



State Drought Plan Moving Forward

by Joe Gelt

The Governor's Drought Task Force, established about a year ago to develop a management plan for drought stressed Arizona, is making progress on its assigned task.

Sandy Fabritz, coordinator of the drought task force, says, "The focus of the plan is primarily on developing an adequate monitoring system so that we can give people enough up-front notice to enable them to adapt land management practices and personal habits ... to the conditions we are in at the time."

Timing is important to the success of the plan, knowing what to do and when. The drought plan will set various trigger points to indicate when certain actions are to be taken as drought develops, from its early beginnings to a full-scale emergency. Because drought affects multiple sectors in the same location differently, triggers will be in response to the vulnerability of each sector and region. Triggers will not be set to respond to statewide drought stages.

Fabritz emphasizes that drought is not

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The Virgin River flowing through Arizona, near Littlefield. Photo: Arizona State Library, Archives and Public Records, Archives Division, Phoenix, #93-0694

Water Management Issues Surface as Virgin River Wends its Way to the Colorado

Wheeling emerges as prominent issue

by Joe Gelt

In Arizona, the Virgin River is not a high profile, big issue river like the Colorado, Salt, Verde, and San Pedro rivers. With headwaters in Utah, the Virgin River meanders across the thinly populated northwest corner of Arizona, before flowing into Nevada and eventually into Lake Mead.

Arizona's noncelebrity rivers deserve attention. These rivers are parts of the whole. To know them is to better understand the big picture, that the state's river systems consist of diverse flows and interconnections, and that rivers, regardless of size, can raise issues of broad, statewide significance. This is certainly true along the Virgin River.

In its perennial quest for additional water supplies, Nevada is raising an issue about the management of the Virgin River and ultimately the Colorado River. The state wants to wheel its supply of Virgin River water through Lake Mead for delivery to Las Vegas. However the issue eventually plays out will not affect the Virgin River flow within Arizona. That is not at issue. Yet Nevada's actions could affect Arizona's Colorado River supply and its management of instate Colorado River tributaries.

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Another management issue likely to surface along the Virgin River is out-of-state water transfers. Developments occurring in the area raise expectations that an application will be filed to pipe water from Arizona to Nevada. Not yet having addressed an out-of-state water transfer request, the Arizona Department of Water Resources would be addressing an issue with broad water management significance.

Using Virgin River water

Arizona's stake in the water resources of the Virgin River is not high, compared to its neighboring states of Nevada and Utah. The Virgin River flows through a relatively isolated area of Arizona, with no large, rapidly growing instate population center thirsting for its waters. Littlefield, population about 1,600, is the only Arizona settlement of any size along the river. The US Bureau of Land Management has several instream flow applications for wild and scenic river status in the area. Also, water right applications for Virgin River water have been filed for some stock watering and municipal uses.

The situation is much different in Utah and Nevada. Both Utah to the north of Arizona and Nevada to its west have rapidly growing population centers that look to the Virgin River as an important water supply.

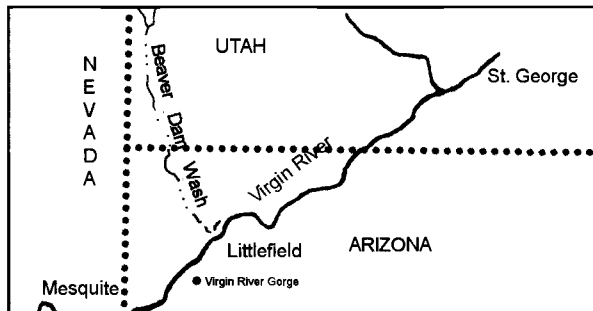
Utah has nearly fully developed its water supplies of the Virgin River and its tributaries. Some Virgin River water rights remain undeveloped, however, including about 50,000 to 100,000 acre-feet. This amount is earmarked for the St. George and southeast Utah area to support its long-term growth. If diversion structures and storage facilities are able to be developed, this last portion of the Virgin River in Utah will be diverted and used.

Downriver from Arizona, the Southern Nevada Water Authority holds surface water rights for 113,000 acre-feet on the Virgin River, an amount granted by state permit based on studies of the river's capacity. Its strategies to obtain the water includes a proposal that, if implemented, could bode major changes in the management of the Lower Colorado River.

Wheeling the waters

In its effort to develop its Virgin River resources, Nevada confronts a paradox that has plagued many efforts to develop the West: a water source distant from its intended point of use. The strategy resorted to in such situations is to pump the water directly from the source, in this case the Virgin River, and pipe it overland to its intended use which would be Las Vegas. SNWA is in fact considering such a strategy.

This would be a formidable undertaking. Cost of such a project, considered to the area's most massive public works project since Hoover Dam, is estimated to be about one billion dollars. This is an option SNWA would prefer not to pursue, especially since a less expensive proposal would seem to be



Virgin River

at hand, if only troublesome legal complexities could be resolved.

The utility's preferred solution, one that would save it from having to build a costly pipeline, is to leave the water in the Virgin River to flow into Lake Mead. Most of Nevada's 300,000 acre-feet of Colorado River water is pumped from this reservoir. According to this scenario Virgin River water would enter Lake Mead, to be retrieved downstream of the reservoir through the Las Vegas water intakes, with Virgin River water in and Virgin River water out. Whatever is needed to deliver the water to Las Vegas would already be in place: the natural course of the river, storage in Lake Mead and delivery via the city's intakes.

This is called "wheeling," with Virgin River water wheeled through Lake Mead for delivery to Las Vegas. Seemingly straightforward and logical, the plan raises troublesome issues and runs aground on formidable legal complexities.

Wheeling is controversial

ADWR Colorado River Section Man-

ager Tom Carr explains some of the complications. He says wheeling would provide Nevada an unfair advantage to waters of the Colorado River. This is because Nevada would not have to build the storage and pumping facilities needed if water were directly pumped from the Virgin River. Under typical appropriative water rights laws, including Nevada's, a water right is not approved until water is physically diverted and put to use. Allowing water from the Virgin River to flow to Lake Mead is not actually an appropriation of Virgin River water.

Wheeling in effect enables a state to claim water flowing into the Colorado River as a separate state water right distinct from all other water in the Colorado River. But Colorado River water is apportioned by the Secretary of the Interior and the Boulder Canyon Project Act, and there is no provision for recognizing state appropriative rights to tributary inflows under the Law of the River.

Carr says, "Wheeling would make it much easier for someone to put together nothing more than a paper water right for Colorado River water. ... What would happen is that someone would be given the benefit of a Colorado River water supply that other folks are now using without requiring them to make any sort of financial or physical commitment to divert that water within the state of origin."

Other problems also arise. According to a 1964 U.S. Supreme Court decree states can develop their Colorado River tributaries for use within the state. Arizona, for example, pumps water from the Little Colorado and the Bill Williams rivers. Whatever water is removed from the tributaries does not count against a state's Colorado River allocation.

Once the tributaries' flow reaches the mainstem of the Colorado River, however, its legal status changes. In mingling with the waters of the Colorado River the tributary flow becomes interstate water controlled by the U.S., subject to the 1922 Colorado River Compact and subsequent acts and agreements dividing the river's resources. In other words, the Law of the River rules rather than state law, with the water now available for diversion by the Lower Basin States and for meeting the water obligation to Mexico.

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Water Vapors

Do We Use Water to Raise Crops or Raise Stakes?

Las Vegas has a water problem, and it is not just about needing water. It also has to do with style and image. In its quest for water the city is aggressive, exploitive, quick to engage in legal maneuverings, but so are many other cities in the arid West.

What distinguishes Las Vegas from other western cities, however, is its defensiveness, almost a combativeness, as it takes up the gauntlet to defend its use of water against charges of promiscuous water use. And no other western city must wage battle on behalf of such a numerous, unpromising and extravagant assortment of water consumers; i.e., resorts and casinos.

In combating the image that the city is not to be trusted with water, city officials sometimes willingly go out on a limb to make a dubious point. Consider what the Nevada official said about the labors of Imperial Valley farmers.

In a bold display of one-upmanship, Richard Holmes, assistant Clark County manager, announced that water is better, or at least more profitably used to support gambling and tourism than to grow crops in California's Imperial Valley.

He raised some hackles when he said in a speech to an annual meeting of the Nevada Water Resource Association, "Our use of water for the primary industry in southern Nevada — gaming — is probably several hundred times the value per acre foot than ... you'll find in Imperial Valley.

This our-water-use-is-better-than-your-water-use boast is the old urban vs. agricultural water use controversy that has played out many times. It seems to come with a new twist when Las Vegas is the urban center in question. This is because gambling, although profitable, is not generally considered a highly esteemed urban activity, at least when compared to farming.

Jim Shaw of Yerington, federal water master for the Walker River, rose to the occasion when he asked, "Are we going to get our food from Third World countries so we

can support golf courses and slot machines?"

(The Water Resources Research Center's April 28 conference, "The Future of Agricultural Water Use in Arizona" will be approaching the topic more thoughtfully. Information about what occurred at the conference will be included in the next AWR newsletter.)

Las Vegas values water's finer qualities

Lest one become overly critical that Las Vegas appreciates water mainly to promote excess, spectacle and lavish expenditures, they might consider recent statements by Las Vegas business leaders reported in the *Las Vegas Review-Journal*. Perhaps some sensitivity about the aesthetics and finer qualities of water is not lacking.

Attuned to the mysterious power that water has on people, Las Vegas developer Steve Wynn said, "People want an emotional experience they can't get every day. ... They want to be enveloped in an idyllic, romantic, beautiful environment, and you really can't do anything beautiful without the water."

He also is aware of the sensuous, and even the spiritual qualities of water. He said, "Water is integral to the presentation of romance. ... Water evokes the common memory of Paradise."



The University of Arizona's Water Sustainability Program hosted Arizona State Legislators and other invited agency guests to dinner and a water information session on March 23 in Phoenix. Program speakers included staff from the four UA water centers including the Water Resources Research Center. Seen above during a panel presentation are Dave Goodrich, adjunct professor in the UA's Department of Hydrology and Water Resources, WRRRC Project Wet Director Kerry Schwartz, WRRRC Associate Specialist Kathy Jacobs and WRRRC Associate Director Sharon Megdal. Photo: Jackie Moxley

Hotel owner Phil Ruffin exults about the recreational attraction of water. He says, "Water is a great amenity. ... People like to look at water, people like to splash around in it. They just seem to like it."

One might be rightly skeptical upon finding that the above lofty statements were made in defense of extravagant water features in Las Vegas resorts. The headline of the newspaper article read, "Water attractions to remain Strip staple, developers say."

Perhaps Southern Nevada Water Authority General Manager Pat Mulroy is being the most straight forward when she says, "It's not slots and gaming that brings people to Las Vegas. It's the overall Las Vegas experience, and water features are part of that. People want to escape reality, and we market illusion."



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News Briefs

USGS, UA Form New Research Institute

The United States Geological Survey is forming a partnership with the University of Arizona to establish a new research institute on the Tucson campus. The Earth Surface Processes Research Institute will conduct ground-breaking research on landscape change and ecosystems response in arid and semi-arid environments.

ESPRI will consist of four core research areas: Quaternary bio/geochronology, quantitative hydrogeology, quantitative geomorphology and landscape change and ecosystem response. John F. Sutter, ESPRI co-director for development, says, "Two, maybe three of the areas are significantly

oriented toward water or hydrology."

Quantitative hydrogeology is the institute research area or component most directly concerned with water. Sutter describes the research intent in this area: "What we are interested in is how the geomorphic process — the surficial materials process — affects water availability at the surface at any particular place."

The quantitative hydrogeology component's initial focus is on semi-arid issues affecting the Southwest. Research topics include water extremes (flood/drought); landscape change ranging between Quaternary time scale and forecasting future response probability; humans as a hydrological process (large scale water movement); and urbanization (e.g., identifying areas of a basin that can be developed to minimize impact).

The intent of the USGS-UA partner-

ship is to form a multi-discipline research pool to ensure the widest possible perspective in designing common models and simulations. UA programs involved in ESPRI include the Geosciences Department, Hydrology and Water Resources Department, Laboratory for Tree Ring Research, Institute for the Study of Planet Earth, and the Office of Arid Land Studies.

Although USGS and the UA are currently involved in several cooperative ventures, ESPRI will break new ground. Sutter says, "What we are going to do is expand the relationship and make it more of a partnership. ... We are talking about actually designing entire joint research programs.

"This is a fairly new approach. It is not that it hasn't been done before — but not at this scale."

Sutter says the research institute will

Snow Falls Short of Water Needs

Snowfall on the eastern slope of the Rocky Mountains was again low this year marking the fifth straight year of below-average precipitation in the Colorado River Basin. The basin snow pack stood at 90 percent of average during the last week of March. April 1 usually figures as the last date to expect any additional snowfall.

The 90 percent figure may not seem an especially dire deficiency until the area's water needs are considered. To significantly relieve the extreme drought conditions several straight years of well-above-average snowfall is needed in the eastern Rockies. For example, even with snow pack levels at 90 percent Lake Powell's inflow is expected to be about 55 percent of normal due to the extreme dry conditions in the upper Colorado River Basin.

Reservoir water levels reflect the prolonged dry spell. Lake Mead is down to 59 percent of its capacity, with Lake Powell at 43 percent of its capacity,

down from 88 percent of capacity in January 2000. Water releases into Lake Mead have been halted until the capacity level of Lake Powell rises at least to the same level as Lake Mead. Officials say that during the past five years, the two reservoirs have lost a volume equivalent to a full Lake Mead.

Officials estimate that if the drought continues another year or more Lake Powell could be drained dry as early as 2007. This would be an extreme contrast to the situation in 1999 when engineers were releasing an excess of an overfull Lake Powell.

Meanwhile snow pack in Northern Arizona also has been disappointing. In Flagstaff, in-flow into St. Mary's Lake from snowmelt is expected to be about 37 percent of average this year. The lake, an important source of Flagstaff's water, is expected to receive about 1,520 of its usual 4,100 acre-feet of water from snowmelt this year.

Last year, Lake Mary had about 45 percent of its normal flow and in 2002 just 17 percent. Figures are based on a 30-year average.



The effects of the ongoing drought can be seen in the above photos comparing the Colorado River delta flowing into Lake Powell on June 2002 and March 2003. Hite crossing (bridge) is seen in the background. Photos: John C. Dohrenwend

create about 90 to 100 new positions. About 40 of the positions will be filled by PhD level scientists, with the remaining positions for various kinds of support staff.

Mexico Will Host Next World Water Summit

Mexican president Vicente Fox announced that Mexico will host the fourth World Water Forum in 2006 marking the first time the weeklong meeting on water scarcity will be conducted in America. Providing clean water and sanitation to the world's poor will be the focus of the 2006 summit.

As a prelude to the 2006 forum, a series of regional meetings will be conducted, organized by Mexico's National Water Commission and the World Water Council, an international water policy think tank. Nongovernmental organizations and the public will be able to contribute to the planning effort through a "virtual forum" to be conducted on the Internet over the next two years.

A topic that will not be on the agenda, possibly to the disappointment of some U.S. citizens and officials, is Mexico's water debt to the United States. Gaston Luken Aguilar, president of Mexico's National Water Advisory Council, says it is binational issue, between the two countries.

Mexico is obligated under an international agreement to deliver annually about 350,000 acre-feet of water to the United States each year from its Rio Grande tributaries, with the United States required to provide annually to Mexico an average of 1.5 million acre-feet of the Colorado River. Mexico fulfilled its requirement this year but owes from previous years.

In 2003, the World Water Forum was conducted in Japan attracting about 24,000 people, including water technicians, researchers, government officials and many citizens of water-stressed areas of the world.

Filtered Systems Gain Sales vs. Bottled Water

Once the tap water alternative of choice, bottled water is facing a market challenge from filtered water systems, now being installed in greater numbers in homes and offices. While demand for filtered water systems grew about 7 percent in 2002, with sales amounting to \$1.5 billion, sales of bottled water delivered to homes and business was about \$1.7 billion, representing about a one percent growth rate. Figures for 2003 are not yet available.

Industry representatives speculate that if the current trend continues deliveries of bottled water to homes and offices could shrink from what has been about a two to four percent annual growth. This would be the industry's first reduction in many years.

Economics may partly explain the shift. University of Arizona microbiologist Chuck Gerba sees varied savings. He says, "There is a significant cost savings using a filter. Also it is better for the environment because you don't have to transfer bottles all over." He says both

provide about the same quality of water.

Gerba says, "I think the trend (of using filters) will continue because of the deterioration of water quality at the tap. It is not that the water is not safe but we add more and more chemicals to meet current drinking water standards. And we taste the chemicals."

For example, new regulations require that groundwater under the influence of surface water must now be disinfected. More disinfectants therefore are used.

Another factor working to encourage increased use of filtered treatment systems is concern about treatment plant failures. Kelly Reynolds, UA assistant research scientist, says, "You may not have as effective treatment when you have high turbidity spikes from storm events. Even if your treatment plant is performing 100 percent effectively, the distribution system is subject

to contamination through leaky connections and backloads"

So I think the reason people are taking more control and treating their water at the tap is because of these unknowns and personal preferences for aesthetics. ... I get a lot more calls in my office from the public who want information about the risks"

RECENT WATER RESOURCES RESEARCH CENTER STAFF PRESENTATIONS:

On March 10, **Sharon Megdal** addressed the topic, "Securing Sustainable Water Supplies in Arizona" and on March 11, "Groundwater Management in the Sonoran Desert of Arizona: The Importance of Surface Supplies and Recharge." Both presentations were conducted at Torreón, Coahila, Mexico, with the first event a community presentation sponsored by Consejo Ciudadano por el Agua de la Comarca Lagunera and the second a presentation at a conference, Engalec '04, XII Encuentro Nacional de Ganaderos Lecheros. On March 20, **Kathy Jacobs** presented "Water Management Structures for Rural Arizona" at the Verde Water Forum in Cottonwood; on March 23, "Water Management Structures for Rural Arizona" during a legislative briefing dinner; on March 26, "Water Management, Drought and Rural Water Supply" in Peoria for the League of Woman Voters of Maricopa County; and on April 12, "Arizona Water Resources Management and Drought" at the University of Arizona Drought Seminar. On Feb. 26, **Terry Sprouse** presented "Exploring Alternatives for Management of Mexican Effluent in Ambos Nogales" in Mexico City to the 2003-2004 Fulbright-Garcia Robles Scholarship Recipients; on March 23, "Water Issues in the Southwest" to University of Maryland students visiting WRRC; and on April 7, "Surveying Water Quality in Tumacacori" and "Management Options for Mexican Effluent" during the Tumacacori Information Exchange Day in Tucson.

Do you live in a watershed?

A 2003 survey conducted by the League of Women voters asked 380 Coloradans, "Do you live in a watershed?" 50 percent of respondents said "no," 29 percent did not know. This information was provided by the Colorado Foundation for Water Education in a brochure recruiting membership.



Guest View

Arizona Agriculture Deserves Home Team Support

Joe Sigg, Director of Government Relations, Arizona Farm Bureau, contributed this Guest View.

Devotees of Wildcat basketball have nothing on Ohio State football fans. I was there cheering them on during the glory years of Woody Hayes. Admittedly, his penchant for running the ball over passing was a little dull, but they won.

As I look ahead to Water Resources Research Center's April 28 conference, "The Future of Agricultural Water Use in Arizona," the title inspires me to wonder, not if we will win, but will we convey a message of changing vitality, ingenuity and prosperity? We must, because water is the lifeblood of agriculture across all of our enterprises, and we need public understanding on many issues surrounding water.

While unintended, the philosophy of Woody Hayes also provides some guidance to agriculture in the upcoming conference. When asked why he did not pass the football more, his famous response was, "...three things can happen when you put the ball in the air, and two of them are bad." The same thing could happen at this conference with Arizona agriculture. When you put it up for debate, two of the outcomes are bad: (1) those with other agendas can confirm their preconception — i.e., agriculture should just move over; and (2) others may conclude it will just go away if we keep brushing it aside and treat it with benign neglect.

A third possibility is more positive: (3) we can confirm agriculture as a major economic engine for Arizona in capital creation and deserving some respect at the table, because it sets the table, differing from publicly financed projects touted as economic engines.

In large measure, the future of Arizona agriculture is linked to the creativity and energy of its farmers and ranchers. Success always rests with the participant; however, it is not just active engagement in the activity, as success is also in the shaping and guidance of the message, which brings me back to this conference as a focal point.

Because Arizona agriculture is diverse and entrepreneurial, we often fail to convey a cohesive message. My father often commented that in agriculture, each player has it "all on the line," and is in many respects a competitor with the folks next door, which works against both time and inclination for collaboration. He began many weeks not knowing how he would meet payroll at week's end, with all of it constantly on the line. He had to be innovative, adaptive and creative, as he knew what accountability was and where it would come to rest — a concept somewhat foreign to many people today.

The American public simply has no concept of what it takes to provide the bounty of choice in their food, fiber and ornamentals, leaving a big chunk of disposable income (about 90 percent) for other pursuits. We spend less on food than any industrialized country in the world.

Lesson # 1: We must convey our message for the public to develop a better understanding and respect for what is at stake.

In this country, we treat our agriculture with a bit of schizophrenia. Polls show favorable leanings and feelings toward those who provide stewardship over the land and husbandry of livestock, but those favorable images seem to have more breadth than depth.

The contributions and role of western grazing in preserving open space and holding resources together are not understood. We hear various voices against factory and corporate farms, without any understanding of the process, using sound bites without meaning that capture attention and misconstrue outcomes.

Some use outdated and outmoded environmental language to attack inputs generated by good science, sound research and economic realities. We take a bad rap for abusing resources and water, failing to account for the stewardship and efficiencies achieved. Best management practices across many enterprises is not just a slogan but recognizes we are making commercial business decisions in a highly regulated environment

In this country, we treat our agriculture with a bit of schizophrenia.

Yes, we need water, we use it, and it is not available for transfer just because someone has decreed a higher use. This is not a command-and-demand economy with some central authority saying where and what we produce. Just because we are highly regulated should not invite further intrusion, with us being told how or whether to operate our businesses, and yet, there is no lack of this kind of advice.

The media bombard us with complaints about farm programs, with no regard as to the consequences of outsourcing our agriculture. Much in current debate is the outsourcing of American jobs. Many economists reassure us the U.S. economy is flexible enough and has capacity to handle this — i.e. outsourcing is a natural force in a free and global market, and we are going through an adjustment period. Of course, we can also export our agricultural production capabilities, but perhaps we will need more than economists to weigh in on this, as we are now talking about food security. We have been outsourcing our energy production for more presidential administrations than I care to remember — how is that working out anyway? What does it cost to be at others' mercy for oil? Do we really want to add food to this list?

Arizona agriculture plays a major role in our security, our sustenance and our tax base. We are a highly regulated series of industries, additionally providing food safety at bargain basement prices. Agriculture needs a concerted message, and just maybe we can get a little leg up on true understanding.

Show a little respect Arizona. 🏡



Legislation and Law

Proposed Law Allows CAGR D to Recharge Less Water

The Central Arizona Groundwater Replenishment District will be recharging less water with legislation now under consideration by Arizona lawmakers. Some say the proposed legislation is merely a technical adjustment to the present law. Others maintain the exemption is a strategy to enable CAGR D to reduce its total recharge obligation.

Understanding the implications of the proposed legislation requires familiarity with CAGR D operations. The CAGR D helps member subdivisions and water providers demonstrate that they have a 100-year assured water supply. Demonstrating an AWS is a legal requirement that must be met before home sales in a subdivision can begin.

CAGR D membership enables a developer to use groundwater to supply the new development, without violating the Groundwater Management Act. CAGR D will replenish (recharge) in each AMA the amount of groundwater pumped by or delivered to its members in excess of the limited pumping allowed under the AWS Rules.

In discharging its responsibilities, CAGR D must meet legal requirements of its own. The recharge and recovery statutes require that the district recharge five percent more water into the aquifer than its replenishment obligation. The proposed legislation will exempt the CAGR D from the five percent "cut to the aquifer."

Proponents of the legislation argue that other entities such as cities and private water companies that recharge water are not always assessed the five percent cut. Their recharge operations are either classified as annual or long-term storage and recovery. Annual storage and recovery operations are not assessed the five percent cut whereas long-term operations are.

The CAGR D is said to engage in similar short-term operations, although in a different sequence. Instead of recharging water and then recovering it, which is what cities and utilities do, CAGR D replenishes groundwater only after its clients have used a supply. Although the sequences are reversed, the principle is said to be the same: a renewable supply is being recharged into the aquifer within a short period of time. Supporters of the proposed law therefore argue that CAGR D should be granted the same exemption that cities and utilities can obtain.

One difference between the two operations is that for cities and utilities short-term means storage and recovery in the same calendar year. With CAGR D three years can elapse from the time its members acquire groundwater to the time when the district recharges. The CAGR D's longer time frame is attributable, at least in part, to the delay caused by reporting requirements.

The five percent cut – and the proposed elimination of it – also is an issue with CAGR D's replenishment reserve. Legislation passed last year requires the district to establish this reserve for use during water shortages, with its long-term credits applied down the road as needed.

Under current law, most of the water CAGR D includes to build up the reserve is subject to the five percent assessment. (Effluent stored at a direct recharge facility isn't assessed a cut.) This could be a significant amount of water since the reserve may grow to several million acre-feet. Water the district takes from the reserve must be replaced to comply with its ten year plan of operation, and the five percent is again assessed on the recharged water. The proposed law would eliminate the five percent charge on both these transactions.

The rationale offered is that CAGR D pays the five percent charge twice. Also, and even more significantly, proponents argue that the entire replenishment reserve might be considered a cut to the aquifer. The supply of water is expected to remain in the ground, except in limited circumstances when it is "borrowed" and then replaced. It is argued, therefore, that the water generates a long-term benefit to the aquifer and should not be subject to the five percent.

The proposed legislation includes a provision that if the long-term storage credits in the reserve are sold or used for any purpose other than fulfilling a replenishment obligation, the five percent cut would be assessed.

Supreme Court Sidesteps Water Transfer Ruling

The U.S. Supreme Court sidestepped a decision on a case with possible major implications to the operations of water transfer projects. Many water managers in the West have closely followed the case.

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 Tribes argue that such a permit is, in fact, needed, to protect the wetlands from runoff that often contains contaminants.

The South Florida Water Management District, operators of the pumping station, disagreed, 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.

A lower court ruled in favor of the tribe stating that the pumping operators needed a permit since they were piping water with various pollutants into the Everglades. A U.S. Court of Appeals subsequently upheld the lower court decision. The pumping company turned to the Supreme Court.

The Bush administration backed the district position arguing that permits were not required when water from one navigable body was channeled into another navigable body of water.

The Supreme Court voided the appeal's court decision and ordered the lower court to reconsider the case taking into account the Bush administration argument. The sole justice to disagree with the decision was Justice Antonin Scalia who stated that the lower court decision should have been affirmed.



Publications & On-Line Resources

Government publications do not often get their just due. Often anonymously authored, although usually carefully researched, with a plethora of facts and figures, government publications are there for whomever wants them. Wanting such publications, however, means knowing they are available, and that is often the problem. Their availability is not much publicized. In an effort to help get word out, several U.S. Environmental Protection Agency publications of general water interest are described below:

Regulations: A Vital Tool for Protecting Public Health and the Environment

This is a guide intending to demystify EPA's regulatory development process. Written in a plain-language style, the guide includes such topics as: the origins of regulations; important considerations that guide decision making, including economic benefits and costs; and when regulations are not needed. Copies are available by contacting Andrew McIntosh, phone: 202-564-4696; email: mcintosh.Andrew@epa.gov. Also guide can be downloaded at www.epa.gov/opei/regulatory/booklet

Water On Tap; What You Need to Know

This is essentially a consumer's guide to the nation's drinking water, with each chapter title posing a question about the source, use,

treatment, quality or protection of water supplies. Chapter titles include: How Safe is My Drinking Water?; and Where Does My Drinking Water Come From And How Is It Treated? A copy can be ordered via mail from Water On Tap, #634D, Consumer Information Center, Pueblo, CO 81009 or be downloaded at www.epa.gov/ogwdw/wot/index.html

Getting in Step; A Guide for Conducting Watershed Outreach Campaigns

This guide offers advice on how watershed groups, local governments and others can maximize the effectiveness of public outreach campaigns to reduce nonpoint source pollution and protect lakes, rivers and streams. It is intended as a reference that pulls together principles, techniques, and information for effective watershed outreach into a single, user-friendly source. A companion video, suitable for viewing by stakeholders, educators and others interested in generating watershed outreach campaigns, is available to reinforce the steps outlined in the guide. Copies of these resources can be obtained from the National Service Center for Environmental Publications, phone: 800-490-9198; or the web site: www.epa.gov/ncepiphom. The booklet can be downloaded at www.epa.gov/nps/outreach.html

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Carr says that allowing SNWA wheeling rights, "sets a precedent for other folks to do the same thing ... to use wheeling to develop rights to tributary waters to the Colorado River of the lower basin. What is good for Las Vegas then is good for anybody, on the Little Colorado, the Paria or the Bill Williams. Water supplies that would be reaching the river for apportionment under the compact could be more readily claimed as part of the deliveries within the states."

This ultimately could affect Arizona's Colorado River supplies. Herb Dishlip, former ADWR assistant director for planning, says, "The Lower Basin States are obliged to provide half the Colorado River water owed by treaty to Mexico. The water to meet the Mexican obligation comes from inflow below Lake Powell. If we start using all that inflow, the only way we are going to be able to make up our half of the obligation to Mexico is to take it out of our share. And that causes shortages, and that means shortages to CAP."

Changing the Law of the River to accommodate Nevada's water needs would be a controversial undertaking, at least outside the state of Nevada. Even within the state, the success of the proposal is doubted, if a recent *Las Vegas Review-Journal* editorial is any indication. The editorial espoused the wheeling cause, at the same time sarcastically shrugging off what it considered to be its inevitable result. The editorial headline read, "Wheeling the water," with a subhead stating, "It makes good sense, so it will never happen, of course."

Arizona and California, the other lower basin states, are decidedly against Colorado River wheeling, even though Arizona could stand to gain if wheeling were an allowable option. To allow wheeling, however, the Colorado River Compact would have to be changed or modified. States using Colorado River water generally fear this would be done at high cost, that the compact as written ensures that river waters are appropriately allocated among various interests. In the rough and tumble of water politics, the compact's inflexibility is viewed as a virtue, ensuring that exceptions do not undermine its main purpose.

Arizona stands to gain

With no Colorado River tributaries California has little to gain from wheeling and much to lose if Colorado River flow is diminished or reduced. Arizona on the other hand does have Colorado River tributaries. What water Arizona currently pumps from its tributaries is mainly for use close to the point of diversion, with little transport required. There is, however, a situation in Arizona in which a city could benefit from wheeling a water supply through the Colorado River.

Scottsdale owns Planet Ranch and its 14,000 acre-feet of Bill Williams River water. With the ranch located nearly 200 miles from the City of Scottsdale, the water would need to be transported a great distance from its point of diversion to point of use. The city has identified several alternatives for transporting the water. One option is to build a 172-mile pipeline

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Special Projects

Drought Plan...continued from page 1

a sudden, unexpected event and that the triggers will enable the state to prepare. When triggers are hit sufficient information will be available and local involvement organized to be able to identify impacts and those likely to be affected by them. Appropriate responses can then be implemented.

Droughts are best managed to the extent they are understood, with a lack of information and a limited understanding the cracks that the best laid plans fall through. To avoid this pitfall the task force is relying heavily on science. Obtaining and applying the latest scientific information, particularly climate data is key to the plan.

Kathy Jacobs, co-chair of the task force executive committee, says, "We are trying to incorporate scientific information into the drought plan in new ways, particularly as it relates to the ability to predict drought conditions in the future."

The plan's emphasis on science is boosted by new scientific developments. For example, scientists now better understand the workings of global climate and its effect on local climate. Other scientific advances include the monitoring of ocean temperatures to predict future climate conditions. Of further scientific significance, much important work is being done at the University of Arizona's Tree-Ring Research Laboratory in identifying long-term climate conditions.

Jacobs says, "The task force is clearly taking advantage of research that has been going on nationally and internationally. What we are doing is tying ongoing research to the specific drought plan in Arizona." The task force also considered the experiences of other states, with drought plans from Montana, Georgia and New Mexico proving especially useful.

Nor have the social sciences been overlooked in developing the state drought plan. Researchers including anthropologists and geographers from the UA Climate Assessment for the Southwest project have studied sources of vulnerability in the municipal, ranching and agricultural sectors. They also have looked at the effectiveness of various strategies for communicating drought related information.

Jacobs says, "Historically the social science contributions to drought plans have gotten short shrift. We are doing our best to incorporate that kind of information into the Arizona plan."

For example, the Arizona drought planning process seeks to respond to the questions: What conditions create vulnerability to drought and what potential adaptive responses can be taken to cope with the effects of drought? This is a different approach than many other states have taken.

The task force realizes that whatever drought plan is devised must be sufficiently flexible to take advantage of the new and more extensive climate information becoming available. Rather than defining a specific drought management plan, therefore, the task force worked to develop a sustainable planning process. Jacobs says, "We are designing a process. The process is intended to be ongoing, and we hope to improve the way we do this over time. This is commonly called adaptive management."

Jacobs says that historically drought plans often have stressed reaction or after-the-fact emergency responses whereas Arizona's plan encourages sectors and regions to be more adapted to drought. She says, "In other words we figure out what sectors are vulnerable and how they have been affected by drought in the past. And then we work out how we can prevent those kinds of impacts in the future."

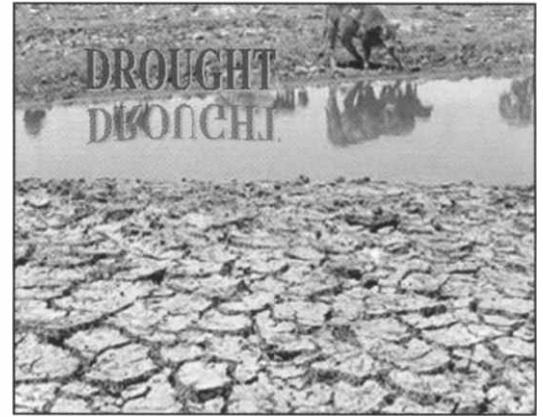


Photo: Arizona Department of Water Resources

The drought plan is breaking new ground in Arizona. Whatever state drought planning was done in the past focused on identifying water supplies for the major metropolitan areas then reacting to emergency situations in outlying areas by trucking in water. The proposed plan adopts a broader perspective, with conditions in rural areas now considered. Also the plan includes an evaluation of the dependability of urban area supplies in the face of severe sustained drought; e.g. during times when the Salt and Colorado river flow is affected.

Jacobs says, "Our water supplies may not be as secure as we believe they are so drought planning is essential."

The proposed plan's organizational structure includes a monitoring committee which is the hub of the plan's operations. Jacobs calls it "the heart of the ongoing exercise." The committee's task is to be forever vigilant and on the outlook for any signs portending drought. Whether signs of drought are present or not, the committee will meet monthly to review and evaluate present weather and climate conditions and anticipate future developments. Other indicators such as reservoir levels, stream flow and soil moisture also will be watched. The committee will collect and analyze data and evaluate the effectiveness of adaptive responses.

Membership in the monitoring committee consists of experts in their fields, ensuring that the most recent scientific information will be available for review. For example, the group is co-chaired by Gregg Garfin, head of the Climate Assessment for the Southwest and Tony Haffer, head of the National Weather Service Office in Phoenix. The state climatologist from Arizona State University and officials of the U.S. Geological Survey, the Natural Resources Conservation Services, U.S. Bureau of Reclamation and Salt River Project also participate

Jacobs says, "These are all people who are very involved either

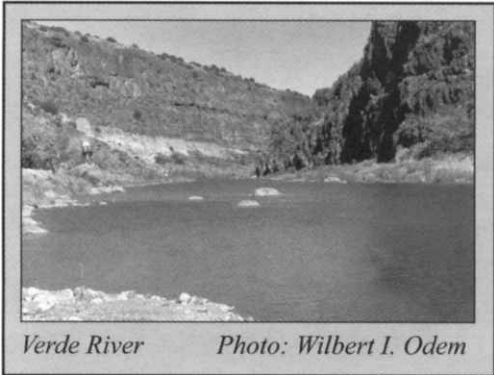
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Announcements

Water Protection Funds Available

The Arizona Water Protection Fund Commission has approved implementation of an FY-2005 grant cycle, with about \$1.2 million available for awards. Due to the limited amount of funding, the commission will only be accepting grant applications for capital



Verde River Photo: Wilbert I. Odem

projects that demonstrate direct benefits to rivers, streams and/or riparian habitats. Grant applications are due no later than June 16, 2004 by 3:00 p.m. Applications must be submitted to: Arizona

Water Protection Fund Commission, Arizona Department of Water Resources, 500 N. Third St. Phoenix, Arizona 85004. Grant application manuals and forms are available on the web at: www.awpf.state.az.us. To have materials mailed to you, please contact AWPf staff at 602-417-2400, X 7016. Direct questions to Rodney J. Held, phone: 602-417-2400, X 7012; email: rjhheld@adwr.state.az.us

Best Education Practices Symposium for Water Outreach Professionals

The symposium "Best Education Practices for Water Outreach Professionals" will be conducted June 2-4 in Madison, Wisconsin, with water education and natural resource professionals from around the country encouraged to attend. The symposium's tar-

geted audience include participants who have research or practical experience in educating audiences about water management. Those attending the symposium will participate in fine-tuning Water Outreach National Facilitation Project products and marketing strategy. The symposium's purpose is to assist natural resource professionals in meeting their water management education and outreach objectives. Agenda details and registration information are available at <http://www.uwex.edu/erc/waterbeeps/symposium.html>.

May 28 Deadline for CAP Research Award Competition

The May 28 deadline is rapidly approaching for papers to be submitted for the Central Arizona Project Award for Water Research. Papers submitted for this award should focus specifically on water issues affecting Central and Southern Arizona and the Colorado River. The first place award is \$1,000 and second place is \$500. Finalists will be invited to present their research at the Arizona Hydrological Society's annual symposium, expenses paid. For additional information about the award check "award for research" under "public info" on in the Central Arizona Project web site: <http://www.cap-az.com/>

Training for Small Utilities' Personnel

A National Environmental Training Institute for Small Communities will be conducted in Morgantown, West Virginia, July 27-30. Focused toward the needs of those who work in or with small communities, the sessions will include such topics as: small utility funding sources, drinking water technology issues, emergency response planning and coordination, management of small drinking water systems and alternative wastewater treatment technology. For the latest information contact the National Environmental Training Center for Small Communities at 800-624-8301 or 304-293-4191 or check the NETCSC's website at www.netc.wvu.edu.

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in data collection or weather and climate prediction."


According to the draft plan, the monitoring committee is to notify the governor at the first signs of drought and declare a drought warning or emergency when conditions warrant. The early drought warning will call into action two other groups created by the drought plan, one consisting of local officials from around the state and another group made up of state and federal agency heads. They will meet more regularly as drought conditions build, sharing information and coordinating activities in response to local and statewide conditions.

Conservation has a role in the drought management plan, although a separate and distinct effort is underway to develop a statewide water conservation plan. Fabritz says, "We are trying to make a distinction between long-term conservation practices and

short-term drought response options. These are two completely different things, although sometimes they overlap."

We are trying to get information out about the technology of water conservation. ... Hopefully communities can then adopt conservation measure to reduce their drought vulnerability."

Public input has been invited as the plan was developed. About 1,000 people are on a mailing list to receive information about task force activities. Also a web site is maintained to enable people to access materials related to the plan. (<http://www.water.az.gov/gdtf/>) The draft plan is expected to be released for public comment at the end of May, with a series of workshops planned for the summer. The task force expects to have a final version in the fall.

Governor Janet Napolitano established the task force by executive order on March 20, 2003 and gave lead responsibility to the Arizona Department of Water Resources. 



Public Policy Review

by Sharon Megdal

Obtaining, Interpreting Water Use Data is Complex Task



In developing the program for the April 28 Water Resources Research Center's conference, "The Future of Agricultural Water Use in Arizona," it seemed unwise to spend precious conference time providing statistical information on historical use of water by agriculture. But gaining perspective on what the future might hold in store usually requires some understanding of the past and present.

Plus, a look at water use trends over time and across regions within the state can be interesting and informative. So, I asked a few water professionals on and off campus to assist in preparing some written materials on agricultural water use to distribute at the conference.

This exercise highlighted a particular challenge, namely determining what we mean by water use. Often people report simple pie chart numbers on the percentage of water used by agriculture in Arizona. But, what do these numbers on water use by the different water using sectors in the state, most notably agricultural, municipal and industrial, tell us? In mid-March, an article appeared in the *Arizona Republic* on water use numbers for the state, as reported by the United States Geologic Survey. These numbers indicated that Arizonans withdraw more than 6.7 billion gallons — or almost 20,500 acre feet — of surface water and groundwater daily. The article reported that about 80 percent of the water is withdrawn for agricultural purposes, with 16 percent going toward municipal uses.

Note that a few different words were employed in the above paragraph. Although I first expressed the question in terms of water "used," I then wrote of "water withdrawal numbers." Water use is not the same as water withdrawn. Think of your own homes. Much of the water used to wash clothes drains through and is piped into the wastewater treatment plant (or for a very few of you a graywater system). The effluent or treated wastewater may then be used, perhaps even by another water-using sector. Some of the water used to irrigate your trees seeps into the ground and recharges the aquifer incidentally. Not all the water delivered to your home is therefore used by you. Similarly, not all water withdrawn by agriculture is used by agriculture.

I consider myself pretty good with numbers. But, when it comes to water, nothing is simple. At one point during the process of trying to understand just what the numbers were reporting, I asked for help. A series of emails from some very knowledgeable people followed regarding water "use" versus "demand" versus "consumptive use" versus "withdrawals." Incidental recharge and return flows were also discussed. We later met to discuss the difficulties of developing the pie chart referenced above.

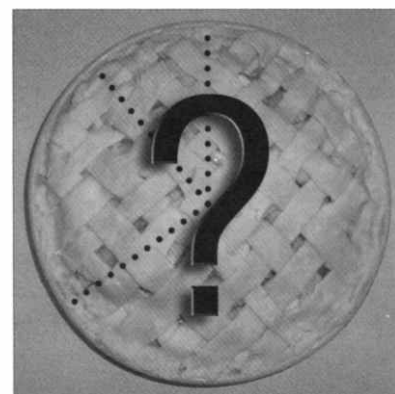
Developing what might seem like a simple pie chart is not so simple at all. In many parts of the state or for some users, water use is not metered and/or reported. Reporting of groundwater withdrawals is required only in the Active Management Areas. Data indicate that groundwater is the source water for over 40 percent of

the water used in Arizona. How accurate is that number? We don't really know. Consequently, we don't really have accurate statewide data for water withdrawn by any of the water using sectors.

Despite the difficulties in obtaining and understanding water use data, we do have good data on water used in the AMAs, including the heavily populated Phoenix and Tucson areas. And data on the Colorado River and other surface water withdrawals are generally good. The number of harvested acres, which may be a good proxy for agricultural water use, is clearly declining in parts of the state. George Frisvold, my colleague from the University of Arizona's Department of Agricultural and Resource Economics, has worked with me on sorting through the definitional issues discussed above and the data across counties. Data from the *Arizona Agricultural Statistics Bulletin* on harvested acres show that non-Indian agricultural activity has generally declined over the past 20 years in the Central Arizona AMAs but has increased in the Yuma area. Ken Seasholes of the Arizona Department of Water Resources has prepared a short write-up on the difficulty in estimating water usage and, with the assistance of Saied Tadayon of the USGS, has produced a map showing the distribution of agricultural activity

over the state. A short paper written for the conference by John Hetrick and Dave Roberts of Salt River Project shows that water used by non-Indian agriculture in the Phoenix AMA has declined by approximately 11,500 acre feet per year since 1984, which amounts to 1 percent to 1.5 percent per year, although some individual irrigation districts show increases in water use over the same period. In fact, it is interesting that if you look at 1984-2002 water use by non-Indian agriculture aggregated by the ADWR across the state's AMAs and Irrigation Non-expansion Areas, which do not include Yuma, there is no discernable trend (down or up) in agricultural water use. However, like in the Phoenix AMA, the geographic distribution, as well as cropping, has changed.

Lack of accuracy does not eliminate our ability to document important trends. Although agricultural activity is declining in some areas of the state, it remains robust and is growing in other areas. Municipal and industrial demand for water will continue to grow. We are in a drought and water conservation, while always important, is more important than ever. Exercises like the one we've gone through will enhance our understanding of our state's demand for water resources and assist us as we plan for the future. ■



Water use pie chart ingredients are data and pie. The data, however, is often too complex to neatly fit as segmented pieces of a pie.

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from the ranch to Scottsdale at a cost of about \$175 million, not counting the cost of acquiring rights of way and operation and maintenance expenses. Another option is to build a 16-mile over-land pipeline to discharge Bill Williams river water directly into the CAP canal for delivery to Scottsdale. This would be at a cost of about \$22 million, not counting charges for using the canal.

A more direct and certainly a less expensive plan of action would be to leave Planet Ranch water in the Bill Williams River to flow directly into the Colorado River. The Bill Williams empties into the river just above the CAP intake. Scottsdale's Bill Williams River allocation could then be pumped from the river into the canal for delivery to the city. Such a plan also would pay an environmental dividend, with Bill Williams River water benefitting a wildlife refuge downstream from what would be the point of diversion if a pipeline were built.

Such a plan seemingly offers efficiency and cost savings yet it is not a realistic option. State officials consider that whatever advantages Scottsdale may gain from the plan are more than offset by the legal problems likely to arise if the Law of the River were modified to allow wheeling. Scottsdale officials readily admit that wheeling is not an option. Beth Miller, the city's water resource advisor, says, "We want to work within the Law of the River. ... It would obviously be less expensive for us if we were able to discharge to the river, but we understand and agree with the state's concerns."

Out-of-state water transfers

The northwest corner of Arizona is a land of few people and little water demand. In the area, across the state border, the town of Mesquite, Nevada is growing in leaps and bounds. The scene is set for a possible role for out-of-state water transfers.

Taking unlawful advantage of such transfers may already be the stuff, if not of legend then certainly of rumor. Mike Pearce, former ADWR chief legal council, says, "I have heard allegations many

times during the years that water was actually crossing state lines up there, but it was never documented or proven to my satisfaction."

The first legal request came in 1990 when the Mesquite Farmstead Water Association submitted an application to ADWR to pipe Arizona water over the state line for use in Nevada. High quality aquifers, both alluvial and deep, are located along Beaver Dam Wash, a tributary of the Virgin River. The Mesquite utility hoped that for the cost of a relatively short pipeline it could gain access to good quality groundwater.

The request attracted opposition. Bruce Babbitt who represented an interest in the area went so far as to propose that the Beaver Dam Wash area become an active management area to restrict groundwater pumping. The vigorous opposition from residents in the Littlefield area, however, carried the day, and the application was never acted upon.

Arizona officials anticipate the issue to arise again, with either the Virgin Valley Water District in Mesquite requesting water transfers from Arizona or an entity within Arizona applying to sell water to the Nevada utility. Either way ADWR would have to address the issue of out-of-state water transfers. The agency has not yet approved any out-of-state water transfer applications, and any actions now taken could set a legal precedent in other areas of the state and possibly along the Mexican border.

Carr says the application to transfer water would need to meet a variety of different tests. Factors ADWR would consider include the availability of water in other states to meet the need; the adequacy of Arizona's water supply to meet the need; and the potential of conflict with existing and future Arizona water right holders. Also, a hearing would have to be held in the area of origin.

Carr says, "There is quite a burden on the ADWR to take a very hard look at any transfer request."

Would a transfer at this point of time stand a better chance than the 1990 application? Carr says, "I really can't say. It all depends on the circumstances." ■



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