The Water Report™
Water Rights, Water Quality & Water Solutions in the West

In This Issue:

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INTEGRATED WATER-ENERGY PLANNING

MAJOR NATIONWIDE DIALOGUE UNDERWAY - SEPTEMBER SYMPOSIUM

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Introduction

Water and energy are critical resources that are inextricably and reciprocally linked. Meeting our energy needs depends upon the availability of water, often in large quantities. The pumping, conveyance, treatment, and distribution of water (and wastewater) are all likewise dependent upon readily available, affordable energy. It is this interdependence that lies at the heart of what some have termed the "Energy-Water Nexus."

This article will provide a brief overview of several current national initiatives, including information on the US Department of Energy's ongoing role in addressing national energy-water strategies and activities completed to date through its Energy-Water Nexus program. Also discussed are a range of integrated water and energy developments being undertaken by states and other entities at various scales — from individual building site considerations to basin-wide planning efforts.

Join the Discussion

WATER-ENERGY SUSTAINABILITY SYMPOSIUM, SALY LAKE CITY, SEPTEMBER 13-16

Your authors are all professionally involved in the rapidly expanding national effort to bring about the many demonstrable benefits of integrating the planning and management of water and energy. For many reasons, a number of which are discussed below, we believe the need for integrated planning of water and energy is becoming increasingly critical to our country's future.

We encourage all interested parties to join us in attending the "Water-Energy Sustainability Symposium" — sponsored by the US Department of Energy and the Ground Water Protection Council — to be held September 13-16, 2009, in Salt Lake City (www.gwpc.org). A description of this major national event follows this article.

Overview

The security and economic health of the United States depends upon maintaining a sustainable supply of both energy and water. However, the nation's ability to continue providing clean and affordable energy along with safe and reliable water is being seriously challenged on a number of fronts. For instance, the increasing demand for both energy and water arising as a consequence of relentless population growth is proving particularly challenging in water-stressed areas of the country.

Climate change is also exacerbating the interrelated challenges to maintaining water and energy supply. Regional droughts, intensified by climate change, are prompting energy sector demands to develop additional water supplies from lower-quality sources. Hence, water is being pumped from greater depths and transported over longer distances from

Water/Energy

Climate Change

Sector Differences

Questions of Scale

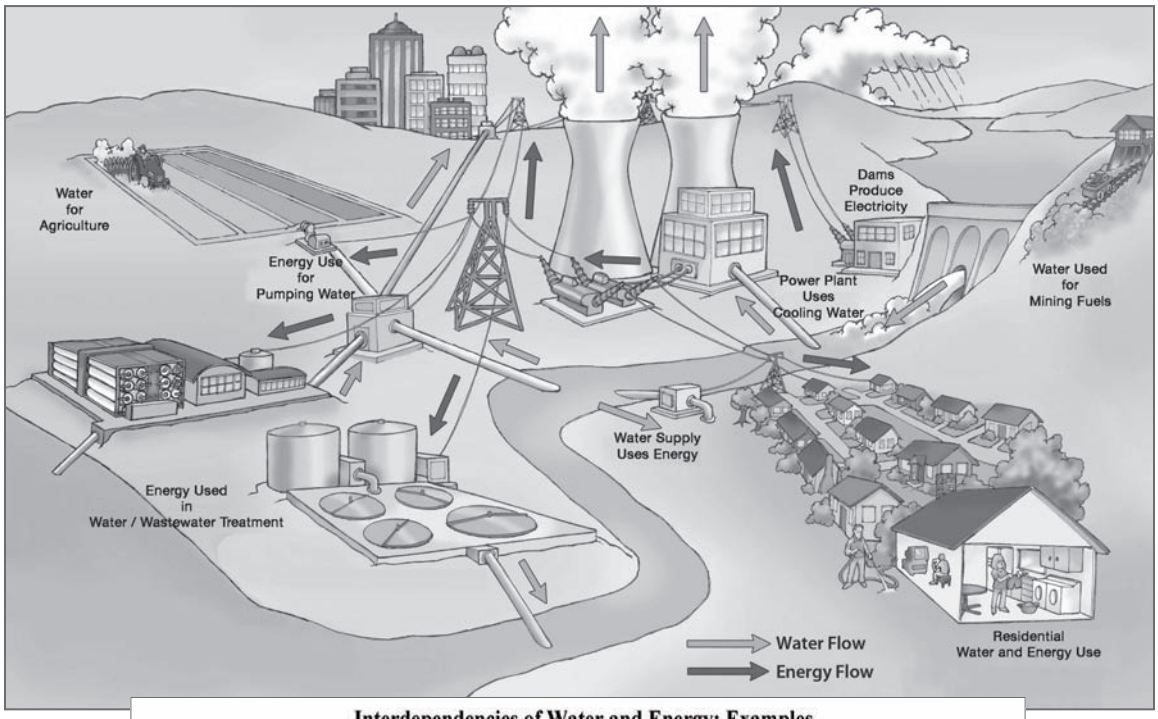
increasingly depleted surface and groundwater resources. More extreme temperatures, both hot and cold, are changing the national distribution of need for power and water — in part to support shifts in heating and air conditioning. For example, in the Pacific Northwest the increasing need for air conditioning is reducing the amount of regionally-produced hydropower available for distribution to the Southwest for their energy requirements. Climate change is also associated with natural disasters that affect water supplies and energy demands. Climate-driven extreme weather events (e.g. hurricanes, fires, floods) can directly damage water and wastewater infrastructures and increase power sector demands to treat or divert water.

Addressing climate change also entails a wide range of industries investing in actions to reduce carbon emissions and overall "carbon footprint" — including both energy and power production facilities and water and wastewater facilities.

Despite the current and increasing interdependence of energy and water, the development histories of these economic sectors are largely disparate. Developing integrated water-energy planning and management will therefore be challenging, given the differences in language, culture, and technological approaches used for managing each resource.

The energy industry largely consists of private companies working in competition, with relatively little disclosure of data or planned activities other than as mandated by regulations. Water entities, on the other hand, are often public or quasi-public organizations, whose planning activities are subject to a higher level of public review. There are also far more water utilities than energy companies or power utilities, so collection of power use data from water utilities may be more challenging than collection of water use data from the energy and power sectors.

Many water users in municipal, agricultural, habitat, and recreational sectors are already actively engaged in watershed-scale water management, while many in the energy sector are more focused on site-scale water issues. Energy sector water users, unlike municipal and agricultural water users, do not provide water as a product. Instead, water is often viewed as a production component to be utilized for extraction, refining, transport, temperature control, fire suppression and other aspects of production and delivery. Water may used for to create steam to generate electricity. Water may be seen as a "nuisance" (e.g. stormwater) to be routed around energy resources and production facilities. Avoiding water impacts and/or managing runoff may constrain site development and be a major driver of cost and feasibility for an energy project. Consequently, energy planners may not see a need for watershed planning efforts.



Interdependencies of Water and Energy: Examples

Water Needs for Energy	Energy Needs for Water
• Thermoelectric Cooling •	• Pumping •
• Hydropower •	• Conveyance & Transport •
• Energy Minerals Extraction/Mining •	• Treatment •
• Fuel Production (fossil fuels, H2, biofuels) •	• Use Conditioning •
• Emission Control	• Surface and Groundwater •

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Water/Energy

Integrated Planning Imperative

From the water planners perspective, energy interests are often not included in water planning discussions. Yet, energy and power demands can have a significant impact on a watershed. Water and wastewater planners have only recently become aware of their carbon footprint, even though power costs are often a major consideration in project costs.

Whatever the obstacles, developing a sustainable approach to managing water resources and energy resources within the US will require integrated planning — which begins with greater cross-sector education and dialogue. While watershed planning will continue to be led by water managers, given their knowledge of area water resources and demands, energy and power planners can provide important information concerning their often considerable water needs and conservation opportunities.

Federal Efforts

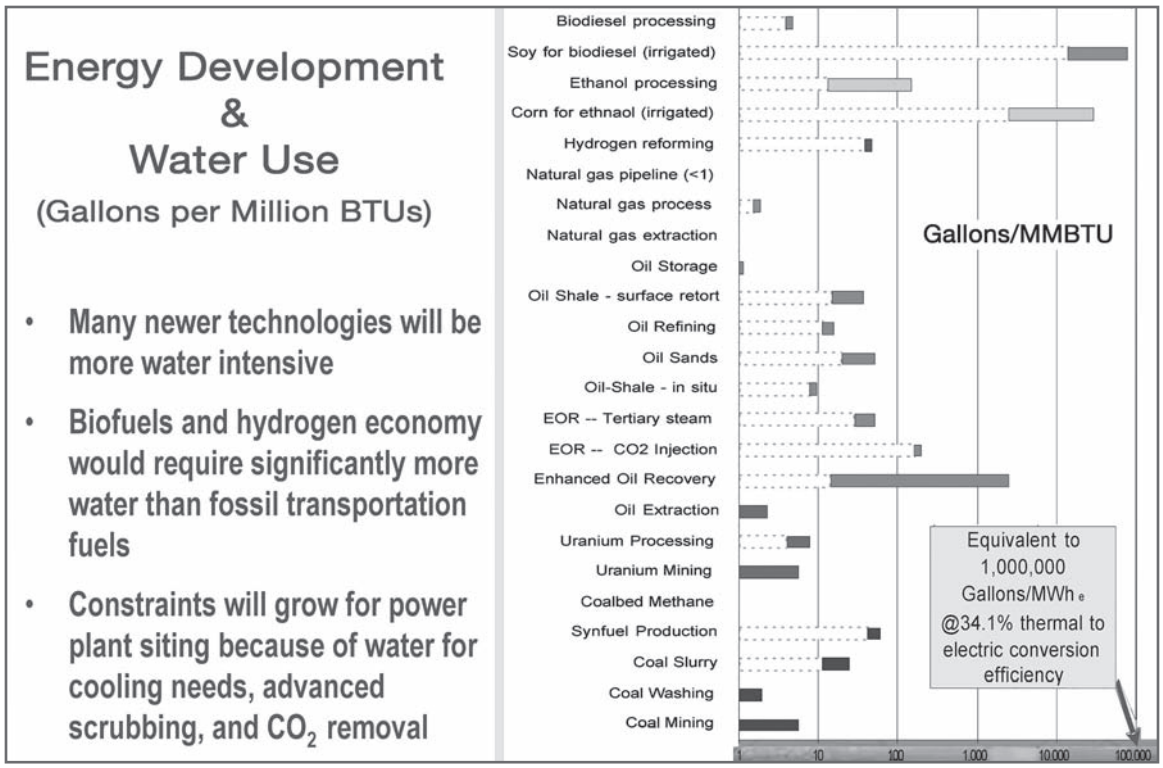
ONGOING ROLES AND NEW INITIATIVES

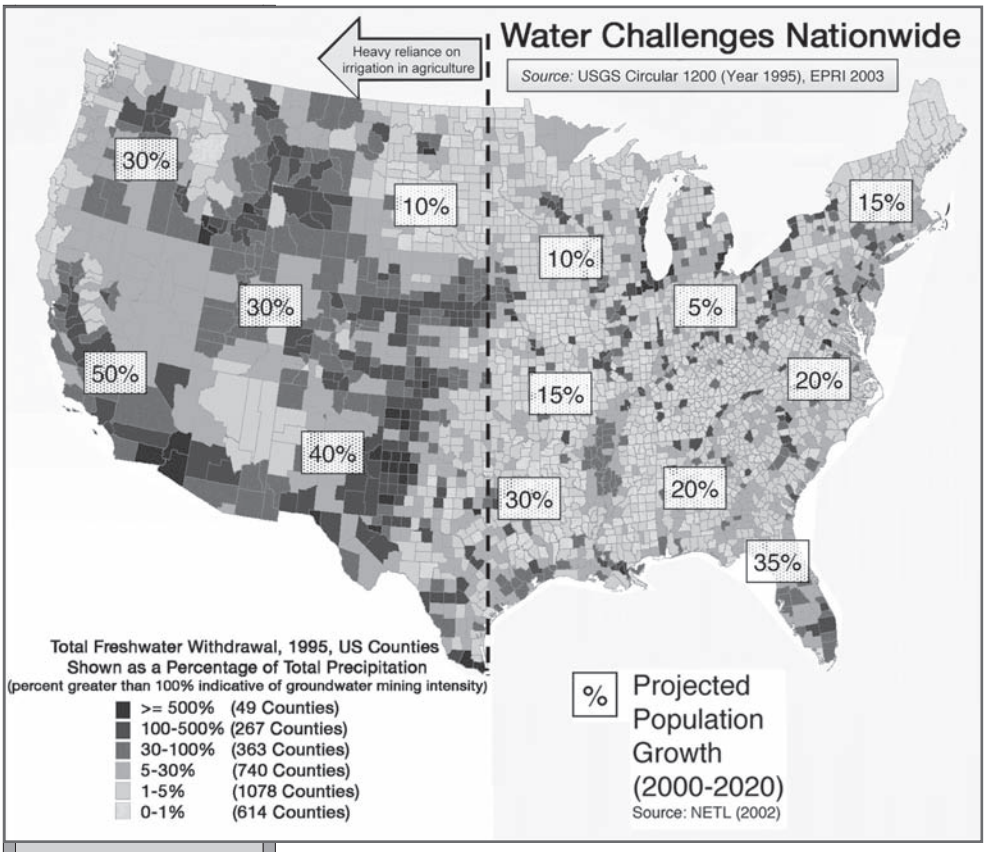
New Approach

The current federal Administration's understanding of the need for better management of both water and energy has been reflected in the creation of an Assistant to the President for Energy and Climate Change. The Administration has also initiated steps towards more collaborative agency approaches to climate change, as evidenced by joint meetings of the Secretaries of the Departments of Interior, Energy, and Agriculture, and the US Environmental Protection Agency (EPA) Administrator. This year, Congress has held several hearings on legislation addressing water-energy integration, as well as legislation on improved coordination of water research among federal agencies. These hearings focused heavily on existing and current research concerning the interrelationship of water, energy, and climate change. An emphasis on the need for more sustainable approaches to water and energy resources management was also reflected in the American Recovery and Reinvestment Act ("Stimulus Package") passed earlier this year, which dedicated substantial funding to modernizing infrastructure (including water infrastructure) and investing in clean energy technologies.

Federal Program Reviews

Numerous federal entities review our nation's approach to water and energy. For instance, in accordance with Executive Order 13211, EPA assesses the energy demands associated with changes in regulations under the federal Safe Drinking Water and Clean Water Acts, recognizing that new water and wastewater treatment requirements can significantly impact energy requirements and associated costs at water facilities. Agencies within the US Department of the Interior (including the Bureau of Land Management and National Park Service), as well as within the US Department of Agriculture (including the US Forest Service), are assessing water-energy issues on public lands. Federally-owned lands make up 20% of the US, including lands that support major watersheds and water supplies, and lands that overlie energy resources or otherwise provide locations for energy and power development (e.g. solar and wind power generation and electric power transmission). The US Geological Survey (USGS) regularly





provides data on water use, including water use for thermoelectric power generation (e.g. Hutson et al. 2004), as well as assessments of energy resources, including: the ongoing national oil and gas assessments (current resources of conventional oil and gas); continuous oil and gas (coal-bed gas, basin-center gas, shale gas, tight gas); and oil shales and tar sands (Shenk 2006). The Federal Electric Regulatory Commission (FERC) also plays an active role in reviewing the interactions between water and energy, including hydrodynamic power generation and associated financing. Responding in part to a petition from the Sierra Club, Natural Resources Defense Council, and the International Center for Technology Assessment, the White House Council on Environmental Quality (CEQ) is reviewing how climate change should be incorporated into the considerations of Environmental Impact Statements developed for federal projects under the National Environmental Policy Act.

Water/Energy

Planning Approaches

When planning for water projects, federal agencies (including the US Army Corps of Engineers (Corps), Bureau of Reclamation, Tennessee Valley Authority, and Natural Resources Conservation Service) use planning approaches required under the federal Water Resources Development Act (WRDA). The Corps develops the federal water project planning approaches, which are referred to as the Principals and Guidelines or "P&G." In 2007, the WRDA reauthorization bill required revisions to P&G, placing a greater emphasis on non-economic factors in the planning of water resources projects, including environmental, social, and public safety impacts. P&G revisions — currently under development and review — incorporate more advanced water resources approaches, including watershed-based systems approaches featuring integrated and adaptive water resources management. The Corps is currently conducting a review of state water planning approaches for the purpose of identifying needs, challenges, gaps and opportunities for enhanced federal support to states and regional entities for more **i**ntegrated **w**ater **r**esource **m**anagement (IWRM)(www.building-collaboration-for-water.org).

In general, water planning is moving towards a more collaborative planning and implementation process with a stronger role for non-federal partners, other stakeholders, and project beneficiaries to support locally-based prioritization. Water planners are considering a range of water uses and stakeholder interests.

DOE's Changing Role

US Department of Energy's Role in Water-Energy Initiatives

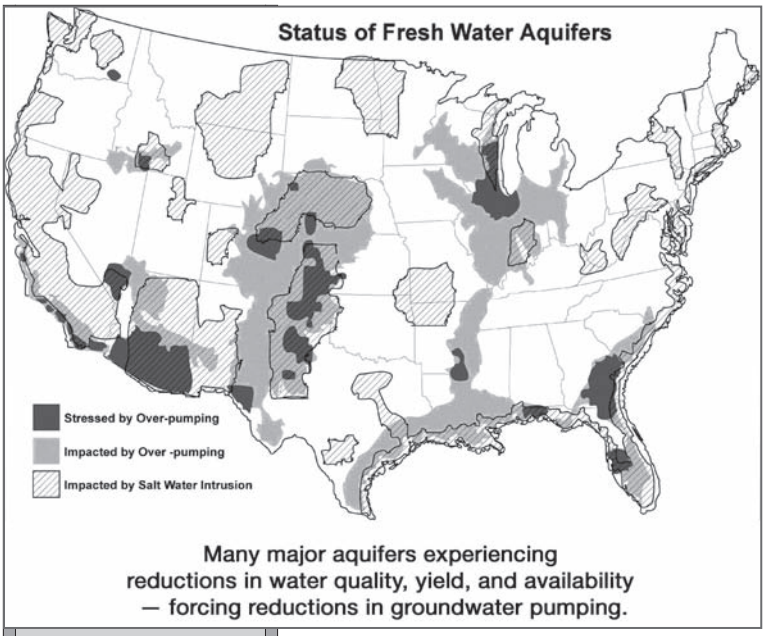
Congress requested the US Department of Energy (DOE) to improve the understanding of the interdependencies and challenges between water and energy, and identify opportunities for improved management of both energy demands for water and water demands for energy, by integrating the management of water and energy. DOE continues to play an increasing role in broadening the understanding of the "energy-water nexus."

Energy Policy Act

The Energy Policy Act of 2005 directed the DOE to develop an Energy and Water program to include "research, development, demonstration, and commercial application."

The energy policy act of 2005 directs doe to:

- Address energy-related issues associated with provision of adequate water supplies, optimal management, and efficient use of water
- Address water-related issues associated with the provision of adequate supplies, optimal management, and efficient use of energy
- Assess the effectiveness of existing programs within DOE and other federal agencies to address these energy and water related issues



Many major aquifers experiencing reductions in water quality, yield, and availability — forcing reductions in groundwater pumping.

DOE has identified a number of opportunities for more integrated planning and management of energy and water. DOE's findings include approaches ranging from the individual building site and community scale, to utility service areas and distribution grids, to river basins, aquifers, and other regional approaches. Integrated resource planning and management is not confined to reducing the water needs for energy and the energy needs for water. Beneficial ways in which water can be used across sectors are also identified — for instance, reusing treated produced water from energy extraction activities for irrigation, or reusing treated municipal wastewater for cooling water in power plants.

In December 2006, DOE submitted a Report to Congress in response to a letter to the Secretary of Energy from the chairmen and ranking members of the House and Senate Subcommittees on Energy and Water Development Appropriations. This DOE Report described the "interdependency of energy and water focusing on threats to national energy production resulting from limited water supplies." [This Report, along with information on DOE's efforts to identify energy and water related research and development needs, can be found online at: www.sandia.gov/energy-water.]

Water/Energy

Energy Production & Use Studies

DOE has a clear role in developing opportunities to reduce water demands and otherwise address water constraints associated with the supply, management, and use of energy. DOE has made significant progress in the completion of studies related to water-efficient, environmentally-sustainable, energy production and energy use (see testimony to the House Science and Technology Committee by DOE Under Secretary Kristina Johnson, July 9, 2009 — www.congressional.energy.gov/documents/).

Water Demands

DOE and the energy industry have always given consideration to water resources as a material input for regulation and siting of energy and power production, distribution, and use. DOE has assessed water demands for various types of energy production and opportunities for the treatment and reuse of energy-related water (e.g. produced water, cooling water) for other beneficial uses — such as irrigation or recharge of alluvial aquifers to augment streamflow.

DOE Areas Assessed

DOE WATER-EFFICIENCY AND SUSTAINABLE-ENERGY RESEARCH AND PROGRAMS INCLUDE:

- Thermoelectric Power
- Concentrated Solar Thermal Power
- Geothermal Power Plants
- Hydroelectric Power
- Carbon Capture and Sequestration
- National Risk Assessment Program
- Natural Gas and Oil, including development of "Risk-Based Data Management Systems" protocols
- Hydrogen
- Biomass Energy
- Energy efficiency improvements in buildings, industry, and transportation, including joint responsibility (with EPA) for the ENERGY STAR program
- DOE Facility Efficiency Options
- Water Demands for Wind Power

Unique Hydropower Aspects

DOE has ongoing involvement with water users and water resources management, particularly in regard to hydroelectric power distribution. Compared with other power sources, hydropower has had a unique relationship with other water users and uses. This is particularly true with respect to instream "nonconsumptive" uses of rivers for habitat and recreation. Since the early 1900s, DOE has worked closely with federal hydropower facilities, through the four power marketing administrations that market hydroelectric power from federal power plants to wholesale customers. The Western Area Power Authority, Bonneville Power Administration, Southwestern Power Administration, and Southeastern Power Administration were developed to sell power produced at federal projects in excess of project needs in order to repay government investment. These Power Marketing Administrations market in such a manner as to encourage the most widespread use of the power at the lowest possible rates consistent with sound business principles. Wholesale customers include: rural electric coops; municipal utility systems; Native American tribes; federal facilities; state institutions (such as universities); and irrigation districts.

Water/Energy

Water-Related Research

DOE has served in a supporting role on the energy aspects of other federal agencies' water-related research activities through active participation in the White House Office of Science and Technology Policy, National Science and Technology Council, and the Committee on Environment and Natural Resources' Subcommittee on Water Availability and Quality. DOE's Office of Energy Efficiency and Renewable Energy Resources has supported research on building technologies, including technologies that reduce water use. DOE also works with EPA on the ENERGY STAR program, developing a labeling program for products that meet strict requirements for energy savings, many of which also result in direct water savings. DOE's Office of Fossil Energy has conducted research on wastewater treatment technologies and innovative approaches to protect and conserve water resources in oil and natural gas production and power generation.

Oil & Gas Considerations

Recently, the Office of Fossil Energy's Oil and Natural Gas Program has considered the merits of a national Energy-Water Framework to address the water challenges and opportunities of environmentally responsible production of domestic oil and natural gas. Such an effort, if undertaken, could include basin-oriented Energy-Water Framework Assessments to optimize water management in major US regions with significant oil or natural gas resources, as well as field testing and demonstrating high priority water management technologies consistent with the Energy-Water Framework Assessments. Criteria for basin selection could include, for example, opportunities for synergies with energy production from renewable resources and furthering regional sustainable development goals. The assessments could draw on the expertise of industry, government, academic institutions and national labs with expertise in integrated resource planning. Such activities would complement prior work by DOE on cost-effective technologies for the environmentally responsible management, treatment and beneficial use of the more than 20 billion barrels of produced water generated each year in US oil and gas production operations.

Energy-Water Roadmap

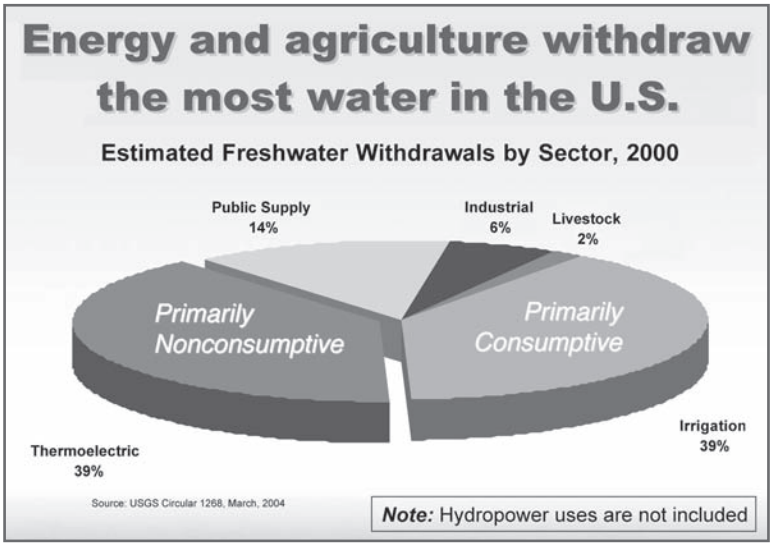
DOE's Roadmapping Process and Feedback Assessments

In 2005-2006, DOE conducted several workshops designed to provide input for the development of an Energy-Water Roadmap, which was also directed in the Energy Policy Act of 2005. The Roadmapping process was designed to assess the effectiveness of existing programs within federal agencies in addressing energy and water related issues and assist DOE in defining the research, development, demonstration, and commercialization efforts needed to reduce water demands in energy development. Sandia National Laboratories was selected to coordinate these Energy-Water Roadmap activities, assisted by the Electric Power Research Institute, other DOE national laboratories, and the Utton Center (a water law center at the University of New Mexico).

The Energy-Water Roadmap process was designed to assess and integrate regional issues and concerns into a nationally coordinated yet regionally focused energy-water science and technology research and development program.

DOE'S ENERGY-WATER WORKSHOPS INCLUDED THREE MAJOR ELEMENTS:

1) Identification and evaluation of regional and national energy-water issues and needs through regional workshops
2) Identification and evaluation of the gaps between current programs/initiatives and future needs
3) Identification of science and technology options to address current and emerging issues/trends and support future energy-water research strategies and priorities



Water/Energy

Use/Stakeholder Driven Assessment

DOE "Needs Assessment Workshops" were held in 2005 and 2006. The workshops were designed to ensure that the process of identifying emerging needs and establishing appropriate research directions was user-driven. User/stakeholder workshop participants included water managers, industrial users, regulators, and public interest groups, as well as policymakers from federal, state, tribal and local governments. Input was obtained from around 350 participants from over forty states and tribal nations.

Based on the workshops, a Gaps Analysis Workshop was held in 2006 to assess the major gaps between existing programs and the emerging issues and needs. Utilizing the Gaps Analysis Workshop results, a Technology Innovations Workshop was later held to suggest research directions and priorities necessary to meet the needs and gaps identified in the previous workshops. DOE has developed a synopsis (still under review) of the national and regional level needs and issues (see Pate et al. 2007—available on the DOE/Scandia National Laboratory energy-water nexus website: www.sandia.gov/energy-water/).

Identified Needs

DOE WORKSHOP-IDENTIFIED NEEDS INCLUDE:

IMPROVED ENERGY AND WATER RESOURCES PLANNING AND MANAGEMENT

- Long-term or integrated resource planning
- Consistent and detailed data and models
- Fundamental understanding of the nation's surface and groundwater resources
- Understanding climate change and its impacts on water supplies and energy production
- Decay of water treatment and delivery infrastructures
- Significant transmission and distribution problems and constraints

Non-Traditional Supply

IMPROVED USE OF NON-TRADITIONAL WATER FOR ENERGY PRODUCTION, INCLUDING:

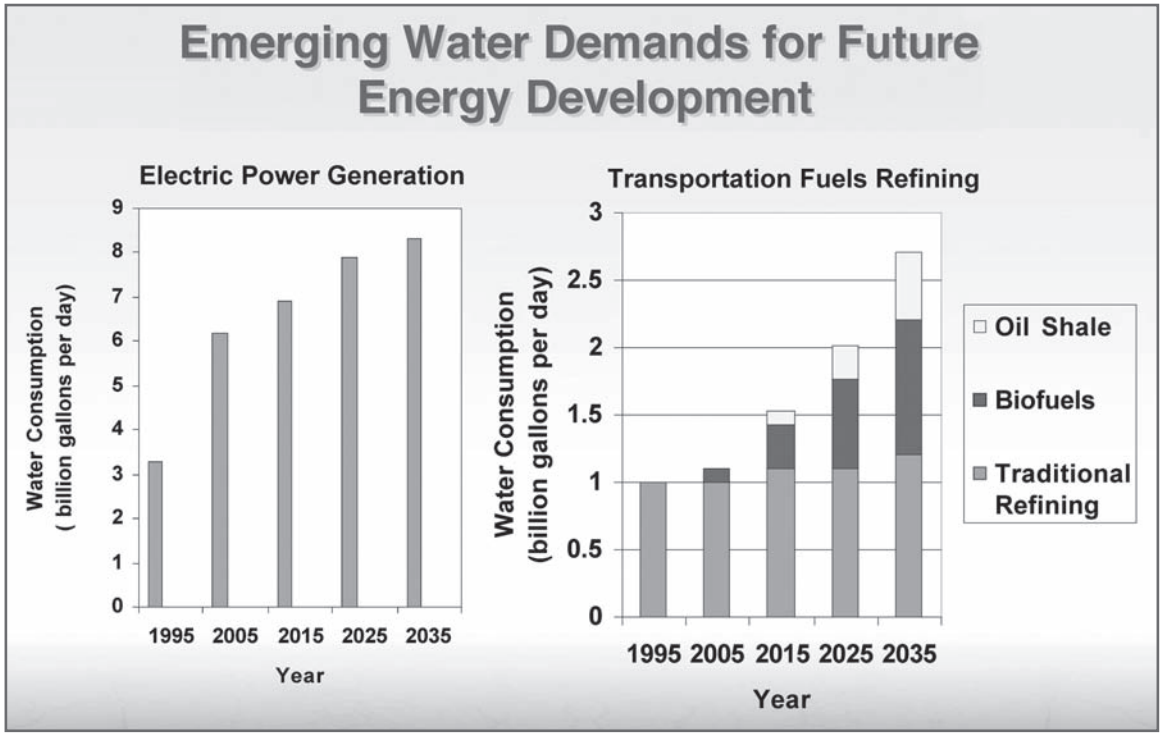
- Produced waters
- Brackish groundwater
- Wastewater

Conservation & Efficiency

IMPROVED ENERGY AND WATER CONSERVATION AND WATER USE EFFICIENCY IN ENERGY PRODUCTION

- Less water-intensive energy production and electricity generation (including solar)
- Hydropower research, river ecology, and overall management of co-location of energy and water facilities
- Biofuels water demands
- Cost and value of water
- Conservation programs

As noted, the US energy infrastructure depends heavily on the availability of water. There is growing concern about the availability of water for future competing demands once limited water resources are considered. In some regions, power plants have had to limit generation because of insufficient water supplies, and citizens and public officials concerned about the availability of water have opposed new



Water/Energy

power generation and fuel processing facilities. Most state water managers expect shortages of water over the next decade (GAO, 2003), and water supply availability is already affecting existing and proposed power plants and nonconventional transportation fuel production in various locations around the country.

Water Demand

Analysis of trends of increasing water demand for energy reveals:

- Current directions in energy development and production could significantly increase water consumption through 2035, making energy the largest non-agricultural water consumer
- Additions of freshwater resources are limited without new storage capacity, forcing water reclamation and water reuse to become the major sources of future water supplies
- If growth in water reclamation continues, overall national water availability could be sufficient to support water demand growth, though regional shortages are likely to occur (especially through 2015)
- Energy sector processes for cooling, scrubbing, refining, etc. will need to become compatible and cost-effective for use with reclaimed or nontraditional waters

Reclaimed Water

- Through 2015, water supplies development will be under significant pressure to keep pace with emerging water demands
- Siting priorities of energy facilities may change to use large reclaimed water sources in urban areas
- Energy planning will become increasingly dependent on interactions between regional water, wastewater, and agricultural water managers and planners; regional energy and water concerns may begin to emerge

DOE-Identified Opportunities for Integrated Water-Energy Planning

As noted in a recent paper by DOE researchers, there are many areas where DOE and the energy sector can support water planning and management activities (see Pate et al. 2007).

Energy sector water planning and management support activities include:

Energy Costs

Reducing energy costs for water supply. Supplying the nation's freshwater needs requires energy, and enhancing those supplies as they become more limited by climate change, population growth, and other factors will likely increase energy requirements. Nationwide, about three percent of US power generation is currently used for water supply and treatment, which is comparable to several other industrial sectors. Electricity represents 75 percent of the cost of municipal water processing and distribution. In California, where water is conveyed long distances, nearly 20 percent of state electricity consumption is for water and wastewater conveyance, pumping, supply, treatment, and discharge.

Augmenting freshwater supplies through substitution with impaired quality water. Lower quality source waters such as brackish groundwater, seawater, produced water, and wastewater can be used either where lower quality water can be tolerated, e.g., irrigation and some industrial uses, or where the cost and energy to treat water is affordable. Saline groundwater underlies much of the country and saline groundwater and seawater may be converted to potable water using desalination. Desalination requires more energy than typical public water supplies. Energy requirements for desalination are similar to those for pumping water long distances via projects such as the California State Water Project.

Coordinated Conservation

Coordinated energy and water conservation. Water and energy conservation measures represent an opportunity to stretch both resources. Reducing water consumption can save energy for water supply and treatment as well as for heating water, and thus reduce the requirements for water for the energy sector. Power companies often have the authority to invest in programs that save energy, but as noted by the California Energy Commission, utilities may not have the authority to invest in customer programs that lead to energy savings by reducing water consumption (CEC, 2005). Both power and water supply generation facilities are designed to meet peak demands. Coordinated energy and water conservation can occur at scales from individual houses to communities, and cities to watersheds and river basins.

Synergistic Production

Synergistic energy and water production. Throughout the energy sector, there are opportunities to co-produce energy and water. Locating power plants adjacent to water treatment facilities, or more brackish or produced water resources, could at least partially displace freshwater needs. In addition, waste heat from power plants can be used in some desalination cycles, and biogas from wastewater treatment plants can be used to generate power. Within the energy sector, the need to provide heat for re-gasification of liquefied natural gas fits well with the need to provide cooling for power plants. Many water providers are beginning to incorporate alternative energy sources on a smaller scale (e.g. wind and solar) at their treatment facilities to meet peak power demands.

Water/Energy

Water Allocation

Holistic Approach

Western Water & Energy Reports

Eastern Issues

Colorado Energy Needs

State and Provincial Approaches to Water Supplies

Several state agencies, watershed planning groups, and water user organizations have recently conducted studies and developed program initiatives to address energy-related issues associated with water supplies. Generally, water allocation is handled at the state level. This is particularly true in the western US, where water use is governed by the Prior Appropriation Doctrine (simply put, "first in time, first in right" regarding rights to use water). Federal projects and management priorities are being incorporated into state-led planning efforts, and must comply with state water laws. In the eastern US, water availability has been less problematic and water allocation laws and institutions have been somewhat less structured. However, some eastern state water agencies and multi-state River Basin Commissions (e.g. for the Potomac and Susquehanna) have been taking a greater role in identifying water demands and allocating larger withdrawals — particularly in areas where water resources have been identified as stressed and over-utilized (e.g. "Capacity Use Area" or "Critical Area" designations).

Approaches to water resources planning and water use prioritization have become increasingly holistic. Such approaches are based on managing for entire watersheds or river basins or aquifers and take into account the full range of these areas' water resource uses — including municipal, industrial, agricultural, environmental, and recreational demands. Increasingly, prioritization of water uses is determined through local input in formal processes such as the "Basin Roundtables and Interbasin Compact Committee" in Colorado, "Basin Advisory Groups" in Wyoming, and "Watershed Planning Units" in Washington. States and River Basin Commissions have varied in the level to which energy water demands and impacts on water availability from energy development have been incorporated into water resource planning. As noted earlier, the Corps is reviewing state and regional approaches to collaborative, integrated water planning, although energy sector water uses are not a specific focus of their review.

Western states face a combination of decreased water availability, fast growing population centers, and several areas with energy resources and power production potential (including traditional and nontraditional sources). The Western States Water Council and its parent organization, the Western Governors' Association, have recently completed reports on water and energy. The Western States Water Council and DOE are currently scoping studies on water impacts and demands associated with energy in western states, including transmission line needs, energy enterprise zones, and water needs associated with renewable energy sources such as wind and solar.

Eastern states also have been facing increased pressures on water supplies and water quality associated with energy demands. Representatives from several state agencies in the mid-Atlantic states recently joined researchers from various Water Resources Research Institutes (located at the land grant universities in each state) to address the water-energy nexus, focusing particularly on the challenges associated with development of area energy resources, such as the multi-state Marcellus Shale formation. Unlike energy resource development in the West, which often involves large projects on public lands that undergo comprehensive studies under NEPA, development of shale resources in states like Pennsylvania and West Virginia will involve agreements between small, private companies and private landowners. These differences in the "players" involved in energy production present challenges for state water quality and water management agencies and multi-state river basin commissions, which typically have fewer staff and financial resources than their counterparts in the West.

Two examples of cases where state water planners and the water supply industry have incorporated energy development projections into water planning activities include Colorado and California.

Colorado

In Colorado, a "Phase I Energy Development Water Needs Assessment" was completed for the northwest region of the state, where there are extensive oil shale reserves and other energy resources under development, as part of the ongoing Statewide Water Supply Initiative. This Initiative is supported by funds from the Colorado Water Conservation Board. Colorado's Basin Roundtables, consisting of water users and other water stakeholders from each basin of the state, are now identifying projects and processes that are being planned to meet projected water supply needs and remaining gaps. An energy development needs assessment was conducted in northwest Colorado to estimate water demands of four energy production sectors (natural gas, coal, uranium, oil shale). This assessment took into consideration: Direct Water Demands (for construction, operation, production, and reclamation); Indirect Water Demands (uses associated with an increase in population); and Thermoelectric Power Demands (power to meet operational demands in energy development and production activities). Colorado's "Phase II Energy Development Water Needs Assessment" will expand the review of water demands for energy statewide, and more specifically locate energy-related water demands, and associated water supplies and water rights. Several private energy concerns have been actively engaged in the development of this assessment, including Shell and the National Oil Shale Association.

Water/Energy

Greenhouse Gas Emissions

California

California's Energy-Water activities have been led by the California Energy Commission (CEC), working collaboratively with several water agencies at the state and federal level. Participants include: the California Division of Water Resources; the California Division of Public Health; the State Water Resources Control Board; the California Public Utilities Commission; the California Urban Water Conservation Council; the Association of California Water Agencies; the federal Bureau of Reclamation; and additional water providers and stakeholders. California's energy-water efforts have been driven by goals set within that state for reduction of **g**reen**h**ouse **g**as (GHG) emissions to meet Kyoto protocols, as well as by constraints on the use of fresh surface waters for nonpotable uses. The CEC has identified power demands (and associated GHG emissions) arising from water sector uses, primarily associated with the pumping, transferring, treating, distribution and end uses of water (*see* Chaudry, 2009). The power needs arising from the collection and treatment of wastewater was also assessed. California energy and water planners have identified a number of ways to reduce GHG emissions from the water sector.

California Strategies

California water sector GHG emissions reduction strategies include:

- Reducing end-use water demand (e.g. in buildings) to reduce energy required to deliver water
- Improved energy efficiency related to water use
- Incorporation of cleaner energy sources into water industry uses

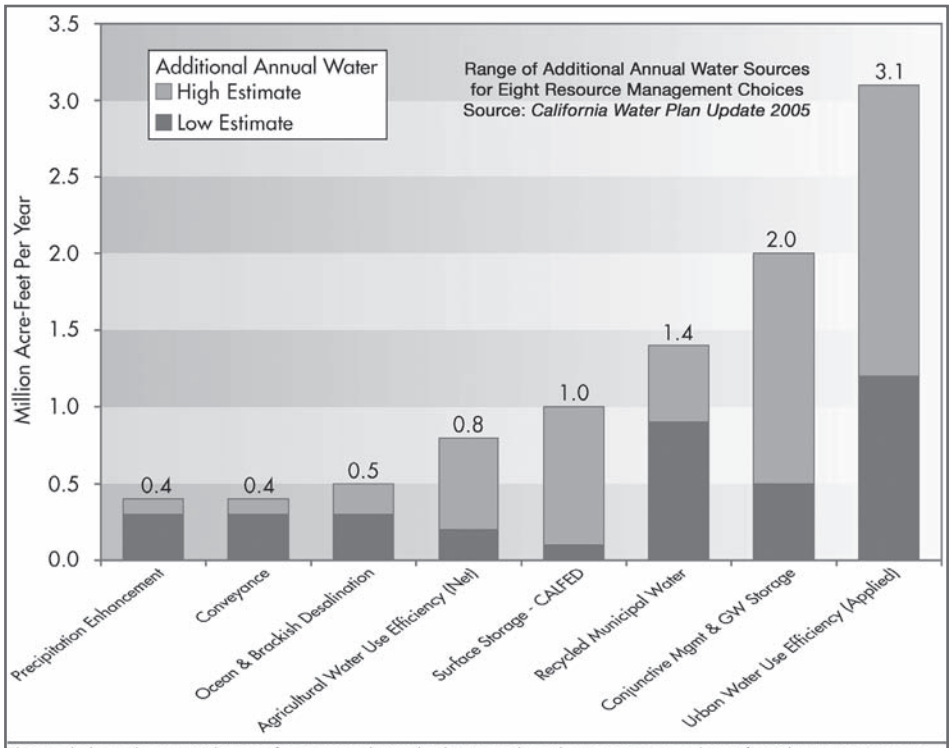
State initiatives to reduce both water use and GHG emissions in the water sector include:

- Increased urban water runoff reuse by increasing infiltration to aquifers
- Expanding use of low impact development
- Capturing dry weather flows
- Water recycling in water importing regions and/or where water recycling is less energy intensive than other sources
- Implementation of cost effective energy efficiency measures in water system infrastructure projects
- Measurement and verification of efficiency and conservation programs
- Conducting Research and Development projects to reduce energy intensity within the water use cycle
- Development of reduced energy projects that can be co-located with existing water system infrastructure

Alternative Sources

Increased Efficiencies

CEC has also worked with California water agencies towards increased energy efficiency. Identified efficiencies will be integrated into California's "20 x 2020 Initiative" — which is a plan to achieve a 20% reduction in per capita water use by the year 2020. The figure below illustrates the opportunities for increased use of alternative water sources and increased water efficiency.



This graph shows the potential range of more water demand reduction and supply augmentation each year for eight resource management strategies. Low estimates are shown in the lower (dark blue) section of each bar. The water supply benefits of the resource management strategies are not additive. As presented here, urban water use efficiency includes reduction in both consumptive and non-consumptive uses (or applied water), whereas agricultural water use efficiency only includes reduction in consumptive uses (or net water).

Water/Energy

Oil Sands Development

Province of Alberta, Canada

Another location where water planners and energy planners are working collaboratively is in the Province of Alberta, Canada. Extensive development of oil sands has occurred in the Peace-Athabasca River Basin. As part of the Provincial Water Strategy, water planning advisory committees (including one for the oil sands region) are being formed with support from Alberta Environment — the province's lead environmental agency. In addition, several multi-stakeholder efforts are involved in developing and distributing data resources which combine the resources of: energy companies; research institutes and universities; provisional agencies; local governments; tribes; and other water users. For example, the Cumulative Environment Management Association is a multi-stakeholder organization in the Wood Buffalo Region focusing on water quantity and quality; watershed integrity; and approaches to reclamation of oil sands facilities. This Association is developing plans for the protection of wetlands and other water resources throughout site development, operation, closure, and post-closure activities. Another effort is the Regional Aquatic Monitoring Program — a joint monitoring program for data on rivers and lakes. Canadian Oilsands Network for Research and Development Water Resources Committee also has contributed to the improved understanding of water resources use in the oil sands region by bringing together the water managers from each of the energy companies with projects in the region to understand issues and new technologies available to manage water and protect the Athabasca River and surrounding "muskeg" wetland environments. The willingness by private companies to work cooperatively has been essential to support management of water resources in Alberta's oil sands region.

Water Industry Associations and Non-Profits

In addition to state water planning efforts, several water manager and water utility associations have also conducted studies, prepared educational materials, and explored policy and program approaches to energy and water issues.

For example:

Impacts on Utilities

American Water Works Association (an association of water utilities) and the Water Research Foundation have conducted several studies on the energy-water nexus and how energy demands impact utilities. Both organizations have been conducting research and developing tools and communications programs for water utilities and policy makers. Currently, Association members are reviewing the potential roles and strategies needed by water utilities on energy issues, including consideration of the implications of a "cap and trade" program for water providers.

Climate Change

The Water Utility Climate Alliance was formed by some of the largest water utilities in the country, including Southern Nevada Water Authority (Las Vegas Valley and surrounding communities), Denver Water, East Bay Municipal Utility District (San Francisco Bay area), and New York City. They have come together to provide leadership and collaboration on climate change issues affecting drinking water utilities by improving research, encouraging the development of adaptation strategies, and creating mitigation approaches to reduce greenhouse gas emissions.

Reclaimed Water

The WateReuse Research Foundation has completed extensive studies on potential for desalination and reclaimed water reuse related to reuse of energy related water supplies (e.g. produced water, cooling water, and other energy industry wastewater) for other beneficial uses such as municipal water supplies and irrigation. The Foundation recently entered into a partnership agreement with the California Energy Commission related to energy and water, looking at the energy requirements and related costs for alternative water supplies, including desalination and water reuse.

Groundwater Protection

The Ground Water Protection Council (GWPC), the association of state groundwater protection agencies, has been actively involved with EPA's development of carbon sequestration rules and has recently completed research on groundwater protection and shale gas. In projects funded by DOE, GWPC has developed Risk-Based Data Management Systems (RBDMS) protocols (currently in use by twenty-three states) for review of water impacts to support regulation of oil and natural gas production and underground injection well activities.

Geothermal Challenges

The National Ground Water Association and the American Ground Water Trust have both worked to develop educational materials (guide books and workshops) related to geothermal energy production and groundwater protection. There are unique challenges associated with opportunities for geothermal energy production and underground heat storage, as well as the potential impacts to groundwater from energy production and waste disposal in aquifers (including carbon sequestration).

Several energy and power related organizations and private companies have also played an active role in improving the current understanding of water use for energy, energy use for water, opportunities for improvements, and integrated management approaches, including the Electrical Power Research Institute and General Electric (GE) Water and Power.

Water/Energy

Nationwide, universities are increasingly active in water and energy research — including numerous Water Resources Research Institutes and notably the "WaterCampus" at the University of Illinois-Champagne Urbana. Energy research centers at the University of Texas and the University of Southern California have also focused on water. Few universities, however, have taken a truly integrated approach. Private research and advocacy organizations, such as the Pacific Institute and Brookings Institute, have also conducted studies related to water and energy.

Other Issues & Approaches

Community Scale

Green Buildings and Green Cities

Another key step towards integrated energy-water planning has occurred at the building site and community scale. The Coalition for Alternative Wastewater Treatment was recently developed through efforts led by the Water Environment Research Foundation. Coalition efforts support reductions of both water and energy at the "point of use" through "sustainable infrastructure designs and principles." Since both water and power facilities are designed to meet end-use demands, understanding and managing water and energy demands at the point of use is critical.

Community scale sustainable energy-water planning includes:

- Onsite and neighborhood treatment and reuse
- Green Infrastructure (e.g. rain gardens, green roofs and walls)
- Smart Growth
- Green Cities (restoration of natural cycles of water infiltration and evaporation)
- Watershed Restoration

Agricultural Perspective

Water, Energy, and Agriculture

There are many obvious links between water, energy, and agriculture. Studies of water demands for biofuels (an alternative to fossil fuels) have been undertaken by DOE and other agencies. However, studies focusing on the overall impacts of energy and water demands from an agricultural perspective are rare.

Some studies on energy and power demands specific to irrigation have been conducted by USDA, the US Bureau of Reclamation, and related researchers. Review of the USDA National Agricultural Statistics Service's 2002 Census of Agriculture, identified several barriers to improvements in agriculture to reduce energy or conserve water (Orendorff, 2006).

Ag Barriers

Barriers to improvements in agriculture include:

- Improvement(s) won't save enough to cover installation costs
- Uncertainty about future availability of water
- Farmer cannot finance improvement(s)
- Physical field conditions limit system improvement(s)
- Improvements involve risk of reduced yield
- Landlord will not share cost of improvement(s)
- Farmer will not farm this operation long enough to justify improvement(s) expenditures

Opportunities

Opportunities to beneficially link management of agricultural water and energy include:

- Use of energy water for irrigation, which can also provide water temperature benefits for some crops, although concerns regarding salinity from energy water reuse must be addressed
- Capture of methane from lagoons and animal wastes to provide power for energy and water facilities
- Use of "microhydro" — i.e. hydrodynamics within canals, pipes, and wells to provide power as well as additional revenue streams for irrigation districts

CONCLUSION

Steps towards integrated water-energy planning

Integrated water-energy planning holds great potential for balancing the Nation's future energy and water needs. The September 2009 Water-Energy Sustainability Symposium provides an important venue for cross-sector education on this topic, dialogue on current knowledge and water-energy issues, learning what's been done by DOE and others, discussing lessons learned, and exploring paths forward. As national understanding of the relationship between water and energy grows, opportunities will also grow for improved collaboration, leveraged expertise and shared visions on smarter, more sustainable approaches for meeting the Nation's future water and energy needs.

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US Army Corps Project: Building Strong Collaborative Relationships for a Sustainable Water Resources Future: www.building-collaboration-for-water.org

US Geological Survey National Oil and Gas Assessments: http://energy.cr.usgs.gov/oilgas/noga/index.html

US Department of Energy, Energy-Water Nexus: www.sandia.gov/energy-water

National Water Policy

Candidate's Record

Economics

Budget for Water

Wetlands Protection

NATIONAL WATER POLICY

BALANCING RESOURCE PROTECTION & ECONOMIC DEVELOPMENT:
AN EARLY ASSESSMENT OF EMERGING WATER POLICIES IN THE OBAMA ADMINISTRATION

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Introduction

In terms of environmental and natural resources issues, the 2008 presidential campaign focused on mainstream policy initiatives such as global climate change, renewable energy development, and the nation's dependence on foreign oil. The candidates expressed very little regarding their views on issues such as water quality, water resources protection, water supply and infrastructure, and policies affecting oceans and coastal areas. Despite this relative dearth of information and debate, then-Senator and presidential candidate Barack Obama had developed a relatively clear record favoring greater protection of the country's water resources, with particular attention to nationally important ecosystems. For example, as a long-time resident of Chicago, Illinois, Obama recognized the importance of the Great Lakes to the region and the nation. According to his campaign materials, Obama supported efforts to comprehensively restore the Great Lakes, including wetlands, wildlife and fisheries habitat, and water quality. *Barack Obama and Joe Biden: Promoting a Healthy Environment* (2008), www.barackobama.com/pdf/issues/EnvironmentFactSheet.pdf. As a candidate, Obama also supported: enhanced drinking water standards; greater federal financing for water and wastewater infrastructure; expansion of programs to promote restoration of wetlands and the Gulf Coast; and market-based water conservation initiatives. *Id.*

In the six months since Obama's inauguration in January 2009, however, it is still too early to discern the path the Administration will take on water policy, as several factors have converged to make any predictions difficult. To begin with, as the nation faces its worst economic downturn since the Great Depression, the Obama Administration has focused much of its attention on developing policies and supporting legislation that would stimulate the economy, create jobs, and restore consumer confidence. As a result, environmental issues other than climate change have not been among the highest priorities emerging from the White House. Obama's policies on water supply, water resources protection, and water quality have yet to fully emerge and evolve. Until recently, in fact, many key appointees within the US Environmental Protection Agency (EPA) had yet to be nominated or confirmed. Only recently, for instance, did the Senate confirm Peter Silva, a Californian, as a senior advisor for water programs within EPA.

Although focusing present policies and resources primarily on the economic realities facing the nation, the Obama Administration has promoted and commenced a surprisingly large number of discrete initiatives concerning the nation's water resources. In fact, water initiatives remain a prominent focal point of the Administration's environmental policies: the Administration allocated nearly half of EPA's $10.5 billion budget to water programs. *Fiscal Year 2010 EPA Budget in Brief* (May 2009), www.epa.gov/budget. While certainly we have not seen the full extent to which this Administration may progress in terms of a comprehensive water policy, as a general matter it would appear that the Administration is looking for innovative ways to promote more aggressive clean water and resource protection programs, while responding to the realities of the current economic climate. The interrelationship of these overarching, and at times competing, values is seen in six areas where, as discussed in detail below, the Administration has advanced or advocated policies in the water resources area: wetlands restoration and preservation; protection of nationally important ecosystems; protection and development of oceans and coastal areas; environmental controls; infrastructure modernization; and improving transparency and efficiency.

Wetlands Preservation

For decades, debate surrounding the protection of wetlands has continued unabated. Early indications suggest it will only intensify during Obama's tenure. Under Justice Scalia's plurality approach articulated in *Rapanos v. United States*, 547 U.S. 715 (2006), federal jurisdiction over a wetland exists only if it is adjacent to a channel that "contains a…relatively permanent body of water connected to traditional interstate navigable waters," and has a "continuous surface connection" to that water. *Id*. at 742. In the wake of this decision, considerable confusion and ambiguity still exists over which wetlands fall under the jurisdiction of Clean Water Act (CWA) protection. Reports suggest that US Corps of Engineers' (Corps') districts fail to consistently apply the opinion's holding. EPA and Corps guidance documents have failed to provide sufficient clarity. [**Editor's Note**: Justice Kennedy's concurring opinion in *Rapanos* provided the decisive fifth vote in the Supreme Court, thereby creating the "significant nexus" test.]

National Water Policy

Wetlands Jurisdiction

With Congress again exploring possible amendments to the CWA, the Obama Administration appears poised to support legislative changes. A pending bill proposes to clarify the scope of the CWA to include wetlands. This change is intended to clarify and potentially expand waters and wetlands subject to jurisdiction under the CWA, as well as help ensure uniformity in its application. Clean Water Restoration Act, S. 787, 111th Cong. (2009). Notably, the bill specifically references *Rapanos* and — if enacted — would effectively reverse the holding in *Rapanos* and put in its place a more specific definition of jurisidictional waters. In a significant gesture of support, five members of the Obama Administration drafted a letter to key Congressmen championing this clarification. Letter from Nancy Sutley, Chair, White House Council on Envtl. Quality (CEQ); Lisa Jackson, Adm'r, EPA; Terrence Salt, Acting Assistant Sec'y of the Army (Civil Works); Tom Vilsack, Sec'y, Dep't of Agric.; Ken Salazar, Sec'y, Dep't of Interior, to Sen. Barbara Boxer, Chair, Comm. on Env't and Pub. Works (May 20, 2009), www.greenenvironmentnews.com/feed_images/293a81f3-7df6-4319-ac22-ce0ed1611e78.pdf. The Administration outlined four principles for consideration, including: broadly protecting the nation's waters; making the definition predictable and manageable; promoting consistency between CWA and Agricultural Wetlands Programs; and recognizing long-standing practices. In the Administration's view, Congress can reduce ambiguity and confusion over the definition through a clear statement of intent.

Protection of Nationally Important Ecosystems

Regional Efforts

In a related effort, during its first six months the Obama Administration has demonstrated considerable interest in addressing long-standing problems of the nation's largest and most important water resources. Specifically, the White House has initiated measures and allocated funds for the Great Lakes, Chesapeake Bay, Puget Sound, and the Everglades, in an effort to combat pollution and climate change effects.

Great Lakes

Trust Fund

The Administration has recognized that the Great Lakes are vital not only to their immediate surrounding areas, but to the entire nation as well. As such, issues surrounding the Great Lakes could become a major focus of the Administration's water policy. EPA Administrator Lisa Jackson recently stated: "As the Great Lakes go, so goes the national policy as to water." Lisa Jackson, Adm'r, EPA, Great Lakes Semiannual Meeting (Feb. 24, 2009). Consequently, Obama espouses the development of a $5 billion trust fund for the restoration and preservation of the Great Lakes, although he has not yet announced a plan of action regarding this initiative. In the meantime, the President has allocated $475 million of EPA's budget to programs targeting problems in the Great Lakes area such as non-point source pollution, invasive aquatic species, and contaminated sediment. Draft, *Great Lakes Multi-Year Restoration Action Plan Outline* (July 17, 2009), www.epa.gov/greatlakes/glri/glmyrapo.pdf; FY2010 EPA Budget in Brief (May 2009), www.epa.gov/budget. Further demonstrating the President's intention to promote their preservation, Secretary of State Hillary Clinton and Canadian Minister of Foreign Affairs Lawrence Cannon recently announced their plans to renegotiate the Great Lakes Water Quality Agreement, created almost four decades ago. Hillary Clinton, US Sec'y of State, 100th Anniversary of the Boundary Waters Treaty, Niagara Falls (June 13, 2009), www.state.gov/secretary/rm/2009a/06/124716.htm.

Canadian Agreement

Chesapeake Bay Order

In addition to the Great Lakes, the Administration has announced aggressive measures to protect other nationally significant ecosystems. In May 2009, the President issued an executive order calling for restoration of the Chesapeake Bay. Exec. Order No. 13,508, 74 Fed. Reg. 23,099 (May 15, 2009). In the order, the President created a federal cross-departmental committee to pinpoint the estuary's environmental issues and develop conservation strategies. Headed by EPA, the Federal Leadership Committee for the Chesapeake Bay includes representatives from the Departments of Agriculture, Commerce, Transportation, Interior, Defense, and Homeland Security. Deeming the Chesapeake Bay a "national treasure," the President underscored his dedication to keeping America's large water resources healthy. *Id.*

Puget Sound

The Administration also has provided significant funding for Puget Sound in Washington State. Under Section 320 of the CWA, 33 U.S.C. § 1330, EPA approved the Puget Sound Action Agenda which grants access to $20 million of funds in 2009 for the protection and restoration of the Sound. *EPA Gives Puget Sound Action Agenda "Stamp of Approval," Paves Way for Continued Federal Funding* (July 15, 2009), www.epa.gov/newsroom>>Region 10 news releases>>July 15. The Puget Sound Action Agenda, which was proposed by the State of Washington prior to its EPA approval, outlines a plan to solve problems that threaten the Sound, including pollution and endangered species. Recognizing the centrality of the Sound to the region and its importance to the nation, the Administration has stated that it considers the estuary on par with other large bodies of water in the United States, including the Great Lakes and the Chesapeake Bay. *Puget Sound Action Agenda* (May 27, 2009), www.psp.wa.gov.

Everglades

Finally, President Obama has increased federal support for the restoration and maintenance of the Everglades. Early this year, the President signed the American Recovery and Reinvestment Act of 2009 (ARRA), which included $241 million for Everglades-dedicated projects. Pub. L. No. 111-8, § 5, 123 Stat. 115. In addition, President Obama's FY 2010 Budget requests $278 million for Everglades restoration initiatives. U.S. Dep't of Interior (June 24, 2009), www.doi.gov/news/09_News_Releases/062409b.html.

National Water Policy

Technical Approach

Task Force

Oceans & Energy

MOU

Joint Jurisdiction

Heightened Controls

Mountaintop Removal

Discharge Permit Ban

Oceans and Coasts

With regard to oceans and coastal areas, the Obama Administration appears to promote policies that not only preserve these resources, but also encourage development — particularly with regard to renewable energy. While primarily directed by the Administration's policies on global climate change and renewable energy, these measures suggest that the Administration's water policies, as they evolve, likely will focus on greater restoration and protection.

As an initial matter, the Administration appears to be taking a technical approach in investigating and researching approaches to better understand oceanic resources, which could lead to new and innovative regulatory programs. With regard to marine protection criteria, for example, which are designed to control pH levels in ocean waters, the Administration has recognized that a new approach may be warranted as current criteria were developed over 30 years ago. EPA has sought comments and recommendations, including additional scientific information and data, as well as suggested federal, state, and local strategies to address the impacts of ocean acidification. *Ocean Acidification and Marine pH Water Quality Criteria*, 74 Fed. Reg. 17,484 (Apr. 15, 2009). Similarly, the National Oceanic and Atmospheric Administration is undertaking an 18-month study to investigate how oceans absorb carbon dioxide emissions. *Id.*

At the same time, the Administration has taken steps to begin addressing protection of oceanic resources. In June 2009, the White House executed a memorandum which established an Interagency Ocean Policy Task Force, led by CEQ Chair Nancy Sutley. *Memorandum from the President for the Heads of Executive Departments and Agencies Regarding National Policy for the Oceans, Our Coasts, and the Great Lakes* (June 12, 2009), www.whitehouse.gov/assets/documents/2009ocean_mem_rel.pdf. In recognition of the effects of industrial practices, acidification, and rising sea levels on ocean waters, the Task Force will develop policies aimed at the maintenance and protection of the oceans and coasts. The memorandum stresses effective coordination and accountability in the development of these policies.

With regard to harnessing oceanic resources, the Administration has promoted greater coordination and regulatory efficiency in approval of renewable energy projects on the Outer Continental Shelf (OCS). In April 2009, the US Department of the Interior, on behalf of the Minerals Management Service (MMS), and the Federal Energy Regulatory Commission (FERC) entered into a Memorandum of Understanding (MOU) regarding alternative energy development on the OCS, including hydrokinetic energy development. *Memorandum of Understanding Between the US Department of the Interior and Federal Energy Regulatory Commission* (Apr. 9, 2009), www.ferc.gov/legal/maj-ord-reg/mou/mou-doi.pdf. The MOU provides a role for both agencies in the siting of hydrokinetic energy projects on the OCS. MMS will issue leases, easements, and rights-of-way for such projects, and FERC will issue licenses and exemptions for the construction and operation of hydrokinetic projects. The MOU addresses in general terms how, in practice, the agencies will exercise their joint jurisdiction. In addition to this MOU, MMS issued final regulations to implement its offshore alternative energy program. *Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf*; Final Rule, 74 Fed. Reg. 19,638 (Apr. 29, 2009). The final rule authorizes MMS to issue limited leases and commercial leases to developers of hydrokinetic energy projects, consistent with the MOU.

Environmental Controls

Although the Obama Administration has yet to announce any comprehensive policies addressing water quality, in the first six months of his presidency he has demonstrated a movement toward heightened environmental controls. For instance, EPA issued a final rule lowering the acceptable level of acrolein and phenol in water in response to new health risk information. *Notice of Availability of National Recommended Water Quality Criteria for Acrolein and Phenol*, 74 Fed. Reg. 27,535 (June 10, 2009). Additionally, the Administration — recognizing the effects of dioxin contamination on the surrounding area, including the economic impacts — increased efforts to lower dioxin levels produced by the Dow Chemical Plant in Michigan. Letter from Lisa Jackson, Adm'r, EPA, to Midland, Mich. area residents (May 26, 2009), www.epa.gov/region5/sites/dowchemical/pdfs/jackson-dow-letter-signed-20090526.pdf. In addition, the White House released a draft of an executive order that would restrict development on floodplains. Exec. Order Draft, www.eenews.net/public/25/11835/features/documents/2009/07/21/document_gw_01.pdf.

On the other hand, recent administrative actions concerning mountaintop removal coal mining suggest Obama might be willing to loosen environmental controls in the interest of resource extraction and job creation. EPA approved forty-two of forty-eight applications for mines in the Appalachian Mountains. Press Conference, *Status of EPA and Corps of Engineers Coal Mining Permitting Process*, U.S. Rep. Nick Rahall II (May 15, 2009), www.rahall.house.gov >> Press Release>>May 15, 2009. Although EPA acknowledged the adverse environmental impact mountaintop removal mining will have on Appalachian streams, the agency also considered the fact that these mining operations provide thousands of jobs for area residents. However, the Administration has tempered its mountaintop coal mining initiatives by proposing a ban on the use of a nationwide permit authorizing discharge of mining waste-rock into valley streams. Memorandum of Understanding, *US Dep't of the Army, US Dep't of the Interior, and the US EPA Implementing the Interagency Action Plan on Appalachian Surface Coal Mining* (June 11, 2009), www.epa.gov/owow/wetlands/pdf/Final_MTM_MOU_6-11-09.pdf. Moreover, Secretary of the Interior Ken Salazar

National Water Policy

Infrastructure Priorities

Stimulus Funding

sought to withdraw a rule which allows coal mine operators to dump mountaintop fill into streambeds if it is determined that such dumping is the least expensive and most convenient option. *Remarks on Mountaintop Mining Rule*, Ken Salazar, US Sec'y of the Interior (Apr. 27, 2009), www.doi.gov/news/09_News_Releases/Mountain_Top_Remarks.pdf.

Water Infrastructure Modernization

In perhaps the best example of how the Administration has attempted to promote greater resource protection while addressing the current economic crisis, the modernization of water infrastructure has emerged as a significant priority of the early Obama Administration. The Administration provided approximately $4 billion in stimulus money to states for water infrastructure development, and in doing so explicitly emphasized that these projects would result in job creation. *FY 2010 EPA Budget in Brief* (May 2009), http://www.epa.gov/budget. The Administration also plans to work on approximately 1,000 clean water projects and 700 drinking water infrastructure projects across the country. *Id.* To help ensure that these funds are devoted to these initiatives, in fact, EPA waived a "Buy American" provision in the stimulus bill that would have blocked refinancing for these projects. *Notice of Nationwide Waiver of Section 1605 (Buy American Requirement) of ARRA for Projects With Debt Incurred on or After October 1, 2008 and Before February 17, 2009 that Are Refinanced Through the Clean or Drinking Water State Revolving Funds Using Assistance Provided Under ARRA*, 74 Fed. Reg. 15,722 (Apr. 7, 2009). Similarly, the Obama Administration boasts that its efforts to promote the cleanup of underground storage tanks would create additional jobs. Utilizing stimulus funds, EPA allocated finances to communities with petroleum seeping into their groundwater. *EPA Recovery Act Program Plan: Underground Storage Tanks Program* (May 15, 2009), www.epa.gov/recovery/plans/oust.pdf.

Transparency and Efficiency

The Obama Administration's overall commitment to enhance transparency and efficiency within the federal government has influenced some early water resources policies. For instance, EPA recently published enforcement data and reports for all 50 states on its website. Consequently, regulators and individuals can more easily access federal enforcement information. *Enforcement and Compliance History Online*, www.epa-echo.gov/echo. Similarly, EPA recently launched NetDMR, an internet-based database that allows facilities permitted under the CWA's National Pollution Discharge Elimination System program to electronically submit **d**ischarge **m**onitoring **r**eports (DMRs) via the Internet (www.epa.gov/netdmr/index.html).

Further, the Administration is increasing efficiency by streamlining duplicative programs, including several water programs. In the Administration's proposed budget for FY 2010, earmarks for EPA's water infrastructure budget equaling $145 million were eliminated because they serve a similar purpose to the funds states receive under the Clean Water and Drinking Water State Revolving Funds. Likewise, the budget proposed eliminating certain Corps' water infrastructure programs. The Administration also has expressed a desire to curtail funds disbursed through the Rural Community Facilities program in the Department of Health and Human Services, stating that EPA's Revolving Funds serve the same purpose. *Terminations, Reductions, and Savings: Budget of the US Government FY 2010* (2009), www.whitehouse.gov/omb/budget/fy2010/assets/trs.pdf.

In order to effectively and efficiently use water resources, the Administration seeks to revise the 1983 *Principles and Guidelines for Water and Land Related Resources* to implement nationally uniform standards across agencies. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies; Initiation of Revision and Request for Suggested Changes*, 74 Fed. Reg. 31,415 (July 1, 2009). Currently, the *Principles and Guidelines* govern the formulation and evaluation studies of the major federal water resources development agencies. In addition to those agencies traditionally associated with water resource development, CEQ is considering expanding application of the guidelines to other agencies involved in water resource development to better facilitate water resource planning. *Id.*

Conclusion

The Obama Administration has yet to forge a comprehensive water policy. Based on a robust number of discrete policy initiatives, however, it would appear that the Administration could be focused on water policies that would improve interagency coordination and cooperation, couple water initiatives with other policy objectives, and promote overall transparency. Eventually, these early actions of the Administration in the areas of water pollution, water infrastructure, and oceans, lakes, and wetlands could lead to a comprehensive policy regarding water resources, water supply, and water quality. In the meantime, it is at least relatively discernible through the actions of the President and his Administration thus far that such policies could promote greater resource protection while balancing economic development.

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Colorado Water Trust

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Instream Flow

Senior Rights

Land Conservation Model

THE COLORADO WATER TRUST

WESTERN WATER TRUSTS & THE COLORADO EXPERIENCE

by Amy W. Beatie, Executive Director, Colorado Water Trust (Denver, CO)

INTRODUCTION

It was a crisp fall day and I was heading over Cochetopa Pass from Saguache, Colorado to Gunnison, Colorado. I made the left-hand turn at the "Old Agency" sign, nosed my car south along the dirt road, and stopped. I opened my car door and stepped out, grasshoppers clack-clacking everywhere. I was in a high mountain valley — cattle country — overlooking a wide swath of land irrigated by a few ditches that pull water from a twisting, turning, tightly winding creek well-protected by willows, alders, and brush. And I was on private property.

I was also in the middle of a Colorado Division of Wildlife fishing easement covering approximately eight miles of three tributaries, all of which support wild trout. If you fish and you haven't been to this area of Colorado, you are missing out. You are also missing out on a microcosmic example of a macrocosmic Colorado water challenge: the competition between consumptive water uses like irrigation and nonconsumptive uses like instream flows.

The State of Colorado has clearly recognized the importance of instream water uses in addition to more traditional water uses. The placement of an instream flow program in the hands of the Colorado Water Conservation Board (CWCB) in 1973 was its clearest pronouncement. The parameters of Colorado's instream flow program are set forth in Colo. Rev. Stat. §§ 37-92-102(3) & -102(4) (2009). Yet, the commitment to instream flows is young, as are many of the water rights that CWCB has secured to protect Colorado's streamflows (*see* Jerd Smith, *State's Money in the Banks*, Rocky Mountain News, 9/15/08, at 5). As a result, more work to balance consumptive uses like irrigation and the needs of aquatic ecosystems must occur. This sentiment — heard around the West a bit louder and more often of late — has fueled the rate at which water trusts are springing up in many prior appropriation states. Most — if not all — water trusts were formed to protect and enhance streamflows for the benefit of aquatic ecosystems, the flora and fauna that depend on them, and the people who enjoy them.

The water trust movement is premised on the notion that the tools necessary to improve streamflows already exist in western state-by-state water allocation systems. "Change," from an outdated maximizing-diversions paradigm to a newer one of maximum use that includes instream uses such as recreation, piscatorial, and aesthetic uses, can be achieved within the "constants" of western water law.

This article begins with a description of water trusts generally. It then describes in detail Colorado's instream flow program, a discussion that necessarily includes a description of CWCB and the role the Colorado Water Trust (CWT) plays in the context of the state's instream flow program. It then examines the challenges and opportunities facing the effort to improve instream flows. The paper concludes with the idea that, while using water transactions to improve Western streamflows is not a panacea to solving the tension between diversions and aquatic ecosystem needs, working to create an active instream flow transaction market is an important step in the right direction.

WATER TRUSTS

Water trusts have been formed to help restore flows for existing habitat while working with water users to maximize the benefits of their water portfolios. Generally, the these trusts are nonprofit organizations recognized as public charities under Section 501(c)(3) of the Internal Revenue Code. Water trusts encourage voluntary, market-based transactions to put more senior, more defensible, more reliable water back in stressed segments of rivers while offering at the same time an alternative to selling water to, say, municipalities or local developers. Although some water trust work requires working within a state's instream flow program, other options do not. The tools used are as varied as the location of each water right deal.

When considering water trusts, one would be remiss in failing to mention that water trusts have drawn heavily from the institutional model of the private land conservation movement. Mary Ann King, *Getting Our Feet Wet: An Introduction to Water Trusts*, 28 Harv. Envtl. L. Rev. 495, 507-511 (2004). The very success of land trusts encouraged the effort to apply the same kind of transaction and incentive-based programs to water. Even more intriguing is the cross-pollination that is now occurring between land trusts and water trusts. Water trusts' work is often described in shorthand as using tools that mirror those used in land conservation. But this description is too blunt an instrument to do the trick — any discussion about water trusts will wander into land conservation territory, to be sure, but only for a brief moment before moving into and spending most of its time lingering on points pertaining to the intricacies of Western water law and instream flow protection. The reason? The "constants" of Western water law have no analogue in land conservation except for the very obvious: a Western water right, like land, is real property (Tom Huhnle, *Note: The Federal Income Tax Implications of Water Transfers*, 47 Stan. L. Rev. 533 (1995)).

Colorado Water Trust

Temporary Protection

Owners' Choices

Free Market Solutions

Trusts in The West

Diversion Requirement

Different systems govern the use and allocation of land and water. Practical considerations are at play here as well. For example, land deals do not lend themselves neatly to temporary conservation arrangements. Temporary protection or even intermittent protection, however, works well in the water context. Sometimes, water is needed in a particular stream only in dry years and a dry-year lease arrangement is possible. Leasing in general is popular given the flexibility it provides. To add to the complexity, state-specific water laws and instream flow laws are the major determinants of what a water trust will look like and the programs each will pursue (King, *supra* n. 14 at 505-506). Thus, even from water trust to water trust in the various states, the deals they pursue can be quite different.

There is also an element of perception at play here. As Dan Tarlock has noted, "instream flow protection rests on the twin bases of public acceptance and economic rationality." A. Dan Tarlock & Doris K. Nagel, *Future Issues in Instream Flow Protection in the West* 137 (Lawrence J. MacDonnell, Teresa A. Rice, & Steven Shupe eds., 1989). This idea as it relates to the work of water trusts is best encapsulated in the following quotation from John Wilson, a rancher in Oregon:

> When it comes to water challenges…one thing most folks can agree on is that we'd like to solve them ourselves. I think one of the best ways to make sure water gets where it needs to go is to use the free enterprise system to give property owners some choices.

Mr. Wilson has it right on a number of levels. First, he recognized that balancing consumptive and non-consumptive uses is a challenge, and one that is being taken on state by state. Development of traditional water rights (i.e., rights that divert water from the stream system for consumptive uses) historically was made without considering the impact on healthy streamflows. Over the years, however, people have come to recognize the social, economic, and environmental importance of healthy streamflows. Accordingly, diverters, especially those drying up stream segments, are seeing a lot more pressure to mitigate the damage local aquatic ecosystems suffer as a result of their diversions. Although their diversions are lawful, the consequences to an ecosystem can be dire. Therein lies the challenge that water trusts aim to address every day: how can the needs of both the diverter and the aquatic ecosystem be met?

Second, Mr. Wilson recognized what most people who work at water trusts learn almost immediately — people prefer using free market solutions to solve environmental issues. The top-down, mandated approach is seen as offensive by water right owners. Such an approach is often characterized as trampling on their private property rights. Where a river system suffers from low flows and local water users' diversions are receiving attention, it becomes clear time and time again that people would rather work on a solution over which they have control as opposed to one that is mandated or imposed.

Lastly, Mr. Wilson observed that a water transaction program offers a free market choice to repairing streamflows. His reference was to the Columbia Basin Water Transaction Program (www.cbwtp.org/about.htm). Because water trusts do indeed offer a voluntary solution and a financial benefit — a solution to which many water users are naturally responsive — they are being formed all over the West.

The first to form was the Oregon Water Trust (OWT), which began operations in 1994. OWT merged with Oregon Trout this summer to become The Freshwater Trust (www.thefreshwatertrust.org). *See* Janet C. Neuman, *The Good, The Bad, and The Ugly: The First Ten Years of the Oregon Water Trust*, 83 Neb. L. Rev. 432, 433 (2004). The Washington Water Trust began operations in 1998 (www.thewatertrust.org). The Colorado Water Trust and the Montana Water Trust followed, in 2001 and in 2002, respectively (www.coloradowatertrust.org; www.montanawatertrust.org). There are also a number of other water trusts with jurisdictions ranging from local to regional, and other organizations whose mission and programs are not tailored exclusively to transacting water deals for streamflow enhancement but who nonetheless work on water transactions as part of their watershed programs. (*See, e.g.*, the Columbia Basin Water Transactions Program, http://cbwtp.org; the Trans-Pecos Water Trust, www.transpecoswatertrust.com; the Deschutes River Conservancy, www.deschutesriver.org; the Scott Water River Trust, http://scottwatertrust.org; Friends of the Teton River, www.tetonwater.org; the Klamath Basin Rangeland Trust, www.kbrt.org; The Nature Conservancy, www.nature.org/initiatives/freshwater/; and Trout Unlimited, www.tu.org).

Diversion Versus Instream Rights

For well over a century, the Prior Appropriation Doctrine has determined how water is allocated in the Western states. Based on the principle of "first in time, first in right," prior appropriation allows the first person who puts water to a beneficial use a right to continue that use without interference from those who begin using water later. (*See* James N. Corbridge & Teresa A. Rice, Vranesh's Colorado Water Law at 3-7 (Rev. Ed. 1999). The doctrine historically required that to obtain a defensible water right, one had to remove water from the stream system through a diversion. Recent and protracted litigation in Colorado over kayak courses (now called Recreational In-Channel Diversions or RICDs; see Knox, TWR #30) pushed the debate in Colorado regarding diversions versus instream water use to its height. Those who opposed the idea that water rights that remained in the stream for instream benefits could constitute a defensible water right argued, among a litany of arguments, that the water must be physically removed from the stream in order to have a lawful water right. They unsuccessfully asserted that *removal* of water from

Colorado Water Trust

its source as a requirement for a water right was a principle embedded in the Prior Appropriation Doctrine. The article by Glenn E. Porzak et al., *Recreation Water Rights: "The Inside Story,"* 10 U. Denv. Water L. Rev. 209, 216 (2007) discussed the opposition to Recreational In-Channel Diversions in the application for water rights of the City of Golden, Colorado in Case No. 98CW448 (Colo. Dist. Ct., Water Div. 1). Primarily during the summer peak growing season, but also at other times of year, water withdrawals stress the flow levels in stretches of many Western streams and rivers, forcing them to run critically low — and indeed sometimes dry — imperiling aquatic ecosystems.

Tools Used for Instream Flows

Instream Attributes

To mitigate the effects of water withdrawals, every Western state maintains some form of instream flow program that entitles water that remains in rivers to the same attributes as a diversionary water right — namely a defined volume, a place of use, a season of use, and a defensible priority. (*See*, e.g., 1967 Minimum Water Flows and Levels Act, Wash. Rev. Code § 90.22.010 (2008); and C.R.S. § 37-92-102(3)).

Evolving State Programs

Some instream flow programs are nascent, some more established, but all seem to be ever-evolving. For some indication of the range of ages of different Western states' programs, it is helpful to note that an instream flow program was adopted in Washington in 1971, but not until 2001 in Texas (*see* www.ecy.wa.gov/programs/wr/instream-flows/isfrul.html and www.twdb.state.tx.us/InstreamFlows/index.html).

In addition to instream flow programs, the use of permanent sales or acquisitions, leases, "soft-management solutions," structural solutions, and other incentive-based approaches to streamflow enhancement are improving the way streamflows are protected and improved in Western states. These efforts — the everything-but-new-instream-flow-rights efforts — are being pursued by water trusts throughout the West.

Sale

A sale is a permanent transfer of a water right for change to instream flow use. In Colorado, it requires separation of the water from the land and acceptance of the water by the CWCB. As a water trust, CWT can put together funding packages to buy the water, conduct any necessary engineering and other investigations including investigations into title, and will conduct the transaction with the CWCB. In some cases, CWT also participates in a water court application to change the use of the acquired water to instream flows. In Colorado, there are two options for leasing water to the CWCB described in more detail below.

Sale Alternatives

"Soft-management solutions" include alternatives such as changes in points of diversion, changes in source (e.g., a surface diversion to a well), and exchanges to improve instream flows. Other approaches include innovative agricultural technology and re-timed storage releases or changes in reservoir management that can provide additional flows. In Colorado, these types of arrangements may have to go through water court, depending upon the plan.

Water-short stream reaches can also benefit from physical solutions such as headgate and delivery-system upgrades, and outlet structure and spillway renovation. These solutions may make more water available downstream.

Agency Role

In Colorado, use of acquired and leased water for instream flows must occur within the confines of Colorado's instream flow program. As described above, the CWCB is the only entity in Colorado that may hold water rights for instream flows. C.R.S. § 37-92-102(3) states that "in the adjudication of water rights pursuant to this article and other applicable law, no other person or entity shall be granted a decree adjudicating a right to water or interests in water for instream flows in a stream channel between specific points, or for natural surface water levels or volumes for natural lakes, for any purpose whatsoever." On the other hand, soft-management solutions, structural solutions, and other incentive-based approaches may not be required to involve the instream flow program. Sometimes, a joint approach is warranted. The facts of each deal will determine whether the instream flow program must be used.

How Water Trusts Work: New Appropriations

Many water trusts must work in collaboration with a state administrative agency. In some cases, the water acquired by a water trust may only be held by a state agency if it is to be used for instream flows. As mentioned previously, Colorado's instream flow program is housed within a state agency, the CWCB. There are a number of different sections within CWCB that manage its various programs. With programs that encourage maximizing the use of the state's water and provide financing for water construction projects housed within the same agency as the program intended to improve streamflows, there can be mission conflicts.

New Water Rights

The instream flow program is managed by CWCB's Stream and Lake Protection Section. The Section's mission is "to correlate the activities of mankind with reasonable preservation of the natural environment" and "to preserve or improve the natural environment to a reasonable degree." (*See* http://cwcb.state.co.us/StreamAndLake). To accomplish the mission, CWCB adds water to the instream flow program in two ways. The first is through appropriating new water rights for particular stretches of river. Currently, the Colorado instream flow program stewards nearly 1,500 appropriations protecting 8,500 river

Colorado Water Trust

Priority Issues

Water Availability

Acquisition Option

Senior Rights

Evaluation Factors

Quantity

Water Court Involvement

miles and 476 natural lakes (*Id.*). This is an incredible network of protected streams and rivers. CWCB's instream flow appropriations, though, are quite junior. Remember that it was not until 1973 that the Colorado legislature created the instream flow program. As a result, CWCB's instream flow appropriations are young, with priorities that date only from 1973 to the present.

Often when a new, junior water right is obtained, regardless of its decreed use, it may have water available to it only infrequently and in inconsistent amounts. When newer, junior water rights are being satisfied, water is generally available to most water rights in the system and, as a result, to the stream system itself. For all water rights in the West, the times of plenty are not the times of crisis. The times of crisis occur during shortages. Because CWCB's appropriated water rights are quite junior, they cannot prevent the de-watering of stream reaches by senior water rights located above or in the instream flow reach — they can only prevent conditions from worsening.

Another challenge exists in stream reaches where CWCB could not satisfy one of the elements of a *new* water right appropriation: water availability. On those reaches, CWCB cannot "appropriate" a water right at all, i.e. obtain approval for a new water right.

Acquisitions of Water Rights: Purchases, Loans and Leases

Protection from further decreases in flow for an already stressed segment of river has its benefits, but if improving streamflows is part of the plan, another tool must be used. The second arrow in CWCB's quiver is the acquisitions program. C.R.S. § 37-92-102(3) states that CWCB "also may acquire, by grant, purchase, donation, bequest, devise, lease, exchange, or other contractual agreement, from or with any person, including any governmental entity, such water, water rights, or interests in water in such amount as the board determines is appropriate for stream flows or for natural surface water levels or volumes for natural lakes to preserve or improve the natural environment to a reasonable degree."

Acquisitions are an important mechanism by which the CWCB preserves or improves streamflows in critical areas of the state. It has at least two benefits that are not available to the appropriations program. First, the acquisitions program matches willing sellers (or lessors) with a willing buyer (or lessee). As a result, it represents a market-based approach to protection of streamflows. Most importantly, it provides CWCB with access to senior water rights.

CWCB can acquire absolute direct flow or storage rights on either permanent or temporary bases. C.R.S. § 37-92-102(3). To determine whether to accept an offered water right, CWCB evaluates proposed water acquisitions using a public process and established criteria under the "ISF Acquisition Rules" (2 Colo. Code Regs. 408-2). These rules were revised in early 2009 to incorporate statutory changes in the program made under House Bill 08-1280 and accommodate the funding CWCB now has available to its acquisition program (discussed in more detail below). Under the revised rules, CWCB must consider certain factors in evaluating a proposed acquisition.

CWCB proposed water right acquisition evaluation must include:

1) the reach of the stream where acquired water will be used;
2) the historical use and return flow patterns;
3) the natural flow regime;
4) the location of other water rights within and near the reach;
5) the potential for material injury to existing decreed water rights;
6) the natural environment that may be preserved or improved by proposed acquisition;
7) the effect of proposed acquisition on interstate compacts and maximum utilization of the waters of state;
8) whether the water will be available for subsequent use downstream; and
9) costs associated with transaction.

Among the information it must consider, CWCB must quantify the amount of water necessary to preserve or improve the natural environment. "Before initiating a water rights filing, the board shall determine that the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made; that there is a natural environment that can be preserved by the board's water right, if granted; and that such environment can exist without material injury to water rights." It works closely with the Colorado Division of Wildlife to conduct these analyses. C.R.S. § 37-92-102(3)(c).

Once it has determined to accept a water right into the instream flow program, under almost all circumstances, CWCB must apply to water court to obtain a decreed right to use the water right for instream flow purposes. 2 Colo. Code Regs. 408-2 (ISF Acquisition Rule 6i). Water court ensures that no injury will result to other water users from the change. In Colorado, all changes of water rights must meet the elements of what is called the "no-injury" rule. See *Handy Ditch v. Louden Irrigating Canal Co*., 62 P. 847, 848 (Colo. 1900).

In *Handy*, the Colorado Supreme Court clearly articulated the no-injury rule, stating:

> The general rule is that an appropriator of water for any beneficial purpose may change the place of diversion at his pleasure, provided the rights of others

Colorado Water Trust

No Injury Rule

"3-in-10" Loan

Long-Term Leases

Acquisition Hurdles

Funding

CWT Purpose

CWT Programs

> are not injuriously affected...[This rule] is peculiarly applicable to subsequent appropriators...The rights of a prior appropriator, as against a subsequent appropriator who changed the place of diversion, are already sufficiently safeguarded by the fundamental doctrine of so-called irrigation law: He who is first in time is first in right. A subsequent appropriator has a vested right, as against his senior, to insist upon the stream continuance of the conditions that existed at the time he made his appropriation[.]

In addition to obtaining fee simple title to a water right, CWCB has other options for putting acquired water in the instream flow program. Two common ones are temporary in nature. The first option is the negotiation of a loan of water under C.R.S. § 37-83-105(2)(a) ("3-in-10 loan"). Water rights placed in 3-in-10 loan may only be used for a period of 120 days in a given year, and only for three years of use over a ten year period. A 3-in-10 loan may be used on any stream where CWCB currently holds an appropriated instream flow right, and in an amount up to the decreed amount of the instream flow. One of its most flexible attributes is that a 3-in-10 loan does not require a water court change case; the State and Division Engineers can approve the use of a 3-in-10 loan quickly as long as there will be no injury to other water rights. C.R.S. §§ 37-83-105(2)(a)(III), -105(2)(a)(V), & -105(2)(b). The approval process requires the filing of a request for approval with Division Engineer. Written notice of the proposed loan is sent to all parties that have indicated they would like to be notified of such requests. The process includes time for the filing of a protest, and instructions for the circumstances under which Division Engineer can approve. The 3-in-10 loan is ideal for use in emergency circumstances such as drought.

CWCB may also enter into long-term leases. These leases are controlled by C.R.S. § 37-92-102(3) (HB 1280 lease). Although long-term leases are not new to the instream flow program, the Colorado legislature recently established protections for a lessor with the passage of House Bill 1280 during the 2008 legislative session. The same process used to determine whether to accept fee simple title to a water right for instream flow purposes is used to evaluate water proposed for use under an HB 1280 lease, in addition to a few additional considerations. To use water under an HB 1280 lease, CWCB must maintain records of how much water CWCB uses under the contract each year it is in effect and must install any measuring device deemed necessary by the Division Engineer to administer the lease of water and to measure and record how much water flows out of the reach after use by the Board under the lease. For all HB 1280 leases, the CWCB must file a change of water right application or other application with the water court to obtain a decreed right to use the leased water for ISF purposes.

Of CWCB's two instream flow arrows in its proverbial quiver (appropriations and acquisitions), the acquisitions program is the less utilized. Since 1973, CWCB has completed a few more than twenty water rights acquisitions (*see* http://cwcb.state.co.us/StreamAndLake/WaterAcquisitions), as compared to nearly 1,500 appropriations. There seem to be several reasons for this circumstance. Running an acquisition from start to finish is a more time-consuming process than an appropriation. Among other time-consuming efforts, it requires finding willing sellers in areas identified as critical stream reaches, conducting an engineering analysis to determine the utility and health of the water right for sale, conducting a title analysis, allowing for the time to negotiate and execute the acquisition, preparing for CWCB's acceptance process, and running a water rights change application through water court. CWCB has lacked adequate staff time to target, negotiate, and process transactions. Although institutional capacity is a factor that contributes to the lack of acquisitions conducted by CWCB, by far the biggest hurdle is funding. The acquisition program requires money for acquisitions, which, until 2008 CWCB simply did not have. Until 2008, it relied on donations of water rights.

Given the difference in use between the appropriation program and the acquisition program, the institutional and funding issues faced by CWCB, and the utility of putting solid, senior water rights in the instream flow program, the Colorado Water Trust (CWT) was primarily formed to hammer out instream flow acquisitions for the CWCB. In essence, CWT works as a broker of water rights for CWCB. The relationship between CWCB and CWT can broadly be described as collaborative governance. CWT relies on and works within the state's program, and the state gains benefits from the work CWT does in the form of increased acquisitions. CWT targets (or responds to offers of) water, negotiates the deals, processes the instream flow water right transactions, raises the funds, puts together an acquisition package, and then contributes the water to the instream flow program.

CWT actually has three different program areas it pursues in order to further its mission to protect and enhance streamflows in Colorado. Working in coordination with the agricultural community and other water users, governmental entities, land trusts, watershed groups and other non-profit conservation organizations, CWT pursues and supports the following program areas: (1) conducting water rights acquisitions; (2) implementing physical, structural, and management solutions to improve streamflows; and (3) providing technical support for land trusts with water issues that often arise in connection with their land conservation activities.

Colorado Water Trust

OPPORTUNITIES & CHALLENGES in COLORADO

Each Western state has its own unique approach to the Prior Appropriation Doctrine. This, each state presents its own, discrete opportunities and challenges for water trusts. This section focuses on the challenges and opportunities that affect the efficacy of a working water trust in the Colorado.

New Opportunities

There are a number of opportunities that are improving the ability to find and acquire water rights for instream flows. These opportunities range from legal to technical to practical to political opportunities.

House Bill 1280

Legislated Lease Protections

HB 1280 (2008 State Legislative Session) provides two significant new protections for those who enter into long-term leases of water for instream flow purposes with CWCB. In Colorado, a change of water right almost always requires an analysis of the historical consumptive use. A change of water right must be approved if it "will not injuriously affect the owner of or person entitled to use water under a vested water right or decreed conditional water right." § 37-92-305(3)(a) (2009). A change of water rights does not cause injury if the change of water rights decree maintains the same stream conditions that existed at the time a junior appropriation commenced. *City of Thornton v. Bijou Irrigation Co*., 926 P.2d 1, 80 (Colo. 1996). The historical use limitation reflects the hard-and-fast rule that application of water to the decreed beneficial use is required to perfect a water right. *Weibert v. Rothe Bros*., 618 P.2d 1367, 1372 (Colo. 1980). If the amount actually used is *less* than the decreed amount, only the amount used ripens into a water right and is available to change.

Historical Use

If a water right is not used for a consumptive purpose in a given year, it receives no credit for consumption and a zero is factored into an analysis of annual diversions for each year the water right is not used consumptively. Rather than penalizing a water user by factoring zeroes into a consumptive use analysis for the time the water right spends in the instream flow program under an instream flow lease (a non-consumptive use), HB 1280 fixes the historical consumptive use at the time the lessor places the water right in the instream flow program. C.R.S. § 37-92-102(3). This protection removed the single biggest reason why water users were reluctant to lease water to the instream flow program.

Abandonment Concerns

Second, HB 1280 allays abandonment concerns. The loss of a water right through abandonment occurs when a water user fails to use his or her water right for its decreed purpose for the statutory period. *Corbridge & Rice*, supra n. 3, at 252-57. Under an HB 1280 lease, instream flows must be added as a beneficial use in a change of water rights case in water court. With instream flow added as a beneficial use in water court, an abandonment argument would fail even without this provision. Although a "sleeves-from-the-vest" concession to those who requested it, this provision's inclusion in the statute will prevent an avenue of challenge to use of a water right temporarily in the instream flow program.

The passage of HB 1280 has generated a significant amount of interest in instream flow leasing. The new protections help preserve the value of the water right for the lessor, yet still allow CWCB to pursue terminable uses of water for instream flow purposes. The end result is greater flexibility for all and improvement of the instream flow program. Everybody wins.

House Bill 09-1067

Tax Credits

Instream flow tax credits are another new tool available to help Colorado water right holders protect the state's streams and rivers. House Bill 09-1067 (HB 1067) provides a financial incentive for water right owners to donate water to the state in order to improve the long-term health of important stream reaches. For income tax years commencing on or after January 1, 2009, but prior to January 1, 2015, this bill authorizes CWCB to award tax credit certificates to qualifying taxpayers who donate water rights. In order for the water rights to be accepted as a donation in exchange for a tax credit, CWCB must first conduct a public review process and reach a determination that the proposed donation will preserve the environment to a reasonable degree. HB 1067 has generated interest in instream flow donations for tax credits.

Money: Species Conservation Trust Fund and Construction Fund Instream Flow Acquisition Funds

Legislated Funding

The 2008 legislative session secured two different pots of funds for CWCB's instream flow acquisition program for the first time in the program's history. The first pot, specifically earmarked for instream flow acquisitions, was contained in House Bill 08-1346 (the annual "projects bill" for CWCB) — an appropriation from the Severance Tax Trust Fund Perpetual Base Account in the amount of $1 million. C.R.S. § 37-60-123.7. These funds are available to pay for the costs of acquiring water, water rights, and interests in water for instream flow use. The primary priority for expenditures of these funds shall be the costs of water right acquisitions for existing or new instream flows. They may be used in limited circumstances for the costs of water acquisitions to: (1) preserve the natural environment of species that have been listed as threatened or endangered under state or federal law, or are candidate species or likely to become candidate species; (2) support wild and scenic alternative management plans; or (3) provide federal regulatory certainty.

Colorado Water Trust

The second, Senate Bill 08-168, allocated $500,000 from the Species Conservation Trust Fund for instream flow acquisitions. SB 08-168 was the annual appropriation to the Species Conservation Trust Fund, a fund designed to permit water development to continue by mitigating endangered species and habitat issues.

This new infusion of $1.5 million will serve as the heart of the acquisitions program and can ensure its success. With it, CWCB's instream flow program has become a concrete option for those wanting to place their water rights in a conservation program, stay in their local communities, and obtain compensation. The decision to allocate the requested money to instream flow acquisitions when that money could have been used in other programs, e.g., for construction projects, showed a commitment to the vitality of the instream flow program never before seen in the history of the program.

Changing Use of Western Lands

Population Impacts

The changing use of land in the West is also creating opportunities for instream flow water rights acquisitions. The population explosion in the West reflects a sustained passion for living in this landscape at the same time it changes that very landscape. What were formerly working farms and ranches are now exurbs, suburbs, and ranchettes. William R. Travis et al., *Western Futures: A Look into the Patterns of Land Use and Future Development in the American West* at 3, Center of the American West (Report #6, 2005). With the decline in the agricultural economy and children no longer interested in running family farm and ranch lands, one of the most common questions farmers and ranchers are now asking themselves is what to do with their land and water. A growing conservation ethic in the West has led to an increase in land conservation; water is finally catching up and becoming part of the conversation. When there is pressure on a farm or ranch to sell to developers, in Colorado there are viable alternatives. The alternatives allow for maintaining the historical use of the land and water and making some money at the same time: the placement of all or part of the land in a conservation easement, tying up some or all of the water through that process, or selling some or all of the water for use in the instream flow program.

Development Alternatives

Other Opportunities: Municipalities

Municipal Exemption

These are only a few of the opportunities available to those conducting water transactions to improve streamflows. The exemption for municipalities from the strict application of the anti-speculation doctrine could provide another opportunity. Under the express terms of Colorado water law, an appropriation is speculative "if the purported appropriator of record does not have either a legally vested interest or a reasonable expectation of procuring such interest in the lands and facilities to be served by such appropriation *unless such appropriator is a governmental agency or an agent in fact for the persons proposed to be benefited by such appropriation*." C.R.S. § 37-92-103(3)(a)(I). (emphasis added). This is sometimes called the Great and Growing Cities Doctrine. The exemption allows a municipality or other water provider to obtain more water than it currently needs. This translates to a surplus that can be placed in a lease for use in the instream flow program. CWT has in fact been contacted by several municipal water suppliers about putting excess water into a HB 1280 lease. These discussions are ongoing.

In general, each opportunity is derived from an increasing conservation/green ethic that is spreading throughout the West. These opportunities have not yet translated into water flooding into Colorado's instream flow programs, but they have certainly increased the opportunities available to put together creative packages and have diversified the options for improving the state's streamflows. Still, there are challenges remaining.

Challenges

While instream flow water right markets are emerging all over the West, they are in their relative infancy. Thus, they face several challenges, ranging from the difficulty in finding available water, to lack of information, to lack of standardization in negotiations.

Lack of Information

Market Information

Lack of information is one problem common across all water markets. First of all, finding water for sale is often hard. CWT has been working on water transactions since 2001 and, while water is certainly available to acquire, it has been hard to target a stream reach and find readily available water. CWT has identified the "low-hanging fruit." For example, water rights that are close to being abandoned are offered fairly regularly. High-volume, senior water in critically water-short stream reaches, however, is hard to find and harder to afford.

Pricing

Limited market information to assist in determining price adds to the challenge. In one case, CWT is working on a transaction in which an appraisal was necessary because the parties were substantially apart on pricing. Part of the problem was the lack of comparable sales and the difficulty in extrapolating certain comparables to the transaction being pursued. The low end of the comparables for this transaction was water available by contract from a reservoir. Water can be leased from this reservoir for a renewable term for about $110 per year per **a**cre-**f**oot (AF). Assuming a thirty-year term for repayment, and an interest

Colorado Water Trust

Fair Market Value

rate of 5.5%, the present value of annual payments for this water is approximately $1,566 per AF. In the appraisal at the other end of the spectrum was water that was acquired for $15,000 per AF of firm yield. When you begin talking about the amount of water we were negotiating for (about 100 AF), the range of pricing was from $150,660 to $1.5 million. Assumed in this scenario, too, is that a temporary contract for water can even be used as a comparable for an outright sale. Yet such contracts are available, are often used in-lieu-of outright acquisitions, and can oftentimes constitute the entire market. Ultimately, markets may not be sufficiently developed for fair market value to be determined if the transaction so requires. This makes negotiations extremely tricky.

Transfer Risks

Contract Terms: What's Fair?

Another reason water rights deals for instream flows can be challenging is that there are no set standards for the terms of the transfer. The terms are negotiated among the parties. As a result, there are limitless permutations and combinations of contract terms — some that make little difference to the transaction, and others with very real consequences. Take, for example, a deal in which the price of the sale is based on the water right *prior* to a water court change application: a take-it-or-leave-it proposition where the buyer bears all the risk of the amount of the water right being decreased during the change process, but can also gain a benefit if more water is available to change than was initially thought. Then examine the alternative: a transaction where the price is dependent upon how much water is ultimately decreed after a change application is prosecuted through the transfer process. For a water trust, one of the benefits is that it looks and feels just like any other water user except that end use of the water is instream flow. Negotiations occur in the same way as negotiations between one traditional water user and another. The problem, however, is that with a water trust, public funds are often used and risk taking is not part of the model. That can complicate the process.

Transfer Details

Complexity of the Transactions

As with any water right transfer, instream flow water rights acquisitions require complex analyses to determine: (1) the exact identity of the water right to be transferred; (2) title to the water right; (3) the current validity of the water right from a use perspective (avoiding abandonment through non-use); (4) how the water right has been administered/regulated; and (5) possible restraints on change. Amy W. Beatie and Arthur R. Kleven, *The Devil in the Details: Water Rights and Title Insurance*, 7 U. Denv. Water L. Rev. 381, 383 (2004). Unlike a more typical water rights transfer, however, an analysis of the suitability of the water right for instream flow purposes must also be conducted. If there is an existing instream flow on the reach where the acquired water is to be used, the priority date of the instream flow appropriation, the location of the instream flow reach, the amount decreed, the type of natural environment preserved, the water availability for the instream flow, whether there are multiple flow periods or a terminus at a headgate, and whether the decreed amount for the instream flow is already adequate or has been reduced from the original biological recommendation based upon a water availability analysis all must be considered to determine the suitability of the acquired water. The offered water right must also be examined for its potential use — i.e., how it will benefit the existing instream flow? Will it firm up the physical supply? Improve the existing instream flow's priority? Increase the level of protection?

Instream Suitability

CWCB Approval

Another challenge is the complexity of the process to change a water right to instream flow use. Every water acquisition for instream flow purposes must have the imprimatur of CWCB in addition to a change of water rights decree that adds instream flow as a beneficial use or permanently changes the use of the water to instream flow. CWCB has its own rules, required investigations, and procedures for the acceptance of a water right for instream flow. This preliminary process is time-consuming and, if pursued by an individual, could be quite costly and overwhelming.

Water Court Scrutiny

The next step is water court. With the exception of a 3-in-10 loan, any water use, including HB 1280 leases, must go through water court. The very fact that a water right must go through water court is a significant transaction-inhibitor. Going to water court is perceived, fairly or not, as a complicated, expensive, uncertain, and even risky process. If an entire water right is the subject of a transaction, the fact that it must go through water court may not matter so much. In the case of partial rights, though, the entire water right is opened to scrutiny and a standard is set for future changes of the balance of the water right retained by the seller. A number of deals CWT has spent time negotiating have been unsuccessful once the interested seller learned that water court would be part of the process. The risk of water court scrutiny in addition to the cost of water court can complicate the process of convincing a possible seller to part with his or her water rights.

Irrigation Dry-Up

Dry-Up of Irrigated Land

In Colorado, as previously explained, for a change of water rights to be approved it cannot injure other water users. One way to prevent injury is to distill the water right to its historical consumptive use and allow only the historical consumptive use to be changed. That way, a water user cannot expand his or her previous use to the detriment of other water users in the system. Typically, with irrigation rights, a change of water right will require the dry-up of irrigated land. CWT has found that many people do not understand this concept. They believe that their flow rate alone will form the basis of a transaction.

Colorado Water Trust

Flow Rate v. Historical Consumption

Water Portfolio Benefits

Take, for example, the following scenario recently encountered by CWT. In the fall of 2007, CWT was contacted by a watershed advocate about talking to a family that was interested in selling one of their water rights. The water right for sale was decreed to a senior priority ditch that diverts from a severely water-short section of a river on the Western slope of Colorado. The initial idea was that the landowners would sell half of the 9.6 **c**ubic **f**eet per **s**econd (cfs) water right to us. They irrigated about 260 acres with the water right and the 9.6 cfs was far more water than they could use on the land the particular ditch services. Therein was the problem. The sellers were under the impression that they could sell 4.8 cfs to CWT and not change their irrigation practices at all. CWT had a very difficult time explaining the no-injury rule to them, including why dry-up was necessary. In the end, they did not want to conduct the transaction.

Overcoming Misconception

There persists a misconception that arises from two mistaken beliefs: (1) that a water user can get something for nothing (in the transaction above, obtaining money for selling a water right that would not affect one acre of historical practice); and (2) that a water right is the most valuable asset a person owns. That may be true if the water is used in a way that maximizes the historical consumptive use, is very senior, and is in a local market that justifies a high price tag, but it is not so for every locality or every right. The process of disabusing people of the notion, long-held in the family, that their great-great-grandfather's 9.6 cfs water right is worth millions of dollars can be hard, especially when one is the opposing party to a transaction.

Other Challenges

These are only some of the challenges faced by those who conduct water transactions to improve instream flows. Others challenges include:

- the difficulty in convincing the seller to hire a lawyer to help with the transaction if it looks as though it will be complicated or if the seller is having trouble understanding the consequences of the deal
- financing transactions
- financing an organization's day-to-day operations
- the time and resources involved in investigating every lead on potential water rights for sale

CONCLUSION

Notwithstanding the obstacles and challenges facing the development of an instream flow water market, you now have information to share with your water clients about new options available for diversifying and maximizing the use of their water portfolios: selling or leasing water for instream flows. These options, while functioning clearly within the prior appropriation system, have the added benefits of: (1) improving local watersheds; (2) keeping water in local communities and within families; (3) maximizing the use of valuable, senior water rights; (4) allowing adaptation to changing circumstances; and (5) in many cases, generating additional income for water users.

Some may believe that the idea that water trusts are satisfied with the prior appropriation system is an overstatement. Perhaps water trusts are simply operating within the existing system — within the "constants" of Western water law — because it is practical and effective even if not ideal. There may also be those who believe that the water trust movement can be a powerful part of the solution to balance the playing field, that it can "be the change." Whatever a person's beliefs, water transactions to improve streamflows are likely to neither solve all of the West's streamflow problems nor fit the needs of every water user. As economically rational, equitable, environmentally sound, and sustainable as instream flow water transactions are, they represent a step — and a pretty good one — in the right direction.

For Additional Information:
Amy Beatie, Executive Director, Colorado Water Trust (Denver, CO),
720/ 570-2897 or email: abeatie@coloradowatertrust.org

Amy Beatie graduated from Dartmouth College in 1993 and the University of Denver College of Law in 2000, with an emphasis in environmental law. Amy comes to the Colorado Water Trust with six years of experience in water and environmental litigation. Prior to practicing water litigation, she clerked for the Honorable Gregory J. Hobbs of the Colorado Supreme Court and served as a staff attorney at the Wyoming Outdoor Council, a non-profit conservation organization. As Executive Director of the Colorado Water Trust, Amy has applied her wide array of knowledge and skills to accelerate the pace of water conservation in Colorado in ways that respond to the state's unique water allocation system and its challenges.

WATER BRIEFS

TAKINGS CASE STANDS US
NO APPEAL TO SUPREME COURT

The Obama Administration has decided not to appeal the *Casitas* "takings" case to the US Supreme Court (Supreme Court). By deciding not to seek review of the decision by the U.S. Court of Appeals for the Federal Circuit in *Casitas Municipal Water District* v. *United States*, Case No. 2007-5153 (Fed. Cir. Sept. 25, 2008), the Administration effectively let stand the decision that found a "physical taking" of water rights — "the government physically appropriated water that Casitas held a usufructuary right in." *Id*. at 23. "In this case, in contrast, the government did commandeer the water for a public use — preservation of an endangered species. When the government diverted the water to the fish ladder, it took Casitas' water. The water, and Casitas' right to use that water, is forever gone." *Id*. at 26.

The Takings Clause of the Fifth Amendment provides that private property shall not "be taken for public use, without just compensation." U.S. Const. amend. V. *See* Marzulla, TWR #21.

The *Casitas* case will now be remanded to the trial court (Court of Federal Claims) to "determine the ultimate question of whether a taking occurred in this case. If the court determines that a taking occurred, it will be necessary for it to determine the amount of damages to which Casitas is entitled." *Id*. at 31, footnote 17. The amount of actual water Casitas has lost due to the required diversion to a fish ladder remains in dispute between the parties. Casitas argued previously that the amount of loss is up to 3,200 acre-feet of water per year.

For info: *Casitas* decision available at: www.cafc.uscourts.gov/opinions/07-5153.pdf

TRIBAL ISSUES OK/AR
POULTRY LAWSUIT CLAIMS DISMISSED

Damage claims under a lawsuit brought by the Oklahoma Attorney General's Office in 2005 against a dozen poultry companies in Arkansas, alleging injury in the Illinois River Watershed (IRW), have been dismissed on procedural grounds. On July 22, a federal district court (court) in *Oklahoma v. Tyson Foods, Inc. et al*, -- F.R.D. --, 2009 WL 2176337 (N.D. Okla. 2009) threw out all the monetary damages claims (over $611 million) in the lawsuit under Rule 19 of the Federal Rules of Civil Procedure for failure to join an indispensable party — the Cherokee Nation. The damage claims were brought under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §9601 et seq., in addition to various nuisance, trespass, and unjust enrichment claims. The state's claims for injunctive relief remain intact and trial has been set for September 21.

The court noted the Cherokee Nation's claimed interests in water rights, land and natural resources and also alluded to the contingency fee arrangement that Oklahoma has with a private law firm. "The State's most recent damages reports identify natural resources damages to the IRW totaling $611,529,987.00. In the absence of the Cherokee Nation as a party to this action, the State may distribute any award of monetary damages (for damage to both tribal and non-tribal resources) as the State alone sees fit. A large portion of the damages awarded for injury to tribal lands and natural resources would not benefit the Nation, as the State has contracted to give private counsel up to half of all monetary recovery as a contingency fee. In the Cherokee Nation's absence, the State officials bringing this action are the only persons determining whether the contingency fee arrangement is appropriate, and the Cherokee Nation's ability to decide for itself how to prosecute its claims for natural resources damages is impaired." *Slip Op*. at 13-14.

Oklahoma responded to the defendants' (poultry companies) motion to dismiss and included an agreement between its Attorney General and the Cherokee Nation attorney general dated May 19, 2009, that attempted to retroactively assign the Tribe's claims in the lawsuit to Oklahoma as of the date the Complaint was filed (2005). The court, however, held that the agreement was invalid under Oklahoma law. The court then went on to find that the Cherokee Nation was a required party under Rule 19 and that "joinder" of the Tribe was not feasible. "This Court concludes that, with respect to the claims for money damages, disposing of the case in the Cherokee Nation's absence may impair or impede the Cherokee Nation's ability to protect its interests." *Id*. at 15. The court did note that Oklahoma "could dismiss and refile the action after the State and Cherokee Nation have entered into a legally binding agreement whereby the State may obtain standing to assert the Nation's CERCLA, and possibly other, damage claims." *Id*. at 20.

For info: Gary Michelson, Tyson Foods, 479/290-6111 or email: gary.michelson@tyson.com; Dismissal Order available at: www.oklahomafarmreport.com/wire/news/media/01671_dismiss-order.pdf

EXEMPT WELLS CLOSURE WA
GROUNDWATER CLARIFICATION

The Department of Ecology (Ecology) recently clarified its current groundwater closure in upper Kittitas County with the filing of an amended emergency groundwater rule. The amended rule makes it clear that people with vested building permit applications or issued building permits in the upper county as of July 16, 2009, are not subject to the groundwater closure and may use permit-exempt wells. A vested building permit application is one that has been completed and submitted to the county, and issuance of a permit is expected.

The amended rule was signed July 31, 2009, and is effective for a maximum of 120 days. A map of the affected area is available on Ecology's website at: www.ecy.wa.gov/programs/wr/cro/kittitas_wp.html. Under the amended rule, metering will be required for all uses of the groundwater exemption for residential purposes. During the 120 days of the amended rule, new water uses proposed by those *without* vested building permits will be allowed only if the proposed use of water is fully mitigated to offset impacts to senior water rights and streamflows. Mitigation can generally be achieved by acquiring and transferring or retiring another existing water right from the same water source to offset a new use. Some existing sources of mitigation water are already available and Ecology is working with the owners of existing water rights to quickly develop a water banking system to allow access to mitigation water by new water uses.

Since 1998, nearly 3,000 wells

have been drilled in Kittitas County, prompting concerns that groundwater pumping in the headwaters regions of the county threatens senior water users and stream flows in the Yakima Basin. A number of parties, including the citizens group Aqua Permanente, the Yakama Nation and the city of Roslyn, have asked that Ecology close the groundwater to further appropriation while a groundwater study is completed. That study, funded by the Legislature and designed to gain a better understanding of the connection between groundwater and surface water, will commence soon.

At the urging of Governor Chris Gregoire, Ecology and the Kittitas County Commissioners have renewed talks on a groundwater management agreement and a permanent groundwater rule that will limit the uncontrolled proliferation of wells exempt from water permits in the upper county.

For info: Tom Tebb, Ecology, 509/572-3989 or website: www.ecy.wa.gov>>Kittitas County groundwater

TRIBAL/MUNI WATER NM/AZ

NAVAJO-GALLUP SUPPLY PROJECT RECLAMATION REPORT & EIS

On July 6, the Bureau of Reclamation announced the release of the Navajo-Gallup Water Supply Project Planning Report/Final Environmental Impact Statement (FEIS). The PR/FEIS provides a discussion of various ways to provide a long-term municipal and industrial (M&I) water supply to the Navajo Nation, City of Gallup, and Jicarilla Apache Nation in New Mexico and Arizona. The PR/FEIS evaluates potential environmental impacts and costs for two action alternatives compared to a No-Action Alternative.

The PR/FEIS identifies a preferred alternative that diverts a total of 37,764 acre-feet (AF) of water per year from the San Juan River basin with a resulting depletion of 35,893 AF. This would meet the needs of projected population increases through the year 2040 with a use of 160 gallons per capita per day. The PNM Alternative diversion on the San Juan River would take 33,119 acre-feet of the diversion, with an average return flow of 1,871 acre-feet and provide M&I water supplies for the Navajo Nation and the city of Gallup. An additional Cutter Reservoir diversion would divert 4,645 acre-feet per year with no return flow to the San Juan River to provide M&I water supplies for the Navajo Nation and the Jicarilla Apache Nation.

For info: Stan Powers, Reclamation , 970-385-6555; PR/FEIS available on Reclamation's website: www.usbr.gov/uc/envdocs/eis/navgallup/FEIS/index.html

USGS AQUIFER STUDY CA

CENTRAL VALLEY MODEL

A study was recently released by the U.S. Geological Survey (USGS) on groundwater pumping and groundwater availability in California's Central Valley. The USGS study found that groundwater levels are declining in the southern, Tulare Basin portion of the San Joaquin Valley as more water is pumped out than recharges naturally. The report found that between 1962 and 2003, nearly 60 million acre-feet of aquifer system storage was depleted. The southern valley, however, also shows the most promise for large-scale artificial groundwater recharge. Groundwater levels in the Sacramento Valley and the northern portion of the San Joaquin Valley are generally stable, the study found.

California's Central Valley covers about 20,000 square miles and is one of the most productive agricultural regions in the world. More than 250 different crops are grown in the Valley with an estimated value of $17 billion per year. This irrigated agriculture relies heavily on surface water diversions and groundwater pumpage. Approximately one-sixth of the nation's irrigated land is in the Central Valley.

The Central Valley also is rapidly becoming an important area for California's expanding urban population. Since 1980, the population of the Central Valley has nearly doubled from 2 million to 3.8 million people. The Census Bureau projects that the Central Valley's population will increase to 6 million people by 2020. This surge in population has increased the competition for water resources within the Central Valley and statewide, which likely will be exacerbated by anticipated reductions in deliveries of Colorado River water to southern California. In response to this competition for water, a number of water-related issues have gained prominence: conservation of agricultural land, conjunctive use, artificial recharge, hydrologic implications of land-use change, and effects of climate variability.

The USGS Groundwater Resources Program made a detailed assessment of groundwater availability of the Central Valley aquifer system that includes: (1) the present status of groundwater resources; (2) how these resources have changed over time; and (3) tools to assess system responses to stresses from future human uses and climate variability and change.

To complete the study, the USGS developed an extensive, detailed three-dimensional computer model of the hydrologic system of the Central Valley. Water managers may download the Central Valley Hydrologic Model to understand how water moves through the aquifer system and predict water-supply scenarios. The model was developed as part of a four-year study by USGS examining 30 regional aquifers nationally. California's Central Valley contains 20% of the groundwater pumped in the nation, according to the study. The model was designed to help resource agencies assess, understand and address the many issues affecting the joint use of surface and groundwater supplies — known as "conjunctive use" — in the Central Valley.

For info: USGS Report available at: www.usgs.gov/newsroom/article.asp?ID=2249; Model available at: http://ca.water.usgs.gov

TRIBAL LIABILITY US

NO LIABILITY UNDER CERCLA

US District Court Judge Lonny Suko of the Eastern District of Washington recently ruled that Indian tribes cannot be held liable under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), because they are not defined as covered "persons" subject to liability under CERCLA, 42 U.S.C. Section 9607(a). The definition of "persons" is located in 42 U.S.C. Section 9601(21). Teck Cominco contended that the Confederated Tribes of the Colville Reservation (Tribes) caused and contributed to the hazardous substances contamination of Lake Roosevelt in Washington. The District Court (court) granted the Plaintiffs'

WATER BRIEFS

Fed. R. Civ. P. 12(b)(6) Motion and dismissed Teck Cominco's CERCLA counterclaims against the Tribes. *Pakootas v. Teck Cominco Metals, Ltd.,* No. CV-04-256-LRS, (E.D. Wash. June 19, 2009).

The court's ruling was based on statutory construction. The definition of "persons" does not expressly include "Indian tribe" and that term is defined separately at Section 9601(36). The court found that the statutory language, therefore, was plain and unambiguous, so the court would enforce the language according to its clear terms. Teck Cominco made additional arguments to assert that the Tribes were "persons" that were rejected by the Court.

The *Teck Cominco* case involves that company's operation of a lead-zinc smelter in Trail, British Columbia and the disposal of substances into the Columbia River, which then flowed into the United States. The transboundary lawsuit has already been up to the US Supreme Court once. See Du Bey and Rosenthal, TWR #15 and #18 and Water Briefs, TWR #48.

For info: Decision available at the Native American Rights Fund website: www.narf.org/nill/bulletins/dct/unreported/pakootas.pdf

MUNI WATER SUPPLY TRANSFER RECOMMENDED WA

On July 20, the Thurston County Water Conservancy Board recommended the transfer of 6,515 gallons per minute and 2,327.43 acre-feet per year from the former Olympia Brewery located in Tumwater, Washington to the Cities of Lacey, Olympia and Tumwater (Cities). This transfer allows the Cities to put this water to use for municipal supply in an urban area where new water sources have become increasingly difficult to secure.

In Washington, Water Conservancy Boards are independent units of local government established by the counties they serve. Each water conservancy board consists of three or five commissioners, all trained by the State of Washington's Department of Ecology (Ecology) to review and make decisions on a water right transfer application. The Thurston County Water Conservancy Board is composed of lawyers, engineers, and environmental professionals that serve on a voluntary basis. Applications submitted to Conservancy Boards are reviewed under the same standards as changes and transfers submitted to Ecology. However, while it can take Ecology several years to act on a request, the Water Conservancy Board was able to render a determination in just over one year. Once acted on by a Board, Ecology has 45 days to review the decision and affirm, reverse, or modify the Board's decision.

The transfer of the Brewery rights is among the largest water right transfers made in Washington State. In 2006, the Cities moved to acquire the Brewery water rights and wells by eminent domain (also called condemnation; see Water Briefs, TWR #25 and #27). The annual quantity authorized for transfer was approximately a third of the original rights enjoyed by the Brewery. In Washington State, water rights that are not fully exercised are subjected to relinquishment for non-use. The amounts transferred reflected declining water use at the former facility. Were it not for this transfer, the water right secured by the former brewery could have been completely lost to the community, due to non-use.

For info: Mike Rhubright, Thurston County Water Conservancy Board, 360/ 491-9199 or email: mprhubright@comcast.net

EXEMPT GROUNDWATER OR NEW RECORDING RULES OR

The Oregon Water Resources Commission approved temporary rules regarding Exempt Groundwater Use Recording Requirements. These rules became effective July 1, 2009.

For info: Cindy Smith, OWRD, 503/ 986-0876; Rules available at: www1.wrd.state.or.us/cgi-bin/notices.pl?new_oars

CWA SETTLEMENT UNION PACIFIC RAILROAD AGREEMENT NV

Union Pacific Railroad Company (UP) has agreed to settle alleged violations of the Clean Water Act (CWA) in Nevada by restoring 122 acres of mountain-desert streams and wetlands, implementing stormwater controls at its construction sites, and paying a civil penalty, the US Justice Department (DOJ) and Environmental Protection Agency announced August 6.

UP agreed to restore 21 sections of Clover Creek and Meadow Valley Wash, in Clark and Lincoln Counties, Nevada, and will monitor eight major restoration areas for at least five years. The work will include removal of illegal fill, restoration, monitoring, maintenance, re-vegetation, and invasive species removal, at an estimated cost of $31 million. UP will also pay $800,000 in civil penalties.

According to EPA, Meadow Valley Wash and Clover Creek are valuable, sensitive water resources which provide habitat to many fish species and endangered wildlife, such as the desert tortoise and southwestern willow flycatcher.

The settlement resolves a complaint filed by the US against UP for alleged CWA violations stemming from the railroad's activities in Clover Creek and Meadow Valley Wash in 2005. In January 2005, UP railroad tracks sustained significant damage following a flood. The company took time-critical actions to repair damage. However, UP also conducted extensive non-emergency construction and stream alteration work without obtaining the required CWA permits, which could have minimized and compensated for the damage to the streams. UP's unauthorized discharges included the construction of massive structures to control stream flows, such as dikes, berms, levees and diversions within the stream systems. The structures ranged from five to 15 feet high, and from 20 to thousands of feet long.

The proposed consent decree, lodged in the US District Court in Las Vegas, is subject to a 30-day comment period and final court approval.

For info: DOJ, 202/ 514-2007; Proposed consent decree available on DOJ's website at: www.usdoj.gov/enrd/Consent_Decrees.html

CONSERVATION PROJECT IRRIGATION CANAL PIPING WA

A major conservation project has been funded by the Washington Department of Ecology (Ecology) Office of Columbia River that will keep more than 6,400 acre-feet (AF) of water in the Yakima River. The Barker Ranch near West Richland, Washington,

WATER BRIEFS

was awarded a $5.6 million grant to replace three miles of an open-earth irrigation canal with a closed pipe system, reducing water losses due to leaks and evaporation. The conversion will bolster streamflows by decreasing the Ranch's diversion from the river by 6,436 acre-feet per year at a point above the Yakima River's confluence with the Columbia River.

Nearly 175 different species of birds have been recorded on Barker Ranch by Audubon Society members the last few years. The ranch has a varying array of habitat types. The property contains several miles of contiguous wetland and riparian habitat, as well as associated tall upland grass and shrub-steppe conditions that are needed by many wildlife species, especially nesting birds. The ranch is under a permanent Wetland Restoration Program easement administered by the Natural Resource Conservation Service.

Michael Crowder, general manager of Barker Ranch and an adjunct professor at Washington State University-Tri-Cities, noted that wetlands contribute to local groundwater supplies and aquifer recharge, filter nutrients and sediments out of the water, serve as areas for flood-water retention, and fulfill a habitat need for a great number of wildlife species.

Construction on the three-mile long 63-inch diameter pipe will begin this summer and should be functioning by the fall.

For info: Michael Crowder, Barker Ranch, 509/ 521-3663; Ecology Columbia River Projects: www.ecy.wa.gov/programs/wr/cwp/cr_08fund.html

FEDERAL REGULATIONS US

IMPROVED ACCESS

The Environmental Protection Agency (EPA) has upgraded the interagency website that provides public access to federal regulations. Enhancements to the site include improved search capabilities, new navigation tools, and easier access to areas for the public to provide comments on proposed regulations. Users can now streamline search results with date ranges, select specific US government departments or agencies, and view results by docket number. The website also offers new options for information sharing, such as social bookmarking and RSS feeds for specific government agencies.

For info: www.regulations.gov

CEASE & DESIST ORDER OK

CWA VIOLATIONS

On July 1, EPA issued an emergency cease and desist administrative order to Murphy Products Inc. and the Oklahoma National Stock Yards Company, both of Oklahoma City, to stop all conditions which may lead to a discharge of pollutants to the waters of the State, including the Oklahoma River. The order for violations of the Clean Water Act (CWA) specifically addresses a compost facility which is operated by Murphy Products on property owned by the National Stock Yards, which incorporates animal manure from the stock yards. On June 22 and 23, 2009, inspectors from EPA and the Oklahoma Department of Agriculture, Food and Forestry (ODAFF), observed the potential for unauthorized discharges from the compost facility directly into the Oklahoma River.

Murphy Products, Inc. and the Oklahoma National Stock Yards Company have been ordered to cease all discharges of pollutants from the compost system, and within 30 days submit to EPA and ODAFF a plan and schedule of actions that will ensure that all run-off from the compost facility does not discharge to the Oklahoma River.

For info: Dave Bary, EPA, 214-665-2200 or email: r6press@epa.gov; EPA Region 6 activities available at: www.epa.gov/region6

OPEN RIVERS INITIATIVE US

NATIONAL FUNDING OPPORTUNITY

The NOAA Restoration Center is currently soliciting applications for dam and river barrier removal projects that aim to repair vital riverine ecosystems, enhance populations of migratory fish, and benefit local communities. Applications for the Oregon Rivers Initiative (ORI) are due before midnight on November 16th, 2009.

Project proposals should demonstrate strong on-the-ground habitat restoration components that will result in long-term ecological improvements for living marine and coastal resources, particularly migratory fish. Projects that also foster economic, educational, and social benefits for communities will receive priority consideration.

Funding of up to $6,000,000 is expected to be available for ORI Project Grants in FY 2010. Typical awards will range from $200,000 to $750,000. Although a select few may fall outside of this range, project proposals requesting less than $100,000 or greater than $3,000,000 will not be accepted or reviewed.

For info: Tisa Shostik, NOAA, email: Tisa.Shostik@noaa.gov; NOAA website: www.nmfs.noaa.gov/habitat/>>Funding for Habitat Restoration>>NOAA Open Rivers Initiative

AQUIFER RECHARGE ID

EASTERN SNAKE PLAIN AQUIFER

The Idaho Water Resource Board (IWRB), in partnership with six canal companies and irrigation districts, was able to perform successful early season recharge of the Eastern Snake Plain Aquifer (ESPA). The recharge projects were possible due to a combination of factors: favorable wet and cool weather conditions which delayed early season irrigation demand; a good water supply this year; and agreements negotiated over the winter between the IWRB and canal companies and irrigation districts in the event water for recharge became available for the Board's 1980 priority water right.

An especially wet June allowed recharge to continue longer than expected. Total recharge to the ESPA was in excess of 103,000 acre-feet as of the end of June. The Shoshone recharge site northwest of Shoshone, Idaho is one of the recharge sites. Water is diverted from the Milner-Gooding Canal into an area of highly fractured basalt that allows water to infiltrate rapidly. In that case 230 cubic feet per second was being diverted to recharge the ESPA. An April 14 press release noted that at that point, more than 800 cubic feet per second of water was being diverted for recharge.

For info: Bob McLaughlin, Idaho Water Resources Department, 208/ 287-4828 or website: www.idwr.idaho.gov/

CALENDAR

August 16-20 CA
8th Annual StormCon North American Surface Water Quality Conference & Exposition, Anaheim. For info: Steve DiGiorgi, StormCon, 805/ 682-1300 or website: www.StormCon.com

August 17-21 CA
Geomophic & Ecological Fundamentals for River & Stream Restoration Course, Truckee. Sagehen Creek Field Station. For info: Course website: http://sagehen.ucnrs.org/courses/geomorph.htm

August 19-20 CA
Understanding Riparian Processes, Davis. Da Vinci Bldg. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

August 19-21 WA
Advanced ArcGIS 9 for Fisheries & Wildlife Biology Applications Course, Olympia. Evergreen State College. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

August 19-21 CO
Colorado Water Congress Summer Convention, Steamboat Springs. Sheraton Steamboat Resort & Conference Center. For info: CWC, 303/ 837-0812, email: cwc@cowatercongress.org or website: www.cowatercongress.org/

August 20 CA
Sustainability & Green Building Session, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

August 24-25 CA
The Tuolumne River: Ecology, Resource Management & Whitewater, Groveland. Tuolumne River. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

August 24-26 WA
NARF/WSWC Symposium on Indian Water Rights Settlements, Ferndale. Silver Reef Hotel. For info: Cheryl Redding, WSWC, 801/ 561-5300, email: credding@wswc.state.ut.us or website: www.westgov.org/wswc/meetings.html

August 26-27 CA
Developing & Writing Effective CEQA Documents, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

August 26-27 WA
Introduction to Aquatic Toxicology Course, Seattle. 650 South Orcas Street, Ste. 220. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

August 26-27 ID
Water Quality Credit Trading Workshop, Indianapolis. Crowne Plaza Hotel at Airport. For info: Conf. website: www.conservationinformation.org

August 27-28 NV
Western Water Law 16th Annual Conference, Las Vegas. Mandalay Bay Hotel. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 30-Sept. 2 AZ
Managing Hydrologic Extremes - 2009 Annual Symposium, Scottsdale. Westin Kierland Resort. Sponsored by AZ Hydrological Society & American Instit. of Hydrology. For info: AHS website: www.azhydrosoc.org

August 31-Sept. 1 WA
The Ecology of Pacific Salmonids Course, Seattle. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 1-3 CA
Facilitation Skills for Scientists & Resource Managers Course, Sacramento. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 2-3 CA
Interest-Based Negotiation for Planning & Resource Management, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

September 3 OR
Water Rights Academy, La Grande. Eastern Oregon University. Sponsored by Water for Life. For info: Helen Moore, WFL, 503/ 375-6003, email: helen.moore@waterforlife.net or website: www.waterforlife.net

September 3 CO
Obama's Energy & Climate Policy, Boulder. UC - Wolf Law Bldg. Sponsored by the Renewable & Sustainable Energy Insitute. For info: Margie Bopp, Institute, email: margie.bopp@colorado.edu

September 4 WA
Fish Passage Course, Seattle. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 8-11 CO
Bridging the Gap: Collaborative Conservation from the Ground Up, Fort Collins. CSU. For info: Conf. website: www.collaborativeconservation.org

September 9-10 IL
Water Innovations Alliance & Conference, Chicago. McCormick Place. For info: WIA website: www.waterinnovations.org

September 10 CA
Environmental Initiatives for 2009 & Beyond Seminar, San Francisco. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 10 CA
Wetlands Regulation & Mitigation Seminar, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

September 10-11 CO
Institute on Energy Development: Access, Siting, Permitting & Delivery on Public Lands, Denver. Sponsored by Rocky Mt. Mineral Law Foundation. For info: Mark Holland, 303/ 321-8100 x106, mholland@rmmlf.org or website: www.rmmlf.org

September 10-11 CA
Wind Power in California Seminar, Los Angeles. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 10-11 WA
Introduction to Ecological Statistics Course, Seattle. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 11 CA
California Environmental Quality Act Seminar, Santa Monica. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

September 11 WA
Environmental Initiatives for 2009 & Beyond Seminar, Seattle. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 11 OR
Advocating for an Environment of Equality: Legal & Ethical Duties in a Changing Climate Symposium, Eugene. U of O School of Law. For info: ENR, 541/ 346-1395 or website: www.law.uoregon.edu/org/jell/equality.php

September 11-13 OR
Spawning Solutions Through Creative Ideas Conference, Salem. Oregon 4-H Conference Ctr. Sponsored by Oregon Dept. of Fish & Wildlife. For info: Debbi Farrell, ODFW, 503/ 947-6211, email: Debbi.L.Farrell@state.or.us or website: www.dfw.state.or.us/STEP

September 12 TX
American Rainwater Catchment Systems Assoc. Conference, Austin. For info: ARCSA website: http://arcsa.org

September 13-16 WA
24th WateReuse Symposium, Seattle. Sheraton Seattle Hotel. Sponsored by WateReuse Association. For info: WRA website: www.watereuse.org/

September 13-16 UT
Water/Energy Sustainability Symposium, Salt Lake City. Sponsored by Ground Water Protection Council and Dept. of Energy. For info: GWPC website: www.gwpc.org

September 13-19 NM
Rocky Mt. Section AWWA & Rocky Mt. Water Environment Assn Joint Annual Conference, Albuquerque. Hyatt Hotel. For info: RMWEA website: www.rmwea.org/

September 14-15 MO
Successful Remediation Technologies Course, St. Louis. For info: NGWA, 800/ 551-7379 or website: www.ngwa.org

September 14-15 TX
Texas Water Law Conference, Austin. Omni Downtown. For info: CLE International, 800/ 873-7130 or website: www.cle.com

September 14-15 MO
Construction Dewatering & Ground Water Control: Design & Application Course, St. Louis. For info: NGWA, 800/ 551-7379 or website: www.ngwa.org

September 14-16 OR
Who Will Own the Forest? Summit 2009, Portland. World Forestry Center, 4033 SW Canyon Road. For info: WFC website: www.wwotf.worldforestry.org/wwotf5/agenda.html

September 14-16 NC
2nd International Conference on Forests & Water in a Changing Environment, Raleigh. For info: Conf. website: www.sgcp.ncsu.edu:8080/

September 14-16 OR
Clean Pacific Conference & Exposition, Portland. Oregon Convention Center. For info: Clean Pacific website: www.cleanpacific.org.

September 14-16 MO
From Dust Bowl to Mud Bowl: Sedimentation, Conservation & the Future of Reservoirs Conference, Kansas City. Westin Crown Center. For info: Conf. website: http://www.swcs.org/en/conferences/

September 15-16 OR
2009 Ocean Renewable Energy Conference IV, Seaside. Oregon Wave Energy Trust. For info: Conf. website: www.oregonwave.org

September 16 MT
Montana Water Law: How to Navigate Permitting & Change Application Process, Helena. Sponsored by DNRC & Montana Watercourse. For info: Janet Bender-Keigley, MT Watercourse, 406/ 994-6671 or website: www.mtwatercourse.org/

September 16-17 WA
Construction Site Erosion & Pollution Control Lead (CESCL) - UW Engineering Program, Shoreline. For info: UW Engineering website: www.engr.washington.edu/epp/cee/cec.html

September 16-17 CA
Stormwater Regulations in California Course, Oakland. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 16-17 OR
Sustainable Stormwater Symposium, Portland. For info: ASCEOR: www.asceor.org/stormwater_home

September 17-18 CA
Developing Wind Power Projects in California, Marina del Rey. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 17-18 CA
ACWA's 2009 Water Law Workshop, Costa Mesa. Sponsored by Assoc. of California Water Agencies. For info: ACWA, 916/ 441-4545 or website: www.acwa.com

September 18 WA
Ecosystem Goods & Service Valuation Course, Seattle. For info: NWETC, 206/ 762-1976 or website: http://nwetc.org

September 19-20 CO
Sustainable Living Fair, Fort Collins. For info: www.SustainableLivingFair.org

September 20 OR
Advanced Water Rights Bootcamp, Klamath Falls. Sponsored by Water for Life and Schroeder Law. For info: Helen Moore, WFL, 375-6003, email: helen.moore@waterforlife.net or website: www.waterforlife.net

September 21 OR
Water Rights Academy, Tillamook. OSU Extension. Sponsored by Water for Life. For info: Helen Moore, WFL, 375-6003, email: helen.moore@waterforlife.net or website: www.waterforlife.net

September 21-22 CA
California Environmental Quality Act Seminar, San Francisco. For info: CLE International, 800/ 873-7130 or website: www.cle.com

September 21-22 WA
Resolving Interstate Water Conflicts Seminar, Spokane. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

September 21-24 Australia
International Riversymposium, Brisbane. For info: Lynette Maxwell, Riversymposium, email: lynette@riversymposium.com or website: www.riversymposium.com

The Water Report
Water Rights, Water Quality & Water Solutions in the West
260 N. Polk Street • Eugene, OR 97402

CALENDAR

(continued from previous page)

September 22 NV
Water Crisis in California: Challenges Faced by MWD to Adapt to Long-Term Water Curtailments, Las Vegas. Golden Nugget Hotel. Sponsored by Nevada Water Resources Association: Southern Nevada NWRA Dinner Forum. For info: NVWRA, 775/ 473-5473 or website: www.nvwra.org/

September 22 OR
Water Rights Academy, Seaside. Riverside Suites, 102 N. Holladay. Sponsored by Water for Life. For info: Helen Moore, WFL, 375-6003, email: helen.moore@waterforlife.net or website: www.waterforlife.net

September 22-23 MD
Artificial Recharge of Ground Water, Baltimore. Sponsored by the National Ground Water Assoc.. For info: NGWA, 800/ 551-7379 or website: www.ngwa.org

September 22-23 MD
Pharmaceuticals & Endocrine Disrupting Chemicals in Water: 7th Int'l Conference, Baltimore. For info: National Ground Water Assoc. website: www.ngwa.org

September 23-26 MD
Environment, Energy & Resources Law Summit: 17th ABA Section Fall Meeting, Baltimore. Baltimore Marriott Waterfront. For info: ABA website: www.abanet.org/environ/fallmeet/2009/

September 24 OR
Climate Change: Positioning Your Business, Portland. DoubleTree Hotel-Lloyd Center. Sponsored by Northwest Environmental Business Counsil. For info: NEBC, 503/ 227-6361 or website: www.nebc.org

September 24 OR
Wind Power Seminar, Portland. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 24-25 OR
OWRC Water Law Seminar, Redmond. Eagle Crest Resort. Sponsored by Oregon Water Resources Congress. For info: OWRC, 503/ 363-0121 or website: www.owrc.org/

September 24-25 CA
California Environmental Quality Act Seminar, San Diego. For info: CLE International, 800/ 873-7130 or website: www.cle.com

September 24-25 TX
Conservation Easements Seminar, Austin. For info: CLE International, 800/ 873-7130 or website: www.cle.com

September 24-25 MD
Artificial Recharge of Ground Water Course, Baltimore. For info: NGWA, 800/ 551-7379 or website: www.ngwa.org

September 25 WA
Washington Water Trust 4th Annual Benefit Celebration, Seattle. For info: Lea Whitehill, Washington Water Trust, 206/ 675-1585 x102, email: lea@washingtonwatertrust.org or website: www.washingtonwatertrust.org

September 25 CA
California Environmental Quality Act Seminar, Santa Monica. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

September 28-29 FL
Aquifer Storage Recovery in the US: National Status of Projects, Issues & Solutions Conference, Orlando. Holiday Inn Select. For info: American Ground Water Trust, 800/ 423-7748 or website: www.agwt.org/events/2009/09FL_ASR9Reg1.htm

September 28-30 CO
Watersheds, Water, and Land Use Planning Symposium, Denver. Western States Water Council. For info: Cheryl Redding, WSWC, 801/ 561-5300, email: credding@wswc.state.ut.us or website: www.westgov.org/wswc/meetings.html

September 29-Oct. 1 CA
9th Biennial State of the Estuary Conference, Oakland. Ecological Health of the San Francisco Bay-Delta Estuary. For info: EPA website: www.epa.gov/region09/water/

September 30 CA
Overview of Fluvial Geomorphology Course, Davis. Da Vinci Bldg. For info: UC Davis Extension, 800/ 752-0881 or website: http://extension.ucdavis.edu

September 30-Oct. 2 MT
Waters That Cross Divides: Joint Meeting of AWRA MT Section & UM Center for Riverine Science, Missoula. For info: Conf. website: http://awra.org/state/montana/events/conference.htm

September 30-Oct. 2 FL
Coping with Change - Balancing Environmental Needs With Economic Realities: Southeast Stormwater Assoc. 09 Conference, Tallahassee. For info: SESWA, 850/ 561-0904 or website: www.SESWA.org

October 1-2 MT
River Center Conference/Montana AWRA, Missoula. Sponsored by U of M River Center & MT AWRA. For info: http://water.montana..edu/awraabstracts/

October 1-2 MT
Montana Water Law Seminar: 9th Annual, Helena. Great Northern Hotel. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

October 2-5 CO
Ground Water & Climate Change Conference, Boulder. For info: National Ground Water Assoc., 800/ 551-7379 or website: www.ngwa.org

October 4-8 FL
2009 International Water Conference, Orlando. Hilton in the Walt Disney World Resort. For info: Conf. website: www.eswp.com/water/

October 5-9 NV
CA-NV Section American Water Works Assn Annual Fall Conference, Las Vegas. Riviera Hotel. For info: CA-NV Section website: www.ca-nv-awwa.org

October 6 WA
Environmental Crimes & Penalties Seminar, Seattle. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net