



The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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RESOLVING ESA-WATER CONFLICTS

The Edwards Aquifer Recovery Implementation Program

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INTRODUCTION

Mark Twain is frequently (perhaps incorrectly) attributed with the observation that “whiskey is for drinking and water is for fighting over.” At least part of that observation is clearly appropriate to south central Texas where, for over 50 years, use of the Edwards Aquifer has inspired regional antagonism and periodically open conflict in courts and the state legislature. A seemingly intractable dispute has raged between and among municipalities, industrial and agricultural users, as well as environmental interests and downstream surface right holders dependent on springflows, regarding whether pumping from the Aquifer should be regulated. In the early 1990s, the Endangered Species Act (ESA) brought state regulation to the Aquifer and ended unrestricted withdrawals.

The conflicts, however, have not ended. Today, competing water needs within the region continue to influence management of the resource, and a workable plan for the long-term protection for the federally-listed species has yet to be adopted among the region’s stakeholders. As a result, in 2006-2007, the United States Fish and Wildlife Service (USFWS) and the Texas Legislature brought together stakeholders from throughout the region to participate in a unique collaborative process to develop a plan to contribute to the recovery of federally-listed species dependent on the Edwards Aquifer. This process is referred to as the Edwards Aquifer Recovery Implementation Program (EARIP).

This paper briefly describes the Edwards Aquifer, the history of the disputes regarding the Aquifer, EARIP and its accomplishments, and EARIP’s plans for future work to solve what has been an intractable problem in the region. More detailed information about EARIP can be found at <http://irnr.tamu.edu/earip/>

THE EDWARDS AQUIFER

The Edwards Aquifer is a unique groundwater resource, extending 180 miles from Brackettville in Kinney County to Kyle in Hays County (see Map, page 2). It is the primary source of drinking water for over two million people in south central Texas and serves the domestic, agricultural, industrial, and recreational needs of the area. The Edwards Aquifer is the source of the two largest springs remaining in Texas — the San Marcos and the Comal. These springs feed the San Marcos and Comal Rivers which are tributaries to the Guadalupe River that provides fresh water inflow to the bays and estuaries.

The Edwards Aquifer is a karst aquifer flowing through highly porous limestone. Pertinent to this discussion, the Aquifer is divided for regulatory purposes into two pools — the Uvalde Pool, under Uvalde County, and the San Antonio pool under the remainder

ESA-Water

Listed Species

Low Flows

Rule of Capture

of the Aquifer. Aquifer levels vary with rainfall, recharge, and the rate of groundwater withdrawals. Withdrawals from the Aquifer have increased from approximately 100,000 acre-feet (AF) in 1934 to a peak of 542,400 AF in 1989. The total water demand for the Edwards Aquifer region is projected to increase over 34 percent over the next 30 years.

Eight species that depend directly on water in the Aquifer, or water discharged from Comal and San Marcos springs, are federally-listed as threatened or endangered. These species include: fountain darter, San Marcos salamander, San Marcos gambusia, Texas blind salamander, Peck's cave amphipod, Comal Springs dryopid beetle, Comal Springs riffle beetle, and Texas wild rice. The San Marcos gambusia has not been seen since 1982 and may be extinct. See USFWS, *San Marcos & Comal Springs & Associated Aquatic Ecosystems (Revised) Recovery Plan*, 1996, at 28-29. Listing petitions have been filed pursuant to section 4 of the ESA with respect to additional aquatic species that depend directly on water in, or discharged from, the Edwards Aquifer springs.

The primary threat to these aquifer-dependent listed species is the intermittent loss of habitat from reduced springflows. Springflow loss is the combined result of naturally fluctuating rainfall patterns, regional variable pumping, and temporal drawdown of the Aquifer. Other threats include invasive non-native species, recreational activities, predation, and direct or indirect habitat destruction or modification by humans and other factors that decrease water quality (USFWS, 1996).

During the Edward Aquifer's drought of record, Comal Springs ceased to flow for 144 days in 1956, and the fountain darter population in the Comal Springs system was extirpated. Fountain darters were successfully reintroduced into the Comal River in the mid-1970s from the San Marcos Springs.

HISTORY of EDWARDS AQUIFER DISPUTES

Use of groundwater in Texas is governed by the common law Rule of Capture. In *Houston & Texas Central Railway Co. v. East*, 81 S.W. 279 (1904), the Texas Supreme Court adopted the English common law rule that the owner of the land may pump unlimited quantities of water from under his land regardless of the impact that action may have on his neighbors' ability to obtain water on his own land. The Texas Supreme Court relied on the Rule of Capture to allow a major spring in West Texas to dry up due to groundwater pumping. *Pecos County Water Control and Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App.-El Paso 1954, writ ref'd n.r.e.).

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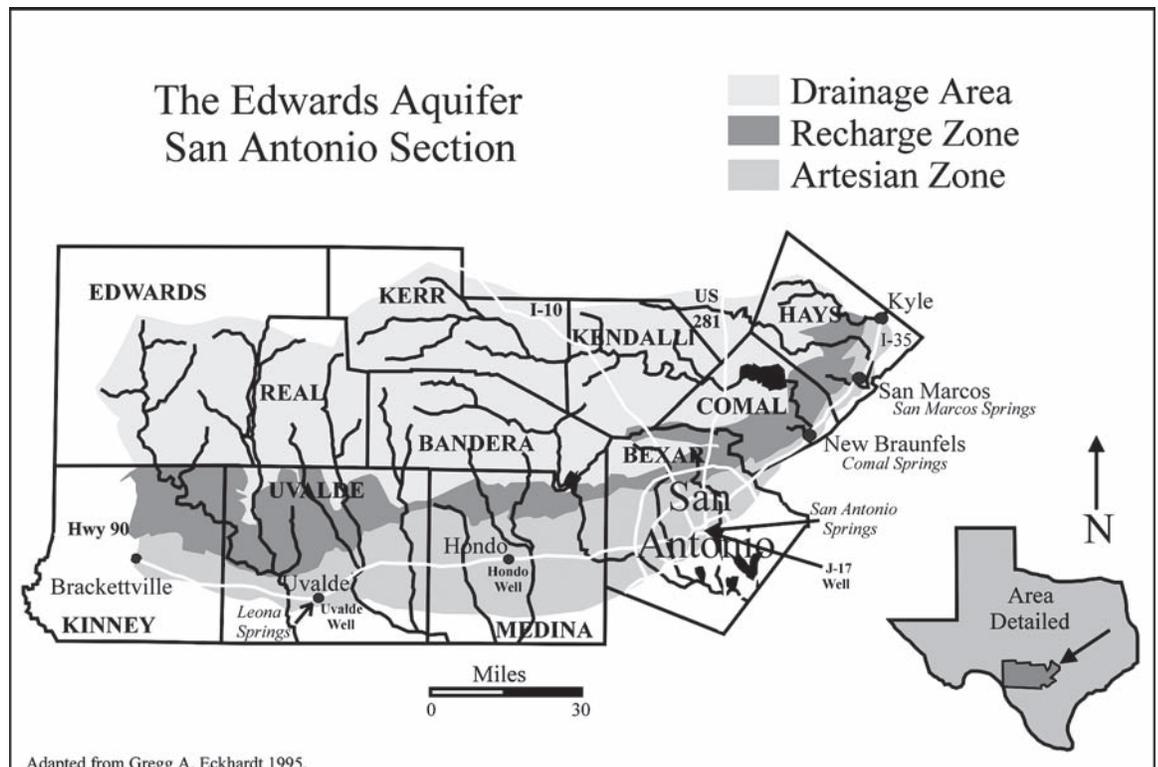
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ESA-Water

In the 1950s, Texas began to move away from the common law and the Rule of Capture in favor of local management by groundwater conservation districts. Until 1993, withdrawal of groundwater from the Edwards Aquifer was largely unregulated. The Edwards Underground Water District (EUWD) was created in 1959. In 1991, EUWD pursuant to an express grant of authority prepared a Drought Management Plan. Otherwise, EUWD was unable to successfully regulate or manage withdrawals from the Aquifer.

In 1989, a suit was filed asking the court to declare that the water in the Aquifer is an underground river, and thus, under Texas law, owned by the State. *Guadalupe-Blanco River Authority v. Royal Crest Homes*, No. 89-038 (22nd Dist. Ct., Hays County, Tex. June 15, 1989). While this case was pending, in 1992, the Texas Water Commission determined that the Edwards Aquifer was an underground river and, thus, subject to State regulation. This determination was overturned by a state district court. *McFadden v. Texas Water Comm'n*, No. 92-05214 (Dist. Ct., Travis County, Tex. 1992).

ESA Lawsuit

Sierra Club v. Lujan

In 1991, the Sierra Club filed a lawsuit under the Endangered Species Act (ESA) that resulted in the creation of the Edwards Aquifer Authority (EAA) and the regulation of withdrawals from the Aquifer. *Sierra Club v. Lujan*, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex.) (subsequently *Sierra Club v. Babbitt*). On February 1, 1993, the federal district court held that USFWS's failure to develop and implement a recovery plan that identifies springflow levels at which "take" and "jeopardy" occurs for the species in Comal and San Marcos springs violated the ESA. The court ordered USFWS to determine within 45 days the springflows at which "take" and "jeopardy" occur for the fountain darter, the Texas blind salamander and other listed animal species, and the springflow levels at which Texas wild rice would be damaged or destroyed. The court also ordered USFWS to determine the minimum springflow required to avoid destruction or adverse modification of critical habitat defined for any listed species.

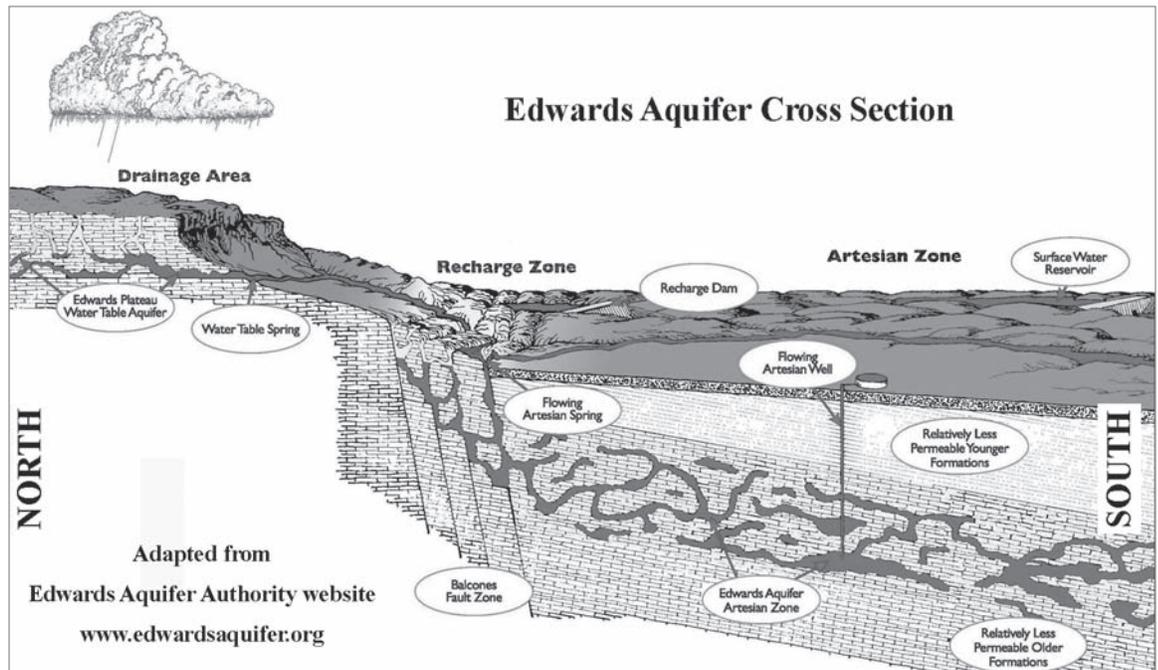
Springflow Impacts

Response of the US Fish and Wildlife Service to the Decision in Sierra Club v. Lujan

In response, on April 15, 1993, USFWS filed its "take" determinations, "Springflow Determinations Regarding 'Take' of Endangered and Threatened Species," with the federal district court. On June 15, 1993, USFWS filed with the court its "jeopardy" and "adverse modification" determinations, "Springflow Determinations Regarding Survival and Recovery and Critical Habitat of Endangered and Threatened Species."

USFWS Determinations

With respect to its determinations, USFWS acknowledged that the numbers reflected USFWS's best professional judgment and that, because insufficient data were available, it had taken a conservative approach in making these estimates. USFWS recognized that the court's order required it to make its estimates in the absence of a specific project or action. Accordingly, it had to make assumptions regarding the duration, timing, extent, and impacts of possible actions.





Comal Springs Riffle Beetle (*Heterelmis comalensis*)

This beetle is a small aquatic, surface-dwelling species. Adults are about 1/8 inch long. Some riffle beetle species can fly, but the hind wings of *H. comalensis* are short and almost certainly non-functional, making the species incapable.



Texas Blind Salamander (*Typhlomolge rathbuni*)

This sightless, cave-dwelling salamander reaches a mature length of about 13 centimeters (5 inches). Two small black eyespots mark the location of vestigial eyes.



Peck's Cave Amphipod (*Stygobromus pecki*)

Like all members of the exclusively subterranean genus *Stygobromus*, this species is eyeless and unpigmented.



Fountain Darter (*Etheostoma fonticola*)

The fountain darter is a reddish brown darter with an average length of 2.5 centimeters (1 inch). Source: Edwards Aquifer Authority website: www.edwardsaquifer.net/species.html

USFWS estimated that “take” and “jeopardy” or “adverse modification” of critical habitat would occur when springflows fell below the levels shown in the following table.

TAKE - JEOPARY - ADVERSE MODIFICATION LEVELS

Springflow Levels expressed in cubic feet per second (cfs)

	Take	Jeopardy	Adverse Modification of Critical Habitat
Fountain Darter in Comal Springs	200	150	N/A
Fountain Darter in San Marcos Springs	100	100	100
San Marcos Gambusia	100	100	100
San Marcos Salamander	60	60	60
Texas Blind Salamander	50	50	N/A
Damage and Destruction			
Texas Wild Rice	100	100	100

USFWS estimated that flow levels could be reduced to 150 cfs without resulting in “take” of fountain darter if effective control of the giant ramshorn snail could be accomplished. With effective ramshorn snail control and the ability to control the timing and duration of low springflows, USFWS also found that flow levels could be reduced to 60 cfs for short time periods during certain times of the year without jeopardizing the continued existence of the fountain darter.

Section 9 of the ESA does not prohibit the “take” of plants. USFWS estimated that sufficient damage and destruction of Texas wild rice would occur at 100 cfs to cause “jeopardy.” USFWS estimated that short-term reductions in flow levels below 100 cfs might avoid jeopardy for Texas wild rice, if exotic species could be effectively controlled, an aquifer management plan implemented to control timing and duration of lower flows, and the status of the species improved throughout its historic range.

USFWS has agreed to reevaluate its 1993 determinations in the context of EARIP’s proposed action.

Response of the Texas Legislature to the Decision in *Sierra Club v. Lujan*

The federal district court in *Sierra Club v. Lujan* also made clear that it would entertain motions for further injunctive relief if the Texas Legislature did not develop a regulatory system to limit withdrawals from the Edwards Aquifer to protect listed species. In May 1993, the Texas Legislature passed Senate Bill 1477 creating the EAA. It authorized the EAA to issue permits and regulate groundwater withdrawals. Senate Bill 1477 directed EAA to cap the permits that could be issued at 450,000 AF annually, but required EAA to limit withdrawals to 400,000 AF by December 31, 2007, by proportionally reducing issued permits or by purchasing and retiring issued permits. The cost of permit retirements to get from 450,000 AF to 400,000 AF was to be borne equally by Aquifer users and downstream water rights holders. Senate Bill 1477 further required EAA to adopt a Critical Period Management Plan to reduce pumping during droughts and to implement and enforce measures by December 31, 2012, to ensure “minimum continuous spring flows” to protect the listed species to the extent required by federal law.

The problem of limiting withdrawals from the Aquifer to protect listed species was not solved. While Senate Bill 1477 set specific pumping caps, it also required EAA to issue permits with minimum pumping rights based on historic use and guaranteed specific withdrawal rights for qualifying use. When the applications were submitted, EAA determined that the minimum permitted rights created by the Legislature totaled at least 549,000 AF, well above the 450,000 AF pumping cap. Further, EAA had not addressed the requirement to ensure minimal continuous flow that Senate Bill 1477 required be done by the end of 2012. The Legislature attempted to address these problems in 2005, but was not successful.

EDWARDS AQUIFER RECOVERY IMPLEMENTATION PROGRAM

Creation of EARIP

In late 2006, USFWS brought together stakeholders from throughout the region to participate in a “recovery implementation program” to develop a plan to contribute to the recovery of federally-listed species dependent on the Edwards Aquifer. Recovery implementation programs (RIPs) are voluntary, multi-stakeholder initiatives developed by USFWS that seek to balance water use and development with the recovery of federally-listed species. To achieve this balance, the stakeholders develop a comprehensive document that outlines the program goals, activities, timelines, measurements of success, and roles of the participants, and execute an agreement to implement the activities outlined in the program document.

With the deadline looming to reduce the permitted withdrawals to 400,000 AF and water costing in the thousands of dollars per acre-foot, the Texas Legislature once again tried to resolve the problem in 2007. In May 2007, the Texas Legislature raised the pumping cap to 572,000 AF and adjusted the critical period management requirements established by EAA in its regulations. At the same time, the Legislature directed EAA and certain other state and municipal water agencies to participate in EARIP and to prepare a USFWS-approved plan by 2012 for managing the Aquifer to preserve the listed species at Comal and San Marcos Springs. The Legislature directed that the plan must include recommendations regarding withdrawal adjustments during critical periods that ensure that federally-listed species associated with the Edwards Aquifer will be protected, including during the drought of record.

EARIP Attributes

Senate Bill 3 directs the Edwards Aquifer Authority to “cooperatively develop a recovery implementation program” through a facilitated, consensus-based process that involves input from the USFWS, other appropriate federal agencies and all interested stakeholders, including specified state agencies. The stakeholders in EARIP include State agencies, local water resource authorities, water purveyors, environmental groups, municipalities, public utilities, and other individuals and groups interested in the Aquifer and the species residing in the Aquifer. Approximately 60-to-80 persons routinely attend the monthly meetings of EARIP and its Steering Committee. Thirty-eight stakeholder groups or individuals have executed a Memorandum of Agreement with USFWS with respect to how the recovery implementation program process will be carried out. In addition, EARIP has adopted Program Operational Rules for the Steering Committee and stakeholders.

EARIP differs from other RIPs in several ways. The typical RIP involves federal land and/or federal agencies managing water, e.g., the operation of a dam. The federal agencies contribute significant funding to the RIP process. EARIP by contrast does not involve federal land or have federal agencies involved in management of the Aquifer. Although Senate Bill 3 directed “EAA and the other stakeholders” to provide money to finance the activities of EARIP, it did not provide funding for them to do so.

Another key difference between EARIP and other RIPs is the Texas Legislature’s involvement. Participation in EARIP is not entirely voluntary for some of the stakeholders. Senate Bill 3 required EAA and certain other state and municipal water agencies to participate in EARIP. Moreover, development of the program document in a typical RIP can take many years. The Texas Legislature, however, limited that time to less than five years. The Legislature also established specific tasks and deadlines for accomplishing these tasks.



San Marcos Gambusia (*Gambusia georgei*)
Most aquatic biologists feel this species is already extinct. It ranged in length from 2.5 to 4 centimeters (1 to 1.6 inches).



San Marcos Salamander (*Eurycea nana*)
This salamander is about 6 centimeters (2.4 inches) long. This voiceless salamander is also earless.



Texas Wild Rice (*Zizania texana*)
Texas wildrice is an aquatic grass with thin, flat, elongated leaves that are typically immersed and long-streaming in river currents. Leaves often grow as long as 57 inches.



Comal Springs Dryopid Beetle (*Stygoparnus comalensis*)
This beetle is the only known subterranean member of the beetle family Dryopidae. Adult Comal Springs dryopid beetles are about 1/8 inch long. They have vestigial (non-functional) eyes, are weakly pigmented, translucent, and thin-skinned.

Source: Edwards Aquifer Authority website:
www.edwardsaquifer.net/species.html

ESA-Water

SB 3 Requirements

EARIP Tasks

Mandates Met

EARIP Accomplishments

Senate Bill 3 requires that through the RIP process, the EAA, Texas Commission on Environmental Quality, the Texas Parks and Wildlife Department, the Texas Department of Agriculture, the Texas Water Development Board, and other stakeholders are to prepare a program document by September 1, 2012, that provides recommendations for withdrawal adjustments during critical periods to ensure that federally-listed species associated with the Edwards Aquifer and associated springs will be protected “at all times, including throughout a repeat drought of record.” The program document “may be in the form of a habitat conservation plan.” In addition, Senate Bill 3 established specific tasks and deadlines that EARIP must accomplish in developing the program document.

SPECIFIC EARIP TASKS INCLUDE:

- Create a Steering Committee by September 30, 2007
- Hire a program manager by October 31, 2007
- Enter into a Memorandum of Agreement not later than December 31, 2007
- Appoint an expert Science Subcommittee by December 31, 2007
- The Science Subcommittee must submit to the Steering Committee and stakeholders initial recommendations regarding issues identified in S.B. 3 by December 31, 2008
- Establish a Recharge Facility Subcommittee (no deadline)
- Enter into an implementing agreement to develop a program document by December 31, 2009
- Prepare a program document by September 1, 2012

THE FIRST SIX MANDATES HAVE BEEN MET IN THE TIMEFRAME REQUIRED BY THE LEGISLATION:

- Members of EARIP convened a Steering Committee composed of the twenty-one members designated by S.B. 3. That Committee has been enlarged by five members to provide even more diversity in the interests represented
- EARIP has hired a Program Manager
- Thirty-eight stakeholder groups or individuals have signed a Memorandum of Agreement with USFWS
- EARIP has appointed fifteen scientists to serve as the Science Subcommittee
- The Science Subcommittee has completed its initial recommendations to the Steering Committee and other stakeholders
- EARIP has set up its Recharge Facility Feasibility Subcommittee
- The stakeholders have accomplished all of these actions in the collaborative spirit that the Legislature expected of them

FUTURE WORK OF EARIP

EARIP now is beginning the process of developing a program document and implementing agreement. Because it is a “recovery implementation program” with the goal of aiding the recovery of the species, and because of the interest in obtaining “take” protection, the program document probably will take the form of a “Habitat Conservation Plan” (HCP) that satisfies the requirements of §10 of the Endangered Species Act and contributes to the recovery of the species. To obtain approval of the HCP, EARIP will have to prepare a draft Environmental Impact Statement (EIS) to satisfy the requirements of the National Environmental Policy Act.

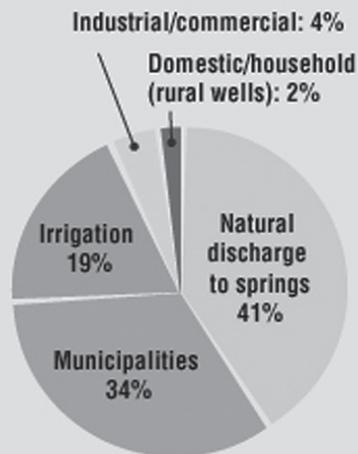
At a minimum, the HCP will cover the eight federally-listed species in the area of the springs. Because the HCP may include the construction of recharge facilities in the recharge zone and because the Comal and San Marcos Springs also supply a portion of the flow in the Guadalupe River Basin, including the bays and estuaries, stakeholders may decide to include as covered species other listed or candidate species in the area of the HCP, e.g., black-capped vireo, golden cheeked warbler, and the whooping crane.

EARIP intends to use a consensus-based, structured decision-making (SDM) process to identify a suite of actions that will form the basis of the HCP. The SDM process is a systematic way to approach complex decision problems, with emphasis on identifying and evaluating management or policy options (see [www. StructuredDecisionmaking.org](http://www.StructuredDecisionmaking.org)).

In the SDM process, EARIP will utilize the building blocks established by Senate Bill 3 — the Science and Recharge Facility Feasibility Subcommittees.

Uses of the Edwards Aquifer

In 2006, an estimated 766,500 acre feet of water was discharged or pumped from the aquifer.



Discharge statistics from Edwards Aquifer Authority

<p>ESA-Water</p> <p>Technical Expertise</p> <p>Initial Assessments</p> <p>Review Underway</p> <p>Withdrawal Limitations</p> <p>Review Planned</p> <p>Recharge Projects</p> <p>Program Document</p>	<p>The Science Subcommittee</p> <p>The Texas Legislature required EARIP to establish a Science Subcommittee comprised of individuals “with technical expertise regarding the Edwards Aquifer system, the threatened and endangered species that inhabit that system, springflows, or the development of withdrawal limitations.” EARIP has appointed fifteen well-respected scientists from academia, state and federal agencies, water authorities and purveyors, and the private sector to serve as the Science Subcommittee. These Subcommittee members are volunteers who meet once a month. In conducting its work, the Science Subcommittee must “consider all reasonably available science” and “base its recommendations solely on the best science available.” The Subcommittee also must operate “on a consensus basis to the maximum extent possible.”</p> <p>The Legislature required the Science Subcommittee to prepare “initial recommendations” by December 31, 2008.</p> <p>INITIAL RECOMMENDATIONS WERE TO INCLUDE:</p> <ul style="list-style-type: none"> • The option of designating a separate San Marcos pool • The necessity to maintain minimum springflows, including a specific review of the necessity to maintain a flow to protect federally threatened and endangered species • Whether adjustments in the trigger levels for the San Marcos Springs flow for the San Antonio pool should be made <p>The Science Subcommittee finalized these initial recommendations on November 13, 2008 — ahead of the schedule set by Senate Bill 3. EARIP has arranged to have these recommendations peer reviewed by an independent panel of scientists. At the completion of this review, EARIP will have a critical piece of information to inform its future decision-making.</p> <p>Senate Bill 3 also directs the Science Subcommittee to analyze species requirements in relation to spring discharge rates and to make recommendations “for withdrawal reduction levels and stages for critical period management” to maintain target spring discharge and Aquifer levels. To inform the Science Subcommittee’s work on possible withdrawal limitations, EARIP has retained a team of scientists to evaluate the impacts of instream flows and other impacts such as recreation, flood events, and other factors on species in the Comal and San Marcos Springs systems. Each of the scientists on the team has worked extensively on the listed species in the springs. The team is led by Dr. Thomas Hardy from Utah State University. Dr. Hardy is the principal author on two studies on the impacts of instream flows on the fountain darter at Comal and San Marcos Springs and Texas wild rice at San Marcos Springs.</p> <p>In addition, EARIP has retained the United States Geological Survey (USGS) to participate in the Hardy study process to ensure that the results will serve both the needs of EARIP in preparing its program document and USFWS in reviewing it.</p> <p>Like its initial recommendations, the Science Subcommittee recommendations on withdrawal limitations during critical periods and the Hardy study will play an important part in the decision-making process of EARIP. EARIP intends to have independent peer review of these scientific studies to enhance their acceptability to stakeholders and others and to improve prospects for making agreed-upon decisions based on the results of the studies.</p> <p>The Recharge Facility Feasibility Subcommittee</p> <p>EARIP has set up its Recharge Facility Feasibility Subcommittee as directed by Senate Bill 3. This Subcommittee will make recommendations regarding how to calculate the amount of recharge to the Aquifer made available from recharge projects, what entities should build the projects, and how they should be funded. It is examining all of the options for enhancing recharge, including land management strategies. Members of the Recharge Facility Feasibility Subcommittee include 18 representatives from environmental groups, land stewardship groups, regional/river authorities, water purveyors, the Edwards recharge and contributing zones, and general stakeholders. In addition, three state agencies and four federal agencies participate in the Subcommittee.</p> <p style="text-align: center;">CONCLUSION</p> <p>EARIP is committed to submitting a completed program document and supporting documentation to USFWS in time for the agency to review and approve it by September 2012. The deadline is tight, but it adds structure to the process and has kept EARIP focused. EARIP is now beginning more difficult substantive work and decision-making. To date, the individual stakeholders have been willing to look past their immediate interests to keep the process functioning effectively. This commitment to the process should help in tackling the difficult, substantive problems that lie ahead.</p>
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ESA-Water

EARIP Funding

The ability to pay for EARIP process is a significant problem for the participating stakeholders. Currently, we estimate that the total cost of the process including program operation costs, studies, peer review, and the development and producing the program document will be close to \$3 million. To date, stakeholders in EARIP raised over \$775,000 to cover program management expenses through 2009, peer review of the initial recommendations of the Science Subcommittee, and the cost of the Hardy study. EARIP has applied to USFWS for a \$6 Habitat Conservation Planning Assistance Grant to pay the cost of preparing the HCP and supporting documentation. EARIP expects to ask the Texas Legislature to also contribute to the cost of developing the HCP.

Another potential problem facing EARIP is the drought that the region is currently experiencing. It is difficult to predict what effect this will have on the EARIP process if the drought continues into the spring and Aquifer levels and springflows continue to decrease.

Notwithstanding these difficulties, the process is off to a good start and the commitment is there to make it work. The prospect of another round of litigation or a legislatively-imposed solution is generally not viewed as a good alternative. To be certain, EARIP has a long road to travel. But perhaps through EARIP both whiskey and water will soon be "for drinking" in south central Texas.

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Todd H. Votteler is Executive Manager of Intergovernmental Relations and Policy for the Guadalupe-Blanco River Authority. He is also the Executive Director of the Guadalupe-Blanco River Trust. Votteler served as the Federal Special Master for the Endangered Species Act litigation, *Sierra Club v. San Antonio*. Previously, Votteler was the Federal Court Monitor's assistant during *Sierra Club v. Babbitt*. Votteler has a BS in Natural Resources from The University of the South, a MS in Natural Resources from The University of Michigan, and a PhD in Environmental Geography from Texas State University.

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16th Annual Endangered Species Act Conference ~ Seattle, WA
 Tuesday, January 27, 2009

<p>8:00 Optional Session: Introduction to the ESA James M. Lynch, Program Co-Chair <i>K & L Gates LLP</i></p> <p>9:00 Introduction and Overview - Day One Melanie J. Rowland, Program Co-Chair <i>N.O.A.A. Office of General Counsel</i> James M. Lynch, Program Co-Chair <i>K & L Gates LLP</i></p> <p>9:10 Keynote Address ~ Are We in a Current Mass Extinction? Peter D. Ward, PhD <i>University of Washington, Earth and Space Sciences</i></p> <p>9:40 Political Climate Change in "the Other Washington": ESA Implications of a New Congress and Administration John F. Kostyack <i>National Wildlife Federation</i> William W. Stelle, Jr. <i>K & L Gates LLP</i></p> <p>10:30 Break</p> <p>10:45 Litigation Update Patti Goldman <i>Earthjustice</i> Eric W. Nagle <i>Office of the Solicitor, U.S. Dept. of the Interior</i></p> <p>11:45 Lunch (on your own)</p> <p>1:00 Climate Change and Ecosystems: Science Update Gordon H. Orians, PhD, Professor Emeritus <i>Department of Biology, Univ. of Wash.</i></p> <p>1:30 Consideration of Climate Change in ESA Listing and Consultation • Analytical Framework Melanie J. Rowland • Polar Bear Listing; Section 7 Rule Changes James M. Lynch Kassie Siegel <i>Center for Biological Diversity</i></p> <p>3:00 Break</p> <p>3:15 Spotted Owls, Timber Harvest and the ESA: Twenty Years Later Peter Goldman <i>Washington Forest Law Center</i> Patricia Hickey O'Brien <i>Office of the Attorney General, State of Washington</i></p>	<p>4:00 Tribal Issues • Culverts Case: Update and Implications Alan C. Stay <i>Muckleshoot Indian Tribe</i> • Columbia River Settlement: Tribes' Perspective Timothy R. Weaver <i>Law Office of Timothy R. Weaver</i></p> <p>5:00 Questions and Answers Members of the Faculty</p> <p>5:15 Reception ~ <i>Sponsored by K&L Gates LLP</i></p> <p style="text-align: center;">Wednesday, January 28, 2009</p> <p>9:00 Introduction and Overview - Day Two Program Co-Chairs</p> <p>9:10 In our Backyard: Climate Change and Puget Sound Ecosystem Changes; Listed Salmon Lara Whitey Binder <i>UW Climate Impacts Group</i> Douglas R. Myers <i>People for Puget Sound</i></p> <p>10:15 Break</p> <p>10:30 ESA Water Conflicts: Two Views from the Trenches Robert Gulley, PhD <i>Edwards Aquifer Recovery Impl. Prog., Austin, TX</i> Douglas W. MacDougal <i>Schaube Williamson and Wyatt, Portland, OR</i> Todd Votteler, PhD <i>Exec. Mgr., Intergovernmental Rel. & Pol. Guadalupe-Blanco River Authority</i></p> <p>11:30 Lunch (on your own)</p> <p>12:45 Section 4 Update Distinct Population Segments; Wolf Delisting; "Significant Portion of the Range"; Critical Habitat Donna Darm <i>N.O.A.A Fisheries</i> Douglas Homnold <i>Earthjustice</i> Eric W. Nagle <i>U.S. Dept. of the Interior</i></p> <p>2:00 Break</p> <p>2:15 Section 7 and Conservation Banking Maggie B. Coon <i>The Nature Conservancy</i> Steven W. Landino <i>NMFS</i> Kemper McMaster <i>Wildlands, Inc.</i></p> <p>3:30 A Panel Discussion Melanie J. Rowland, Moderator Donna Darm Patti Goldman James M. Lynch Gordon H. Orians Alan C. Stay</p> <p>4:00 Questions and Answers Members of the Faculty</p>
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AG to Muni Water Use

AGRICULTURAL WATER TO MUNICIPAL USE

THE LEGAL AND INSTITUTIONAL CONTEXT FOR VOLUNTARY TRANSACTIONS IN ARIZONA

by Susanna Eden (Water Resources Research Center, The University of Arizona),
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and Taylor Shipman (Errol L. Montgomery & Associates, Tucson, AZ)

OVERVIEW

The development of water markets to facilitate the movement of water rights from agricultural to municipal and industrial use has been slower in Arizona than some expected. Several explanations for the lack of transfers have been offered in economics literature. This article reviews the institutional incentives for and barriers to voluntary water transfers in Arizona, focusing on the role of agricultural water supply organizations in the development of water markets. Survey results from a cross-section of agricultural water supply organizations in Arizona suggest that the impact of these institutions on water transfers can be significant in either promoting or impeding transfers depending on the specific circumstances. The sample size and response rates to questions do not lend themselves to definitive analysis, but qualitative analysis of the survey responses along with the statistical evidence provides insights into the critical ways irrigation districts can influence market response to pressures for water re-allocation.

INTRODUCTION

In the semi-arid West, the combination of rapid population growth, a rise in manufacturing and services, increased environmental concerns, and the effects of possible climate change have brought about calls for a re-allocation of water from traditional agricultural use to meet new demands in other sectors. Both temporary transfers to meet intermittent drought and long-term transfers to address shifts in demand are needed.

Arizona is one of the fastest growing states in the US. Its population grew by nearly 1.5 million people between 1990 and 2000; 1.2 million of these new residents live in the Phoenix or Tucson metropolitan areas, or in the traditionally agricultural corridor between them. Currently, Arizona's population increases by about 195,000 people each year, raising statewide residential water demand by about 25,000 acre-feet (AF) annually.

The rapid and continuing growth in Arizona's urban population and complementary increase in manufacturing and service sectors have led to steadily increasing water demands and a search for additional supplies to meet them. The portion of Arizona's annual water use going to agriculture has decreased since its peak of 8 million AF in 1976, because of increases in water use efficiency, growth of urban areas on farmlands, and other reasons. Nonetheless, farming still accounts for roughly 75 percent of the water used each year in Arizona. Thus, water rights controlled by the agricultural sector represent the single largest potential source of water to fill growing municipal and industrial water needs.

Economic research has identified large potential gains from transfers of water out of agriculture to other sectors. Water commands substantially higher prices in urban uses. In one analysis of 2,154 water transfers between 1987 and 2005 in 12 Western states, study authors reported significantly higher prices for agriculture-to-urban trades compared to agriculture-to-agriculture trades — two to four times higher on average (see J. Brewer, R. Glennon, A. Ker and G. Libecap, University of Arizona, 2007). Because water can command much higher prices for urban uses than for irrigated agriculture, there are significant economic incentives for transferring water out of agriculture to cities.

Despite the disparity between the prices paid for water in agricultural and urban uses, agriculture-to-urban water markets have developed more slowly than some anticipated. Researchers have identified several reasons for the slow development of markets, the discussion centering around the properties of water that increase the cost of defining, enforcing, and transferring water rights. One factor that has received significantly less attention is the role of agricultural water supply organizations.

This article focuses on the role of agricultural water supply organizations in the development of water markets in Arizona. These organizations typically are corporate bodies governed by an elected board of directors and responsible for the distribution of water for irrigation to members, the maintenance of

Undeveloped
Markets

Irrigation
Districts Impact

Allocation
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Decreasing
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Premium

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Organizations'
Role

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Survey

water distribution facilities, and appropriate record keeping. They have special powers authorized under state law in order to perform their functions which — depending on the organization — may include the power to incur debt for the purpose of constructing facilities, to assess and levy taxes, and the power to block transfers of water across the organization’s boundaries.

A survey of agricultural water supply organizations was conducted to characterize their organizational features and assess receptiveness to efforts to transfer water from agriculture to other uses. The sample size is too small for definitive analyses, but qualitative analysis of the survey responses adds critical information to the picture of institutional barriers and incentives to development of water markets in Arizona.

To provide a context for the survey and analysis, we first examine the system of water rights and institutions that set the context of water transfers and provide a description of the various kinds of agricultural water supply organizations in Arizona. A very brief summary of recent water transfers is also provided.

RIGHTS TO THE USE OF WATER AND LEGAL REQUIREMENTS FOR TRANSFER

Water Transfers

Water in Arizona is owned by the state for the benefit of its citizens, but individuals may own the right to use water for a *beneficial* purpose. Water transfers are transactions that change the right to use water through sale, lease or other contractual arrangement. How water is transferred depends on the system of laws and institutions that governs the right to use the water. That system has been evolving in Arizona over more than a century, and the result is something of a patchwork. Different kinds of water are governed by different rules. Rather than generalize about water transfers in Arizona, it makes more sense to separately review the different legal definitions of water and the unique laws and institutions that apply to each type.

Prior Appropriation

Surface Water Rights

The Doctrine of Prior Appropriation governs surface water rights in Arizona. The essence, stated by the principle “first-in-time is first-in-right,” gives senior rights to the person who first uses the water of a stream for a beneficial purpose. Surface water rights in Arizona are *appurtenant* to the land; that is, rights to the water are conveyed with the land. Not only does the right attach to a specific plot of land where the water is used, it also is specific as to the point where water is *diverted* from the river or lake and the nature of the use.

1919 Water Code

Until 1919, appropriators could acquire a surface water right by posting a notice of intent to appropriate in the County Recorder’s Office and subsequently diverting and using the water. In 1919, the Arizona Legislature enacted a comprehensive water code that required an appropriator to apply for a permit from the State Water Commissioner. Today, the Arizona Department of Water Resources (ADWR) administers the state’s surface water rights permit system. Any change in the place or nature of use of surface water requires the approval of the Director of ADWR.

“No Injury” Rule

The basic rule for transfers of surface water rights throughout the west is the “no injury rule.” A change in the place or nature of the Prior Appropriation-based right must not hurt any other water right holder on the river, even if the right is *junior*, or newer than the right to be transferred. Though seemingly fair and simple, this rule creates barriers to potential water transfers.

“Sever and Transfer”

Arizona law allows surface water rights to be transferred to a different place and/or use through a process termed “*sever and transfer*.” To sever and transfer a surface water right the seller must file an application with ADWR. The department will give public notice of the filing and invite objections. The Director of ADWR (Director) determines that the water rights in question are valid (*perfected*) and that the water to be transferred will not exceed the amount of water *consumed* (actually taken out of the system, for example through evaporation or use by crops). Besides these basics, the criteria the Director uses in deciding on a sever and transfer application are whether the transfer: (1) conflicts with other vested rights; (2) is a menace to public safety; and 3) is contrary to the interest and welfare of the public.

Limitations

Sever and transfer applications will specify the proposed changes to the perfected water rights. Any change that has the effect of increasing the amount of water consumed will be denied to prevent a net loss of water to the system. Changing the location or nature of the use is likely to have an impact on how much water seeps and flows back into the river, potentially reducing the amount of water available to downstream appropriators. If the transfer takes water completely out of the river system, the quantity to be transferred can be no more than the amount historically consumed. This amount is likely to be much less than the amount historically diverted. Calculating the amount that may be transferred can be problematic where information is lacking, and may involve costly and time consuming studies.

AG to Muni Water Use

Broad Latitude

Appropriation rights involve a complex intersecting set of rights: every appropriator potentially has rights that are adverse or inconsistent with every other appropriator. The no injury rule gives every other rights holder on the entire river system standing to claim harm from a proposed transfer. ADWR has been reluctant to grant sever and transfer applications when there are objections from other rights holders. In addition, the public safety, interest and welfare criteria give the Director broad latitude in denying applications based on harm to third parties. The Director may consider impacts on the local economy, taxes, and related concerns that raise the political visibility of sever and transfer decisions. The degree of consensus needed to effect a major transfer of surface water rights significantly raises the transaction cost of such transfers.

Three Categories

Colorado River Water Rights

Rights to use Arizona's allocation of Colorado River water fall into three broad categories: rights predating the Boulder Canyon Project Act of 1928 that were acknowledged by United States Supreme Court decree; so-called "Section 5" contracts with the US Bureau of Reclamation (Reclamation); and subcontracts from Section 5 contract holders — essentially, Central Arizona Project (CAP) subcontracts.

The US Supreme Court held in *Arizona v. California* that five Indian reservations located along the Colorado River mainstem have rights to 917,552 AF of Colorado River water from Arizona's total 2.8 million AF allocation. In addition, the decree acknowledged preexisting surface water rights established mainly by irrigators along the Colorado's mainstem.

Reclamation Contracts

The remainder of Arizona's allocation is water allotted through contracts administered by Reclamation, including the contract with CAP for approximately 1.5 million AF of Colorado River water, which it distributes to subcontractors in central Arizona. The Boulder Canyon Project Act of 1928 federalized the administration of Colorado River water rights, requiring all users to enter into a contract with the Secretary of the Interior (through Reclamation). This requirement is assumed to include even those rights acquired before 1928, although this assumption remains judicially untested. Reclamation also administers the contract for Arizona's CAP allocation. Other contracts provide water primarily for irrigated agriculture in Mojave, La Paz and Yuma Counties, although some water goes to municipalities such as Yuma and Bullhead City. For the Colorado River, pumping groundwater from within the defined *accounting surface* for the river aquifers is considered taking water from the river.

Transfer Approval

Similar to other surface water rights, a Section 5 contract grants a perpetual right of use, with amount, place and nature of use specified in the contract. Transfers of rights to Colorado River water must obtain approval by the Secretary of the Interior in the form of a new contract.

ADWR Role

In 1994, the Arizona Legislature gave the Director of ADWR a role in Colorado River water reallocation. For any proposed transfers of Colorado River water having a term of more than one year, Arizona law states that the parties to the transfer must have their new contractual arrangement reviewed by the Director before it is executed. The policy applies to all non-federal Arizona entities. The ADWR review is based on criteria similar to those applied to sever and transfer applications, with similar results. Transfers within an existing contract service area, however, are not governed by this policy.

Ownership Issues

Although it is generally acknowledged that a contractual right to Colorado River water is a permanent entitlement, questions remain unresolved about what property interest, if any, owners of water contracts with Reclamation have in the water. [Reclamation ownership issues, see Glick, TWR #22] These questions touch any potential transfer of Colorado River water, greatly complicating the transfer process. On the other hand, Reclamation maintains records of all water diverted and consumed by Section 5 contract holders, making it easier to calculate the amount of water that might be transferred.

CAP Water "Rights"

CAP water "rights" were acquired by subcontract from the Central Arizona Water Conservation District (CAWCD), also called simply the Central Arizona Project (CAP). The CAWCD is a special multi-county water conservation district created in 1971 to contract with the Secretary of the Interior. CAWCD is a municipal corporation with powers similar to other water districts in Arizona (see section on Water Districts). It entered into a master contract with the Secretary of the Interior and subcontracts with CAP users within its boundaries, which coincide with the boundaries of Maricopa, Pinal and Pima Counties.

CAP provides water for agriculture in several different ways. Originally, irrigation districts were allocated CAP water under subcontracts, but taking the water proved prohibitively expensive. When the financial realities became clear, irrigation districts declined or relinquished subcontracts because of costs. Many of these same districts then purchased CAP water from excess supplies, that is, the water left unused by CAP water subcontractors in any year. Because subcontractors have allocations greater than current demands, large, though decreasing quantities are not used directly each year. CAP makes some

Excess Supplies

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ag pool Water

of this excess water, designated *ag pool* water, available to farmers at lower prices. The farmers who use this surplus water do not own a transferable right. Irrigation districts that waived their CAP allocations were offered alternative contracts for delivery of CAP water at more affordable rates for a ten-year term. Contracts are subject to availability of excess supply. Under Arizona's groundwater storage and recovery statutes, farmers also may receive CAP water from CAP subcontractors to substitute for their use of groundwater. (This arrangement will be discussed in more detail in the groundwater rights section.) Under this arrangement the farmers do not own a transferable right to CAP water.

Very little CAP water is allocated currently to irrigation districts through subcontracts. A few irrigation districts with CAP subcontracts transferred their rights to CAP water to other entities. McMicken Irrigation District transferred its CAP subcontract to the Cities of Surprise, Avondale, Goodyear and Peoria. Such transfers require approval from the Secretary of the Interior (through Reclamation) under advice from the Director of ADWR, as described above, and the parties are prohibited from profiting from transfers of CAP subcontracts. The McMicken transfers took five years from the original agreement through final approval.

Effluent Attributes

Rights to Effluent

Effluent is a legally distinct kind of water in Arizona. Effluent is the treated wastewater produced by a wastewater treatment plant and is owned by the entity that generates it. Once it is discharged into a river channel, however, it becomes surface water and subject to the Prior Appropriation Doctrine, with one major difference. The entity that generates the effluent is not obligated to continue its discharge. In other words, it may redirect the effluent to reuse or recharge and cease discharge, even if the change harms downstream appropriators. The effluent generator may use a natural channel for conveyance to a downstream user or for in-channel recharge. If effluent is conveyed for these purposes rather than merely discharged, it retains the legal character of effluent and is not appropriable. This is what the City of Phoenix did when it began piping some 70,000 AF of effluent from its treatment plant to the Palo Verde Nuclear Generating Station instead of discharging it into the Salt River. Downstream appropriators of irrigation water sued to compel Phoenix to continue discharging effluent into the riverbed (*Arizona Public Service Company v. Long* (1989)). The failure of their case (along with changes in state law) has enabled the formation of a market in effluent for which the legal and institutional barriers are relatively low (see TWR #46, Water Briefs).

Market for Effluent

Rights to Groundwater outside Active Management Areas

Throughout most of its history, Arizona acknowledged the right of landowners to pump and use groundwater from under their land. The right was not limited, except by requirements that water must be used on the overlying land and the use must be *reasonable*.

The amount of water that a land owner may pump is not limited to prevent damage to neighbors, as long as the water is used on the overlying land. Any reasonable use of water is allowed, even if it has a negative impact on a neighbor's spring or groundwater well (see TWR #24, Water Briefs). Using water at any other location is permitted, but subjects the right holder to damage claims from neighbors.

Because the right of a landowner to use groundwater is not limited, there has been very little incentive for buying groundwater rights, except where the limits of the physical system require one use to cease to enable a different use. Two events changed the nature of incentives: passage of the 1980 Groundwater Management Act and construction of the CAP canal.

Groundwater Use

"Reasonable" Use

Rights to Groundwater in Active Management Areas

After the passage of the Arizona Groundwater Management Act (GM Act) in 1980, groundwater law was entirely changed for large areas in the most populous regions of the state (Active Management Areas). AMAs roughly comprise groundwater basins around Prescott, Tucson, Phoenix, most of Pinal County, and Santa Cruz County (see map, page 13). Within AMAs, rights to use groundwater, except by small *exempt* well owners, are established by permit. The law governing groundwater use for irrigated agriculture in other specified areas (Irrigation Non-expansion Areas) also changed. INAs were formed around Douglas, Joseph City and the Harquahala Valley.

Changes in the law that imposed new limits on groundwater use in AMAs created incentives for purchasing and transporting water from groundwater basins outside into AMAs. Several cities purchased land for its appurtenant water rights (what were termed "water farms") in anticipation of future needs. Among these were Phoenix, Scottsdale, and Mesa. The City of Scottsdale made the only purchase of a farm for surface water rights and has had to keep the farm in agricultural production in order to avoid forfeiting those rights. A backlash of concern in rural Arizona that their futures would be curtailed and their

Groundwater Law Changes

"Water Farms"

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Water Use**

**Assured
Water Supply**

**Grandfathered
Irrigation
Rights**

economies damaged by urban water farming led to the prohibition on water transfers into AMAs. In 1991, Arizona's Groundwater Transportation Act (GTA) removed the water farming option. Although the GTA prohibited the transfer of groundwater into AMAs, the GTA also grandfathered existing water farms, many of which have not yet been used.

When water farming was no longer an option, central and southern Arizona cities needed another mechanism to supply increasing needs for water. A new Assured Water Supply (AWS) program made permits to develop land dependent on a demonstration that there would be enough water to supply the needs of the development for 100 years. Some of this water had to be *renewable*, such as CAP water. The Central Arizona Groundwater Replenishment District (CAGRDR) was created to provide water suppliers and developers the means to meet the AWS program rules where they did not have access to CAP water or other renewable supplies. Membership in the CAGRDR allows members to substitute payment of CAGRDR fees for developing their own renewable supplies.

Agricultural Rights to Groundwater in AMAs: Conversions and Credits

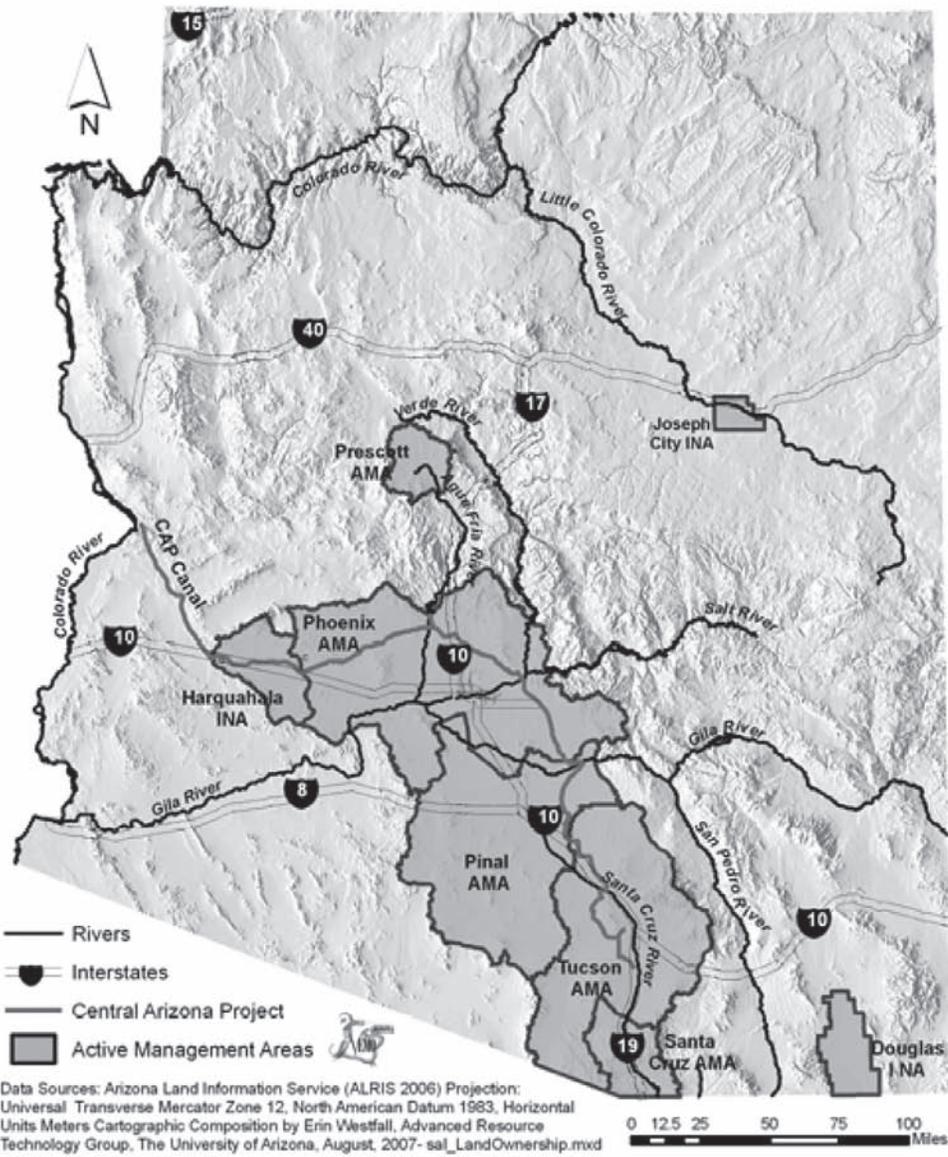
Within AMAs, groundwater rights are defined and regulated. The rights of irrigators who used groundwater for agriculture before the 1980 law was enacted were "grandfathered;" that is, they were acknowledged as existing rights. Irrigators who had farmed lands from 1975 through 1979 were allotted a maximum annual quantity of groundwater based on their historic crop(s) and the maximum number of

acres planted in any one year during the period 1975-1979. These rights were designated Irrigation Grandfathered Rights (IGFR). By chance, cropped acreages during this period were relatively high because of high commodity prices, yielding relatively large initial maximum IGFR allotments.

IGFRs are perpetual rights to pump groundwater for agricultural irrigation in AMAs, subject to a maximum limit. They are appurtenant to the land and can only be conveyed with the land. All IGFRs must be used on overlying land and can be used only for agricultural irrigation. The IGFR system was devised to permit agricultural operators to continue farming but prevent increases in the use of groundwater for agriculture.

If IGFR holders want to put their water to another use, they must first convert the IGFR to a Type 1 non-irrigation right. Once converted, the land associated with that right can never be returned to irrigation. Type 1 non-irrigation rights also are appurtenant to the land; they must be conveyed with the land and some restrictions limit the place of use. Type 1 rights are quantified; that is, the quantity of water that may be pumped annually is specified at the time of conversion. Converting an IGFR to a Type 1 right usually reduces the amount of groundwater that may be pumped (the change has generally ranged from approximately 3.3-5 AF/acre to 3 AF/acre). [Editor's Note: AF/acre refers to the volume of water in acre-feet per acre per irrigation year].

Arizona Active Management Areas



AG to Muni Water Use

Groundwater Credits

Exchange for CAP Water

Credit Benefits

District Control

Districts Formation

District Types

Authorities

Delivery Districts

Another type of quantified groundwater right defined by the 1980 GM Act was based on preexisting non-irrigation uses. A market for these more flexible Type 2 non-irrigation rights has developed.

Both IGFRs and Type 1 rights can be *extinguished* for groundwater credits. Groundwater credits represent an amount of water the credit holder is allowed to pump (Type 2 rights also can be extinguished for groundwater credits). Extinguishing a right to pump groundwater severs the water from the land and creates a right to pump a fixed quantity of groundwater from anywhere in the AMA, although some restrictions may apply. The amount of water that an entity is credited for extinguishing IGFRs or Type 1 rights is 1.5 AF/acre of land retired from irrigation in an AMA multiplied by the number of years between the date of extinguishment and 2025. After 2025, the multiplier is zero; in other words, it will no longer be possible to extinguish these rights for groundwater credits. The purpose for reducing the credit over time is to provide an incentive to extinguish the rights sooner rather than later.

Groundwater credits are also created when IGFR water is exchanged for CAP water in Groundwater Savings Facilities. Farmlands in AMAs that are irrigated with groundwater can receive CAP water purchased at a subsidized price from a CAP subcontractor. If the farmland is permitted by ADWR as a Groundwater Savings Facility, the subcontractor will earn groundwater credits equal to the amount of CAP water used, for the groundwater left in the ground. This arrangement allows irrigation districts to use CAP water they otherwise would not have been able to afford, and the subcontractor makes a return on a portion of its water allocation that would otherwise have gone unused. The Arizona Water Banking Authority also has stored water in Groundwater Savings Facilities.

Groundwater credits have qualities that encourage markets — they are portable, flexible and well-defined. Purchase of 10,000 AF of groundwater credits provides the right to pump a total of 10,000 AF of groundwater. For an AWS water portfolio, this translates to 100 AF of water annually for 100 years. Sales of groundwater credits are relatively common. In the Prescott AMA, where CAP water and the services of the CAGR are not available, developers are shopping for IGFRs to extinguish for groundwater credits.

WATER DISTRICTS AND OTHER SUPPLIERS OF IRRIGATION WATER TO AGRICULTURE

The potential of agricultural water as a source for future municipal supplies will continue to motivate willing buyers and sellers to investigate transfers. Because agricultural water districts control much of the water used by agriculture, they will be parties to any significant transfers. The authority, structure and rules of these districts will have an impact on potential transfers.

In Arizona, agricultural water associations first formed in the 19th century to facilitate investment in water infrastructure, such as diversion dams and irrigation ditches. Many of these later reorganized themselves as districts under the laws of the state in order to contract for Reclamation project water. New districts were formed as projects were authorized, a number forming in the mid-twentieth century on the Lower Gila River. Later in the century, many new districts organized among groundwater users for the purpose of securing subcontracts for CAP water and to construct irrigation and drainage systems to receive CAP water. Other districts were formed among groundwater users for the purpose of obtaining energy for pumps at subsidized rates.

In Arizona, there are three kinds of agricultural water service organizations: (1) irrigation districts (also water conservation districts); (2) irrigation water delivery districts; and (3) agricultural water companies. Irrigation districts (and water conservation districts) may also be drainage districts, and if so, would have the word drainage in their name. All agricultural service organizations have geographical boundaries, defined in their charters, within which they operate. For our purposes, the general term irrigation district refers to any organization formed for the purpose of delivering irrigation water.

The first category of irrigation district is a political subdivision of the state, empowered as a *municipal corporation*, meaning the district has powers similar to incorporated towns. They can acquire water rights, buy and sell property, and carry out other activities and provide services as defined in the statutes that authorize them (ARS Title 48, Chapter 19; the category also includes some districts organized under Chapter 17). Some of their powers are governmental, including the power to assess and levy taxes, and use *eminent domain* (the power to condemn property for public purposes); although not all irrigation districts use these powers.

Although they are not municipal corporations, irrigation water delivery districts have very similar powers. In addition, they are specifically authorized to incur debts and contract with the federal government for irrigation services (ARS Title 48, Chapter 20). Many districts also govern the power supply in their service area.

Both kinds of districts are formed by petition of a majority of the landowners and controlled by

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Distribution****Water Rights
Ownership**

an elected board of directors. They are financed by some combination of taxes and charges as set out in their charter, with taxes apportioned on a per acre basis. Boards of directors are elected according to the voting rules of the district. Most districts limit voting to owners of property that receives irrigation water and many districts weight votes according to the number of acres owned or the assessed value of the acreage. Arizona law provides that on petition by owners of not less than 51 percent of the total acreage in the district, the board may change from a "personal and individual" system of voting to an acreage system. Not surprisingly, relatively few district boards are elected on the principle of one person one vote by district residents.

Agricultural water companies are private corporations and associations. They may operate under a variety of names including water associations, canal companies, irrigation companies, and mutuals. Their boards are elected by shareholders. They have no power of eminent domain and cannot assess and levy taxes. They are financed by issuing stocks and bonds and through charges and fees for water service.

All district boards of directors control district operations and make decisions regarding management. A board's powers include the power to establish rules and regulations for the distribution and use of water within the district; to purchase or acquire water rights; to acquire or lease real estate; to lease, sell or otherwise dispose of real estate and personal property; to construct canals, ditches and other infrastructure for the distribution of water; and to provide for the construction, operation and management of electric power plants. Drainage districts have the authority to construct ditches and other infrastructure necessary for the proper drainage of land within the district. Day-to-day operations are usually managed by a manager or administrator.

Although the board of directors has the authority to establish rules for the distribution of water, state law requires that irrigation districts apply the Prior Appropriation Doctrine to the distribution of surface water and beyond that, on a *pro-rata* basis to the lands within the district. During times of shortage, the board may establish rules and regulations for cutting back the water delivered to members of the district, still applying the Prior Appropriation Doctrine to surface water.

The size of the board of directors varies from three to eleven, with smaller districts tending to have smaller boards. The statute authorizing irrigation water delivery districts specifies a three-member board.

Some districts legally own water rights on behalf of their members, who have contracted amounts of water delivered to them. In other cases, members retain their water rights and have water service contracts with the district. The actual water rights relationship between the district and its members is often left vague. Transfers among members have tended to be arranged informally to meet seasonal shortfalls. Among the powers of most irrigation district boards is the power to regulate water transfers within and across the boundaries of their district. In addition, district boards may veto the transfer of surface water rights anywhere upstream on the river system that provides their surface water.

INTRODUCTION TO WATER TRANSACTIONS

WATER TRANSACTIONS TAKE SEVERAL FORMS. THEY INCLUDE:

- **SALE OF WATER RIGHTS:** Change of ownership, including sever and transfer of existing water rights appurtenant to land. These are relatively rare in Arizona and most often occur between farmers in the same irrigation district. Other sales, such as sales of rights to effluent or credits granting a right to pump a certain amount of groundwater are more common.
- **LEASE OF WATER RIGHTS:** Temporary transfers for a specified period of time, frequently one year, although they can be for as long as 75 to 100 years. While leases are not as common in Arizona as they are in California, where mechanisms are in place to facilitate them, they have been used in response to special circumstances.
- **CONVERSION OF WATER RIGHTS:** A transfer that changes the nature of the water use but not the location. The term "*conversion*" applies, for example, when farmland is developed for housing and the water use changes from irrigation to domestic water supply. Conversions are a common form of water transfer where there is farmland on urban fringes.
- **EXCHANGE OF WATER RIGHTS:** The substitution of one water supply for another. Agricultural water supply organizations take part in several kinds of exchanges. Water exchanges may involve any of the types of water described previously and may be carried out under contract, permit, or notice of water exchange as specified in ARS 45-1002. Such exchanges are reported to ADWR, which maintains a water exchange registry. One of the most common exchanges occurs when groundwater is exchanged for CAP water in Groundwater Savings Facilities. The relinquishment of a CAP subcontract and purchase of CAP *ag pool* water may be considered an exchange as well, although only CAP water is involved.

Sale**Lease****Conversion****Exchange**

WATER TRANSACTIONS IN ARIZONA

**AG to Muni
Water Use****Transactions
Listing****Municipal
Purchases****Surface Water
Purchases****Enviro & Rec
Transactions****Environmental
Enhancement****Reclamation
Contracts****Industrial Use****Conversion
Into Limits**

The most comprehensive listings of transactions in water in the western US are compiled by the *Water Strategist*, published monthly by Stratecon, Inc. of Claremont, California. A review of listed water transactions in Arizona between 1995 and 2008 found few involving agricultural irrigation water. Only a handful for transactions, other than sales of Type 2 non-irrigation rights and reclaimed water (a special class of effluent), were reported.

As mentioned previously, McMicken Irrigation District, located in the rapidly urbanizing west valley in the Phoenix metro region, dissolved itself and sold its CAP water allocation to various municipalities between 1995 and 2000, specifically as conversion of use for lands within the District's boundaries. The Town of Marana purchased a 47 AF CAP subcontract allocation from the Cortaro-Marana Irrigation District. Other transactions that involved changing the use of water from agricultural irrigation to municipal supply include the purchase of Red Gap Ranch by the City of Flagstaff for its groundwater rights and purchases by the City of Prescott of land with groundwater rights in the Big Chino Valley. Both the Flagstaff and Prescott cases also required a change in the location of use and construction of infrastructure to effectuate the transfer.

Purchases of land with surface water rights have also resulted in movement of water from agriculture to municipal use. In 1999, the City of Prescott purchased 855 acres around Willow and Watson Lakes from the Chino Valley Irrigation District for associated surface water and storage rights. The Chino Valley Irrigation District's shareholders who followed their land received a larger per share payment than those who continued to irrigate. Prescott financed the transaction in part by the sale of its CAP subcontract rights. The new water was not intended for immediate use in the direct potable supply and in the short-term is used for irrigation, recharge and recreation. The City of Nogales also purchased land and appurtenant surface water rights in the Santa Cruz River for conversion of use to municipal supply.

Drought and the desire to protect environmental and recreational values motivated a group of transactions that substituted alternative water for reservoir diversions for irrigation. In 1999, the San Carlos Irrigation and Drainage District (SCIDD) was involved through the one-time lease of 2,000 AF of CAP water to Pinal County to maintain water levels in Picacho Reservoir. SCIDD also cooperated in a water exchange when CAWCD leased 16,775 acre-feet of CAP water to Reclamation for irrigation by the SCIDD and the Gila River Indian Community. The exchange prevented diversions from San Carlos Reservoir that would have brought the lake level dangerously low. Federal and state funding sources earmarked for environmental protection were used to finance the exchanges.

More recently, a pending transaction will ensure that a municipal "water farm" will be dedicated to preserving and enhancing habitat for native and endangered species. Planet Ranch, purchased by the City of Scottsdale in 1984 for its surface water rights in the Bill Williams River will be used for environmental enhancements under an agreement between Scottsdale and the Phelps Dodge Corporation and its successor, Freeport McMoRan Copper and Gold, Inc., provided the deal receives final approval.

Reclamation has continued to establish contracts for water from the Colorado River. Arizona State Lands Department acquired a permanent contract for water to irrigate state leased lands near the City of Yuma, and in 2003 and 2006 individual irrigators obtained contracts. Transfers of existing Section 5 contract water are rare, possibly because of institutional impediments. In the one case documented in the *Water Strategist*, the Mohave County Water Authority was formed to help the City of Kingman avoid forfeiture of its Colorado River entitlements when it sold those entitlements to Bullhead City, Lake Havasu City and the Mohave Valley Water Conservation District.

The Vidler Water Company converted approximately 6,500 AF of agricultural irrigation water to industrial use through its sale of land and associated water rights in the Harquahala Valley (Harquahala INA) to Allegheny Energy as cooling water for energy production. Vidler's later sale of land and water rights to Vanderbilt Farms did not affect the status or use of those rights. Vidler Water Company is not an agricultural water supply organization. It acquired water rights in the Harquahala Valley by purchasing farmland that it leases to farmers.

Unfortunately, the *Water Strategist* cannot be considered a comprehensive source of information on water transactions in Arizona for several reasons. Conversions are not captured when they occur within the boundaries of a district. Such conversions appear to be fairly common and routinely carried out as part of the responsibilities of district boards in areas, such as Mohave Valley, where agricultural land is being developed for residential and commercial use. In addition, the *Water Strategist* does not capture the exchanges of groundwater for CAP water in groundwater savings facilities, nor are sales of water credits recorded.

**AG to Muni
Water Use**

**Groundwater
Replenishment**

**Supply
Organizations**

**Transaction
Experience**

It is instructive to look at the CAGR (Central Arizona Groundwater Replenishment District) plans for acquiring replenishment supplies. The CAGR, which is responsible for offsetting groundwater pumping of its members through recharge in the CAP region, has a large and increasing replenishment obligation. The CAGR Plan of Operation contains an inventory of water supplies potentially available to fulfill this obligation over its 20-year planning horizon and beyond. In terms of their maximum acquisition volumes in AF per year, they anticipate the availability of 595,101 AF from Indian supplies, 205,507 AF from effluent, 181,000 AF from groundwater basins exempted from the prohibition against inter-basin transportation, and 177,919 AF from Section 5 contract holders. None is anticipated from other surface water or from non-Indian decreed rights on the Colorado. Considering the relatively large portion of Arizona's water use accounted for by agriculture (approximately 75 percent), the relatively small portion (approximately 15 percent) of the total inventory from water controlled by agricultural water supply organizations is worth noting.

SURVEY RESULTS

To assess the role of water supply organizations in facilitating or inhibiting water transfers in Arizona, data were collected from a statewide survey. Fifty-four surveys were mailed to Arizona's irrigation districts and other water supply organizations in 2005; thirty-one surveys were completed and returned. Five respondents were dropped from the sample because they were not involved with agricultural irrigation water (three are municipal water suppliers and two are electrical supply distributors), reducing the final sample size to twenty-six (see table). The survey gathered information about the governance structure, acreage, membership, and water sources of the districts. Respondents were also asked to describe their experience with water rights transactions, which were divided into three categories: *conversion* of use within district boundaries; *transfer* of location across district boundaries; or simply an *exchange* of one water supply for another. Other key questions attempted to assess the distribution of benefits from water transactions, gauge the level of government involvement with water transactions, and elicit the general sentiment of the district regarding water transfers.

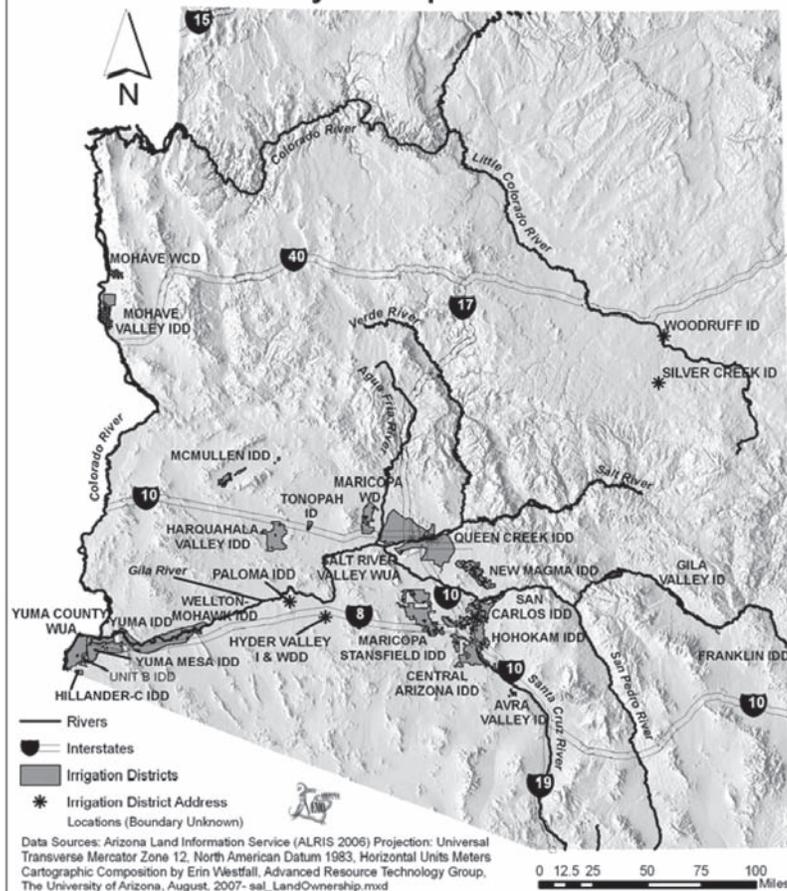
Boards of directors ranged in size from three to 11, with larger districts generally having larger boards. Roughly half of the board elections are weighted by acreage and only two districts extended voting rights to all the residents in the district. For roughly three-quarters of the organizations, a manager runs the day-to-day operations. The numbers of members vary significantly, from a low of five to a high of around 600,000. Similarly, total acreage varies from a low of less than 1,000 to a high approaching 250,000 acres.

Some districts have multiple sources of water. Groundwater rights are typically held by individual landowners. Surface water rights and rights to Colorado River water through Section 5 contracts, however, are usually controlled by the district, as is delivery of CAP water.

Statistical analysis of the survey results was limited by the small size of the survey and by other data issues. Respondents appeared to adopt different interpretations of the survey questions and some answers were inconsistent. However, the statistics generally bear out expectations. Larger districts were more likely to engage in transactions of any kind than small districts, possibly reflecting simply their greater potential in land and water. Water exchanges were more common for districts within AMAs and conversions were more common in urbanizing areas.

Conversions were more common than any other form of transfer and took place predominantly to accommodate the growth of residential and commercial development on the urban fringe. Whether a district is located in an AMA was not a factor in conversions. However, the conditioning factor does appear to be limitations on

**Arizona Irrigation Districts
Survey Respondents**



**AG to Muni
Water Use
Board Policies**

groundwater rights. Conversions take place in AMAs, within the *accounting surface* of the Colorado River aquifer, and where physical conditions limit groundwater use. District boards in urbanizing areas have adopted policies to facilitate conversions within the district for the benefit of its members, including negotiating more flexible Section 5 contracts with Reclamation. The conversions from farmland to residential and commercial uses within the Salt River Project boundaries over the past 50 years have been substantial, from more than 200,000 acres of agricultural land in 1955 to only about 20,000 acres in 2005. The fact that control of the water supply remained unchanged by the conversions facilitated the process.

Agricultural Water Supply Organization Survey Respondents

Organization	Size acres	AMA	County	GW Right holder	SW Right holder	Section 5 contract	CAP contract	GSF	Voting	Board Members	Type of Transfer
Avra Valley ID	11,000	Tucson	Pima	individual ¹	no	no	no	no	weighted	3	none
Central Arizona IDD	87,000	Pinal	Pinal	individual ¹	no	no	district ⁴	yes	weighted	9	conv/exch
Franklin IDD	8,000	no	Greenlee	n/a	individual ²	no	no	no	owners	3	none
Gila Valley ID	32,512	no	Graham	n/a	individual ²	no	no	no	owners	9	none
Harquahala Valley IDD	33,000	Phoenix	La Paz/ Maricopa	individual ¹	no	no	district ⁴	no	owners	5	none
Hillander "C" ID	3,600	no	Yuma	individual	no	no	no	no	owners	3	none
Hohokam IDD	28,000	Pinal	Pinal	individual ¹	no	no	district ⁴	yes	weighted	5	none
Hyder Valley I&WDD	3,542	no	Yuma	individual	no	no	no	no	owners	3	none
Maricopa Stansfield IDD	86,600	Pinal	Pinal	individual ¹	no	no	district ⁴	yes	weighted	9	conv/exch
Maricopa WD	38,000	Phoenix	Maricopa	individual ¹	district	no	no	yes	weighted	5	none
McMullen Valley WC&DD	33,414	no	La Paz	individual	no	no	no	no	registered voters	3	none
Mohave Valley IDD	21,500	no	Mohave	n/a	no	district	no	no	owners	3	conversion
Mohave WCD (WUA)	4,000	no	Mohave	n/a	no	district	no	no	registered voters	3	none
New Magma IDD	27,000	Phoenix/ Pinal	Maricopa/ Pinal	individual ¹	no	no	district ⁴	yes	weighted	7	conversion
Paloma IDD	38,000	no	Maricopa	individual	dist	no	no	no	owners	5	conversion
Queen Creek I(D)D	22,000	Phoenix	Maricopa	individual ¹	no	no	district ⁴	yes	owners	3	none
Salt River Valley WUA	248,239	Phoenix	Maricopa	district	individual ³	no	district ⁴	yes	weighted	11	conversion
San Carlos IDD	50,000	Pinal	Pinal	district	district ²	no	district ⁴	no	weighted	9	none
Silver Creek ID	2,500	no	Navajo	district	district	no	no	no	weighted	3	none
Tonopah ID	3,500	Phoenix	Maricopa	individual ¹	no	no	district ⁴	yes	weighted	3	conv/exch
Unit "B" IDD	3,406	no	Yuma	none	no	district	no	no	owners	3	none
Wellton-Mohawk IDD	62,744	no	Yuma	no	no	district	no	no	owners	9	conversion
Woodruff ID	550	no	Navajo	individual	individual	no	no	no	weighted	3	none
Yuma County WUA	53,450	no	Yuma	no	no	individual	no	no	weighted	7	conversion
Yuma ID	10,600	no	Yuma	no	no	district	no	no	owners	3	none
Yuma Mesa IDD	20,132	no	Yuma	no	no	district	no	no	other	3	none

¹ Irrigation Grandfathered Rights (IGFR)

² Adjudicated rights administered by the Gila Commission

³ Rights adjudicated - Kent Decree

⁴ Central Arizona Project (CAP) 'Ag Pool' contracts

**AMA Factors
in Exchanges**

Location in an AMA is a factor in exchanges of water. Districts in AMAs participated in water exchanges significantly more than others, reflecting the unique incentives and opportunities provided by groundwater law in AMAs. In fact, all of the exchanges listed were entered into with parties located in an AMA and most involved exchanges of CAP water for groundwater credits in Groundwater Savings Facilities.

**ag pool
Water**

One substantial group of respondents was districts that have contracted for surplus *ag pool* water with the CAWCD. These districts are in AMAs and within the CAWCD boundaries. Regardless of how they answered the question regarding exchanges, all but one are permitted Groundwater Savings Facilities. In most of these, groundwater rights, in the form of IGFRs, are owned by individuals. Only four districts (of the 10 in AMAs) reported that members had individually transferred rights through the process of converting IGFRs to Type 1 non-irrigation rights or through extinguishment; however, some respondents may have failed to report such conversions because they are uniquely the responsibility of individual land owners. District rules and customary practices give boards different degrees of control over disposition of individually owned water rights.

**Out of District
Transfers**

Only one irrigation district reported engaging in a transfer defined as a transaction that changed the physical place of use from inside the district's boundaries to outside. This respondent characterized the event as a special, one-time occurrence, never to be repeated. The statement of the respondent captures the sentiment of the majority of those surveyed: the "board will continue to vehemently oppose any proposal to transfer water from [the district]." Of the 16 districts that responded to the question — "is

AG to Muni Water Use

Board Opposition

Legal Constraints

Indian Settlements

Section 5 Contract Water

District Attitude & Recall

Supply Pressures

your organization generally in favor of or opposed to *transfers* of water?” — nine districts reported that they were opposed to transfers; five were neutral; and two supported “voluntary transfers.” Typically, where boards oppose transfers, they have the power to prevent them. It should be noted that some districts opposed to *transfers* participated willingly in conversions and exchanges.

The positive or neutral attitude of an irrigation district may not significantly increase the likelihood that they will engage in water transfers, however. The rarity of transfers reflects a legal and institutional system that reduces the incentives and increases the barriers to transfers of water across jurisdictional boundaries. One of the neutral districts cited the legal constraints as naturally inhibiting water transfers. Another district reinforced this idea, stating no plans exist to transfer water because of legal obstacles to doing so.

It is unsurprising that transactions in surface water rights are rare, given the situation described above. Survey respondents did not include any of the parties involved in the few surface water transactions reported in the *Water Strategist*. Surveyed districts with surface water rights were no more likely to oppose transfers than other districts.

The single transfer referenced in the survey was one of two instances, in the context of obtaining water for Indian water rights settlements, when Colorado River water rights were transferred from Yuma area irrigation districts to Central Arizona tribes: one from the Wellton Mohawk Irrigation & Drainage District for the Salt River Pima Maricopa Settlement Act, the other from Yuma Mesa Irrigation District for the Ak-Chin settlement.

Aside from the IGFR to Type 1 conversions and Groundwater Savings Facility exchanges, Section 5 contract water (Colorado River) is the only water respondents reported had been transferred. The transfers were characterized as conversions to accommodate growth in Colorado River dependent communities in Yuma County. It is interesting to note that ownership of the rights, whether individual or district, does not appear to be a factor in whether conversions take place, although it has an impact on the distribution of benefits.

In its response to the question concerning the attitude of the district to transfers, the Mohave Valley Irrigation and Drainage District (MVIDD) referred to the recall of the District’s board members. MVIDD lands run beside the Colorado River between the Bullhead City line and the Needles (California) Bridge (Rte. 95). MVIDD supplies all the water for the towns of Fort Mojave and Mohave Valley. Housing and commercial developments on historic farmland are expanding and only about 20 percent of MVIDD’s lands remain in agricultural production. The MVIDD Board has established rules for the orderly conversion of its Section 5 contract water right to municipal uses, and it was the establishment of these rules that precipitated a political firestorm for the Board. At issue were a few fundamental questions. If land is taken out of farming and converted to houses, can the water rights attached to the land be included in the sale or should they revert to the Section 5 contract holder — i.e. the MVIDD? If the farmer (not MVIDD) owns the water rights with the land, can he sell them to a buyer intending to move them off the land? Can a board of directors dominated by farmers make those decisions? In 2005, the MVIDD Board of Directors was removed following a recall election over those questions, and a lengthy Court battle ensued, culminating in an Arizona Supreme Court ruling confirming the ability of irrigation districts to limit voting in board elections to owners of farm land. A new board was selected, and in 2007, the day before a board election, they passed (two farmers to one non-farmer) a policy change that allows right holders to sell all or part of their water rights. Of the 318 registered landowners who voted in the 2005 recall election, only four were agricultural landowners. Forty farmers were allowed to vote in the November 2007 board election; 25 voted. [Editor’s Note: Ownership issues between landowners and irrigation districts recently came to a head before the Oregon Supreme Court, resulting in a decision that established a trust relationship. See Moon, TWR # 54].

CONCLUSION

As Arizona’s population grows, pressures on existing water supplies will grow. The search for new municipal supplies will continue to focus attention on the relatively large amount of water controlled by agricultural water supply organizations and their members. For voluntary transactions to occur that produce benefits for Arizona, changes may be needed in law, policy and practice; and these changes should be guided by knowledge about the roles of key institutions. This article has attempted to fill a gap in our knowledge of the roles of agricultural water supply organizations in water transfers.

Transfers are occurring and growing economic pressures will likely increase these in the future. Currently most transfers of water from agriculture are occurring within the boundaries of irrigation districts as agricultural land becomes converted into municipal and industrial uses. Though few in number, there

AG to Muni Water Use

Legal & Institutional Deterrents

Transfer Veto Power

are also transfers that move water outside of irrigation districts, but a substantial increase in these kinds of transfers will depend on changes of attitude and law. Irrigation districts are local organizations with an interest in maximizing value to the local community from local resources. At the present time, this means a reluctance to allow the transfer of water rights out of their control.

It is clear that aspects of Arizona law discourage market transactions in water. With the exception of effluent and quantified rights to groundwater (Type 2 rights and credits) within AMAs, voluntary transactions between willing sellers and buyers are deterred by legal and institutional considerations. Protection of potentially affected third parts is emphasized in rules governing surface water transfers and movement of groundwater from one basin to another. Most transfers of groundwater rights for use outside AMAs are not discouraged by law, but the incentives to buy such rights are typically low or non-existent. Arizona law prevents most transfers from outside for use in AMAs where incentives exist. In AMAs, the ease of joining the CAGR, relative to acquiring water rights individually, creates at least a temporary disincentive to development of a water market. In addition, rights to surface water, other than water rights certified by Reclamation contracts, are subject to such uncertainty that transfers can only be effected through a political process such as an Indian water settlement. The exception appears to be conversions from agricultural to municipal use within the boundaries of an established district, possibly extended beyond, but no farther than the immediate surrounding community or county. Even here, the process is subject to public scrutiny, and as the case of MVIDD demonstrates, can occasion considerable public controversy.

Concerning the role of irrigation districts, individual water rights holders may be deterred by the need for district board approval from entering into private water transactions. Special powers of irrigation district boards to veto transfers of surface water within the same river system render such transfers nearly unthinkable. The power of districts to prevent transfers is not absolute, however, and varies with the rules of particular districts. Individually-owned groundwater rights are the least likely to be controlled by district boards. While irrigation district boards may constrain development of a water market in Arizona, it is also true that districts have participated in transfers, even over the objections of individual members — as part of Indian water settlements and in relinquishing CAP subcontracts in exchange for debt relief and CAP *ag pool* water. In addition, the willingness and ability of irrigation districts to obtain permits and manage large scale Groundwater Savings Facilities promotes exchanges and the creation of tradable groundwater credits.

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Columbia Toxics

January Report Release

COLUMBIA RIVER TOXICS

EPA'S COLUMBIA RIVER BASIN STATE OF THE RIVER REPORT FOR TOXICS

by Mary Lou Soscia and Kim Johnson, US Environmental Protection Agency Region 10, Portland, OR

Introduction

There is growing concern about toxic contaminants in the Columbia River Basin threatening the health of people, fish, and wildlife. To address this growing concern, the US Environmental Protection Agency (EPA) began a collaborative effort, the Columbia River Toxics Reduction Strategy, to bring people together in the Columbia River Basin to better understand and reduce toxic contaminants. The daunting size and diversity of the Columbia River Basin presents a challenge for public education and collaboration. To accomplish this task, in January 2009, EPA Region 10 will be releasing the Columbia River Basin State of the River Report for Toxics. This report will inform, citizens and decision makers on toxic problems and potential solutions; serve as a catalyst for increased citizen involvement and increased action; and inspire additional and more efficient use of resources for increased toxics reduction and assessment actions.

This article will preview and highlight some of the Report's findings.

Background

The Columbia River Basin (Basin) drains nearly 260,000 square miles across seven US states and British Columbia, Canada. The Basin's rivers and streams carry the sixth largest volume of runoff in North America. The Columbia River begins at Columbia Lake in the Canadian Rockies and travels 1,243 miles over 14 dams to reach the Pacific Ocean one hundred miles downstream from Portland, Oregon. The river's final 300 miles, including the dramatic Columbia River Gorge Scenic Area, form the border between Washington and Oregon. The Lower Columbia River is the reach from Bonneville Dam downstream to the Pacific Ocean and the Upper Columbia River is the reach above Grand Coulee Dam. Major tributaries to the Columbia River descending from the headwaters include the Pend Oreille/ Clark Fork, Flathead, Kootenai, Spokane, Okanogan, Methow, Wenatchee, Yakima, Umatilla, John Day, Deschutes, Klickitat, Lewis, Willamette, and the Cowlitz. The largest tributary, the Snake River Basin, includes Walla Walla, Grande Ronde, Clearwater, Salmon, and Owyhee Rivers.

The Basin's salmon and steelhead runs were once the largest runs in the world. For thousands of years, the tribal people of the Basin have depended on these salmon runs and other native fish for physical, spiritual, and cultural sustenance. Bald eagles, osprey, and many other animals also rely on fish from the Columbia River and its tributaries to survive and feed their young. The Basin has supported settlement and development, agriculture, transportation, and recreation.



**Columbia
Toxics**

**Contaminant
Sources**

**Tribal
Consumption**

**Toxics
Measured**

**Prevent
&
Reduce**

The Basin is economically vital to many Pacific Northwest industries such as sport and commercial fishing, agriculture, transportation, recreation, and tourism.

Fish, wildlife, and people are exposed to many toxic contaminants polluting the water and sediment of the Basin. These contaminants come from current and past industrial discharges (point sources) to the air, land, and water, and from more widespread sources such as runoff from farms and roads (non-point sources) and atmospheric deposition. Some contaminants, such as mercury, also come from natural sources. Even when released in small amounts, some of these contaminants are persistent and bioaccumulative and can build up over time to toxic levels in plants and animals.

In 1992, an EPA national survey of pollutants in fish in the United States alerted EPA and others to a potential health threat to tribal and other people who eat fish from the Columbia River Basin. The Columbia River Inter-Tribal Fish Commission (CRITFC) and its four member tribes — the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe — were concerned for their tribal members who consume fish. To evaluate the likelihood that tribal people may be exposed to high levels of contaminants in fish, EPA funded the CRITFC tribes to conduct a Columbia River Basin tribal fish consumption survey which was then followed by an EPA and tribal study of contaminant levels in fish caught at traditional tribal fishing sites. The consumption survey showed that the tribal members were eating six to eleven times more fish than EPA’s estimated national average (at that time estimated to be 6.5 grams per person - per day). The fish contaminant study showed the presence of 92 contaminants in fish consumed by CRITFC tribal members and other people in the Columbia River Basin. Some of these contaminant levels were above the levels of concerns for aquatic life or human health. Contaminants measured in Columbia River fish included polychlorinated biphenyls (PCBs), dioxins, furans, arsenic, mercury, and dichlorodiphenylethylene (DDE) — a toxic breakdown product of the pesticide dichlorodiphenyltrichloroethane (DDT).

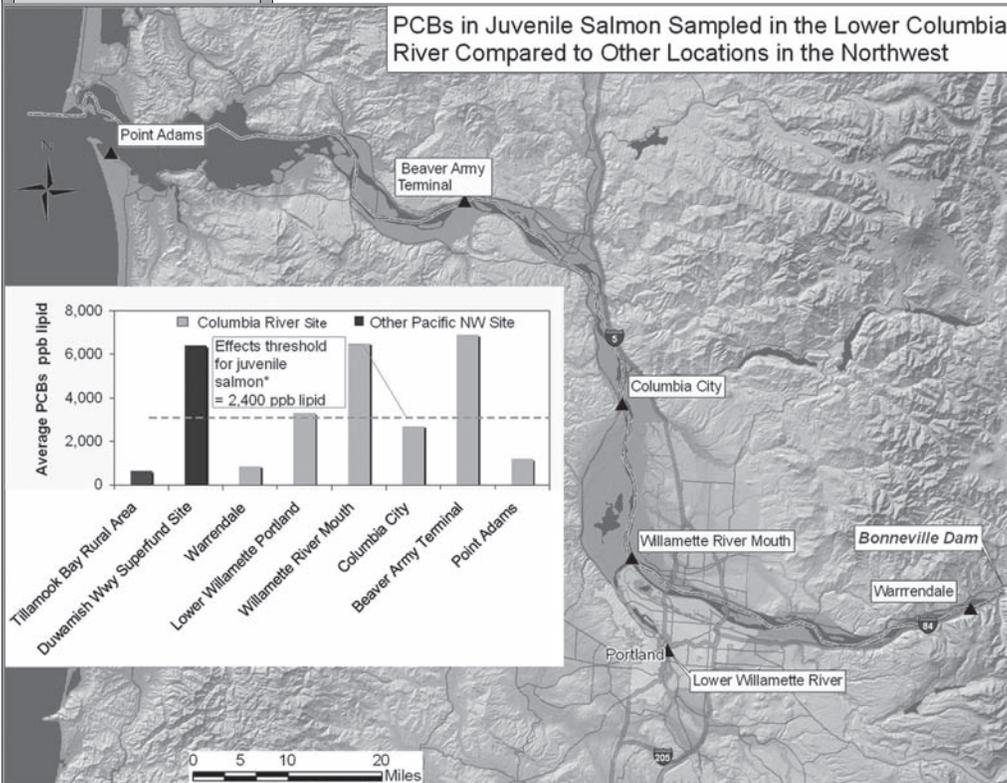
EPA’s Columbia River Toxics Reduction Strategy

WORKING GROUP FORMED - REPORT DEVELOPED

As a part of EPA’s Columbia River Toxics Reduction Strategy, in 2005, EPA welcomed other federal, state, tribal, local, and non-profit partners to form the Columbia River Toxics Reduction Working Group (Working Group) which adopted a goal to prevent and reduce toxic concentration and loads in the Columbia River, including the aquatic life people eat. The Working Group agreed that a major purpose was to collect and share the scattered information on toxic contamination in water, sediment, and fish in

the Columbia River Basin. To accomplish this task, the Working Group agreed to develop a *Columbia River Basin State of the River Report for Toxics* (Report). The Working Group recognized toxics as one of several important factors affecting the health of the Basin’s people, plants, and animals; that toxics had received less attention than other factors and a report on the influence of toxics was a good first step in understanding the health of the Basin’s ecosystem. The Working Group has been working on the Report since 2007. This effort has included federal, state, and tribal agencies, citizen groups, universities and other interested entities. A draft Report was shared with the public in November to receive feedback and comment and a final report will be distributed in January 2009 (access information below).

PCBs in Juvenile Salmon Sampled in the Lower Columbia River Compared to Other Locations in the Northwest



Key Questions

The Report will be used to inform people, communities, and decision-makers in the Basin about the area's toxics problems. It will also serve to begin a dialogue to identify potential solutions to improve the Basin's health. The Report identifies and addresses a number of key questions confronting this effort.

KEY COLUMBIA RIVER BASIN TOXICS REDUCTION QUESTIONS INCLUDE:

- What toxic contaminants are we most concerned about in the Columbia River Basin, and why?
- Which toxic contaminants are the highest priority for cleanup?
- Where are the toxic contaminants coming from? How can they be controlled and cleaned up? How can we prevent contamination in the future?
- What can indicator species tell us about the health of the Columbia River Basin? What indicator species should we use to evaluate the health of the ecosystem? Is the health of the ecosystem improving or declining? What additional information do we need to collect so that we can determine changes over time to better understand and deal with the toxics problem?
- What toxic reduction actions are currently under way? Have they been successful? What actions are planned to further reduce toxics?
- What are the next steps to improve the health of the Columbia River Basin ecosystem? What are the short- and long-term monitoring and research needs?

Priority Toxics

The Report summarizes what is currently known about toxic contaminants in the Basin and the risks to people, fish and wildlife. Although there are many toxic contaminants in the Basin, the Report is focused on four toxic contaminants that are found throughout the Basin at levels that could adversely impact people, fish, and wildlife.

The Report's Priority Toxics of concern include:

Mercury

Mercury contaminates the Basin from industrial and energy-related activities. Fish consumption advisories for mercury continue to be issued in every state in the Basin. Mercury poses a special problem because much of the Basin's mercury pollution comes from outside of the Basin. Air deposition is the greatest source to the Basin, primarily from global sources; however there are local and regional sources such as historic mine tailings, current mine air emissions and point sources. Levels of mercury have increased in osprey in the Lower Columbia River between 1997 and 2004.

PCBs

PCBs were banned in the 1970s, however they still persist in the environment at levels of concern although reduction efforts have lowered their levels. Large data gaps still exist in the Basin and PCB-contaminated sites are still being discovered. Spokane River fish have decreased between 1992 and 2005 in most areas. Sturgeon in the pool behind Bonneville Dam contained higher PCBs than sturgeon in other areas of the Columbia River. PCBs in out migrating Lower Columbia River salmon are higher than juveniles sampled below Bonneville Dam.

DDT

Although DDT was banned in 1972 and levels have declined, it is still found at levels of concern throughout the Columbia River Basin. The primary source of DDT is agricultural soils in which DDT accumulated over three decades of intensive use. Fish eating birds, such as osprey and eagles; have shown a rebound in their populations since the 1970s.

PBDEs

PBDEs are flame retardants chemicals that are used in a wide variety of products including: furniture; upholstery; electrical equipment and devices; non-clothing textiles; and other household products. PBDEs are an example of emerging contaminants of concern (which also include pharmaceuticals and personal care products) because their levels are increasing in fish and wildlife including in the Columbia River Basin. PBDEs have been in widespread use in the US since the 1970s, and there is a growing concern about their persistence in the environment and their tendency to bioaccumulate in the food chain. Some PBDEs may act as endocrine disruptors to humans and other animals. PBDEs have increased in resident fish in some areas of the Spokane River in the past decade and juvenile salmon are showing increased levels of PBDEs as they move through the Lower Columbia River. Though relatively little data is available on PBDEs, and research is beginning to better understand ecosystem impacts from PBDEs and other emerging contaminants. The State of Washington passed the first state ban on PBDEs in the summer of 2007 using a phased approach to regulation.

Columbia Toxics

Reduction Questions

Focus on Four

Mercury Sources

Persistent Contaminants

Legacy Pollutants

Flame Retardants

Columbia Toxics

Indicator Species

BMP Implementation

Collection Events

Sediment Loading

Fish Consumption Rate

The Report focuses on status and trends of these four contaminants in six environmental indicator-species to better assess the levels of toxics and the status of toxics reduction efforts. The six indicator species are: juvenile salmon; resident fish (sucker, bass, and mountain whitefish); sturgeon; predatory birds (osprey and bald eagles); aquatic mammals (mink and otter); and sediment-dwelling shellfish (Asian clams).

Successful Toxics Reduction Actions

The Report describes a number of the successful toxics reduction activities that have been accomplished throughout the Basin. For instance, the Oregon Department of Environmental Quality (ODEQ) is working in partnership with the agricultural community to conduct Pesticide Stewardship Partnership projects in the Hood River, Pudding, Walla Walla, Willamette, Yamhill and Clackamas River Basins. Monitoring data has been used to drive collaborative implementation of **best management practices (BMPs)** in order to reduce the presence of current-use pesticides in rivers and streams. Recent work in the Walla Walla watershed has shown greater than 70% reduction of chlorpyrifos in water column sampling.

The States of Oregon and Washington have both held legacy pesticide collection events for a number of years. At two recent events in the Walla Walla Basin, ODEQ collected over 17,000 pounds of legacy pesticides. At a similar event in the Pudding River Basin in Oregon in 2006, 16,647 pounds of pesticides were collected which included 797 pounds of DDT and 2100 pounds of Dinoseb and assorted smaller amounts of chlordane, 2,4,5-T, lindane, endrin, and strychnine.

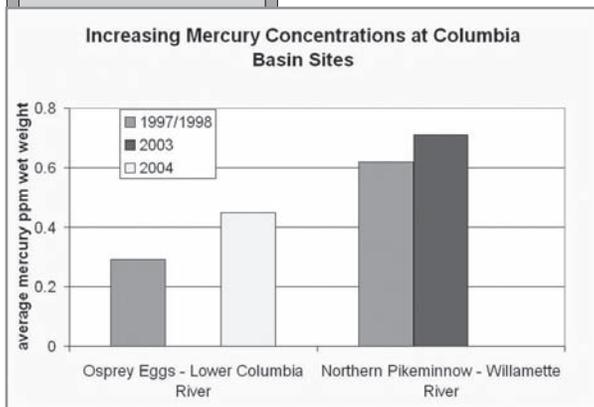
Washington State worked cooperatively with the irrigators and water users in the Yakima River Basin to conduct sediment reduction efforts which substantially reduced DDT in the Yakima River. BMPs reduced suspended sediment loading to the Lower Yakima River between 67 and 85 percent which resulted in reductions in total DDT in fish from 30–to-85 percent. The Washington State Department of Ecology is currently expanding those efforts to further reduce DDT and implement court ordered TMDLs.

On October 23, 2008, the Oregon Environmental Quality Commission directed ODEQ to enter rule-making to revise the human health criteria as a part of Oregon's water quality standards. The Commission has asked for a proposed rule with a fish consumption rate of 175 grams per day instead of the current rate of 17.5 grams per day. This recommendation was a result of a two-year collaborative process led by EPA, ODEQ, and the Confederated Tribes of the Umatilla Indian Reservation. The recommended fish consumption rate of 175 grams per day represents approximately the 90th to 95th percentile of Oregon's fish-consuming populations, as indicated by studies of Tribes, Asians, and Pacific Islanders in Oregon and Washington. The State of Oregon is also working on a broader, legislatively-mandated, toxics reduction strategy with priority contaminants to be targeted for reduction strategies due to be identified by next June.

Other ongoing efforts for toxics reduction include clean up efforts at Bonneville Dam; investigation and cleanup of Portland Harbor, Hanford, and Upper Columbia/Lake Roosevelt contamination sites. These combined efforts should make a major contribution to toxics reduction in the Basin. However, further reduction actions are needed to make the Basin a healthier place for people, fish, and wildlife.

Increased Monitoring is Needed

The Report emphasizes the need for increased monitoring to better understand the sources, status and trends of toxics in the Basin.



PRIORITY MONITORING NEEDS INCLUDE:

- 1) Identify, inventory, and map all potential sources of toxics, both within and outside the Basin
- 2) Determine toxic contaminants of concern from these sources
- 3) Collect information on concentrations of toxic contaminants of concern, where available
- 4) Determine quantities of toxics reaching the Columbia River and tributaries, where possible
- 5) Evaluate fate and transport of toxics and their breakdown products from air and soil into the Columbia River and tributaries
- 6) Determine the role of sediments as a source of toxics
- 7) Prioritize those sources where greatest reduction efforts are needed and can be implemented

Columbia Toxics

Long-Term Monitoring

A long-term monitoring plan is needed to better understand the toxics status and trends in the Basin. This information will help target resources for toxics reduction actions and result in a better understanding of the success of ongoing reduction work efforts. The critical steps in the development of this monitoring plan are identified in the Report.

LONG-TERM MONITORING PLAN NEEDS INCLUDE:

- 1) Complete a data gaps analysis of the Basin's contaminant data collected from 1994 to the present
- 2) Determine the geographic extent of sample areas and identify which contaminants would be monitored
- 3) Determine the types of media to be sampled (e.g., water, sediments, and/or fish tissue)
- 4) Determine the frequency, specific locations, and techniques for sampling

Because of limited resources, monitoring programs need to be coordinated among the different federal, state, tribal, local, and nongovernmental entities to avoid duplication and leverage resources.

Conclusion

CONTINUED COLLABORATIVE TOXICS REDUCTION IS ESSENTIAL

The success of this work will depend on a commitment to join forces to make the best use of available resources. This approach will require strong communication and collaboration among Basin agencies, organizations and the public. The citizens of the Northwest place a high value on a healthy Columbia River Basin ecosystem. Over the next year, the Columbia River Toxics Reduction Working Group will develop a draft work plan that will build on the successful and numerous toxics reduction efforts already accomplished or underway, as well as identify new efforts to reduce toxics in the Basin. In 2009, the Columbia River Toxics Reduction Working Group will host a number of watershed-based workshops to provide a collaborative forum to discuss strategies for building on existing efforts and identify new opportunities for reducing toxic contamination in the Basin. The final outcome of these workshops will be a toxics reduction work plan for the Columbia River Basin that will involve citizens, local watershed councils, Basin communities, other entities, and Tribal, Federal and State governments in a collaborative partnership.

Parties interested in being informed when the *Columbia River Basin State of the River Report for Toxic* becomes available are welcome to contact author Mary Lou Soscia (contact information below).

FOR ADDITIONAL INFORMATION:

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503/ 326-5873 or email: Soscia.Marylou@epamail.epa.gov
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Columbia River Basin State of the River Report for Toxics WEBSITE: When released in January, 2009, the final report will be available from EPA's Columbia River website at: www.epa.gov/region10/columbia

COLUMBIA RIVER BASIN TOXICS REDUCTION WORKING GROUP WEBSITE: <http://yosemite.epa.gov/r10/ECOCOMM.NSF/Columbia/trwg>

Workshops Planned

Mary Lou Soscia currently serves as the Columbia River Coordinator for the US Environmental Protection Agency, Region 10. In this role, she is currently leading the development of the Columbia River Toxics Reduction Strategy. She also represents EPA in the discussions on the role of the Clean Water Act in Federal Columbia River Power System decisions. Ms. Soscia has had thirty years of experience with state, federal, and tribal government specializing in watershed and river management issues. While on EPA assignments in 1993-1997, Ms. Soscia served as the coordinator of the Tribal Watershed Program for the Columbia River Inter-Tribal Fish Commission and as the manager of the Oregon Watershed Health Program. Working for EPA in Washington, DC, Ms. Soscia helped develop and establish EPA's National Estuary Program, a collaborative effort to restore US estuaries. Ms. Soscia has also worked for the States of Maryland and Wyoming. Ms. Soscia has a Bachelor's degree in Geography from Virginia Tech and a Master's degree in Geography from the University of Maryland.

Kim Johnson is an Environmental Engineer currently working on a six month detail to the Oregon Operations Office for the US Environmental Protection Agency. In her current position, she is responsible for providing support on the Columbia River Toxics Reduction Strategy and EPA's National Commitment to the Columbia River in EPA's Strategic Plan. She also represents EPA at the Columbia River Basin Federal Caucus and is currently leading a Water Quality Focus Workgroup of Federal Agency Representatives to identify collaborative Federal opportunities to reduce toxics in the Columbia River Basin. Ms. Johnson has over twenty years of experience with the federal government. Her experience includes 11 years in the EPA office in Kansas City, Kansas, five years with the Bureau of Reclamation in Montana, and five years with the USDA Forest Service in Idaho and Montana. Ms. Johnson has a Bachelor's degree in Civil Engineering from Montana State University.

HYDROELECTRIC RELICENSING

&

TRIBAL RELIGIOUS CLAIMS

FERC'S INCREASE OF MINIMUM FLOWS UPHELD

by David C. Moon, Editor

FERC
DecisionExercise of
Religion ClaimsFERC's Increase
of Instream
Flows"Substantial
Burden"Snoqualmie
Falls
Sacred SiteNew Precedent:
FERC Authority

"Beneficial Use"

Hydropower
Excluded

On October 7, the US Ninth Circuit Court of Appeals (Court) rejected the Snoqualmie Indian Tribe's exercise of religion claims and upheld the Federal Energy Regulatory Commission's (FERC's) relicensing decision concerning the Snoqualmie Falls hydroelectric project. The Court ruled that substantial evidence supported FERC's decision that the relicensing decision does not "substantially burden" the Tribe's free exercise of religion under the Religious Freedom Restoration Act (RFRA). The Court also held that "although FERC employed the wrong standard for analyzing RFRA claims, this error was harmless because FERC's standard was more generous to plaintiffs than the standard we have now articulated in *Navajo Nation* and the Tribe has failed to demonstrate a substantial burden that would meet the *Navajo Nation* standard. Third, because the record for purposes of NHPA § 106 consultation closed in 1997 — before the Tribe gained federal recognition in 1999 — FERC was not obligated to consult with the Tribe on a government-to-government basis." *Snoqualmie Indian Tribe, et al. v. Puget Sound Energy, Inc., et al.*, (No. 05-72739; FERC No. 2493-016), *Slip Op.* at 14239. The Court also held that FERC's amendment of the license order's minimum instream flow provisions did not conflict with the conditions in the Washington Department of Ecology's (Ecology) water quality certification and was supported by substantial evidence. *Id.*

The Court relied on its recent opinion in *Navajo Nation v. U.S. Forest Serv.*, No. 06-15371, 535 F.3d 1058, slip op. 10033 (9th Cir. filed Aug. 8, 2008) (en banc) for its decision (see Moon, TWR #55). The Court reiterated the *Navajo Nation* holding as to what constitutes a "substantial burden," citing from that case as follows: "Under RFRA, a 'substantial burden' is imposed only when individuals are forced to choose between following the tenets of their religion and receiving a governmental benefit (*Sherbert*) or [are] coerced to act contrary to their religious beliefs by the threat of civil or criminal sanctions (*Yoder*)." *Slip Op.* at 14246.

As noted by the Court, "The Falls is considered a sacred site...The Falls plays a central role in the Tribe's creation story and is an important location for its religious practices. The Tribe believes that the mist generated by the Falls connects the earth to the heavens and that a powerful water spirit lives in the plunge pool below the Falls." *Slip Op.* at 14240. The 268-foot waterfall is located about 30 miles east of Seattle, Washington. If the Snoqualmie River flowed freely over the Falls instead of being diverted by PSE, water flows in years of normal rainfall would exceed 1000 cubic feet per second (cfs) eighty percent of the time. PSE's 1975 license mandated that PSE maintain an instream flow of 100 cfs over the Falls during daylight hours. PSE's predecessor constructed the hydroelectric power plant at the Falls in 1898; it has a total generating capacity of 44.4 megawatts.

Another part of the Court's ruling, dealing with FERC's decision to *increase* the instream flows required under the new license, provides a new precedent regarding water quality certifications by States in a relicensing proceeding. Under its initial License Order, FERC adopted certain minimum water flows established in the WQC (May 16-31: 200 cfs at all times; June 1-30: 450 cfs at all times), but also required greater water flows during Labor Day weekend (200 cfs during daytime). Later, FERC revised Article 421 of the License to require 1000 cfs at all times during May and June, conforming the License to the higher minimum daytime flows recommended by FERC staff in the final Environmental Impact Statement.

Puget Sound Energy, Inc. (PSE) cross-petitioned for review of FERC's decision to impose instream flow requirements that *exceeded* those established in Ecology's water quality certification (WQC). "PSE argues that FERC's 2005 revised license unlawfully adopts an aesthetic accommodation that alters the project's flow restrictions in conflict with Ecology's WQC. PSE asserts that, under the CWA, FERC is required to incorporate a state's WQC — without revision — into a license order, and that, by requiring increased flow conditions, FERC has degraded the existing beneficial use of hydropower production." *Slip Op.* at 14251. The Court rejected PSE's arguments: "Contrary to PSE's claim, the increased minimum flow requirements in FERC's License afford greater — not decreased — protection to the 'beneficial uses' protected by Washington's antidegradation statute. Hydroelectric power is not a 'beneficial use' protected by Washington's antidegradation policy." In a footnote, the Court pointed out that Ecology interprets the term "beneficial uses" to exclude hydroelectric power generation and that under Washington law, the Court defers to Ecology's interpretation of a state statute that is within Ecology's expertise. *Slip Op.* at 14253.

FERC Decision

FERC Authority

Cultural Value v. Economic Benefits

“Whether FERC may impose additional, more stringent requirements above the standards contained in a state’s WQC has not been addressed to date by any federal court...As PSE correctly noted, a federal licensing agency lacks authority to reject WQC conditions in a federal permit...We hold that FERC may require additional license conditions that do not conflict with or weaken the protections provided by the WQC.” *Slip Op.* 14254. The Court did go on to hedge its bet on this point, adding at 14255, that “While it might not always be true that mandating higher minimum flows than those in a WQC would be permissible, we think it is permissible in this case.”

The Court explained its rationale behind the decision to allow FERC’s increase, focusing on the Tribes’ religious practice and balancing lost generation costs to the utility. “Finally, we hold that the FERC decision was supported by substantial evidence and demonstrates that the Commission properly balanced the beneficial public purposes specified in §10 of the Federal Power Act. The water flow requirements adopted by FERC...were carefully considered during the thirteen-year relicensing proceeding and were included in the option recommended in the final EIS. The final EIS found that Flow Option C, with 1,000 cfs daytime flow for May and June, would meet the widest variety of important objectives among the different flow options considered and would enhance the Falls’ cultural value. FERC found that a greater amount of water flow will produce a greater amount of mist, in terms of water particles, which is important to the Snoqualmie Tribe’s religious practice. Thus, it was not arbitrary or capricious for FERC to conclude that increasing the minimum flow during May and June to 1,000 cfs would augment the Tribe’s religious experience and result in a better balance of interests. The record also demonstrates that FERC carefully weighed the implications of its decision for the Tribe’s religious experience against its effect on PSE’s bottom line. FERC noted that ‘the Falls are of great religious significance to the Snoqualmie Tribe, and the level of spray and resulting mist produced by water flowing over the Falls is a critical component of their spiritual experience...[The flows] recommended in the final EIS track the seasonal variation in flows at the Falls,...[and] would provide a greater threshold for mist during these months.’ FERC detailed the costs of the increased flows, which resulted in a \$458,000 reduction in the net annual benefit to PSE of \$10,953,000, and concluded that ‘the importance of the mist at this site to the Snoqualmie Tribe’ justified ‘the relatively small effect on net annual benefit.’ That judgment is not arbitrary or capricious.” *Slip Op.* at 14255-14256.

FOR ADDITIONAL INFORMATION:

DAVID MOON, The Water Report, 503/ 343-8504 or email: thewaterreport@hotmail.com

Court opinion available on Hydro Reform Coalition’s website:

www.hydroreform.org/news/2008/10/09/court-project-does-not-interfere-with-religious-freedom



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Section of Environment, Energy, and Resources • Water Resources Committee

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- Owen Olpin, Former Farr Professor of Law at the University of Utah, and Special Master overseeing *Nebraska v. Wyoming*
- Thomas A. Zlaket, Former Chief Justice of the Arizona Supreme Court
- Project perspectives from participants from some of the largest, global, and fully integrated engineering and technical services firms
- Presentations by representatives of the U.S. Department of the Interior, Federal Energy Regulatory Commission, and Bureau of Reclamation
- Insights from leading lawyers and academics practicing and teaching in adapting water law to meet new challenges
- Presentations by representatives of leading land and water trusts working to protect and preserve an environmental heritage

WATER BRIEFS

KLAMATH DAMS CA/OR
PACIFICORP AGREEMENT IN PRINCIPLE

On November 13, the federal government, the states of California and Oregon, and PacifiCorp announced an Agreement in Principle (AIP) that takes a critical step down a path toward a historic resolution of Klamath River resource issues and removal of four Klamath River dams. Together with the Klamath Basin Restoration Agreement, entered into amongst federal agencies, tribes, irrigation interests, and fishing and conservation organizations on January 15, 2008 (see Simmons, TWR #49), the AIP presents the potential for the largest project of its kind in US history. "The proposed KBRA would potentially dedicate about \$1 billion to fundamental and necessary restoration in the Upper and Lower Klamath Basins and provide a long-term strategy to ensure compliance with the ESA for the foreseeable future," Secretary of the Interior Dirk Kempthorne said.

The Klamath River Basin occupies over 16,000 square miles of southern Oregon and northern California. Dam removal will re-open over 300 miles of habitat for the Klamath's salmon and steelhead populations and is expected to alleviate water quality problems caused by the reservoirs. The Klamath River was once the third most productive salmon river on the west coast.

The AIP provides a flexible framework for the presumed transfer of four dams from PacifiCorp to a government designated dam removal entity (DRE), which would then undertake removal of those dams. A target removal date was set for the four dams of 2020. Under the AIP, final authority for dam removal must be granted by the US Secretary of the Interior following an assessment to confirm the current view of the US and governments of California and Oregon that dam removal is in the public interest. The AIP is a non-binding agreement and includes a deadline of June 30, 2009, to enter into a final binding agreement.

Under the AIP, PacifiCorp agreed to contribute up to \$200 million to cover the cost of removing its four dams and restoring the river, with removal funds

obtained from ratepayers in Oregon and California before removal begins. If dam removal exceeds PacifiCorp's \$200 million cap, California and Oregon agreed to contribute up to \$250 million additional funds. Estimates of dam removal costs range between \$75 million and \$200 million.

For info: Art Sasse, PacifiCorp, 503/ 813-6801, Chris Paolino, DOI, 202/ 208-6416; Agreement and other documents available on DOI's website: www.doi.gov/news/08_News_Releases/111308.html

WETLANDS GUIDANCE US
CWA SCOPE & JURISDICTION

On December 3, the US Environmental Protection Agency (EPA) and the Department of the Army are issuing revised guidance to ensure America's wetlands, streams and other waters are better protected under the Clean Water Act (CWA). The guidance clarifies the geographic scope of jurisdiction under the CWA. According to John Paul Woodley Jr., Assistant Secretary of the Army (Civil Works), "This revised interagency guidance will enable the agencies to make clear, consistent, and predictable jurisdictional determinations within the scope of the Clean Water Act."

The revised guidance replaces previous policy issued in June 2007 and clarifies a June 2006 Supreme Court decision in *Rapanos v. United States* regarding the scope of the agencies' jurisdiction under the CWA. The guidance follows the agencies' evaluation of more than 18,000 jurisdictional determinations and review of more than 66,000 comments. More information on the guidance is available at EPA's website: www.epa.gov/owow/wetlands/guidance/CWAwaters.html

For info: Enesta Jones, 202/ 564-7873, email: jones.enesta@epa.gov

INTERSTATE WATER TX/OK
10TH CIRCUIT DECISION

The US Tenth Circuit Court of Appeals (Court) recently ruled in favor of the Tarrant Regional Water District (TRWD) of Texas, rejecting the contention of the Oklahoma Water Resources Board (Board) that the

federal district court in Oklahoma City had erred in refusing its request to throw out TRWD's lawsuit regarding the diversion of water in Oklahoma for use in Texas. The Court denied the Board's motion to dismiss, holding that there is a case or controversy ripe for adjudication, and affirming the federal district court's rejection of 11th Amendment immunity for the Board's members. *Tarrant Regional Water District v. Richard Sevenoaks, et al.*, No. 07-6273 (October 27, 2008).

Pursuant to the Court's decision, TRWD may continue to pursue its case against the individual members of the Board in their official capacities. The Board is the agency that is responsible for issuing permits for the appropriation, sale, and use of Oklahoma water. The Court ruled that 11th Amendment immunity "does not extend to a state official sued in his official capacity when the plaintiff seeks only prospective, injunctive relief." *Slip Op.* at 7.

TRWD filed for permits in Oklahoma to obtain water rights totaling 460,000 acre-feet per year from tributaries to the Red River, before the water flows into that river. The water must be diverted before it flows into the salty waters of the Red River, which forms the border between Oklahoma and Texas, to access water of better quality that would be suited for a municipal water supply. (See Briefs, TWR #36).

In the opinion, the Court also found that "it is also well-established that Oklahoma does not enjoy an 'ownership interest' in water resources located in the state. See *Sporhase v. Nebraska*, 458 U.S. 941, 950-52 (1982); see also *City of El Paso v. Reynolds*, 563 F. Supp. 379, 383 (D.N.M. 1983)." *Slip Op.* at 12-13. The Court, however, did not address the merits of TRWD's lawsuit — its decision was limited to the Board's request to dismiss the lawsuit.

In the case, TRWD seeks to invalidate a series of Oklahoma laws that restrict out-of-state water use. TRWD is also challenging the constitutionality of Oklahoma's moratorium on out-of-state water sales; Oklahoma imposed the ban in order to finish a comprehensive study of

WATER BRIEFS

state-wide water resources (Oklahoma Comprehensive Water Plan), which is scheduled for completion in 2011. The Oklahoma legislature established a moratorium on the sale or exportation of water outside the state that is effective until November 2009 (Okla. Stat. tit. 74, § 1221.A; Okla. Stat. tit. 82, § 1B(A)). TRWD also argued that Oklahoma's moratorium violates the Commerce Clause and is pre-empted by the Red River Compact of 1978. As noted in the decision, TRWD is also seeking to invalidate several other Oklahoma laws it refers to as "anti-export statutes." *Slip Op.* at 4.

For info: Case available at: <http://ca10.washburnlaw.edu/cases/2008/10/07-6273.pdf>; TRWD website: www.trwd.com; Board website: www.owrb.ok.gov/

PUGET SOUND ACTION WA CLEANUP PLAN ADOPTED

On December 1, the Puget Sound Partnership (PSP) adopted an Action Agenda to clean up Puget Sound that will not only put Puget Sound on the path to recovery, but will also give a boost to local economies. PSP is a community effort of citizens, governments, tribes, scientists and businesses working together to restore and protect Puget Sound. The mission given to the PSP by Governor Chris Gregoire and the Legislature is to create a real Action Agenda that turns things around and leads to a healthy Puget Sound by 2020.

New analysis supporting the Action Agenda identified some alarming facts and trends related to the health of Puget Sound. Each year, 52 million pounds of toxic chemicals — or nearly 150,000 pounds per day — inundate Puget Sound with contaminated runoff. This amounts to a toxic spill the size of Exxon Valdez every two years. The toxic chemicals include oil and petroleum products, lead, and phthalates — and 1 million pounds of toxic metals such as zinc and copper.

For the first time, the Action Agenda provides critical data and a strategy for tackling these threats to the waters in and around Puget Sound. Its four cornerstones are driven by the latest available science and are results-

oriented: (1) protect the last remaining intact places; (2) restore damaged and polluted sites to health; (3) stop water pollution at its source; and (4) coordinate all protection, restoration and cleanup efforts.

For info: PSP website: www.psp.wa.gov

FISH HABITAT WEST NOAA MAPPING TOOL ONLINE

The NOAA Fisheries Service Office of Habitat Conservation has a new online tool — the Essential Fish Habitat Mapper. This tool makes essential fish habitat (EFH) data and maps easily accessible to all interested members of the public. The eight regional fishery management councils work with NOAA Fisheries Service to describe and identify EFH for each life stage of each managed species. These EFH descriptions and identifications provide the public information on those marine, coastal and riverine habitats most important to fisheries, and enable Federal agencies to determine whether or not an action may adversely affect EFH. Identifying an area as EFH does not result in the exclusion of any specific activities in the area, but is instead meant to highlight those areas most important to maintaining sustainable fisheries.

For info: EFH website: www.nmfs.noaa.gov/habitat/habitatprotection/efh/index_GIS.htm

PESTICIDES JEOPARDY WEST NOAA FISHERIES BIOP

In November, NOAA fisheries issued a biological opinion (BiOp) to EPA that found three chemicals used in pesticides — diazinon, malathion, and chlorpyrifos — are likely to jeopardize 27 populations of salmon on the West Coast that are listed as either endangered or threatened. The opinion calls for buffer zones next to salmon streams where the chemicals are used. A BiOp is NOAA Fisheries Service's assessment of whether a federal action is likely to jeopardize an endangered or threatened species, or its critical habitat.

EPA will use NOAA's BiOp as it decides how pesticides containing the three chemicals can be used. EPA

examines and registers ingredients of a pesticide to ensure there will be no unreasonable adverse effects. Once registered, a pesticide must be used in a way that is consistent with approved directions on the label.

NOAA's BiOp says these three chemicals may be used in pesticides if farmers and others follow specific restrictions on how and when they apply the pesticides to their fields and crops. NOAA says these restrictions should be made explicit on the pesticide labels.

"Scientific research has shown that these three chemicals when found in streams can damage and even kill salmon," said Jim Balsiger, acting NOAA assistant administrator for NOAA's Fisheries Service. "The chemicals may also harm stream water quality and the small fish and insects that salmon eat. The restrictions are designed to prevent harmful effects."

REQUIRED RESTRICTIONS INCLUDE:

- Buffer zones of 1,000 feet for aerial application and 500 feet for ground application between where the pesticides are applied and salmon streams
- Strips of a minimum of 20 feet of grasses, bushes or other vegetation on agricultural sites adjacent to surface waters designed to absorb runoff from pesticide-treated fields
- Restrictions on applying pesticides in windy conditions that could carry pesticides into nearby streams
- A prohibition on applying pesticides when a storm is predicted that could cause pesticide runoff into nearby streams

NOAA scientists found the chemicals not only can be lethal to salmon at certain concentrations, but can also hinder salmon growth at lower levels of concentration by impairing their ability to smell their prey and by reducing the amount of small fish and insects for food. The chemicals have also been found to slow the swimming of salmon or make their swimming erratic, impairing their ability to return to their natal streams to spawn and to avoid predators.

The final BiOp is the first in a series that NOAA will issue between now and Feb. 29, 2012, to the EPA concerning a

WATER BRIEFS

total of 37 active chemical ingredients in pesticides. EPA requested that NOAA prepare the BiOps as the result of lawsuits from environmental groups in recent years.

For info: Monica Allen, NOAA Fisheries, 301/ 713-2370

BiOp WEBSITE: www.nmfs.noaa.gov/pr/

EROSION BMPS

US

EPA SEEKS COMMENT

EPA is seeking comments on its proposed guidelines to control the discharge of pollutants from construction sites. The proposal would require all construction sites to implement erosion and sediment control **best management practices** (BMPs) to reduce pollutants in stormwater discharges.

Construction activities such as clearing, excavating and grading significantly disturb the land. The disturbed soil, if not managed properly, can easily be washed off the construction site during storms and enter streams, lakes, and other waters. Stormwater discharges from construction activities can cause an array of physical, chemical and biological impacts. Sediment is one of the leading causes of water quality impairment nationwide, including reducing water depth in small streams, lakes and reservoirs.

The proposed rule is intended to work in concert with existing state and local programs, adding a technology-based “floor” that establishes minimum requirements that would apply nationally. Once implemented, these new requirements would significantly reduce the amount of sediment and other pollutants discharged from construction sites.

Construction sites disturbing ten or more acres at a time would also be required to install sediment basins to treat their stormwater discharges. In addition, if sites 30 acres or larger are located in areas of the country with high rainfall intensity and soils with a high clay content, their stormwater discharges would be required to meet a numeric limit on the allowable level of turbidity, which is a measure of

sediment in the water. The turbidity limit is intended to remove fine-grained and slowly-settling or non-settleable particles contained in stormwater. Particles such as clays and fine silts contained in stormwater discharges from construction sites typically cannot be effectively removed by conventional stormwater BMPs (such as sediment basins). In order to meet the proposed numeric turbidity limit, many sites would need to use chemical treatment and filtration of their stormwater discharges.

This proposed rule is projected to reduce the amount of sediment discharged from construction sites by up to 27 billion pounds each year, at an annual cost of \$1.9 billion. The benefits from reducing discharges of sediments include better protection for drinking water supplies, improvements in aquatic environments (e.g., reduced streambed smothering), and less need for dredging of navigation channels and reservoirs.

For info: Enesta Jones, EPA, 202/ 564-4355 or email: jones.enesta@epa.gov

EPA WEBSITE: www.epa.gov/ost/guide/construction/

WATER RECHARGE UPHELD AZ TAKINGS & TORT CLAIMS DENIED

The Arizona Court of Appeals, Division One (Court) affirmed a grant of summary judgment by the lower court that dismissed takings and tort claims against the Central Arizona Water Conservation District (District) in *South West Sand & Gravel, Inc. v. Central Arizona Water Conservation District*, 1 CA-CV 07-0435 (Ariz. App. 11/10/2008) (Ariz. App., 2008). The lawsuit filed by South West Sand and Gravel Inc. (South West) alleged negligence, negligence per se, trespass, nuisance, and inverse condemnation. South West asserted that the District’s Aqua Fria Recharge Project had raised the water table beneath South West’s property to a level that interfered with its sand and gravel mining business. In the summary at the beginning of the case, the Court stated that the lower court’s decision was affirmed, “Based on our decision in *West Maricopa Combine, Inc. v. Arizona Department*

of Water Resources, 200 Ariz. 400, 26 P.3d 1171 (App. 2001), Arizona Revised Statutes (A.R.S.) section 45-173 (1994), and Arizona’s historic encouragement of the full use of scarce water resources in our arid climate...”

The Arizona Department of Water Resources (ADWR) issued permits for the recharge project on May 4, 1999, “authorizing the District to store 100,000 acre-feet of water each year for twenty years in the Project. The permits authorize the District to conduct recharge into the Agua Fria River but also require the District to observe operational limits that maintain groundwater levels below the depth of South West’s sand and gravel pits as they existed when the permits were issued...It is undisputed that the groundwater reaches South West’s property through a natural hydrologic connection between the surface of the riverbed and the underlying aquifer.” *Slip Op.* at 3-4.

Ultimately, the Court found that the Director of ADWR “determined that the District’s storage would not cause unreasonable harm to South West” and that “Just as South West has no right to control the use of the water, so it cannot control the movement of water in natural water-bearing formations. See *Park County Sportsmen’s Ranch, LLP*, 45 P.3d at 707.” *Slip Op.* at 22-23. In regard to the “takings” claim, the Court concluded that “South West took its property subject to Arizona’s reservation of natural channels to move and store water.” *Slip Op.* at 10. (See A.R.S. § 45-173(A)). The Court stated that its decision concerning the trespass claim was “bolstered by the Colorado Supreme Court’s decision in *Board of County Commissioners of County of Park v. Park County Sportsmen’s Ranch, LLP*, 45 P.3d 693 (Colo. 2002)... The Colorado Supreme Court held that the ranch had no obligation to seek the landowners’ permission or to pay just compensation because a recharge does not constitute a trespass. *Id.* at 706-07. The same logic applies here.” *Slip Op.* at 12.

For info: Case available on ADWR website: www.cofad1.state.az.us/opinionfiles/CV/CV070435.pdf

WATER BRIEFS

**PHARMACEUTICAL WASTE US
UNIVERSAL WASTE DESIGNATION
EPA SEEKS COMMENT**

To help provide a streamlined system for disposing of hazardous pharmaceutical waste that is protective of public health and the environment, EPA is proposing to add hazardous pharmaceutical waste to the Universal Waste Rule.

The proposed rule encourages generators to dispose of pharmaceutical waste that is classified as non-hazardous under the Resource Conservation and Recovery Act as universal waste. The proposal will also facilitate the collection of personal medications that are classified as household hazardous waste so they can be managed properly.

The proposed rule applies to pharmacies, hospitals, physicians' offices, dentists' offices, outpatient care centers, ambulatory health care services, residential care facilities, and veterinary clinics, as well as other facilities that generate hazardous pharmaceutical waste. It does not apply to pharmaceutical manufacturing or production facilities.

Currently the federal Universal Waste Rule includes batteries, pesticides, mercury-containing equipment, and lamps. Universal wastes typically are generated in a wide variety of settings including industrial settings and households, by many sectors of society, and may be present in significant volumes in non-hazardous waste management systems.

As established by the federal Administrative Procedure Act, this rulemaking must undergo the notice and comment process. Once public comments are received, comments will be reviewed and the proposed rulemaking will be re-evaluated to determine if changes are warranted. This process takes several months to over a year depending on the nature of these comments. EPA expects that this rulemaking will be finalized in 2010. However, because this rule is less stringent than current RCRA generator regulations, authorized states are not required to modify their programs to adopt this regulation. Therefore, the regulated community cannot choose to

manage their pharmaceutical wastes as universal wastes until the rule is adopted in their particular state.

Comments will be accepted for the 60 days following publication in Federal Register on December 2.

For info: Latisha Petteway, EPA, 202/564-4355 or email: petteway.latisha@epa.gov

EPA WEBSITE: www.epa.gov/epawaste/hazard/wastetypes/universal/pharm.htm

**HANFORD LAWSUIT WA/OR
WA SUES DOE OVER CLEANUP**

On November 25, Washington Governor Gregoire and Attorney General McKenna announced the state's lawsuit against the federal government over the failure to comply with requirements to clean up decades of contamination at the Hanford Nuclear Reservation. The lawsuit was filed in US District Court to compel the US Department of Energy (DOE) to complete the cleanup of 53 million gallons of highly toxic and radioactive waste buried in tanks at the Hanford Nuclear Reservation.

"In Washington state, we have been patient and reasonable in working with the federal agencies at Hanford," Gregoire said. "Today, our patience has run out. The federal cleanup has been far too slow. In the past three years, the situation has gotten much worse. We now face — not years, not decades — but more than a century of delay. The most recent budget proposed by President Bush puts us on pace to empty one tank per year. At that rate, it will take 140 years to empty the worst of the remaining tanks. That's not only absurd. It's unconscionable. The people of Washington cannot stand for that, and will not stand for that."

Washington officials said the DOE is grossly out of compliance with state and federal environmental laws and with the Tri-Party Agreement cleanup order, signed in 1989 by Washington State, the Energy Department, and the U.S. Environmental Protection Agency. The agreement, as amended, currently requires completing all treatment by the year 2028 and emptying all the single-shell underground tanks by 2018. The Energy Department acknowledges

it won't meet these requirements. Consequently, the state lawsuit asks the court to establish and enforce specific new deadlines for emptying 142 single-shell tanks and for treating the 53 million gallons of hazardous and radioactive waste in all 177 underground tanks. One hundred forty-nine of these tanks are of single-wall construction well beyond their design lifespan, and 67 of the tanks have confirmed leaks. The state is also formally requesting that the federal agencies agree to implement new groundwater and soil cleanup deadlines to avoid further delays in taking essential environmental action around the Hanford site, especially next to the Columbia River.

For info: Laurie Dumar, Ecology, 360/407-6606, email: ldum461@ecy.wa.gov or website: www.ecy.wa.gov/programs/nwp/2008lawsuit.htm

**EFFICIENCY LIBRARY US
COMPREHENSIVE RESOURCE LIBRARY**

The Alliance for Water Efficiency (AWE), a national non-profit organization that promotes the efficient and sustainable use of water, recently announced the formal launch of a comprehensive web-based Water Efficiency Resource Library, in cooperation with the EPA, who is a major partner and funder of the program.

The Resource Library is intended as a one-stop shop for water efficient product and program information. Library sections cover residential plumbing and appliances, toilet testing, landscape and irrigation, commercial and industrial water conservation, water rates and rate structures, water loss control, codes and standards, drought planning, and numerous other topics. Research reports, published documents, and case studies are included, providing a comprehensive picture of what water efficiency measures prove to be the most successful, and how water utilities and consumers can best achieve water efficient use. Upcoming features being added to the site are state by state summaries and an on-line discussion forum.

For info: Resource Library located at: www.allianceforwaterefficiency.org

December 15-16 **NV**
Colorado River Water Users Association Annual Conference, Las Vegas. Caesar's Palace. For info: CRWUA website: crwua.org

December 15-16 **WA**
Growth Management Act Conference, Seattle. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

December 17 **WA**
MTCA 101 Workshop, Lacey. For info: Renata Sobol, NW Environmental Training Center, 206/ 762-1976 or website: www.nwetc.org

December 18-19 **WA**
MTCA Cleanup Levels Workshop, Lacey. For info: Renata Sobol, NW Environmental Training Center, 206/ 762-1976 or website: www.nwetc.org

January 5-7 **Thailand**
International Perspective on Environmental & Water Resources, Bangkok. For info: ASCE, 800/ 548-2723 or website: www.asce.org

January 9-11 **CA**
Wild & Scenic Environmental Film Festival, Nevada City. For info: Festival, 530/ 265-5961 or website: www.wildandscenicfilmfestival.org

January 12 **OR**
Bridging Law & Science in the Face of Climate Emergency Conversation, Eugene. Bowerman Center for Environmental Law, 5pm. For info: ENR , 541/ 346-1395, email: enr@uoregon.edu or website: www.law.uoregon.edu/org/enr

January 14 **WA**
SEPA and NEPA Seminar, Seattle. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

January 15 **AK**
Permitting Strategies Conference, Anchorage. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

January 15-16 **HI**
Hawai'i Land Use Law Conference, Honolulu. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

January 16 **WA**
Building Sustainable Infrastructure: Project Evaluation & Enhancement Planning for Economic, Cultural & Environmental Aspects, Seattle. REI | South Room, 222 Yale Ave N. For info: NW Environmental Training Center, 206/ 762-1976 or website: www.nwetc.org

January 22-23 **NM**
Transboundary Water Crises: Learning from Our Neighbors in the Rio Grande (Bravo) and Jordan River Watersheds, Las Cruces. Corbett Ctr., NMSU. Sponsored by NM Water Resources Research Institute & International Relations Institute. For info: NMWRI website: http://wrii.nmsu.edu/

January 22-23 **AZ**
Adaptation to Climate Change in the Desert SW: Impacts & Opportunities, Tucson. Westward Look Resort. Sponsored by Institute for the Study of Planet Earth, James E. Rogers College of Law, & Economics, Law & Environment Program. For info: Conference email: adaptationconference@law.arizona.edu or website: www.law.arizona.edu/adaptationconference/

January 26-28 **TX**
2009 UIC Conference, San Antonio. Sheraton Gunter. Sponsored by the Ground Water Protection Council. For info: GWPC website: www.gwpc.org

January 27-28 **WA**
Endangered Species Act 16th Annual Conference, Seattle. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

January 27-31 **TX**
Golden Alga International Symposium & Texas Chptr of American Fisheries Society Annual Meeting, Fort Worth. Radisson Fossil Creek Hotel. For info: Gerald Kurten, TPWD, email: gerald.kurten@tpwd.state.tx.us or Conference website: www.tpwd.state.tx.us/

January 28 **CA**
Annual Water Law Update Course, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension website: http://extension.ucdavis.edu/

January 28-29 **CO**
Colorado Water Congress 51st Annual Conference, Denver. Hyatt Regency Denver Tech Center. For info: CWC, 303/ 837-0812, email: cwc@cowatercongress.org or website: www.cowatercongress.org/

January 28-29 **OR**
Oregon Sustainable Building Expo & Conference, Portland. For info: Expo website: http://oregon.sustainableexpos.com/Home.aspx

January 29 **OR**
Water for People & the Environment: Conflict, Compromise & New Directions Conversation, Eugene. Bowerman Center for Environmental Law, 5pm. For info: ENR , 541/ 346-1395, email: enr@uoregon.edu or website: www.law.uoregon.edu/org/enr

January 29-30 **KS**
Kansas Natural Resources Conference: Renewable Energy - Renewable Resources, Wichita. Hilton Airport. For info: Conference email: KNRC@kaws.org or website: www.kansasnrc.net/index.html

January 30 **MT**
Water Law Update Seminar, Bozeman. Gran Tree Inn. CLE Institute - MT State BAR. For info: BAR website: www.montanabar.org/

February 3-5 **WA**
Stream Restoration Design Symposium, Stevenson. Skamania Lodge. For info: Rob Sampson, 208/ 378-5727, email: Rob.sampson@id.usda.gov or website: http://rrnw.org

February 3-6 **GA**
2009 Winter Conference: National Association of Clean Water Agencies, Atlanta. Westin Buckhead. For info: NACWA website: www.nacwa.org

February 4 **WA**
Marine Shoreline Development Seminar, Seattle. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

February 5-6 **NV**
Nevada Water Law Seminar, Reno. For info: CLE International, 800/ 873-7130 or website: www.cle.com

February 5-6 **Canada**
"Bringing the Future into Focus:" The State of the Salmon's Second Annual International Conference, Vancouver, B.C.. Speakers from around the Pacific Rim will share knowledge and explore possible solutions to the crises that plague some salmon populations. For info: Conference website: www.stateofthesalmon.org/

February 5-6 **FL**
Growth and Water Supply Seminar, Deerfield Beach. For info: CLE International, 800/ 873-7130 or website: www.cle.com

February 5-6 **FL**
Water & Energy: Climate Change & Sustainability, Deerfield Beach. For info: CLE International, 800/ 873-7130 or website: www.cle.com



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