

### Searching for Signs of Water on Mars

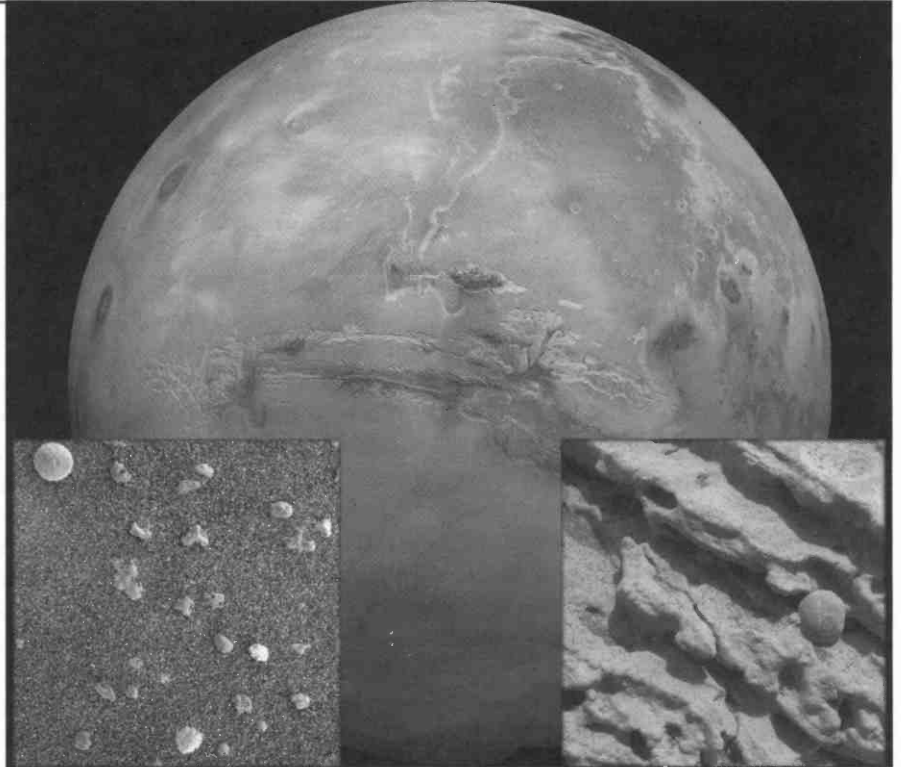
The quest to discover signs of water on Mars continues, with Opportunity, one of the two Mars Exploration Rovers, sending back images of the planet's soil. At bottom left of the photo at right is a magnified look at martian soil showing spherical pebbles among the mix of particles. One of the explanations to account for the pebbles' round shape is accretion under water. A mineral map of Opportunity's surroundings offered a more significant sign of water. It indicated concentrations of a coarse-grained hematite. Hematite usually forms in association with liquid water.

Opportunity also examined eroding outcrop rock embedded with spherical grains that are dropping out as the rock erodes. (See microscopic image at lower right of photo.) Scientists say the spheres may have formed from molten rock spraying into the air. Or, they may be concretions or accumulated material formed by minerals coming out of solution as water diffused through rock.

Interesting news, and it raises a question.

What significance is the ongoing search for water on Mars to hydrologists, water lawyers, lawmakers, government officials and water newsletter editors and all those many others who, in one way or another, are involved in water affairs? Ours is generally a

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Photos: NASA/JPL/Cornell/USGS

### Source Water Assessments Pose Questions About Data Security

Protection Takes on New Significance

by Joe Gelt

Protection is key to Source Water Assessments. Protection was the rationale for the 1996 Safe Drinking Water Act Amendments requiring states to conduct the assessments. Statute requires that the collected information be released to help communities protect their source waters from contamination.

It is now several years down the road, with most states having completed their SWAs, and protection has become a more troublesome issue, with collected information taking on a different significance. We now seek protection from terrorists, and many say that restricting access to SWA information is needed to safeguard ourselves from terrorists' threats.

An official with the Association of State Drinking Water Administrators summarizes the issue: "What it comes down to is that EPA and states are facing a difficult challenge. They must determine how to ensure Source Water Assessment data is available to appropriate parties to promote protection. At the same time they have to ensure that an adequate level of security is provided for sensitive information included in these assessments."

In addressing this challenge various questions are raised: Is it possible to control

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access to such information in our free and open society? What kind of information needs to be restricted to ensure protection against terrorists' threats? What are the most effective methods to adopt to prevent or limit access to the information?

### **SWA is public information**

What clearly is not in doubt is that statute requires that SWA information is available to the public. A well defined set of tasks must be performed when a SWA is conducted. It must delineate the source water assessment area; determine potential sources of pollution within the area; determine the area water supply's susceptibility to the pollution; and the information must be released to public. Without providing the data to the public the SWA is not complete.

Citizens are prime benefactors of SWA information. According to Carl Reeverts of the Environmental Protection Agency's Office of Groundwater and Drinking Water, "The SWA is to provide essential information to allow people to make informed land use decisions." The EPA also has gotten into the act by asking states to share their SWA data with the agency.

Information generally viewed as needing restricted access is the kind that identifies precise locations of certain facilities or operations. These are points of vulnerability that, if sabotaged, could result in extensive damage and threaten human health and safety. For example, most people would agree they would not want terrorists to have the longitude or latitude of point locations of surface water intakes, wells, treatment facilities or any infrastructure component that could be targeted.

Statute allows each state to set its own policies regarding disseminating the information to the public. Mostly the issue is not

about designating some information as top secret, to be kept under lock and key. As an ASDWA official says, "It is not what information will be available or not available ... but determining what restrictions will be placed on people who request certain information." In determining its policy each state in effect does a cost-benefit calculation, figuring the benefit of releasing information vs. its potential cost.

#### **Mars...continued from page 1**

*practical interest, with water understood as a hydrological, legal, health, public policy matter or a topic to write about. What difference is it to us if Mars has or had water? Its discovery will not increase our water supplies.*

*What is fascinating about water is its myriad manifestations. Just as its physical form can be solid, liquid or gas, water has varied significance to humans, from the practical to the aesthetic. Not to be overlooked is water's emotional appeal, its capacity to inspire wonder, even among those with a down-to-earth, practical interest in water.*

*Perhaps this is what partly fascinates us about water on Mars, the wonder and beauty of it, its power and mystery, whether occurring on Mars or the Earth.*

### **States set different public info policies**

In their analysis states come to different conclusions. Further, some leeway exists when interpreting the statute requiring release of information to the public. Differences of opinion exist about what

kind of information needs to be released. This accounts for variations in state policies governing the public release of SWA data.

For example, Chi Ho Sham of the Cadmus Group says SWA information could be released without going into details indicating the locations of wells and water intakes since the SDWA does not require that kind of information to be provided. He says, "A state can respond to the law by publishing a fact sheet. Some information is being released and some is not. This is OK because the act does not say what informational data must be released."

Some states are meeting the requirement by merely announcing the availability of the information. The public therefore would be aware that it is available, and anyone wanting the information would take the initiative to obtain it. Other states are providing a fact sheet on the web, announcing that more detailed information is available upon written request. Other states have placed their SWA on the web but blanking out sensitive information such as intake locations or well locations.

Tennessee has a statutory requirement that drinking-water sensitive information cannot be released to the public. California has an administrative procedure requiring anyone seeking information, including state and federal officials, sign a non-disclosure statement agreeing to restrict their release of the information.

Other states have adopted similar policies, requiring that people wanting certain kinds of information submit a written application explaining their need and intended use for the information and agreeing to various restrictions in its use. For example, an applicant might have to agree that any information to be included on a map or in a public report must be presented to exclude the possibility of deriving GIS coordinates of critical infrastructure.

Arizona is putting final touches on its SWA which is expected to be complete within the next couple of months. Jeff Stuck, Arizona Department of Environmental Quality safe drinking water section manager, says, "All the information and data has been collected and compiled. Draft reports have been provided to water systems and facilities identified within assessments. They look them over for completeness and accuracy. ... We give them an opportunity to provide us additional information." After this review the assessment is ready to be released to the public.

Stuck says the state is currently working on its plan to release the information. He says, "If we are able to resolve certain technical issues by the time the reports become final we will make them available on our web site. If not, we will notify people they are complete and make them available through a different approach."

Sensitive data applying to critical infrastructure will not be readily available. People wanting such data will have to agree that, if ADEQ provides the information, it will be protected and not distributed further.

Stuck says, "It is worth mentioning that the absence of the (sensitive) data will not affect the readability or the usability of the report itself."

### **Does restricting information work?**

Others question the wisdom of restricting even information deemed sensitive. Chi Ho Sham takes this position saying, "I would rather have all the information available to the general public."

*Continued on page 12*



## Water Vapors

### Sol Resnick Endowment Supports Water Research

Thanks to the generosity of Sol and Elaine Resnick several University of Arizona programs, including the Water Resources Research Center, are receiving support for their research in the area of water resources.

The Sol Resnick Endowment Fund will benefit WRRRC by supporting ongoing research conducted by WRRRC researchers, in areas focused on water conservation and utilization, including water harvesting, evaporation and seepage control, efficient use and groundwater recharge; water management; and/or other water resource issues.

The UA College of Law also will benefit, with funds from the endowment to be used to establish the Sol Resnick Water Resources Fellowship, to support research and scholarship in the area of water and natural resources law. Also benefitting from the endowment is the UA Department of Hydrology and Water Resources which will receive funds to support its graduate research programs.

### WRRRC Helps Get Word Out About Water

“Getting word out” is an expression that masks the complexity of a task. Agencies and organizations involved in water issues often have information to convey, about research, special projects and other news, but face the tough question about how best to get word out about their activities. The Water Resources Research Center can assist these organizations reach out to the Arizona water community, to inform interested people of their events or special projects.

This edition of the “Arizona Water Resource” contains a 4-page supplement, found at the centerfold of the newsletter. The supplement is devoted to a U.S. Geo-

logical Survey research project examining stream water quality in Central Arizona. USGS and WRRRC worked out the arrangement, with the federal agency providing the text and WRRRC formatting the material for the newsletter and mailing it. In a more colorful turn of a phrase, the arrangement might be called piggybacking or trailer-on-a-flatcar.

It is a win-win-times-two situation, with each entity winning twice. By performing the service WRRRC earns funds to help support publication of its AWR newsletter — a welcomed contribution during these perilous economic times — and the supplement increases newsletter coverage of water issues. The USGS also wins twice, its text formatted and distributed to the over 2,400 subscribers of AWR, and it experiences a glow of satisfaction knowing its payment serves a good cause, the AWR newsletter.

(AWR readers are mostly from Arizona but also from other western states and even some foreign countries. The people on the mailing list make up a large sampling of the Arizona water community; i.e., utility personnel, government officials, researchers, law makers, regulators and others with a professional interest in water as well as interested citizens.)

### Supplements and Brown Bags

The supplement in the newsletter further advances the WRRRC goal of working with water organizations, to assist them get word out about their operations and activities. Along these lines WRRRC also is promoting a “brown bag” lecture program,

### Mark Calendars for WRRRC Conference

Much progress has been made in planning the Water Resources Research Center's spring conference, to be conducted in Casa Grande, April 28, 2004. The conference is taking on a timely topic, “The Future of Agricultural Water Use in Arizona.” Check “Announcements,” page 10 for conference details.

extending an invitation to individuals and organizations to make lunch-time presentations in the WRRRC Sol Resnick Conference Room. WRRRC host the event, supplying the conference room and sending out notices about the presentation. Guests bring their brown-bagged lunches.

In January Tucson Water conducted a WRRRC brown bag session describing its 2000-2005 water resource and system planning effort. The Upper San Pedro Partnership conducted a February brown bag.

The supplement in the newsletter is the publication equivalent of the brown-bag session in the conference room. Both enable water organizations to work with WRRRC in offering an outreach presentation, either within the covers of the WRRRC newsletter or within its conference room.

WRRRC extends an invitation to water organizations and agencies to get word out through an AWR supplement. Contact Joe Gelt, editor, for information.



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## News Briefs

### DOE Delays Announcing Tailings Plan

The U.S. Department of Energy is sidestepping custom by deciding not to announce its preferred solution for the problem of uranium tailings near the Colorado River until it issues its final environmental impact statement. Some critics see a strategy in this maneuver.

Federal agencies generally identify their preferred solution as they release the draft of the impact statement. By waiting until it releases its final EIS before identifying its solution DOE is leaving the public only 45 days to review its work. The draft EIS for the southeastern Utah tailing site is expected in April.

Among the five options DOE is considering for addressing the problem is pumping the tailings by pipeline to the White Mesa uranium recycling mill, about 85 miles south of Moab. Other possible destinations for the tailings include Crescent Junction, about 28 miles northwest of Moab and Klondike Flats, about 17 miles north of Moab. Another option is capping the tailings in place on the banks of the Colorado River.

Capping the tailings is the least expensive of the options. (No action is a very unlikely option.) Some believe that is not good enough, however, and that removing the tailings from the site is the safest course of action.

Critics say DOE has tipped its hand by deciding to identify its solution at a later date. They believe the agency intends to cap the tailings and wants to defuse any resulting controversy by minimizing the amount of time available for the public to respond.

Critics are concerned that capping the tailings will not safely dispose of the hazard for 1,000 years, the intended goal of whatever action is taken. They say the river might eventually cut into the capped pile. The tailings cover an area equivalent to 118 football fields.

DOE officials deny the allegation saying the agency's intent for the delay is to en-

sure that it is thorough in gathering information.

The site is the source of ammonia, heavy metals and mildly radioactive materials seeping into the Colorado River, posing a potential threat to endangered fish and downstream water supplies.

The 94-foot-tall, 12-million ton tailing site resulted from Uranium Reduction Co. mining and milling uranium for building nuclear bombs in the 1950s. The site was sold to Atlas Corp. in 1962 which operated it until 1998 when it declared bankruptcy.

The Nuclear Regulatory Agency once administered the site. Lacking the authority to move the tailings pile the agency approved a plan to leave the tailings in place, despite its own studies showing that uranium, ammonia and nitrates were leaking into the Colorado River. NRC officials stated that the contamination posed no danger to down river water users.

DOE took over the site in 2001.

### ADEQ Testing Advances Border Wastewater Plans

Plans for building a new international wastewater treatment plant in Nogales are advancing. In a recent development the Arizona Department of Environmental Quality, the International Boundary & Water Commission and the city of Nogales have begun testing the characteristics of wastewater flowing north through a nine-mile pipeline from Nogales, Sonora, Mexico.

Sampling and testing equipment are being installed in the line to continuously monitor the wastewater for acidity, temperature, salinity, corrosion potential and dissolved oxygen for 30 days.

In addition, daily samples are being col-



Attending the University of Arizona agriculture tour are Jackie Moxley, agricultural specialist, Sharon Megdal, associate director, Kathy Jacobs, associate specialist, all from the Water Resources Research Center, and Eugene Sander, dean of the UA College of Agriculture and Life Sciences. Romaine lettuce grows in the Yuma background. Photo: Randy Ryan

lected to determine the organic strength of the wastewater and levels of nitrogen and trace contaminants including metals. The sampling will characterize the wastewater, providing information officials need for developing plans to upgrade and revitalize both the plant and the interceptor pipeline.

ADEQ officials say the testing will supply information about flow rates and help identify possible sources of non-municipal wastewater entering the pipeline.

Plans for redesigning and reconstructing the facility face several challenges. The system must deal with fluctuating flows and industrial discharges of unknown origin, discharges the present plant is not equipped to treat. Finally, the wastewater arriving through the pipeline consistently contains high levels of gravel, sand, and silt loads, which disrupt wastewater treatment processes.

ADEQ officials say the current testing will help determine strategies for addressing these concerns.

### U.S.-Mexico Water Commissioner Named

Arturo Q. Duran has been appointed U.S. Commissioner of the International Boundary and Water Commission, to replace Carlos Ramirez, who served two years before

resigning in November for medical reasons.

Prior to his appointment to the commission, Duran served as general manager of the Lower Valley Water District in Clint, Texas from 2000 until 2003. He also worked as a manager and environmental coordinator with the U.S. Environmental Protection Agency. Duran was born in the State of Chihuahua, Mexico and raised in Ciudad Juarez, immigrating to the United States after graduating high school.

As commissioner, Duran serves as agency head of the U.S. Section directing activities in 12 offices. The IBWC maintains two Arizona offices, in Nogales and Yuma. The commission operates the Nogales International Wastewater Treatment plant that treats wastewater from Nogales, Arizona and Sonora. In Yuma the commission monitors the salinity of Colorado River water entering Mexico.

The IBWC is a joint U.S.-Mexican agency responsible for carrying out boundary and water treaties between the two countries and settling differences that arise in their application. The commission operates and maintains flood control levees, international storage reservoirs, diversion dams, wastewater treatment plants and boundary monuments at various locations on the border.

The IBWC was established 1889. Duran is the tenth U.S. Section commissioner in the agency's history.

#### RECENT WATER RESOURCES RESEARCH CENTER STAFF PRESENTATIONS:

On Jan. 14, Sharon Megdal presented the lecture "Securing Sustainable Water Supplies in Rural Arizona: Managing to Avoid Crisis" at a Navajo County Board of Supervisors special meeting and at the Board of Directors of the Navapache Electric Co-op monthly meeting. On Jan. 16 - 17, Kerry Schwartz conducted Healthy Water Healthy People Training at Lake Pleasant and on Jan. 28, conducted a Water Education Presentation at an Inter-Tribal Council of Arizona, Tribal Environmental Managers Meeting at Hon Dah Resort.

## Native American Group Opposes Snowmaking

If some American Indian advocates have their way Flagstaff's plan to sell reclaimed water for snowmaking might not materialize. Various tribal members are urging the U.S. Forest Service to reverse its support for snowmaking at the Arizona Snowbowl. The City of Flagstaff was to be a source of water for the project.

The Indians say using reclaimed wastewater to make snow on the San Francisco Peaks desecrates the sacred site. "We as indigenous people will not tolerate further desecration of our sacred peaks," said Rowland Manakaja, Havasupai tribe cultural director. He spoke during a news conference in the Flagstaff City Council chambers.

Man-made snow on the peaks also was said to be out of line with Hopi tribal beliefs of katchinas granting the rain and snow. Further, Native American herb gatherers are concerned that the reclaimed water could affect the spiritual qualities of plants collected from the mountains and used in ceremonies.

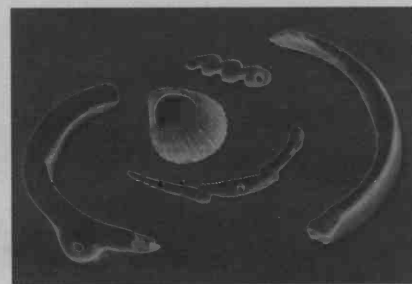
With limited snowfall since the mid-1990s, the 777-acre ski facility has suffered a financial setback. Snowbowl operators say guaranteed snow is needed to save the business. Snowmaking would add runs to the area.

The USFS released an environmental impact study suggesting the impact of snowmaking and upgrades to culturally sensitive sites might be mitigated if tribal leaders are consulted to ensure religious practices are not disrupted.

## Report: Bigger Not Always Better in Water Industry

A recently released study of Britain's water industry concluded that there was "no evidence of general economies of scale in the water industry." The study's results raise questions about some of the touted advantages of water utility privatization.

Commissioned by Ofwat, Britain's water regulatory agency, the study examined data the agency collected from the industry over the past ten years. Stone and Webster, which is part of the U.S.-based engineering firm, Shaw Group, produced the study.



*Shown above is shell jewelry from the Arizona State Museum's excavation of Hobokam sites along Phase B of the Tucson Aqueduct. This is part of an archaeological collection, gathered over 20 years of constructing the Central Arizona Project, that is being moved by U.S. Bureau of Reclamation's Phoenix Area Office to a permanent home at the Gila River Indian Community. Since 1986, the collection has been housed in a temporary facility in the basement of the Federal Building in Tucson. Curation was provided by the Arizona State Museum through an agreement with the University of Arizona. Photo courtesy of U.S. Department of Interior, Bureau of Reclamation.*

Ofwat said in a statement that, "Stone and Webster found there was no clear evidence of economies of scale for the water service companies. They also found significant diseconomies of scale — unit costs rising as companies get bigger — for water and sewerage companies, although these are now declining."

Further, the consultants found no evidence of overall costs savings when the same company provides both water supply and sewerage services. The current structures of water companies integrating water production and distribution were viewed as offering efficiency benefits.

Because of Britain's regulatory approach to privatization the study could have a significant effect on that country's water industry. Rules relating to privatization state that any proposed merger of regional monopolies must be referred to anti-trust authorities and require Ofwat's approval.

Analysts have long maintained that the regulatory barriers to intra-sector takeovers and mergers have had a depressing effect on UK water share prices.

Philip Fletcher, Ofwat's director general of water services, said, "This a useful contribution to our understanding of economies of scale in the water industry. Our own comparative work has shown that bigger is not necessarily better."





## Guest View

# Case Could Add Further Burden to Distributing State Water Supplies

*Sheldon R. Jones, executive director of the Agri-Business Council of Arizona, contributed this Guest View*

We need not look beyond the current headlines of our local or statewide newspapers, or television news' leading stories to be notified of continued challenges to this state's water supply. These challenges come in many forms creating concerns for water quantity and quality alike.

The one issue most widely recognized is the ongoing drought — now in its ninth year by many accounts — which is having noticeable impacts on groundwater supplies in many rural areas of the state. This has caused restrictions in surface water deliveries by Salt River Project two years running and, if the drought continues, may result in substantial impacts on Colorado River water provided to central Arizona via the Central Arizona Project.

Water quality concerns such as arsenic and the latest newcomer perchlorate, which was highlighted in the November-December issue of this publication, are of increasing concern as the science community continues to debate the “real” from the “perceived” risk(s). Lawsuits, whether designed to: establish a landowner's access to water; challenge another's access to “your” water; establish a water “right” in support of ecological or environmental purposes; along with citizen filed lawsuits that challenge the actions of capital enterprise(s) or the inaction and/or mismanagement of federal or state governmental regulatory agencies, these all have an impact on the water supply irrespective of the consumptive use. Agriculture, municipalities, industries, Native American communities and the environment all have a stake in these issues.

How much water are we talking about? Arizona has an annual water supply portfolio of some 7.24 million acre-feet, with 4.2 million acre-feet or 58 percent of the total consisting of surface water.

In all cases, surface water access requires the use of a conveyance system to get it from point “A” to point “B” and perhaps points “X, Y and Z.” Intricate systems consisting of storage facilities (lakes, reservoirs, retention basins and even underground aquifers), distribution and delivery systems (canals, pump stations, tunnels and pipelines) are necessary for surface water delivery. In many instances, surface water, regardless of its source may be commingled with other surface water or groundwater sources. This is true in Arizona, the West and many other parts of the country.

This issue of introducing water from one source into another is currently being considered by the U.S. Supreme Court, in a case known as the Miccosukee v. South Florida Water Management District case. The South Florida Water Management District (SFWMD) is the regional water manager for the 16-county area south of Orlando, Florida. Pursuant to the \$8 billion Everglades Comprehensive Restoration Plan, SFWMD is responsible for implementing the Everglade cleanup and restoration plan. One component of the plan is to move storm water, via canal(s), from flood prone areas of Broward County. The Miccosukee, a local Native American tribe,

challenged the movement of this water citing the Clean Water Act (CWA) and the need for the district to obtain a National Pollution Discharge Elimination System Permit (NPDES).

In 2002 the 11<sup>th</sup> Circuit Court ruled that a trans-basin diversion is a point source discharge under the CWA and subject to NPDES permitting requirements. Further a permit would be required for any transfer of water containing a measurable quantity of contaminants from one watershed to another through a conveyance system in the legitimate exercise of water rights to fulfill municipal, agricultural and industrial demands. This permit requirement would apply to the transfer of water even when the conveyor or transporter did not add any pollutants to the water. This is how CAP operates in delivering Colorado River water in its original river form to a host of users along its 336-mile system. CAP merely transports water, it does nothing to the water itself. The Salt River Project co-manages its system of water sources including the Verde and Salt Rivers as well as groundwater wells. The requirement of a NPDES permit would create a tremendous administrative burden on water providers and the regulatory system that is ill prepared to issue the permits. Further, the act of obtaining a permit does not address or require water quality improvement.

As an indication of the seriousness of this case and the impact an adverse decision by the Supreme Court would have on Arizona and the West, the respective editorial boards of the “Arizona Republic” and “The Las Vegas Review-Journal” issued opinions that contained the following statements:

“The five-year drought has taken its toll. To add huge costs or limit supply requirements would be in nobody's interests. Cities already treat water to Clean Water Act standards to make it safe for human consumption. To require that inter-basin transfers meet the standards of the receiving body — whatever it may be — strikes us as a costly and time-consuming remedy to a nonexistent problem.” “Arizona Republic,” January 3, 2004.

“As if Southern Nevada and the urban West don't have enough water worries with the ongoing drought, a case before the U. S. Supreme Court could complicate the issue even further.” “The Las Vegas Review-Journal,” December 23, 2003.

On December 22, 2003 the “Los Angeles Times” published a news story entitled “Water Pumping Case May Stem Flows in West — Managers fear that a Supreme Court ruling in a Florida suit could require federal pollution permits for transfers in other states.” The story was consistent with the Arizona and Nevada editorial board positions.

An adverse decision will carry a heavy burden for water conveyors and managers in Arizona and throughout the country. Here in the arid Southwest where surface water is of critical importance, with or without a sustained drought, we await the word of the Court. Let us hope it is the right one. (See “Legislation and Law,” page 7, for additional information on the case.) ■■■

## Effects of Natural and Human Factors on Stream Water Quality in Central Arizona

by David W. Anning

The U.S. Geological Survey's National Water-Quality Assessment (NAWQA) Program conducts research to provide an understanding of the water-quality conditions in more than 50 major river basins and aquifer systems across the country that constitute a significant part of the Nation's water supply and are representative of the Nation's major hydrologic landscapes, priority ecoregions, and agricultural, urban, and natural sources of contamination. Recent NAWQA investigations for a study area in central Arizona have shown the effects of natural and human factors on stream water quality. Results from these studies are summarized below and are fully documented in the reports listed in the section entitled "For more information."

### Highly Contrasted Hydrologic Provinces

The Central Highlands and Basin and Range Lowlands are two fundamentally different hydrologic provinces in central Arizona (fig. 1). In the Basin and Range Lowlands, basins are greater in areal extent than the mountains and typically contain thick sequences of basin-fill deposits. In contrast, basins in the Central Highlands have smaller areal extent than the mountains and contain shallow alluvial deposits. The climate is cooler and wetter in the Central Highlands than in the Basin and Range Lowlands. Human population and irrigated acreage are more than an order of magnitude higher in the Basin and Range lowlands than in the Central Highlands. As a result of climatic, geographic, hydrogeologic, and cultural differences, most of the surface-water resources originate in the Central Highlands, but are used in the Basin and Range Lowlands. The effects of natural and human factors on stream water quality for these two

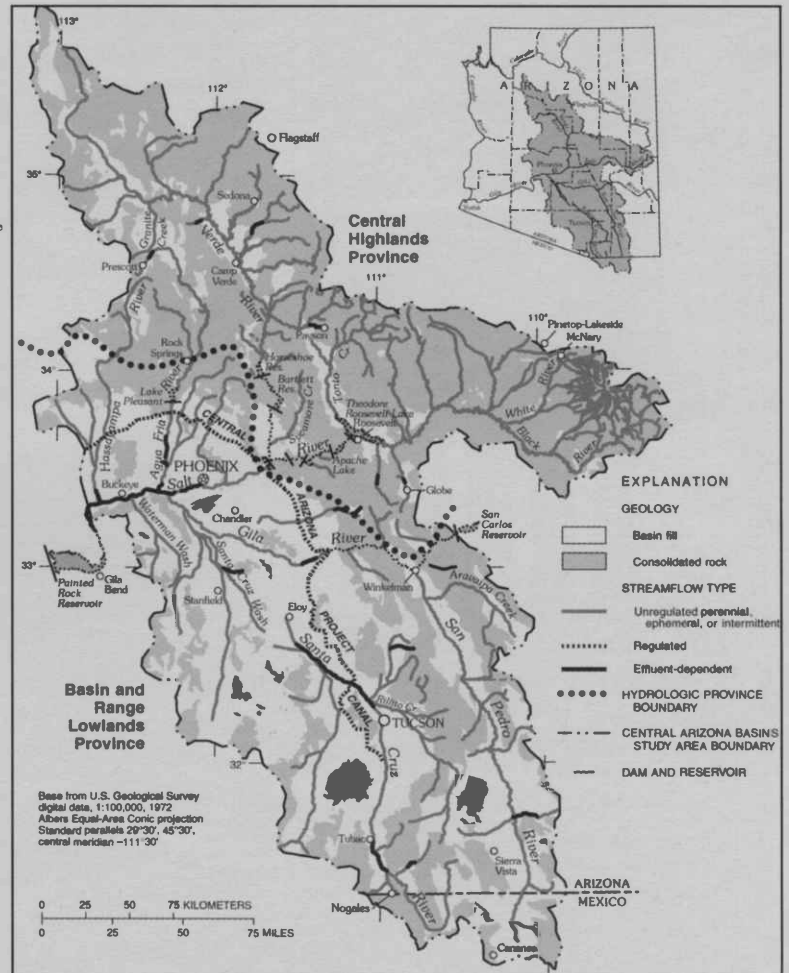


Figure 1 Generalized geology and types of streams in the National Water-Quality Assessment Program's study area in central Arizona.

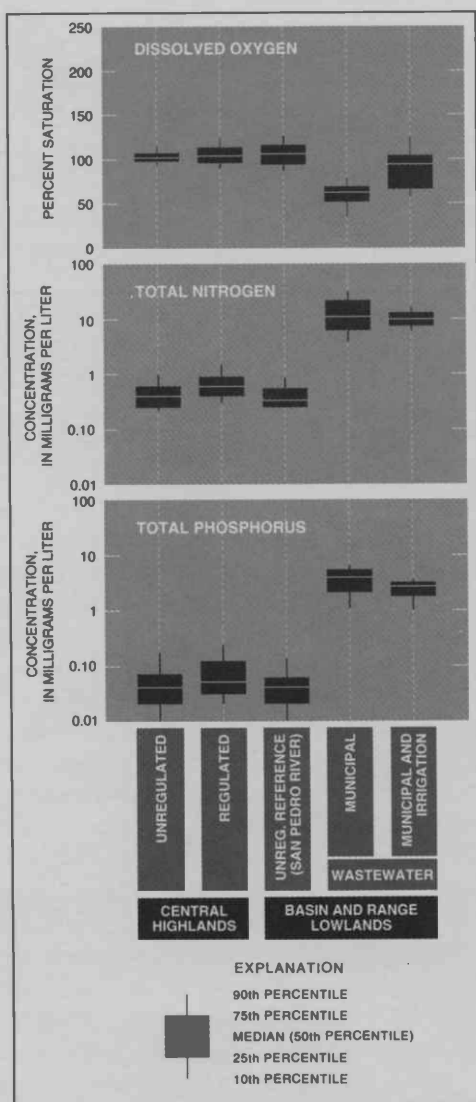
contrastingly different hydrologic provinces will be illustrated in the following sections.

### Central Highlands Unregulated Streams

The quality of most streams in the Central Highlands that are not regulated by dams is generally reflective of natural conditions. This assessment is based on dissolved oxygen, dissolved solids, and organochlorine pesticide and polychlorinated biphenyl (PCB) data for bed-sediment and biological-tissue samples from 5 stream reaches. Although metal contamination may impair water quality, metals were not included in this assessment. Dissolved oxygen typically was around 100 percent of saturation at the measurement temperatures and atmospheric pressures, and occurred at concen-



Sampling the Santa Cruz River.



**Figure 2.** Variation in dissolved oxygen, total nitrogen, and total phosphorus for different types of stream reaches in central Arizona.

ents are scavenged from the atmosphere and from the land surface as precipitation makes its way to the streams, and as a result, concentrations of nutrients in streams generally increased with increased discharges during the winter snowmelt and summer monsoon seasons. In contrast, concentrations of dissolved solids decreased with increasing discharge during the runoff seasons, because the low concentrations in precipitation runoff diluted the base flow of the stream.

In West Clear Creek, one of the most pristine drainages in the Central Highlands in terms of land use, organochlorine pesticides and PCBs were not detected in bed-sediment or biological-tissue samples. Most organochlorine pesticides and PCBs have low solubilities in water and tend to adsorb to streambed

trations adequate to support aquatic life (fig. 2). Dissolved-solids concentrations varied greatly as a result of geology—from about 90 mg/L in the Black River to more than 1,000 mg/L in the Salt River. Concentrations of dissolved ammonia, dissolved nitrate, and total phosphorus were almost always less than concentrations found by a nationwide NAWQA study to be indicative of effects from municipal and agricultural activities.<sup>1</sup>

Concentrations of dissolved solids, organic carbon, and nutrients in unregulated stream reaches of the Central Highlands fluctuated as a result of seasonal variations in runoff. Organic carbon and nutri-

sediment and to accumulate in the fatty tissues of living organisms. Many of these compounds have been restricted or banned in the United States because they are toxic to wildlife and humans and are probable carcinogens.

Not all streams in the Central Highlands are as pristine as West Clear Creek, and some with upstream municipal or agricultural land use had detectable concentrations of organochlorine pesticides. The metabolite *p,p'*-DDE, a chemical breakdown product of the insecticide DDT, was detected in two stream reaches of the Verde River, one reach of the Salt River, and one reach of Granite Creek, a tributary of the Verde River near Prescott. These detections exemplify the persistence of some chemicals in the environment, as DDT was banned for use in Arizona in 1969. Although no other organochlorine pesticides were detected in the main stems of the Salt and Verde Rivers, two other insecticides were detected in bed-sediment and tissue samples from Granite Creek. These detections were attributed to urban land use in the Granite Creek drainage.

## Effects of Large Reservoirs

Transition from the Central Highlands to the Basin and Range Lowlands hydrologically corresponds to a change from a relatively natural hydrologic system to a highly modified system. As major streams such as the Salt and Verde Rivers flow from the Central Highlands to the Basin and Range Lowlands, flow is impounded in large reservoirs and is later released for subsequent downstream municipal and agricultural uses.

Impoundment of water in the reservoirs changes the concentration, the seasonal variability of concentrations, and the relation between discharge and concentration for many water-quality constituents. The seasonal variability and the relation to discharge for many constituents generally are weaker in stream reaches downstream from the reservoirs than in stream reaches upstream from the reservoirs. For downstream users, this is beneficial because the result is a more reliable and consistent quality of the water supply. Concentrations of dissolved nitrate, total ammonia plus organic nitrogen, total nitrogen, dissolved organic carbon, and total organic carbon increase, and concentrations of dissolved solids and suspended sediment decrease, as a result of the impoundment of flow in reservoirs. This is a concern for municipalities because some compounds comprising the dissolved organic carbon may react with microbial disinfectants and form carcinogenic by-products during drinking-water treatment.

For the Salt River, the decrease in dissolved solids through the reservoir system is particularly important because inflow concentrations during low-flow conditions are much higher than the U.S. Environmental Protection Agency's recommended upper limit for drinking water (500 mg/L). Within the reservoir system, however, dissolved salt concentrations are diluted by runoff from winter snowmelt and summer monsoon storms. This dilution can reduce concentrations below the recommended upper limit, especially during wet years, which represents an improvement in drinking-water quality (fig. 3). From 1950 through 1998, the amount of precipitation generally increased in the upper Salt River Basin, and as a result, concentrations of dissolved salts in reservoir releases generally decreased during the same period.

<sup>1</sup> Concentrations indicative of municipal and agricultural activities are 0.1 mg/L ammonia as nitrogen, 0.7 mg/L ammonia as nitrogen, and 0.1 mg/L phosphorus.



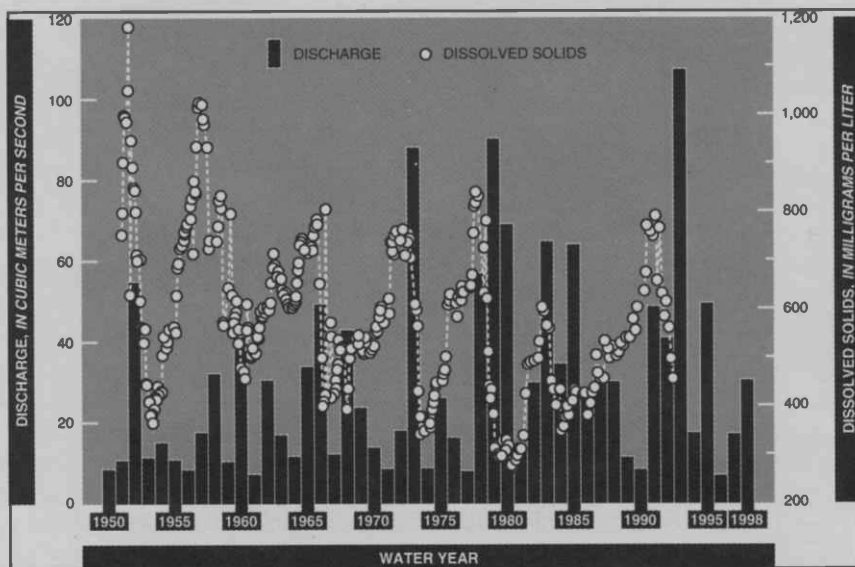


Figure 3. Dissolved-solids concentrations at the Salt River below Stewart Mountain Dam and the annual combined inflow (discharge) from the Salt River and Tonto Creek to the reservoirs upstream from the station, 1950-98

## Effects of Intensive Land and Water Use on Streams in the Basin and Range Lowlands

Since about 1900, approximately 85 percent of the water that was released or spilled from the reservoirs on the Agua Fria, Gila, Salt, and Verde Rivers was diverted for agricultural and municipal use in the Basin and Range Lowlands. Colorado River water, imported through the Central Arizona Project, is also used to meet the water demand. In terms of discharge, it is an even larger source of water supply than the four rivers combined. Within the study area, more than 250 miles of perennial stream reaches in the Basin and Range Lowlands are now ephemeral because of such stream diversions or because of lowered ground-water levels. Conversely, more than 50 miles of ephemeral reaches are now perennial because treated municipal wastewater or irrigation return flows are discharged back to the streams. Most perennial streams reaches in the Basin and Range Lowlands, by length, are either regulated by large reservoirs or dependent on treated municipal wastewater returns or irrigation return flows.

The quality of water in stream reaches receiving treated municipal wastewater or irrigation return flows is reflective of the intensive urban and agricultural land and water use in the Basin and Range Lowlands. The water quality of these reaches is particularly important because their flow infiltrates the streambed and recharges aquifers used for drinking water and other water applications. In addition, these reaches provide habitat for aquatic and riparian life. Water quality, however, is poor in these reaches compared to that of streams in the Central Highlands or that expected for natural conditions of major perennial streams in the Basin and Range Lowlands. The upper San Pedro River

serves as the best reference for natural water-quality conditions<sup>2</sup> because human activities, land use, and hydrologic modification are relatively minimal in this drainage as compared to other areas in the Basin and Range Lowlands. Dissolved-oxygen content and concentrations of nutrients in the upper San Pedro River are comparable to those of unregulated streams in the Central Highlands (fig. 2). Pesticide and organochlorine compounds were not detected in any water-column, streambed-sediment, or biological-tissue samples from the upper San Pedro River.

Nutrient concentrations were much higher and dissolved-oxygen concentrations were much lower in stream reaches receiving treated municipal wastewater or agricultural return flow than in the upper San Pedro River or stream reaches in the Central Highlands (fig. 2). Organic nitrogen is the predominant nitrogen species in the San Pedro River and in streams of the Central Highlands, whereas ammonia or nitrate are the predominant nitrogen species in stream reaches receiving treated

municipal wastewater. In the Gila River at Buckeye Canal and the Hassayampa River below Buckeye Canal, nitrate is the predominant nitrogen species as a result of fertilizers contained in agricultural return flows. Whereas runoff increases nutrient concentrations in the

**THE NATIONAL WATER-QUALITY ASSESSMENT PROGRAM** seeks to improve scientific and public understanding of water quality in the Nation's major river basins and ground-water systems. Better understanding facilitates effective resource management, accurate identification of water-quality priorities, and successful development of strategies that protect and restore water quality. Guided by a nationally consistent study design and shaped by ongoing communication with the local, State, and Federal agencies, NAWQA assessments support the investigation of local issues and trends while providing a firm foundation for understanding water quality at regional and national scales. The ability to integrate local and national scales of data collection and analysis is a unique feature of the USGS NAWQA Program.

upper San Pedro River and stream reaches in the Central Highlands, runoff dilutes nutrient concentrations in stream reaches receiving treated municipal wastewater or agricultural return flow.

Detections of man-made compounds such as pesticides, PCBs, and volatile organic compounds (VOCs) in water-column, streambed-sediment, or biological-tissue samples indicate the effects of municipal and agricultural land use on stream water quality. Of 86 pesticides analyzed in water-column samples, 6 insecticides and 1 herbicide were detected in 6 samples from the Santa Cruz River be-

<sup>2</sup> Excludes metals, which were not investigated.

tween Rio Rico and Tubac, which receives treated municipal wastewater. Samples from reaches that receive a mixture of municipal wastewater and agricultural return flows contained a greater number of pesticides. Water-column samples from the Gila River at Buckeye Canal contained 13 herbicides, 7 insecticides, and 3 pesticide metabolites. Similarly, water-column samples from the Hassayampa River below Buckeye Canal contained 14 herbicides, 9 insecticides, and 3 pesticide metabolites. Pre-emergent herbicides such as dacthal, EPTC, simazine, and trifluralin were detected seasonally between October and May in the Gila River at Buckeye Canal and the Hassayampa River below Buckeye Canal as a result of these compounds being applied before the appearance of broad-leaf weeds and grasses.

Streambed-sediment and biological-tissue samples from streams receiving treated municipal wastewater or agricultural return flows contained organochlorine pesticides and PCBs. Streambed-sediment and biological-tissue samples from the reach of the Santa Cruz River between Rio Rico and Tubac contained DDT and chlordane metabolites, and PCBs. Streambed-sediment and biological-tissue samples from the Gila River at Buckeye Canal and the Hassayampa River below Buckeye Canal contained PCBs and five organochlorine pesticides, including DDT metabolites at concentrations that exceed guideline values for the protection of aquatic life, fish-eating wildlife, and human health for edible portions of fish.

Streams receiving treated municipal wastewater also contained several VOCs. In the reach of the Santa Cruz River between Rio Rico and Tubac, water-column samples contained 10 VOCs. Concentrations were low for these VOCs; however, the detections are indicative of the effects of upstream urban activities. In the reach of the Salt River near Phoenix, 26 VOCs were detected just downstream from the wastewater-treatment plant outfall, but only 15 VOCs were detected 7 miles downstream in the Gila River at Buckeye Canal. Five compounds, including trichloromethane, were detected in every sample collected from near the treatment plant, whereas only trichloromethane was detected in every sample at the downstream end of the reach. The decrease in the total number of compounds detected and the number of compounds frequently detected are attributed to volatilization of compounds in this reach.

## Summary

Stream water quality in the Central Highlands and in the Basin and Range Lowlands of Central Arizona is affected by natural and human factors. In the Central Highlands, water quality of most streams is generally reflective of natural conditions and is affected by natural processes such as climate fluctuations. In some stream reaches, however, the effects of pesticide usage can be found in bed-sediment and tissue samples. As streams flow from the Central Highlands to the Basin and Range Lowlands, impoundment of flow in large reservoirs dampens variation in concentration and changes the mean concentration of several water-quality constituents. The intensive municipal and agricultural land use in the Basin

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and Range increases the concentrations of nutrients and supplies pesticides and VOCs to the streams. The NAWQA Program will continue to monitor streams in central Arizona and assess changes in water quality due to changes in (1) climate and other natural factors; (2) land use, water use, and other human factors; and (3) natural-resources policy.

### For More Information:

#### *Reports on surface-water quality by the Central Arizona Basins National Water Quality Assessment Program*

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## Legislation and Law

### U.S. Supreme Court Reviews Everglades Water Transfers Ruling

*Western water officials carefully watch case*

The U.S. Supreme Court recently heard arguments in a case many western water managers fear could bode unfavorable consequences for the operation of water transfer projects in their region.

The immediate issue is whether a pumping station in South Florida needs a Clean Water Act permit to pump storm water runoff into the Everglades. The Miccosukee Indian Tribe argue that such a permit is, in fact, needed, to protect the wetlands from runoff that often contains contaminants, much of it from agriculture areas using phosphorus-rich fertilizers.

The South Florida Water Management District, operators of the pumping station, disagree, arguing that its operation is not the actual source of the pollutants; it is merely transferring water from one side of a levee to another. In other words, the district functions as a neutral conveyor of water, not a polluter subject to Environmental Protection Agency and state regulation.

Last year a U.S. Court of Appeals upheld a lower court ruling in favor of the tribe stating that the pumping operators needed a National Pollutant Discharge Elimination System permit since they were piping water with various pollutants into the Everglades. The pumping company turned to the U.S. Supreme Court.

A decision favoring the tribe could set in motion a ripple effect, with implications to water managers throughout the nation, especially in the West where moving water to supply urban and other needs is a common practice. Western water officials fear a broad court decision for the tribal position could add expense and complications to the process of transferring water. For example, suppliers might need to treat water moved from one drainage to another.

Colorado's attorney general summarized the concern in an amicus brief filed with the Supreme Court by Colorado and New Mexico: "At risk ... is the continued ability to divert freely water from one basin for delivery in another basin in order to meet municipal, agricultural and industrial demands."

Water transfers are a major western water supply strategy. Colorado relies heavily on water transfers, with both Denver and Colorado Springs piping Western Slope water over the Continental Divide. Consider also the Metropolitan Water District of Southern California. Much of its supplies are imported from northern California and the Colorado River basin.

Arizona dips into the Colorado River for one-third of its annual renewable water supplies, delivered via the Central Arizona Project. What permitting requirements could be imposed to allow Colorado River water, naturally high in salinity and with sediments from runoff, to enter receiving bodies of water? What additional measures might be required to blend CAP water with Agua Fria water in Lake Pleasant? Or to recharge water downstream of Waddell Dam? Or to mix CAP water with Salt and Verde river water?

Sides in the legal controversy are largely drawn along regional lines. The arid and semi-arid West's reliance on transfer strategies to supply critical water needs allies the region with the water district. Along with the Bush Administration, which filed a brief in support of the water district, Western water districts and 11 Western states, led by Colorado and New Mexico, support the district's position.

On the other side, Eastern and Midwestern states, having a relative abundance of water, are concerned about protecting their water supplies from polluting industries. Viewing the tribe's position as protective of water quality, these states have generally aligned with the Miccosukee. Fourteen mostly Eastern states, led by New York and Pennsylvania, are supporting the tribal position in the case. Also aligned with the tribe are the Association of State Wetlands Managers and various environmental groups.

Justice Department lawyer Jeffrey P. Minear argued in court that the CWA does not apply in this case since the pumper is merely moving polluted water and not adding pollution to the water. Further, he said costs would be substantial if permitting were required.

Those on the other side of the issue say that allowing the water district to continue pumping without a federally approved pollution-control plan would undermine CWA protection, not only for the Everglades but also for other situations throughout the country. Environmentalists fear that a ruling against the tribe could leave the door open for further pollution, with water suppliers pumping contaminants from one basin to another.

Some observers disagree that a high court ruling in favor of the tribe will necessarily monkey wrench the western water transfer network. They are waiting to see how the Supreme Court decision is crafted, whether narrowly or broadly defined. With a narrow decision, the high court could concur with the appeals courts' decision, that suppliers diverting water from one drainage must comply with CWA regulations, but, at the same time, leeway could be allowed for water suppliers to develop appropriate plans to best meet the rules.

A decision in *South Florida Water Management District v. Miccosukee Tribe* is expected in the middle of the year.

### "Takings" Ruling Could Affect Species Protection in West

Efforts to save two rare fish over a decade ago may have come at a very high cost. A federal judge awarded \$26 million to a group of California farmers whose water was withheld to protect the fish. If upheld, the decision could also impose a cost on environmentalists who would then have a more difficult course to navigate to protect fish throughout the West.

At issue was the government's decision to withhold billions of gallons of water from farmers in California's Kern and Tulare counties between 1992 and 1994 in efforts to protect endangered winter-run chinook salmon and threatened delta smelt.

A ruling by Court of Federal Claims Senior Judge John Wiese

*Continued on page 8*

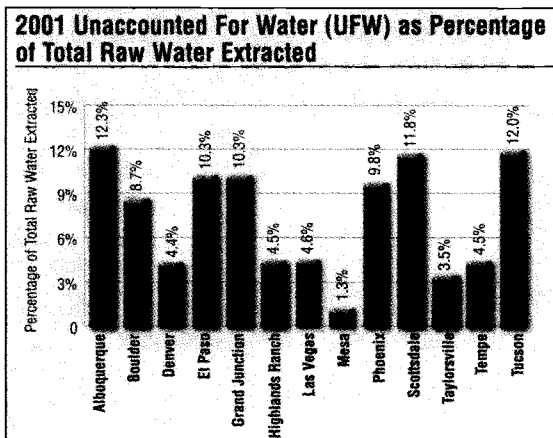


## Publications & On-Line Resources

### Report Compares Southwest Cities' Water Efficiency

**Smart Water: A Comparative Study of Urban Water Use Efficiency Across the Southwest.** *Written and produced by the Western Resource Advocates, the report is available at [www.westernresourceadvocates.org](http://www.westernresourceadvocates.org). Paper copies are available by emailing Don Wojcik at [don@westernresources.org](mailto:don@westernresources.org) or calling him at 303\_444\_1188, Ext. 247. The report is free of charge. Due to substantial production costs, however, WRA is seeking donations to cover the costs. An explanation letter will be included with the report mailing.*

“Smart Water: A Comparative Study of Urban Water Use Efficiency Across the Southwest” provides some needed analysis of western water use. Its premise is that meeting the water needs of the burgeoning populations of western cities poses a threat to the health of western river systems. What to do? The report is a response to those who argue that large water development projects are the way to go. Instead the report presents the case that improving urban water use efficiency can go a long ways toward meeting new water demand. It views western water policy as regrettably deficient in promoting water efficiency alternatives, due to legal impediments and a lack of sustained public interest.



*The above is one of the many figures “Smart Water” provides comparing water information among various western cities.*

Another significant obstacle to the adoption of efficiency options is the lack of comparative data on water use and efficiency options. The report sets out to make up for this lack of information by applying legal, economic and policy analysis principles in an interdisciplinary study of urban water use. Its goal is ambitious, nothing less than providing “for the first time, a detailed snapshot of current water use in major cities across the (western) region as well as recent trends in water uses, conservation and efficiency programs, water system leaks, water rate structures, and unmet potential in over a dozen cities.”

Arizona is included among the states studied in the report, with Mesa, Phoenix, Scottsdale, Tempe and Tucson getting attention. Various water use information from these cities is compared with information from other western cities.

Abundant information is provided in the five chapters of the study. Chapter 1 discusses environmental issues related to water supply and growth, describing what’s at stake if efficiency alternatives are not adopted. If Chapter 1 raised the specter of the hazards of heedless growth, Chapter 2 takes a more upbeat tone, describing available strategies for improving efficiency both on the demand side (i.e. through water conservation) and the supply side (e.g. collection and delivery systems).

Chapter 3 is a detailed analysis of many western cities’ commitment to water consumption and water conservation efforts. Chapter 4 examines the connection between urban sprawl and water use. Chapter 5 highlights “Smart Water’s” conclusions, proposing recommendations for water providers, policy makers and citizens to advance the water efficiency cause.

*Continued from page 8*

stated that the government’s halting of water constituted a “taking,” that it was an intrusion on the farmers’ private property rights. The Fifth Amendment to the Constitution prohibits government from taking private property unless fair payment is provided.

Property right advocates chalk up the ruling as a victory. They view it as a vindication of their position that the federal government has been over zealous in regulating in favor of environmental protection.

Environmentalists fear the decision will have a ripple effect throughout the West, its implications felt whenever the federal government and property owners face off over efforts to save endangered species, a conflict that occurs relatively frequently. The decision could affect the implementation of the Endangered Species

Act, especially the way water diversions are made.

Environmentalists claim the case represents a stealth attack on the ESA, upping the cost of protecting species to the point they become too costly to save. Other environmental areas would need to be neglected to pay the high price tag for preserving species.

The decision could have serious consequences to several western states. For example, California could face billions of dollars of claims, the result of courts having halted water diversions for environmental purposes. Also, in New Mexico an issue could be brewing, with the Bureau of Reclamation seeking court approval to take water from farmers and cities to protect the endangered Rio Grande silvery minnow. (See AWR, p. 7, July - Aug, 2003)

The question now is whether the Justice Department will take the next step and appeal the decision.



## Special Projects

# Two Small AZ Utilities Host EPA Arsenic Treatment Demo Projects

Two Arizona water utilities are among the 12 selected nationwide to participate in phase one of the U.S. Environmental Protection Agency's Arsenic Treatment Technology Demonstration Program. EPA's role in the program is to act as a broker or intermediary, arranging working relationships between small utilities with arsenic treatment needs and vendors or engineering firms having arsenic treatment technologies to demonstrate.

The two Arizona communities involved in the EPA program are Rimrock and Valley Vista in Yavapai County. Both communities' water utilities are owned by the Arizona Water Company.

The program is in response to EPA's awareness that small utilities, those with less than 10,000 customers, will need assistance in meeting the new arsenic standards. The program's intent is to promote research and development of cost-effective treatment technologies and to provide technical assistance to small system operators to reduce compliance costs.

In an early phase of the program, EPA invited small water utilities to submit an application if they were interested in serving as demonstration sites for an arsenic water treatment technology. The participating utility would not get any EPA funding but, if selected, would benefit by having its water treated by an EPA-supported contractor demonstrating a treatment technology.

Bill Garfield, Arizona Water Company vice president, describes the kind of information the company's utilities submitted to EPA. He says, "We provided information on water quality, flow rates, site plans including, for example, the size of the site, and whether liquid waste could be disposed of."

He says they also provided information beyond what the application required, to show that the systems served households with incomes below the national medium. He says, "We felt that also would perhaps be a consideration — the affordability of water rates after arsenic is removed."

EPA's plan was to include utilities in the program with various source water quality parameters to reflect conditions across the United States. This would provide a range of opportunities to demonstrate and test different water treatment technologies.

Arizona's participating utilities are small operations. Rim Rock's flow is about 90 gallons per minute, and its water tests at about 50 parts per billion for arsenic, which is the existing maximum contaminant level. Valley Vista's flow is between 40 to 50 gallons per minute and has 30 to 50 ppb of arsenic. The new arsenic standard to be met by January 2006 is 10 ppb.

Once utilities were selected, EPA requested that vendors, engineering firms and other interested entities involved in water treatment technologies submit program proposals. In preparing their applications, proposers referred to the list of participating utilities and checked the information the utilities submitted to EPA as part of their application process. Proposers could then better determine which utilities would best benefit from their treatment technologies.

Proposers submitted their proposals identifying one or more sites and provided information to support the claim that their treatment technology is compatible with the utility's source water quality conditions. All technologies needed to be commercially available for purchase with no additional development work required.

EPA then reviewed the proposals and determined which to fund, with the proposer or vendor receiving compensation for the technology. In effect, program proposers of treatment technologies get compensated for demonstrating their product to technology users.

The proposer participates in the installation and start-up of the treatment process including on-the-job training. Garfield says the contractors also worked through the process to obtain Arizona Department of Environmental Quality approval.

The utilities also have certain responsibilities to meet. For example, Garfield says that at Rim Rock, "We had to pay for the engineering and construction of the slab and for any structure or enclosures around the treatment plant. Plus we have to provide manpower resources to operate the plant during the term of the program."

Both Arizona plants will be utilizing absorptive treatment technology but with different media. AdEdge, the contractor building the Rimrock plant, will be utilizing an iron media developed by Severn Trent. At Valley Vista, Kinetic, the contractor, will be using activated alumina as the treatment media.

Information gathered during the operation of the demonstration project will provide an opportunity to evaluate the reliability of the technologies for small systems and gauge the simplicity of the operation. Also the projects will help determine maintenance, operator skills and cost-effectiveness and will characterize treatment residuals. At the completion of the program the utilities will have the option of keeping the treatment system and continue its operation or modify it.

ADEQ is expected shortly to approve the Rim Rock site, and construction will begin shortly thereafter, with the Valley Vista project soon to follow.

Information about the performance of the various demonstration projects will be made available in publications, presentations and on the EPA web site. Bob Thurnau of EPA's National Risk Management Lab says the information will enable small utilities who are having trouble finding the right treatment technology to search a database to match their water quality needs against what was done in the demonstration projects to find the best fit for their situation.

Thurnau says that although EPA support of demonstration projects is not new this project is breaking new ground. He says, "The size is one of key characteristics of this program. We have never worked at quite this magnitude before." ■





## Announcements

### Water 2025 Challenge Grant Program RFP

The Request for Proposals for the Water 2025 Challenge Grant Program for Fiscal Year 2004 is now available online at [www.doi.gov/water2025](http://www.doi.gov/water2025). The \$4 million program is seeking proposals from irrigation and water districts seeking to leverage their money and resources in partnership with the U.S. Bureau of Reclamation, to make more efficient use of existing water supplies through water conservation, efficiency and water market projects. The program will focus on achieving the outcomes identified in "Water 2025: Preventing Crises and Conflict in the West," particularly in water conservation and efficiency, water markets, and collaboration, with an emphasis on projects that can be completed within 24 months and that reduce future water conflicts. The deadline for submitting proposals is April 8, 2004. Selection and award will be in May or June with implementation beginning in early August.

### Groundwater in the West Conference

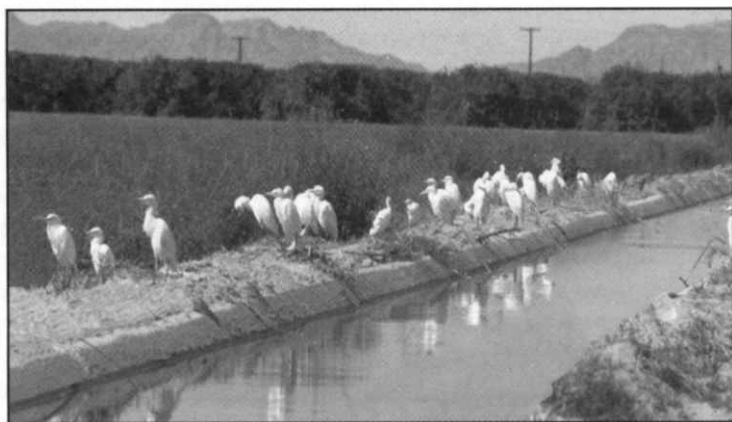
The Natural Resources Law Center is sponsoring its 25th summer conference at the University of Colorado Boulder June 16 -18. This year's conference will explore law, policy and management issues of one of the most important resources of the 21st century. The conference will begin on June 16 with a primer on groundwater in the West, with the next day's program devoted to examining case stud-

ies of groundwater use and management, focusing on innovative solutions for a rapidly growing West, transboundary issues, the High Plains and the Lower Colorado Region. Friday's program — available for separate registration — will focus on Colorado groundwater resources, issues, and solutions. For additional information or to register please contact NRLC, phone: 303-492-1286; fax: 303-492-1297; email: [NRLC@colorado.edu](mailto:NRLC@colorado.edu) or visit website: <http://www.colorado.edu/Law/centers/nrlc/waterconference/index.htm>

### AHS Offers Scholarships

The Arizona Hydrological Society will award three \$1,500 student scholarships in 2004. The intent is to encourage full time junior, senior or graduate students in hydrology, hydrogeology or any other water resource related fields at any Arizona university or college to excel in their field of study. The award will be based on the following: grade point average based on at least two full years of course work; letters of recommendation; application letter describing applicant's interests and career goals in hydrology and water resources; background in hydrology and water resources related activities; and degree of need. Scholarship applications must be submitted by June 30 to Dr. Aregai Teclé, Northern Arizona University, School of Forestry, P.O. Box 15018, Flagstaff, AZ 86011-5018. For additional information about the scholarship check the Arizona Hydrological Society web site: [www.azhydrosoc.org](http://www.azhydrosoc.org)

## WRRC's April 28 Conference-Dialogue Addresses Agricultural Water Use



*Egrets take advantage of agricultural water along an irrigation canal, with cropland and orchard in the background. Photo: ECAT*

"What is the future of agricultural water use in Arizona?" This is the theme of the Water Resources Research Center's spring conference, and it is posed as a question to emphasize that the event, planned as a conference-dialogue, is meant to be interactive. It will be an opportunity for representatives of the agricultural sector to discuss their views, with attendees encouraged to participate in discussions. Topics to be addressed include: key issues affecting the future of agricultural water use in Arizona; changing nature of Arizona agriculture; and the Imperial Irrigation deal — an Arizona perspective.

Scheduled April 28, 2004 in Casa Grande, the event is a joint venture involving WRRC and the University of Arizona's Department of Agricultural and Resource Economics. Sponsors to date include the Agri-Business

Council of Arizona, Arizona Farm Bureau, Central Arizona Project, U.S.D.A. Risk Management Assessment, Salt River Project, U.S. Geological Survey and the University of Arizona's College of Agriculture and Life Sciences.

Check the WRRC web site (<http://ag.arizona.edu/azwater/>) for additional information and to obtain a registration form. Registration fees: Early Bird (Before March 31) \$60; after March 31, \$75; and students \$25.

Contact Jackie Moxley for other conference information. (520-792-9591 ext. 17 or [jmoxley@ag.arizona.edu](mailto:jmoxley@ag.arizona.edu).)



## Public Policy Review

by Sharon Megdal

### AZ Public-Private Water Utility Ownership, A Changing Landscape



Privatization of water services is a complex issue. Ownership of many water systems in the state has long been in private hands, especially in unincorporated areas. On the other hand, public ownership of water systems is occurring more often in cities and towns. Historically, as areas have incorporated, municipal water utilities have often assumed the ownership of private systems.

Is there a trend toward municipal ownership of water systems in Arizona? If so, what are the reasons for it? Starting with the hypothesis that the trend in Arizona is toward governmental ownership – or municipalization – of water provision, my colleague Jackie Moxley and I have begun investigating these questions. We started by asking: How many water providers in Arizona have switched from public to private versus private to public in the past 20 or so years? Answering this question is not as straightforward as we hoped it would be.<sup>1</sup>

The reason it is difficult to track ownership is that the Arizona Department of Environmental Quality (ADEQ), the Arizona Department of Water Resources (ADWR), and the Arizona Corporation Commission (ACC) all collect and report data for different water provider activities. ADEQ drinking water system data are based on individual system identification numbers and system names, and are often listed for sub-systems of a single system. The ACC, which regulates privately owned water companies statewide, lists private companies in its annual reports on a consolidated basis. ADWR regulates groundwater used by water companies only in Active Management Areas. In addition, the information they report in their management plans, which are issued every ten years, has changed over time. In short, tracking change in ownership is not an easy task.

Because of these difficulties, our results to date are limited but interesting. Arizona mirrors the nation in that roughly 85 percent of its population is served by publicly owned water systems. Approximately 270 active water providers are regulated by the ACC. Many water systems are small. Based on recent information, 18 of the 20 largest water providers in the state are public water companies. The Phoenix Water Services Department, serving about 1.2 million people, is the largest water provider in the state. When aggregated across their individual systems, privately owned Arizona-American

Water Company and Arizona Water Company are the seventh and eighth largest privately owned water companies in the state. Like Arizona Water Company, Arizona-American's customers are spread over several divisions.

Because of difficulties in tracking ownership data statewide, we have first focused on tracking information for the Tucson region over a period of time. Upon examination of ADEQ and ADWR data, we concluded that between 1985 and 2001, there were some trends. First, we saw a general trend toward consolidation of smaller systems into larger systems. There was an 11 percent decrease in the number of providers serving the Tucson area, even though the Active Management Area population increased 34 percent. In this period, six large providers (serving more than 250 acre feet of water annually) were acquired by public water providers. Interestingly, among the small providers, all but one of the eight new service areas are served by private companies. This suggests that private water companies have a significant role in developing areas where an established water provider, be it public or private, is not nearby.

Interviews provided some reasons for the change from private to public ownership. A key reason was the need for additional financial resources to upgrade infrastructure and to comply with changing environmental regulations. According to a 1999 United States Environmental Protection Agency report, the estimated 20-year investments requirements in Arizona for water system transmission and distribution, treatment, storage and other needs is \$1.6 billion. Low profitability of the private operations was also cited as a factor. A Tucson area trend is the formation of Domestic Water Improvement Districts (DWIDs). These can be formed to serve unincorporated areas. In the past 10 years, four new DWIDs have been formed in the Tucson AMA.

We are continuing our research to examine what has occurred in other parts of the state and analyze the implications of public versus private water system ownership. Holding on to subcontracts for Central Arizona Project water had historically posed a problem for private water companies, who could not recover any of the holding costs until the CAP water was considered used and useful. The ACC has recently decided cases that allow for use of CAP water and recovery of the holding costs. Private water company involvement in storage of CAP has increased – for multiple reasons. There is renewed private water company interest in joining the Groundwater Replenishment District and obtaining an assured water designation. We would like to look at water quality compliance and compare performance for public and private water companies.

I expect results will show the trend toward municipalization will continue in and near incorporated cities and towns. I expect we will see consolidation of smaller systems in all areas of the state. Finally, I expect that, regardless of the type of ownership, we will see more sophisticated decision making, as water providers are dealing with the complexities associated with serving growing regions in an ever more demanding regulatory and climatic environment. ■

<sup>1</sup> An interesting note: Often the term "public company" is used to describe a water company that is not in private hands. It can refer to a water company owned by a city or town or a water district governed by an elected board. Recently, I realized use of the term public company could be misconstrued to mean a publicly traded company, such as the large private companies operating water systems in Arizona and elsewhere in the United States. In this column, public means not-privately owned.

*Assessment...continued from page 2*

He argues if an accident occurs, such as a tanker truck overturning spilling a toxic within a source water protection area, a response could be better organized. The threat to water sources could be better assessed and appropriate action taken if detailed information were available about wells and intakes. Informed people "could better trigger a deterrent system and clean up spills and releases."

He says a number of states have considered this option but he is unsure if any have implemented it. What it comes down to he says is an evaluation of risk, whether the occurrence of a terrorist act or an accidental spill or release poses the greatest danger to a drinking water source.

Also he believes if local people were aware of intake locations they could better organize variations of neighborhood watch programs. He says, "People would look out for and spot suspicious activities near a wellhouse and report it. If they don't know the locations then they won't be able to do that kind of reporting."

Most who advocate restricting access to sensitive information will acknowledge that it is a formidable task, that such efforts, whatever the strategies, would ultimately prove ineffective in the face of a determined effort to obtain information. Barriers and obstacles can complicate the collecting of information but not put data completely out of reach.

An ASWDA official says, "You can find the location of the surface water treatment plant driving down the street or in a phone book. The question becomes: How accessible do we want to make this information? And do we want to have one-stop shopping?"

"It is a question of determining what level of security is needed to access what information but realizing at the same time that at the end of the day people are going to get this information through other sources if they are diligent enough."

### **EPA requests SWA data**

Whatever built-in security flaws may exist EPA still wants to

use SWA information, although no law requires states to share this data with the federal agency. Discussions between EPA and the states about a voluntary sharing of information center on the federal agency adopting an appropriate policy to ensure the security of state released information.

EPA views SWA data sharing as a way to advance the cause of national water protection. EPA's Carl Reeverts says, "We are working with states to get the data voluntarily because we are both in the same business. ... EPA has a strong mission need for this data to do our federal job." To do the job requires providing good source water data to other federal agency.

Reeverts offers an example. A new law requires the U.S. Forest Service and the Bureau of Land Management to consider the impact of erosion from forest fires on drinking water. The USFS therefore wants to know the locations of intakes in affected areas. This is one example, and Reeverts says, "There are about ten or 15 standing requests from federal agencies to use this data."

It is now up to the states to decide whether to share sensitive information with EPA. Some states have already provided information under an agreement that the agency will not utilize the data until it establishes a security policy. Other states including Arizona await the completion of the policy before they share information.

Reeverts says, "We have not settled our public access policy for the data yet, and we are working on that." He says the main issue in the negotiations is that states have different laws about public access to information, and we are trying to develop one national standard to cover each state's concerns.

EPA values SWA information above other sources of water data. Reeverts says, "If we cannot provide this data — and we say this is the best available drinking water information — other EPA and federal programs will find other sources. That is a path we don't want people to take.

"Basically it is a data quality issue first and foremost." ■■■



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