplies: An Assessment of Risks, Costs, and Benefits* was released. The authors are the Committee on the Beneficial Use of Graywater and Stormwater, Water Science and Technology Board (Division on Earth and Life Studies) and the publisher is the National Academies of Sciences, Engineering, and Medicine.

Chronic and episodic water shortages are becoming common in many regions of the US, and population growth in water-scarce regions further compounds the challenges. Increasingly, alternative water sources such as graywater and stormwater are being viewed as resources to supplement scarce water supplies rather than as waste to be discharged as rapidly as possible. Graywater is untreated wastewater that does not include water from the toilet but generally includes water from bathroom sinks, showers, bathtubs, clothes washers, and laundry sinks). Stormwater is water from rainfall or snow that can be measured downstream in a pipe, culvert, or stream shortly after the precipitation event.

Graywater and stormwater can serve a range of non-potable uses, including irrigation, toilet flushing, washing, and cooling, although treatment may be needed. Stormwater may also be used to recharge groundwater, which may ultimately be tapped for potable use. In addition to providing additional sources of local water supply, harvesting stormwater has many potential benefits, including energy savings, pollution prevention, and reducing the impacts of urban development on urban streams. Similarly, the reuse of graywater can enhance water supply reliability and extend the capacity of existing wastewater systems in growing cities.

Despite the benefits of using local alternative water sources to address water demands, many questions remain that have limited the broader application of graywater and stormwater capture and use. In particular, limited information is available on the costs, benefits, and risks of these projects, and beyond the simplest applications, many state and local public health agencies have not developed regulatory frameworks for full use of these local water resources. This study addresses technical, economic, regulatory, and

social issues associated with graywater and stormwater capture and use across a range of uses and scales.

For info: Free PDF available at: www.nap.edu/search/?term=Graywater

EXTREME WEATHER**WEST****DATABASE & MAPS**

Extreme events, like the 2013 Colorado Front Range floods, cause the lion's share of total societal costs related to weather and climate. Last year, the Western Watershed Assessment (WWA) began a new research focus designed to assess the historical risk of these events, explore how risk might change in the future, and examine the performance of adaptation strategies for extreme events.

As a first step to help understand the historical risk from these events, WWA recently developed two complementary resources: Database of 166 major historical extreme weather and climate events from 1862 to 2015 highlighting those events that have caused the greatest societal impacts in Colorado, Utah, and Wyoming (<http://wwa.colorado.edu/climate/extremes/database/index.html>); and Monthly regional event maps drawn from a much larger database of 20,000 events, showing how risk has varied seasonally and across the region for 10 different types of events (<http://wwa.colorado.edu/climate/extremes/maps/index.html>). In the near future, WWA plans to produce brief reports characterizing the historical risk and likely future risk from extreme precipitation events, and from drought, in our region.

Regarding extreme precipitation, WWA also created a testbed for simulating impacts to highway culvert systems under different assumptions of flood frequency and maintenance and upgrade strategies (*see* Stormwater Management at: http://wwa.colorado.edu/climate/extremes/stormwater_mgmt.html).

For info: "Extremes Team" at wwa@colorado.edu or <http://wwa.colorado.edu>

WATERSHEDS REPORT**WA****TRIBAL SALMON RECOVERY**

In June, the Northwest Indians Fishery Commission (NWIFC) released "The State of Our Watersheds Report" (Report), which examines key indicators of habitat quality and quantity across 22 watersheds in western Washington that lie within tribal Usual and Accustomed fishing areas as defined by *U.S. v. Washington* (Boldt decision).

Unfortunately, as noted by Lorraine Loomis, chair of the Northwest Indian Fisheries Commission, the "findings depicted in" the Report are "grim" — "we are losing the battle for salmon recovery because we are continuing to lose habitat faster than it can be restored." In addition to regional reports about Puget Sound and the Olympic coast, the Report is broken down into tribal areas of interest. This is the third edition of the Report, available in its entirety at the website listed below. It is an update of the 2012 Report. The "Principal Findings" of the 336-page Report are:

- Degradation of Habitat Outpaces Estuary Restoration
- Degraded Nearshore Habitat Unable to Support Forage Fish
- Freshwater Shoreline Armoring Continues Unabated
- Forest Cover Disappearing
- Streams Lack Large Woody Debris
- Riparian Forests Not Recovering
- Alarming Number of Stream Crossings, High Road Densities
- Impervious Surface Area Impacts Water Quality and Salmonid Habitat
- Fish Barriers Cut Off Vast Amounts of Habitat
- Agricultural Lands Remain Degraded
- Sensitive Floodplains Being Overdeveloped
- Rapidly Increasing Permit-Exempt Wells Threaten Water For Fish

According to the report, the amount of land covered by impervious surface increased from 6.59% in 2006 to 6.76% in 2011. Between 2006 and 2011 forest cover declined in nearly every watershed and by 153 square miles overall — an area larger than the city of Seattle. Streamside forests provide shade and cool, clean water for salmon, but only about 17% can be considered properly functioning, down 2% from 2006. Meanwhile, new shoreline modifications continue to outpace restoration.

NWIFC in its press release briefly addressed "What should we do now?" They noted that while the steps to "take are simple" they will take a lot of work. "Declare a statewide emergency for salmon. Engage state agencies with regulatory authority — as well as the public — in the effort. Stop permitting habitat loss. Place a moratorium on development permits until the process can be revised with standards that prevent further habitat destruction. Make sure our water is clean. Complete

WATER BRIEFS

the revision of current water quality rules for human health, then move quickly to update criteria that protect fish. Also, improve stormwater rules to better control the flow of toxics into our waters. Ensure enough water for fish. Complete and enforce instream flow requirements for fish.”

For info: Complete Report at: <http://geo.nwifc.org/sow>; more info at www.treatyrightsatrisk.org or NWIFC website at: <http://nwifc.org/>

LAKE MEAD THREAT AZ

ARIZONA'S STORED WATER

With the historic drought in the West, especially California, not abating anytime soon concerns over the Colorado River supply have naturally been drawing increased attention. US Senator Jeff Flake (R-AZ) went so far as to press the US Department of the Interior (DOI) for written assurances that there would be no problem with water that Arizona had stored in Lake Mead.

Senator Flake's office posted a press release on July 20th, which noted that Senator Flake “secured the Interior Department's (DOI) commitment to honor and protect Arizona's water in Lake Mead, ending the immediate threat of Arizona losing any of that water to another state.”

The DOI's “commitment” is contained in a letter to Senator Flake from Deputy Secretary of the Interior Michael L. Connor. In the letter, Connor noted that “...Reclamation estimates that by the end of this calendar year (2016), more than 400,000 acre-feet of water will have been retained in Colorado River system reservoirs since 2014. We are committed to working with water users throughout the Colorado River Basin, pursuant to these and other ongoing, and other contemplated, voluntary efforts to retain additional quantities of water in the Colorado River reservoir system storage, including Lake Mead.”

For info: Connor's Letter available at: http://www.flake.senate.gov/public/_cache/files/0905de45-eaf4-4035-8a0f-4afa21b3ec11/connor-flake-co-river.pdf; Press release and background info available at: www.flake.senate.gov/public/index.cfm/2016/7/flake-secures-commitment-to-protect-arizona-water-in-lake-mead

SEDIMENT IN RESERVOIR KS

STORAGE CAPACITY LOST

The Neosho River and its primary tributary, the Cottonwood River, are the main sources of inflow to John Redmond Reservoir in east-central Kansas. Storage loss in the reservoir resulting from sedimentation has been estimated to be 765 acre-feet per year (AF/Y) for 1964–2014. The 1964–2014 sedimentation rate was almost 90% larger than the projected design sedimentation rate of 404 AF/Y, and resulted in a loss of about 40% of the original (1964) conservation (multi-purpose) pool storage capacity. To help maintain storage in the reservoir, the Kansas Water Office has implemented more than two dozen stream bank erosion control projects to reduce the annual sediment load entering the reservoir and initiated a dredging project to restore nearly 2,000 acre-feet of storage near the dam to provide additional water supply to downstream users. Storm events during May through July 2015 caused large inflows of water and sediment into the reservoir. Initially, flood waters were held back in the reservoir in order to decrease downstream flooding in Oklahoma. Later, retained reservoir flood waters were released at high rates (up to 25,400 acre-feet per day, the maximum allowed for the reservoir) for extended periods.

The US Geological Survey, in cooperation with the Kansas Water Office, computed the suspended-sediment inflows and retention in John Redmond Reservoir during May through July 2015. During the study period, an estimated 980 acre-feet of storage was lost, over 2.4 times the design annual sedimentation rate of the reservoir. Storm inflows during the three month analysis period reduced reservoir storage in the conservation pool approximately 1.6 percent. This indicates that large inflows, coupled with minimal releases, can have substantial effects on reservoir storage and lifespan. *See* US Geological Survey Scientific Investigations Report 2016–5040

For info: Study available at: <http://dx.doi.org/10.3133/sir20165040>

QUALITY ENFORCEMENT CA

WATER QUALITY POLICY

The California State Water Resources Control Board (SWRCB) is currently accepting written comments on the proposed amendments to the Water Quality Enforcement Policy.

Interested persons must submit written comments by September 13, 2016.

The amendments proposed in this rulemaking action would clarify certain principles that are central to the Water Boards' duties under the Porter-Cologne Water Quality Control Act as they relate to the State Water Board's Enforcement Policy, and will help ensure more transparent and consistent application of the Enforcement Policy. The amendments would change the case prioritization process to make it more efficient and consistent throughout the state. The amendments are also intended to bring greater transparency to the Water Boards' enforcement process and penalty methodology application. The amendments would also make non-substantive technical changes to increase comprehensibility and clarity.

The public hearing to consider adoption of the proposed changes will be held at 9:00 a.m. on October 18, 2016, at the Joe Serna Jr. – CalEPA Headquarters Building, Coastal Hearing Room, 1001 I Street, Second Floor in Sacramento.

For info: Notice & Draft Policy available at: www.waterboards.ca.gov/public_notices/comments/index.shtml

AESTHETIC FLOWS WA

PUBLIC INTEREST IMPACT

On July 11, the Washington State Court of Appeals (Division One), affirmed the Pollution Control Hearings Board and Thurston County Superior Court prior rulings that the Washington State Department of Ecology (Ecology) had the authority to issue a Report of Examination (ROE) ordering the approval of a water right for Public Utility District No. 1 of Okanogan County (PUD) for its Enloe Dam Hydroelectric Project (Project) on the Similkameen River. The ROE grants the PUD an additional 600 cubic feet per second (cfs) in water rights for the Project. “To satisfy the public interest requirement of RCW 90.03.290, the ROE included a condition that the PUD would be required to ensure that the minimum flows in the bypass reach portion of the river would be the same as those found to be adequate to protect aesthetic values as determined by a future study.” *Unpublished Opinion at 1-2. CELP, et al. v. Dept. of Ecology, et al., Case No. 74841-6-I (July 11, 2016).*

The Court of Appeals (Court) decision denied the appeal by the Center for Environmental Law & Policy

WATER BRIEFS

(CELP), which challenged the Enloe Dam water right on behalf of itself and the other appellants, American Whitewater and North Cascades Conservation Council. CELP asserted that Ecology issued its decision before determining that the Project's impact on aesthetics will not be detrimental to the public interest. CELP maintains that state law requires that Ecology must determine that the proposed use of water will not be detrimental to the public interest *before* approving a water right. Ecology instead required that the PUD carry out a study to determine these aesthetic impacts, and the amount of water that will be required to flow over the Falls, *after* the project is completed.

"CELP provides no support for its implicit assertion that the flows specifically tailored to the Project need be definitively determined before issuance of the ROE. The flow study required by the 401 Certification may confirm that the 10/30 [cfs] flows are protective of aesthetic values, in which case the flows need not change, or it may trigger amendment of the flows in the 401 Certification and the ROE. In other words, the flows will be specifically tailored. CELP did not carry its burden of demonstrating that the ROE violates the minimum instream flow rule." *Opinion* at 24-25.

CELP informed *The Water Report* that it filed a Motion for Reconsideration with the Court on behalf of the appellants.

For info: Court Opinion available at: www.okanoganpud.org/sites/default/files/mp3s/board_meetings/Court%20of%20Appeals%20071116.pdf

RIO GRANDE COMPACT TX/NM SPECIAL MASTER REPORT

The dispute between Texas and New Mexico over control of surface water and groundwater affecting the Rio Grande, as determined by the Rio Grande Compact of 1938, appears to be headed to the US Supreme Court based on a draft report by the Special Master in the case. The crux of the case was noted by the Special Master: "...Texas alleges that New Mexico, through the actions of its officers, agents, and political subdivisions, has violated the 1938 Compact by allowing the diversion of surface water and pumping of groundwater that is hydrologically connected to the Rio

Grande downstream of the Elephant Butte Reservoir, thereby diminishing the amount of water that flows into Texas via the administration of Rio Grande Project by tens of thousands of acre-feet." Pre-filing Draft of the First Interim Report (Draft Report), Special Master A. Gregory Grimsal (titled "*First Report of the Special Master*," dated June 28, 2016), page 161-162.

Special Master Grimsal's draft report recommends, in part, that New Mexico's motion to dismiss be denied. "As discussed in detail below, I recommend that this Court deny New Mexico's motion to dismiss Texas's Complaint, but grant New Mexico's motion to dismiss the United States' Complaint in Intervention to the extent it fails to state a claim under the 1938 Compact; rather, to the extent that the United States has stated plausible claims against New Mexico under federal reclamation law, I recommend that the Court extend its original, but not exclusive, jurisdiction pursuant to 28 U.S.C. § 1251(b)(2) and resolve the claims alleged in the Complaint in Intervention for purposes of judicial economy and due to the interstate and international nature of the Rio Grande Project. Finally, I recommend that the Court deny the motions of the irrigation districts for leave to intervene." Draft Report at 7. Despite recommending that the US Supreme Court deny the motions of the irrigation districts (Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1), the Special Master also stated that he would encourage their active participation in this case by *amici curiae* (i.e. as "friends of the court").

In accordance with the Special Master's Case Management Order No. 11 (dated July 1, 2016), the Draft Report has been sent to the parties to inspect. The parties had until August 1st to submit "letter briefs" not to exceed 20 pages to "suggest technical corrections to the Pre-Filing Inspection Draft, such as misstatements of law, misstatements of fact and clerical errors." After consideration of those suggestions, the Special Master will then file his Report with the US Supreme Court.

The Draft Report provides any water professional interested in the issues of the case with an in-depth look at the complex issues at stake in the construction of the Rio Grande Compact

of 1938, in the course of its 240 pages. As noted by the Special Master, counsel for the principal adversaries, Texas and New Mexico, "agree upon one proposition" — the Compact and how it works and the facts in the case are complex; it is a complex system and "[P]eople have been fighting over this river for about 400 years..." Draft Order at 7-8 (citations omitted).

The Water Report has an upcoming major article scheduled dealing with the various water issues on the Lower Rio Grande in its September 15th issue by Jay Stein of Brockmann & Stein.

For info: Draft Report at: <https://static.texastribune.org/media/documents/6-28-16-First-Rpt-SM-Motion-to-Dismiss-and.pdf>

NUCLEAR WATER RIGHTS UT TRANSFERS UPHELD

On July 21, a three-judge panel of the Utah Court of Appeals (Court) upheld the State Engineer's and District Court's decision to grant a diversion of 53,600 acre-feet of water from the Green River for the planned Blue Castle Holdings (BCH) nuclear power plant. The issue before the Court was "whether the district court properly approved two change applications requesting to change the points of diversion and the nature of use of water already appropriated to Kane County Water Conservancy District and San Juan County Water Conservancy District (collectively, the Districts)." *HEAL Utah v. Kane Co. Water Conservancy District, et al.*, 216 UT App 153, (July 21, 2016); *Slip Op.* at 2.

The Districts tentatively leased existing water rights to BCH to move the diversion points upstream on the Green River for the proposed development of a nuclear power plant. As the Court highlighted, "...we note that this is not an appeal from an adjudication of the parties' rights to use water. Rather, HEAL Utah's appeal requires us to determine whether the district court properly approved the Applicants' change applications which effectively authorized Blue Castle to proceed with plans to appropriate the water." *Slip Op.* at 11.

First the Court explained the legal standards for a change application in Utah:

Utah Code section 73-3-8 requires, in relevant part,

WATER BRIEFS

that a change application be approved if “there is reason to believe” that “there is unappropriated water in the proposed source,” “the proposed use will not impair existing rights or interfere with the more beneficial use of the water,” the proposed plan is “physically and economically feasible” and “would not prove detrimental to the public welfare,” and “the applicant has the financial ability to complete the proposed works.” (citations omitted).

Slip Op. at 12.

Then the Court stressed Utah’s application of the “reason to believe” standard for change (transfer) applications:

The Utah Supreme Court has explained that “the burden of persuasion [rests] squarely on the change applicant.” *Searle*, 2006 UT 16, ¶ 50. But because a change application is not a final adjudication of water rights, the reason-to-believe standard puts “a fairly low burden on a party seeking approval of a change application.” *Id.* ¶ 36; *see also id.* ¶¶ 35–42 (explaining that “the reason to believe standard governs the change application process” and “a preponderance standard is reserved for a final adjudication of rights”).

Slip Op. at 12.

The Court’s 28-page opinion addressed HEAL Utah’s three contentions regarding the requirements for a change application. “Specifically, it [HEAL Utah] argues that (1) there is no unappropriated water in the proposed source, (2) the proposed diversion will have an ‘unreasonable impact on the natural stream environment’ and is ‘contrary to the public welfare,’ and (3) the proposed change is not feasible and is speculative.” *Slip Op.* at 11.

Ultimately the low burden of the “reason to believe” standard for change applications in Utah was too much for HEAL Utah to overcome. “Because the Applicants put forth enough evidence to demonstrate that the proposed changes can be undertaken without impairing vested rights, we conclude the district court properly approved the Applicants’ change applications. Although it has identified some evidence to undermine

the Applicants’ reasoning, HEAL Utah’s unsupported arguments are not sufficient to compel the denial of the change applications. We therefore affirm the district court’s decision.” *Slip Op.* at 28.

The Court also relied on Utah’s policy of promoting the beneficial use of water as part of its “Analysis” of state water law:

Nevertheless, the Utah Supreme Court has explained that because “the policy of the law is to prevent waste and promote the largest beneficial use of water, new appropriations or changes should be favored and not hindered.” *Little Cottonwood Water Co. v. Kimball*, 289 P. 116, 118 (Utah 1930). Even in “a doubtful case, when the conclusion is not clear, it is more consistent with sound policy and with the general scheme of the law, to approve the application to appropriate and afford the new claimant the legal status and the opportunity to proceed in due order of law and have the disputed questions definitely and authoritatively determined, rather than to shut off such determination by the denial of his application.” *Id.*; *accord Lehi Irrigation Co. v. Jones*, 202 P.2d 892, 895 (Utah 1949).

Slip Op. at 12–13.

HEAL Utah is reviewing the decision and has not yet decided if it will appeal to Utah’s Supreme Court.

For info: Court Decision at: [www.utcourts.gov/opinions/appopin/HEAL Utah v. Kane Co. Water Conservancy District20160721.pdf](http://www.utcourts.gov/opinions/appopin/HEAL%20Utah%20v.%20Kane%20Co.%20Water%20Conservancy%20District20160721.pdf)

SPILL SETTLEMENT MIDWEST CWA & PIPELINE OPERATIONS

On July 20, EPA and the US Department of Justice (DOJ) announced a settlement with Enbridge Energy Limited Partnership (Enbridge) and related Enbridge companies to resolve claims stemming from 2010 oil spills in Marshall, Michigan and Romeoville, Illinois. Enbridge has agreed to spend at least \$110 million on measures to prevent spills and improve operations across nearly 2,000 miles of its pipeline

system in the Great Lakes region. Enbridge will also pay civil penalties totaling \$62 million for Clean Water Act violations — \$61 million for discharging at least 20,082 barrels of oil in Marshall and \$1 million for discharging at least 6,427 barrels of oil in Romeoville.

The proposed settlement will resolve Enbridge’s liability under the Oil Pollution Act, based on Enbridge’s commitment to pay over \$5.4 million in unreimbursed costs incurred by the government in connection with cleanup of the Marshall spill, as well as all future removal costs incurred by the government in connection with that spill. The settlement includes an extensive set of specific requirements to prevent spills and enhance leak detection capabilities throughout Enbridge’s Lakehead pipeline system — a network of 14 pipelines spanning nearly 2,000 miles across seven states. Enbridge must also take major actions to improve its spill preparedness and emergency response programs. Enbridge is also required to replace close to 300 miles of one of its pipelines, after obtaining all necessary approvals. Enbridge’s Lakehead System delivers approximately 1.7 million barrels of oil in the US daily.

In addition to payments required, Enbridge has already reimbursed the government for cleanup costs of \$57.8 million from the Marshall spill and \$650,000 from the Romeoville spill. Enbridge reportedly incurred costs in excess of \$1 billion for required cleanup activities relating to the Marshall and Romeoville spills.

Under the settlement, Enbridge committed to the following measures, estimated to cost at least \$110 million:

- implement an enhanced pipeline inspection and spill prevention program
- implement enhanced measures to improve leak detection and control room operations
- commit to additional leak detection and spill prevention requirements for a portion of Enbridge’s Line 5 that crosses the Straits of Mackinac in Michigan
- create and maintain an integrated database for its Lakehead Pipeline System
- enhance its emergency spill response preparedness programs by conducting

WATER BRIEFS

four emergency spill response exercises to test and practice Enbridge's response to a major inland oil spill

- improve training and coordination with state and local emergency responders by requiring incident command system training for employees, provide training to local responders, participate in area response planning and organize response exercises
- hire an independent third party to assist with review of implementation of the requirements in the settlement agreement

The government's complaint alleges that Enbridge owned or operated a 30 inch-pipeline (Line 6B), which ruptured near Marshall on July 25, 2010 and discharged oil. Although the rupture triggered numerous alarms in its control room, Enbridge failed to recognize a pipeline had ruptured until at least 17 hours later. Meanwhile, Enbridge had restarted Line 6B on two separate occasions on July 26, 2010, pumping additional oil into the ruptured pipeline causing additional discharges of oil. Ultimately, Line 6B discharged at least 20,082 barrels of crude oil, much of which entered Talmadge Creek and flowed into the Kalamazoo River which flows to Lake Michigan. Flooding caused by heavy rains pushed the discharged oil over the river's banks into its flood plains, and accelerated its migration over 35 miles before it was contained. The rupture and discharges were caused by stress corrosion cracking on the pipeline, control room misinterpretations and other problems, and pervasive organization failures at Enbridge. The complaint also alleges that on September 9, 2010, another Enbridge pipeline (Line 6A), discharged at least 6,427 barrels of oil, much of which flowed through a drainage ditch into a retention pond in Romeoville.

There will be a 30-day public comment period on the consent decree. To comment on that decree, see the DOJ's website: www.justice.gov/enrd/consent-decrees.

For info: www.epa.gov/enforcement/enbridge-clean-water-act-settlement

WATERSHED PROTECTION US DRINKING WATER & LAND USE

On July 19, the National Academy of Sciences released a new study on watershed protection entitled

"Estimating Watershed Degradation Over the Last Century and its Impact on Water-Treatment Costs for the World's Large Cities." Urban water-treatment costs depend on the water quality at the city's source, which in turn depends on the land use in the source watersheds. This study shows that urban source watershed degradation is widespread globally, with nine in ten cities losing significant amounts of natural land cover in their source watersheds to agriculture and development. Watershed degradation increases in water-treatment costs paid for by those living in cities.

The study's Abstract states: "Urban water systems are impacted by land use within their source watersheds, as it affects raw water quality and thus the costs of water treatment. However, global estimates of the effect of land cover change on urban water-treatment costs have been hampered by a lack of global information on urban source watersheds. Here, we use a unique map of the urban source watersheds for 309 large cities (population > 750,000), combined with long-term data on anthropogenic land-use change in their source watersheds and data on water-treatment costs. We show that anthropogenic activity is highly correlated with sediment and nutrient pollution levels, which is in turn highly correlated with treatment costs. Over our study period (1900–2005), median population density has increased by a factor of 5.4 in urban source watersheds, whereas ranching and cropland use have increased by a factor of 3.4 and 2.0, respectively. Nearly all (90%) of urban source watersheds have had some level of watershed degradation, with the average pollutant yield of urban source watersheds increasing by 40% for sediment, 47% for phosphorus, and 119% for nitrogen. We estimate the degradation of watersheds over our study period has impacted treatment costs for 29% of cities globally, with operation and maintenance costs for impacted cities increasing on average by $53 \pm 5\%$ and replacement capital costs increasing by $44 \pm 14\%$. We discuss why this widespread degradation might be occurring, and strategies cities have used to slow natural land cover loss."

For info: Study available at: www.pnas.org/content/early/2016/07/19/1605354113

ESA LAWSUIT

RECLAMATION SUED

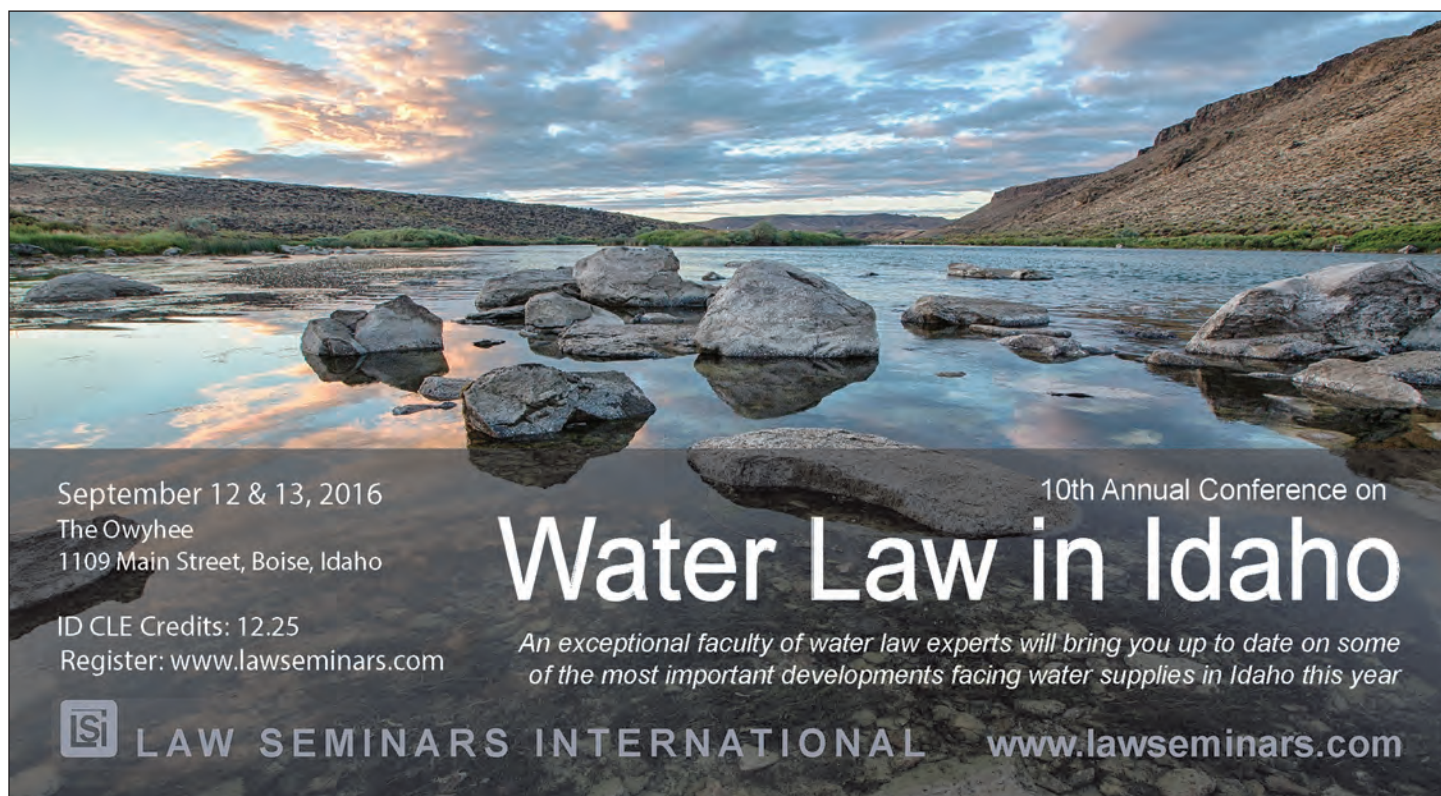
On July 8, the San Luis & Delta-Mendota Water Authority and Westlands Water District (Districts) filed a lawsuit in federal court to compel the US Bureau of Reclamation (Reclamation) to examine the effectiveness of the existing measures intended to protect endangered species, the environmental impacts of those measures, and whether there are alternatives to those measures that would better protect both endangered fish species and California's vital water supplies.

"In November 2015 Reclamation completed an environmental impact statement ('EIS') that did not examine whether the measures are necessary or effective for protecting endangered fish populations. Instead of analyzing the existing measures, Reclamation accepted them as the status quo. The EIS did not identify any mitigation for the water supply lost to these measures, despite current modeling that estimated how the existing measures would reduce the annual water delivery capability of the Central Valley Project and State Water Project by over 1 million acre-feet on a long-term average, and in spite of years of harm caused by implementing the measures. Nor did the EIS try to identify alternatives that could lessen these impacts. Reclamation attempted to minimize the impacts of lost surface water supply by unreasonably assuming the lost supply would be made up from increased pumping of already stressed groundwater supplies. In its Record of Decision issued January 11, 2016 Reclamation announced that it would continue on with the existing measures, and provide no mitigation." Districts' Press Release, July 8, 2016.

The Press Release went on to explain the purpose of the lawsuit. "The lawsuit filed today seeks to compel Reclamation to do the right thing and perform the analysis it should have. If successful, the lawsuit may ultimately result in measures that actually help fish, and identify mitigation activities or alternatives that lessen or avoid water supply impacts that millions of Californians in the Central Valley Project and the State Water Project depend on."

For info: Complaint available from TWR upon request; Westlands Water District website at: <http://wwd.ca.gov/>

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August 22 CA
Information Fair on Water Right Measurement & Reporting, Sacramento. Joe Serna, Jr.-Cal/EPA Bldg., 1001 I Street, 10am-4pm. Presented by the State Water Resources Control Board. For info: Paul Wells, 916/ 323-5195, Paul.wells@waterboards.ca.gov or www.waterboards.ca.gov/waterrights/water_issues/programs/diversion_use/water_use.shtml

August 22-25 IN
Stormcon - 15th Annual Surface Water Quality Conference & Expo, Indianapolis. Indiana Convention Center. For info: www.stormcon.com/

August 23-25 OH
13th Annual U.S. Drinking Water Workshop, Cincinnati. Hyatt Regency. Presented by EPA & Ass'n of State Drinking Water Administrators; Must Register by August 12. For info: <http://tiny.cc/EPADWW>

August 24-26 CO
Colorado Water Congress Summer Conference, Steamboat Springs. Sheraton Steamboat Resort. For info: <http://www.cowatercongress.org/summer-conference0.html>

August 29-31 ME
International Low Impact Development Conference, Portland. Holiday Inn Portland By the Bay. Organized by Environmental & Water Resources Institute of the American Society of Civil Engineers - Urban Water Resources Research Council. For info: <http://www.lidconference.org/about/>

August 30-31 CO
Water Finance Conference: "Financing the Water Utility of Tomorrow", Denver. Denver Athletic Club. For info: <http://waterfinanceconference.com>

September 7 TX
Pollution Prevention Waste Management Workshop, Austin. J.J. Pickle Center, 10100 Burnet Road, Bldg. 137. Presented by TCEQ. For info: www.tceq.texas.gov/p2/events/pollution-prevention-waste-management-workshop-2

September 8-9 OR
Connecting the Dots: Groundwater, Surface Water & Climate Connections - Conference, Portland. Red Lion Hotel on the River - Jantzen Beach. Presented by National Groundwater Association. For info: <http://www.ngwa.org/Events-Education/conferences/Pages/5029sep16.aspx>

September 9 NM
Wildlife & Endangered Species on Public & Private Lands, Albuquerque. 5121 Masthead N.E.. Course Presented by the State Bar of New Mexico. For info: www.nmbar.org/nmstatebar/CLE/Events/Event_Display.aspx?EventKey=AL16

September 11-14 FL
31st Annual WaterReuse Symposium, Tampa. Tampa Marriott Waterside Hotel & Marina. For info: <https://waterreuse.org/news-events/conferences/>

September 12-13 ID
Water Law in Idaho Seminar, Boise. The Owyhee. For info: Law Seminars Int'l, 800/ 854-8009, registrar@lawseminars.com or www.lawseminars.com

September 12-14 CA
Stormwater Evolution: Source to Resource - 2016 CASCA Twelfth Annual Conference, San Diego. Paradise Point. Presented by California Stormwater Quality Ass'n. For info: www.CASQA.org

September 13 OH
Ohio Surface Water Conference, Columbus. Renaissance Downtown. For info: CLE Int'l, 800/ 873-7130 or www.cle.com

September 13-15 NE
Institute for Tribal Environmental Professionals (ITEP) Training: Climate Change Adaptation Planning, Nebraska City. For info: Sue Wotkyns, ITEP, 928/ 523-1488, Susan.Wotkyns@nau.edu or www7.nau.edu/itep/main/Training/training_cc

September 14 WA
Emerging Issues in Stormwater & Water Quality Regulations, Seattle. Motif Seattle. For info: The Seminar Group, 800/ 574-4852, info@theseminarargroup.net or www.theseminarargroup.net

September 14-15 CO
Challenging & Defending Federal Natural Resource Agency Decisions Institute, Westminster. Westminster. Presented by Rocky Mountain Mineral Law Foundation. For info: www.rmmlf.org

September 15 CA
Hydrology & the Law Seminar, Santa Monica. DoubleTree Guest Suites. For info: Law Seminars Int'l, 800/ 854-8009, registrar@lawseminars.com or www.lawseminars.com

September 15-16 CA
ACWA's 2016 Continuing Legal Education for Water Professionals, San Diego. Bahia Resort Hotel. Ass'n of California Water Agencies CLE. For info: www.acwa.com/events/acwa-2016-continuing-legal-education-water-professionals

September 15-16 NM
New Mexico Water Law Conference, Santa Fe. Eldorado Hotel & Spa. For info: CLE Int'l, 800/ 873-7130 or www.cle.com

September 16 CA
California Environmental Quality Act: Critical Updates on Major Developments, Santa Monica. DoubleTree Guest Suites. For info: Law Seminars Int'l, 800/ 854-8009, registrar@lawseminars.com or www.lawseminars.com

September 19 WA
CERCLA & MTCA: Advanced Sediments Conference, Seattle. WA State Convention Ctr. For info: Environmental Law Education Center, 503/ 282-5220 or www.eleccenter.com

September 19-22 CA
VERGE: Where Technology Meets Sustainability (Convention), Santa Clara. Santa Clara Convention Ctr. For info: www.greenbiz.com/events/verge/santa-clara/2016

September 22-23 CA
California Coastal Law Conference, Los Angeles. Intercontinental Century City. For info: CLE Int'l, 800/ 873-7130 or www.cle.com



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CALENDAR

(continued from previous page)

September 23 TX

Valley Environmental Summit, South Padre Island. South Padre Island Convention Centre, 7355 Padre Blvd. Presented by TCEQ. For info: Imelda Pena, 956/ 389-7427 or www.tceq.state.tx.us/assistance/summits/valley-environmental-summit

September 24-28 LA

WEFTEC 2016: The Water Quality Event & Exhibition, New Orleans. Morial Convention Ctr. Presented by Water Education Foundation. For info: www.weftec.org/future-weftec-schedule/

September 28-30 UT

Western States Water Council Fall (182nd) Council Meeting, St. George. Best Western Abbey Inn. For info: <http://www.westernstateswater.org/upcoming-meetings/>

September 29-30 NV

Tribal Water Law Conference, Las Vegas. Caesars Palace. For info: CLE Int'l, 800/ 873-7130 or www.cle.com

September 29-30 TX

Texas Water Law Conference, San Antonio. La Cantera Hill Country Resort. For info: CLE Int'l, 800/ 873-7130 or www.cle.com

October 2-6 OK

18th Annual EPA Region 6 Stormwater Conference, Oklahoma City. Sheraton Downtown Hotel. Hosted by EPA Region 6, Texas A&M University in Kingsville, Oklahoma City MS4s, and States in Region 6. For info: Nelly Smith, EPA, 214/ 665-7109, smith.nelly@epa.gov or www.epa.gov/ok/18th-annual-epa-region-6-stormwater-conference

October 5 AZ

Colorado River Conference, Phoenix. Hilton Scottsdale. For info: CLE Int'l, 800/ 873-7130 or www.cle.com

October 5-6 CA

Water & Long-Term Value 2 Conference, San Francisco. Levi Strauss & Co., 1155 Battery Street. Hosted by Skytop Strategies. For info: <http://skytopstrategies.com/water-long-term-value-2/>

October 5-7 NV

9th Annual WaterSmart Innovations Conference & Exposition, Las Vegas. South Point Hotel & Conf. Ctr. For info: WaterSmartInnovations.com

October 5-7 MI

Great Lakes Adaptation Forum: "A Network of Networks", Ann Arbor. University of Michigan Palmer Commons. For info: <http://graham.umich.edu/climate/forum-2016>

October 9-13 Australia

World Water Congress & Exhibition 2016: Shaping Our Water Future, Brisbane. Brisbane Convention & Exhibition Centre. Organized by the International Water Ass'n. For info: www.iwa-network.org/event/world-water-congress-exhibition-2016

October 12-13 TX

Water Quality / Stormwater Seminar, Austin. Palmer Events Center, 900 Barton Springs Road. Presented by TCEQ. For info: Natalie Myhra, 512/ 239-3143 or events@tceq.texas.gov

October 13 TX

Laredo Environmental Summit, Laredo. Texas A&M Int'l University, 5201 University Blvd. Presented by TCEQ. For info: Carmen Ramirez, 956/ 721-8457 or www.tceq.state.tx.us/assistance/summits/valley-environmental-summit

October 13-14 MT

16th Annual Montana Water Law, Helena. Great Northern Hotel. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net

October 13-14 MT

2016 Montana AWRA Conference (33rd Annual): Water Quality & Quantity in a Changing Climate, Fairmount Hot Springs. Fairmount Hot Springs Resort. Pre-Conference Field Trip Oct. 12. For info: <http://www.montanawatercenter.org/2016-awra-info>

October 19-21 CA

Northern California Tour 2016, Sacramento. Water Projects Tour. For info: www.watereducation.org/general-tours



2016 AWRA-WA Annual State Conference

Rural Domestic and Municipal Water Supply



American Water Resources Association
Washington Section

October 26
Seattle, Washington

Details and Registration at:
www.waawra.org