

Water for People and the Environment

3rd Annual Regional Conference for North Texas

October 4, 2003

Dallas, Texas

Conference Director: Ken Kramer, Director, Lone Star Chapter Sierra Club
Regional Conference Organizers: Molly Rooke and Rita Beving, Sierra Club Dallas Group
Lone Star Chapter Sierra Club Staff: Brian Sybert, Jennifer Walker, Jon Brandt, Margot Clarke, Katy Vedlitz

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Some of the speakers at the conference had PowerPoint presentations on some of the topics discussed in these proceedings. For information on obtaining a copy of a particular PowerPoint presentation, contact the Lone Star Chapter of the Sierra Club at lonestar.chapter@sierraclub.org

PROCEEDINGS
Water for People and the Environment
A Regional Conference for North Texas
Dallas, October 4, 2003

Welcome: Ken Kramer, Director, Lone Star Chapter, Sierra Club



Ken Kramer, PhD. is the Director of the Lone Star Chapter of the Sierra Club and has been associated with the Sierra Club in different volunteer and professional capacities since 1978. Dr. Kramer has a B.A. in History from Texas Lutheran University, an M.A. in Political Science from Stephen F. Austin State University, and a Ph.D. in Political Science from Rice University. He has taught at El Paso Community College, Houston Community College, Angelo State University, and Texas A&M University. Dr. Kramer has served on numerous advisory committees to state and local agencies and officials, and he was recently selected by

the Texas Water Development Board to serve on the new Water Conservation Implementation Task Force.

Two of the purposes of the Texas Living Waters Project, which started in 2000, are to educate Texas citizens about water issues and to shape government policies that affect these water issues. These issues include water quantity and quality as well as planning for future water supplies for people and the environment. Through these regional water conferences we hope to get more people involved in these water issues. This year the Lone Star Chapter of the Sierra Club will hold four regional water conferences – in Houston, Dallas, New Braunfels, and Midland.

This conference is the third annual regional water conference to be held in Dallas. If funding for the project is continued, then the plan is to have just one regional conference each fall rotated around to different areas of the state over a three-year period.

As part of the Living Waters Project, the Lone Star Chapter of the Sierra Club has produced a *Facts about Texas Water* booklet as a basic educational publication on water. The booklet will be distributed to over 50,000 students in the Harris, Galveston, and Fort Bend County region, and 20,000 additional copies of the booklet are being distributed elsewhere, including at the regional water conferences. This booklet is available in Spanish as well.

Protecting Environmental Flows: Science, Economics, & Policy

Moderator: Laura Brock, Environmental Defense

Laura Brock is a Water Analyst for Environmental Defense. Laura's areas of expertise include water policy issues across the state with an emphasis in groundwater management, and growth and development issues as they relate to water availability. She

has a technical background in hydrogeology and a policy background from her tenure at the Texas Center for Policy Studies. Laura earned a Bachelor's Degree in Geological Sciences from the University of Texas at Austin and a Master's Degree in Applied Geography from Southwest Texas State University.



David Bradsby, Texas Parks & Wildlife Dept.

David Bradsby heads the Water Quality Program in the Resource Protection Division of Texas Parks and Wildlife. He has worked on water quantity and water rights issues for 14 years, and has represented TPWD in the Lower Colorado Regional Water Planning Group. He has a B.S. in Biology from the University of Texas and a Masters in Aquatic Biology from Southwest Texas State University.

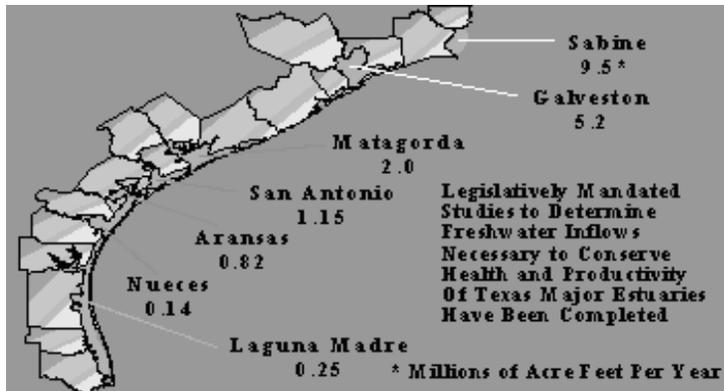
Texas has one natural lake, 23 river basins, and seven major estuaries. It also has 20% of its native fish species threatened with extinction, as well as five species already extinct. The in-place uses of surface water include wildlife habitat, flood control, and navigation.

What are environmental flows? - flows that remain in the stream (instream flows)
Instream flows provide: aquatic and riparian habitat, maintenance of native and rare species, biodiversity, water quality protection, recreation, navigation, and freshwater inflows to bays and estuaries.

Why worry about environmental flows?

- Water rights are granted on a perpetual basis.
- Most water rights do not provide for environmental maintenance flows.
- Many streams in Texas are over-appropriated – more water is permitted for use than typically occurs in the stream.
- Data suggests some aquatic systems have degraded due to dams & reduced stream flow.

Numerous rivers in the state already have altered instream flows, with many more projects proposed and under consideration. We don't know what the biological responses are and will be to such changes. In 1985, the Legislature mandated studies of freshwater inflows in seven major estuarine systems on the Texas coast, to determine the amount of inflow necessary to conserve their health and productivity. It should be noted that, although the inflow needed is usually expressed as an annual amount, seasonal variation must be taken into account to have ecological significance.



More recently, the 2001 Legislature ordered similar studies for instream flow required “to support a sound ecological environment.” These instream flow studies are to be completed by the end of 2010. They will address five components: water quality, hydrology, biology, connectivity, and geomorphology. Then, this year, SB 1369 created the Study Commission on Water for Environmental Flows. This 15-member commission will “conduct public hearings and study public policy implications for balancing the demands on the water resources of the state from a growing population with the requirements of the riverine, bay, and estuary systems.” Included in SB 1369 was a prohibition on issuing a water rights permit solely for environmental flow. One potential alternative is use of the Texas Water Trust, a mechanism to permanently retire water rights from consumptive use and dedicate them to environmental purposes.

Preservation of environmental flows will require multiple strategies.

Dwight Shellman, Caddo Lake Institute

Dwight Shellman is the president of the Caddo Lake Institute and a practicing lawyer. Dwight is also the chairman of the U.S. Ramsar Committee on Wetlands of International Importance and a recognized expert on the Ramsar Treaty of 1971. A former county commissioner, he uses his expertise in land use at the local level to organize community-based environmental stewardship programs. Dwight serves as a member of the NE Texas Air Care Advisory Committee and of the Steering Committee of the Cypress Basin Clean Rivers Program, and is the director of the Caddo Lake Ramsar Clearinghouse.



We are in a transition of the legal structure for managing natural resources, moving from people exercising political power at the local level to a worldwide “marketing” process. When, in the face of this new situation, we tried (and failed) to connect good practices to good policy, the margin of loss was narrow. We need to use new approaches; science can be applied on a watershed basis. And we can work with other interests in existing niches – the time of “winner takes all” is over.

Two years (between legislative sessions) is enough time to make use of and colonize the resources we already have. This session, I worked as a part of an environmental lobbying team whose purpose was to prevent a disconnect of good science

from policy. The legislature has a long history of ignoring science – the way permitting is done now, all the water will be “gone” by the time instream flow needs are established. We will end up having to condemn and purchase back water rights (at public expense). As to rationing resources, right now it’s the guys with ‘guns’ getting permits (the ‘guns’ are money), but it doesn’t have to stay that way.

We need to work within the “political ecology” – work with what we have and work collaboratively. From working with the legislators we can see that participating in city elections has ramifications beyond the city. Engage, get informed, and organize.

Myron Hess, National Wildlife Federation

Myron Hess is Legal Counsel in the Austin office of the National Wildlife Federation, where he concentrates on protection of wetlands and water resources. Mr. Hess has worked on environmental law in private practice and for Texas Parks and Wildlife Department. He is a graduate of the University of Texas Law School and Texas A&M University.

Water rights policy: in Texas, there are two important factors. First, older is better – the prior (senior) rights holder to the water can prevent a later (junior) rights holder from taking water if it would keep the senior right from being fulfilled. Second, water rights are perpetual – if a holder isn’t using the water, they are still entitled to it and can market it. Starting in 1985, some conditions were placed on new permits on behalf of environmental flows but they affect a very small amount (because so much is already permitted). Conditions on new permits alone are not the answer – in a large portion of the state, already-granted rights could use all the available water during a drought.

The situation (of allocated water) has grave implications. For example, in the Dallas area there are 5 million acre-feet already reserved from the Trinity River’s flow to Galveston Bay. The Bay, which, under natural conditions, is too salty around 6 months of the year, would be in that condition about 11 months a year if all the water already permitted were actually being used.

We have to include the environment in our water planning; not doing so is like leaving out a budget item in the budget plan. We must have definite, enforceable flow protections, as well as ensuring that water is used efficiently, and we must act quickly. Conditions can only minimize the damage of new permits; a good option would be creating/allowing instream flow permits. The state could reserve water rights to protect environmental flows, though that is not as good as the flow permits because the state can change its mind. We could cancel unused water rights (as happens in other states) but the legislature has been making that more difficult. Likewise, we could go back and put conditions on old permits – this would probably take judicial action. And, water rights could be purchased or donated for instream flow.

The public needs to let decision makers know that they care about this issue; citizens should show up at the hearings of the Study Commission on Water for Environmental Flows and contact the regional planning group members and elected officials to express their support for protection of environmental flows.

Meeting Future Water Needs: Options and Issues

Moderator: Mary Vogelson, League of Women Voters of Dallas

Mary Vogelson is one of two “public” representatives on the Region C Water Planning Group. She was nominated to this group by the League of Women Voters, with whom she has served in various board positions dealing with planning, environmental, and action issues for over 20 years. She is a former economist with the U.S. Department of Labor, Washington, DC. She holds a B.A. in Economics from Grinnel College, Grinnell, Iowa.

We are learning the economic importance, costs, value of the environment. This is a new addition to our talks on the environment. There is lots of talk about science because it's needed so we can back up an issue with facts and knowledge. Herein lies the importance of engineers and information.

If you don't have a plan for your water, someone else does (e.g. the U. S. Army Corps of Engineers, your water utility department).

We are all on this planet together. Population is an assumption underlying all issues. There is the economic assumption that people coming into an area are a sign of prosperity. But why is it that we plan to give water to anybody, at anytime, for any use they want instead of instituting land use planning?

Ernest Rebuck, Texas Water Development Board – “Desalination”

Ernest Rebuck, PhD. supervises the Regional Water Planning staff at the Texas Water Development Board. The Regional Water Planning staff consists of eight individuals who serve as liaisons to 16 regional planning groups, administer the contracts for the regional water planning and write the State water plan. Dr. Rebuck has B.S. and M.S. degrees in engineering from Penn State University and a Ph.D. in Hydrology from the University of Arizona. He is a registered professional engineer in the State of Texas. Prior to joining the Texas Water Development Board in 1998, Dr. Rebuck was the Planning and Development Manager for El Paso Water Utilities.

Desalination – used on brackish water, groundwater, and seawater. Depending on the source of water, the treatment varies. Brackish groundwater is not as saline as saltwater so it changes the cost of treatment.

Currently there are 100 small plants operating in Texas, producing 40 million gallons of water daily (MGD). Example: the City of Robinson (SE of Waco) desalinates brackish water from the Brazos River using reverse osmosis.

Senate Bill 2 gave the state the ability to offer incentives on desalination projects. Of the RWPGs, eight recommended or addressed desalination for a total capacity of >150 MGD. Two of the regions looked at the desalination of brackish groundwater. The costs are becoming more favorable for desalination. The groups are looking at ways to dispose of the wastes.

Gov. Perry's seawater desalination initiative - the TWDB is going to conduct feasibility studies on desalination in Texas. Nine groups have submitted statements of interest. Three projects will be looked at more closely: Brownsville, Corpus, and Freeport (Brazos River Authority).

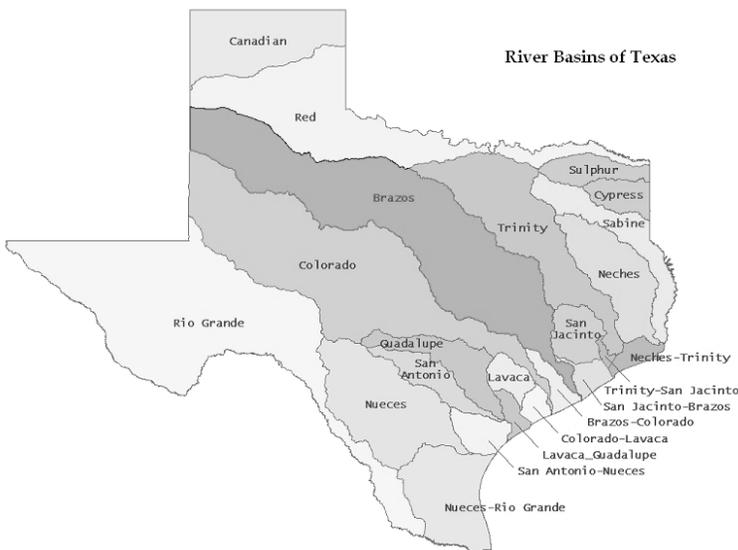
The proposed Brownsville plant is located in Region M. There is currently no power plant there. Having the extra water may make it possible to free up water for Laredo (upstream). The proposed Corpus plant does have a power plant associated with the proposal but it is currently up for sale. They don't have current water needs, but the extra water may make it possible for them to free up water for San Antonio. The proposed Freeport plant will be a public/private partnership between Dow Chemical and the Brazos River Authority.

Each of these projects will get \$500,000 to conduct feasibility studies. TWDB will also be pursuing federal funding. The timeline is for facility construction to be complete by 2006. There are 3 steps to the projects: design, construct, and operate. They are laying out the permitting process, looking at product water availability, and looking at injection wells as a way to dispose of wastes/by product.

**Tom Gooch, Freese & Nichols and Project Mgr. for Region C
"Interbasin Transfers"**

Tom Gooch is a hydrologist, a vice president with Freese and Nichols, Inc., and leader of the firm's water resource planning efforts. Mr. Gooch was the lead consultant and project manager for Senate Bill 1 Region C water supply planning, covering the Dallas/Fort Worth Metroplex and surrounding counties. He worked on developing water availability models of the Neches, Trinity, San Jacinto, and Brazos Basins, and several coastal basins for the Texas Commission on Environmental Quality. Mr. Gooch has helped clients obtain water right and/or Section 404 permits for the proposed Allens Creek Reservoir, Stamford's Paint Creek diversion, North Texas MWD's diversion from Lake Texoma, Lake Alan Henry, and numerous other projects.

Interbasin transfers (IBTs): what they are, what has been done and is being proposed, and what are the regulations, concerns, benefits. Interbasin transfers are the transfer of surface water between river basins (basins are defined by the TWDB). This definition gets



complicated when there are two separate river basins which flow into the same river downstream.

History of IBTs: There have been 85 trans-basin diversions across Texas. A few of the major ones are Lake Texoma to the Metroplex, Lake Meredith to Lubbock and Amarillo, Lake Livingston to serve Houston.

What was proposed in the Region C plan? Most of the new supplies in the plan are IBTs, with the exception of reuse. These include Lake Fork, Lake Palestine, additional Lake Texoma water, Lower Bois d'Arc Creek Lake, water from Oklahoma, and Marvin Nichols Reservoir (proposed). Later proposals include water from Wright Patman Lake and the Toledo Bend Reservoir. There are major IBTs proposed in other regional plans as well.



What are the regulations? IBTs require a state water rights permit. The regulations are more stringent than what are involved in developing a new water reservoir. Requirements include public notice and meetings, receiving basin practicing "highest practicable" conservation, and economic impact analysis. Also, the IBT water right will be junior to all existing rights. However there are exceptions to the requirements, including an emergency, small transfers (less than 3,000 acre-ft/yr), or transfers to a city or county that is partly in the basin of origin.

What are the potential impacts? IBTs impact stream flows and/or inflows to bays and estuaries from loss of water in the basin. There is an equity issue to the basin of origin, and concerns of cost and the potential transfer of undesirable species. This last one is not as high of a concern because IBTs are already happening.

What are the benefits? We can provide needed supplies, allow full use of existing projects, move water from areas of abundance to areas of scarcity, and increase flows to drier areas. IBTs can be beneficial to the state.

Janice Bezanson, Texas Committee on Natural Resources "Proposed Marvin Nichols Reservoir and Environmental Concerns"

Janice Bezanson, executive director of Texas Committee on Natural Resources (TCO NR), began conservation work in 1982 as a volunteer working on the Texas Wilderness Act. She served on the board of trustees and for two years as chairman of TCO NR before joining the staff. During ten years as TCO NR's Issues Coordinator, Janice lobbied on forest issues in Congress, successfully organized grassroots opposition to unneeded reservoir projects, organized a multi-level campaign to keep a Texas wildlife refuge from being removed from the National Wildlife Refuge System, promoted state and federal public land acquisition, and recruited volunteers. Janice also serves on the board of the Natural Area Preservation Association and on the Texas Rivers Conservation Advisory Board for Texas Parks and Wildlife Department.

The Region C Planning group was charged with finding water for the area. The Marvin Nichols reservoir is currently in the Region C plan. The reservoir will inundate 62,000 acres (plus periodically another 10,000 acres) of bottomland hardwood forests and family farms. There will be a displacement of farmers and ranchers, taking their livelihoods away. The Texas Forest Industry conducted a study on the potential impact to the timber industry and found an impact of \$87 to \$275 million a year.

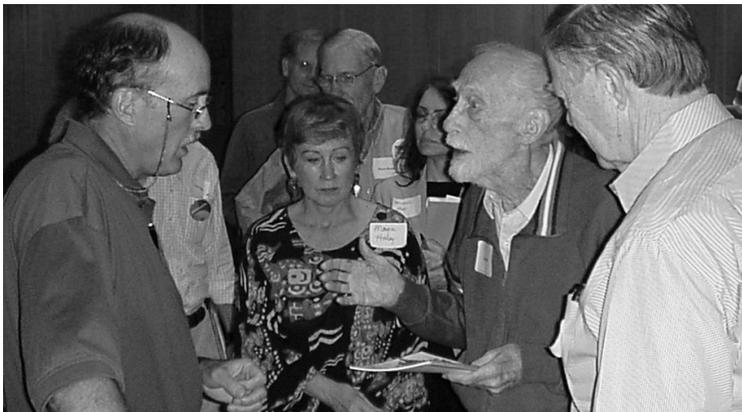


We don't want to build Marvin Nichols unless we absolutely have to.

It is our moral and economic obligation to choose the most economical water source. The lowest impact, and probably the lowest cost, is conservation. Using the as little water per capita as possible is the most efficient and the lowest cost. The per capita consumption rate for the Dallas area is actually projected to rise in the future. Dr. Norman Johns did a study that looked at how much water can be saved if Dallas did the same level of conservation as San Antonio or El Paso has done. This would save the city 521,000 acre-feet a year. This is 80,000 more than the water that will be produced through the development of Marvin Nichols.

We're not talking about having no water to drink – these are sensible, relatively easy changes. All the conservation measures accomplished by those two cities are doable in the metroplex. Even if we still need more water, there are other options, including the efficiency of operating the existing reservoirs as a 'system'. We can bring more water from Lake Texoma. But there is tremendous potential for conservation in Region C, and it is our responsibility as citizens to make conservation a priority.

Special Presentation: Saving Water Through Landscaping & Organic Gardening



Howard Garrett, “The Dirt Doctor”

*Howard Garrett is a landscape architect by training, and a certified arborist with years of practical experience in design, installation, maintenance, and problem solving. Currently, Howard, known as the “Dirt Doctor,” hosts a radio gardening show called **The Natural Way** on WBAP, and TV segments called “Garrett’s Organic Garden” on WFAA. He also writes a weekly column for the Dallas Morning News, likewise called **The Natural Way**, and a monthly column for **Acres USA**, a national eco-agriculture publication. Garrett is the author of numerous books on landscaping, Texas plants, and organic gardening.*

The biggest misconception is that organic can't be done on a large scale. Some of the biggest projects around are organic and there are more all the time. The organic program tries to address the health of the soil – ask yourself, “If I buy this and use it on my property, will it help or hurt the earthworms?” Root systems in organic plants are bigger and stronger, and thus need less watering. No to peat moss (anti-microbial), yes to compost. Cover thy soil – MULCH! Also, add lava sand – it holds water more efficiently than anything.

Plant wildflowers in the late spring, not the fall – that’s when the flowers do it. The Tierra Verde golf course in Arlington is the most organic (70%) so far. Scott Bonus S Weed & Feed is biggest seller nationwide but don’t use it – it will kill your trees. Use corn gluten meal – it has pre-emergent herbicide, as well as being a soil builder.

Go to dirtdoctor.com for more help and information.



Water Conservation in Texas: Progress, Challenges, Prospects

Moderator: Ann Drumm, Dallas Regional Group of Sierra Club

Ann Drumm is the Chair of the Dallas Regional Group of the Sierra Club. Her local advocacy work has included research and presentations on issues such as water conservation strategies and recycling. She is a lawyer by training and enjoys employing her research, writing and advocacy skills in the service of local conservation issues and public education.

John Sutton, Texas Water Development Board
“Conservation: What It Is, What It Isn’t, & How to Do It”

John Sutton is with the Water Conservation Division of the Texas Water Development Board. Mr. Sutton joined the Board in June 1994 to coordinate expanded conservation activities and currently manages the Municipal Water Conservation Section. Prior to being with the Board John managed the water conservation program for the City of El Paso and in a previous life was a landscape designer.

Conservation is defined as those practices, techniques, and technology that reduce consumption, loss, or waste, improve efficiency of use, and increase recycling and reuse of water so that supply is available for future or alternative use. Most of the water conservation actions in the 2002 (50 year) State Water Plan come from the agricultural use sector. The plan has an overall goal of reducing the gallons per capita daily (GPCD) statewide from a projected 181 to 159 (in 2000, GPCD statewide was 174). The 2007 Plan, however, requires the regional water planning groups (RWPGs) to consider conservation practices for every supply need identified in the regional plan. This requirement includes developing a conservation strategy for any proposed interbasin transfer that would result in the highest practicable efficiency.

Successful conservation involves determining the potential water savings of specific measures and selecting those that are most appropriate, as in feasible and acceptable. Quantifiable goals are set, taking into account estimated costs and benefits, with the overarching goal of achieving net savings of water.

A water conservation study done for TWDB (completed May 2002) evaluated the effectiveness of different conservation strategies in each water planning region, including the expected customer participation rate and the projected lifespan of the measure. In addition, the study standardizes the language used to describe the water conservation

techniques. Data for the study includes: estimated costs, both direct (to implement the conservation measure) and indirect (in-house services), to the utility; cost-savings analysis (water savings projections and cost per acre-foot, as well as regional variables and customer benefits); average annual per capita water use (base use, seasonal use, and dry year use).

On the utility side of conservation, operating procedures must be considered, in particular water loss programs and the role of metering, along with reuse of water. Utilities encourage conservation through water pricing, education, and incentives and more emphatically through regulations and ordinances. A big element of achieving water savings is public awareness and education –understanding and buy-in by the end-water user is necessary to ensure the conservation programs are effective. Though hard to quantify, public education supports all the identified water management strategies.

**Case Histories- City of El Paso
Showerhead replacement campaign**

- In 2000, distributed more than 160,000 showerheads
- Cost of showerheads \$2.31 each
- Cost per acre-ft \$9-\$65•Potential savings 1,735 ac-ft/yr

**Ken Kramer, Lone Star Chapter, Sierra Club – Part One of Presentation:
“New State Water Conservation Laws and the Water Conservation Task Force”**

This presentation is actually a two-part presentation – one on new water conservation laws followed by one on water loss. The first presentation is one that Carole Baker from the Harris-Galveston Coastal Subsidence District will be making at two of the later regional water conferences, and it is based on the paper “Water Conservation Legislation & Initiatives 2003” included in the conference packet.

A number of new water conservation laws were enacted in the regular session of the 78th Texas Legislature in the spring of 2003. Indeed about 70% of the bills on water conservation that were introduced in the 2003 regular session passed. Following is a brief description of each new law enacted:

HB 645 – relating to the creation or enforcement of certain restrictive covenants that undermine water conservation; a property owners’ association may not prohibit or restrict a property owner from:

- implementing measures promoting solid waste composting of vegetation;
- installing rain barrels or a rainwater harvesting system;
- implementing efficient irrigation systems.

HB 3338 – relating to the performance of a water audit by a retail public utility providing potable water; requires water utilities to perform water audits in order to increase water conservation in Texas; every five years a retail public utility providing potable water shall perform and file with the board a water audit computing the utility's most recent annual water system loss.

HB 2660 – relating to the establishment of minimum levels of water conservation in water conservation plans;

- beginning May 1, 2005 all water conservation plans must include specific, quantified 5-year and 10-year targets for water savings;
- the entity preparing the plan shall establish the targets;
- targets must include water loss programs and goals for municipal use in gallons per capita per day.

HB 2663 – relating to the establishment of quantifiable goals for drought contingency plans;

- by May 1, 2005, a drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortages and drought;
- TCEQ and TWDB shall identify quantified target goals for drought contingency plans that entities may use as guidelines;
- TCEQ and TWDB shall develop model drought contingency programs for different types of water suppliers.

HB 2661 – relating to the use of graywater;

- graywater is household wastewater from clothes washing machines, showers, bathtubs, handwashing lavatories, and sinks;
- the use of graywater can produce approximately 100 gallons of excess water per day;
- this bill requires TCEQ to adopt and implement minimum standards for the use of graywater for certain purposes.

SB 1094 – relating to the creation of a task force to evaluate matters regarding water conservation;

HB 1152 – relating to the authority of certain nonprofit water supply corporations and sewer service corporations to establish and enforce customer water conservation matters; amends the Texas Water Code to provide nonprofit water supply corporations the statutory authority to enforce reasonable water conservation practices and prohibit wasteful or excessive water use.

Three important water conservation bills from the 2003 legislative session that did not pass floor action were the following:

- HB 487 – requiring the TCEQ to adopt standards for requiring newly installed or modified irrigation systems to have a rain shut-off device;
- HB 488 – relating to performance standards for toilets sold in the state;

- HB 489 – relating to water and energy saving performance standards for commercial clothes-washing machines.

The Water Conservation Implementation Task Force created under Senate Bill 1094 has the following responsibilities:

- identify, evaluate, and select best management practices for municipal, industrial, and agricultural water uses and evaluate the costs and benefits for the selected best management practices;
- evaluate the implementation of water conservation strategies recommended in regional and state water plans;
- consider the need to establish and maintain a statewide public awareness program for water conservation;
- evaluate the proper role, if any, for state funding of incentive programs that may facilitate the implementation of best management practices and water conservation strategies;
- advise TWDB and TCEQ on a standardized method for reporting and using per capita water use data and establishing per capita water use targets and goals, accounting for such local effects as climate and demographics; and evaluate the appropriate state oversight and support of any conservation initiatives adopted by the Legislature.

As required by SB 1094, the TWDB selected task force members recommended by and representing the following entities and interests: TCEQ, TDA, Parks & Wildlife Department, State Soil & Water Conservation Board, municipalities, groundwater conservation districts, river authorities, environmental groups, irrigation districts, industries, institutional water users, professional organizations focused on water conservation, and higher education.

The Task Force will have its first meeting on September 29 and will work at on a fast schedule to complete its assignments.

Ken Kramer, Lone Star Chapter, Sierra Club
Part Two of Presentation: “Water Loss in Texas”

Water loss (also called unaccounted-for water) is the difference between the amount of water a utility purchases or produces and the amount of water that it can account for in sales and other known uses for a given period. Simply put, it is the water that a utility cannot account for. It is often attributable to inaccurate or incomplete record keeping, meter error, unmetered uses such as fire-fighting, line flushing, public use and wastewater treatment plants, leaks and water theft.

Comparing water loss in Texas with other states is difficult due to lack of consistent terminology and standards. Lack of standard terminology and measures are at the center of the water loss penumbra.

How much water loss is acceptable in a system? The TWDB recommends immediate action if the unaccounted for water is above 15% for municipal systems and 15-18% for widespread rural systems. The International Water Association recommends looking at water loss in volume.

The water audit is the first step to understanding water loss. In the typical water audit you record the total amount of water produced or purchased, total amount of water sold and a breakdown of where the remaining water is. There is variability in the types of water audits.

There were three sources of information for the Sierra Club water loss research. The Sierra Club survey sent out to 1000 water suppliers in Texas (those serving the largest number of customers). The survey requested information on annual water loss, cost of the lost water, whether water audits are completed on a regular basis, how water loss is addressed by the utility and whether their water conservation plan addresses the issue of water loss. The second piece of information came from the Water and Wastewater Utilities Annual Report. This is required of all investor-owned utilities and filed with the Texas Commission on Environmental Quality. It has a section about annual water loss. The third piece of information came from the survey of ground and surface water use. This is a yearly report required of all governmental water systems and is filed with the TWDB.

Response to the Sierra Club survey was dismal. Only 67 out of 1000 survey were returned. Possible causes of this low rate of return are outdated addresses, lack of information available, lack of desire to answer questions, lack of understanding and lack of one person in charge of the information. From the returned surveys there is a water loss rate of 10.2%.

There were over 12 billion gallons of water lost in just 67 water utilities (these are the ones that returned the Sierra Club survey). There are thousands of water suppliers in Texas. None of the larger water suppliers responded to the survey. The total population served by those who responded is roughly 800,000. Water suppliers in Texas serve over 20 million people.

According to the surveys turned in to TCEQ, there is a water loss rate of 14.7%. There are 661 investor-owned utilities in the State of Texas. Out of the 4,144 water systems that report to the TWDB, only 399 reported how much water they sold and 1085 reported how much they lost. It is difficult if not impossible to gauge water loss from this data.

The bottom line is that the current data on water loss in Texas is neither accurate nor complete. The State Water Plan proposes to spend billions of dollars to increase the water supply in Texas, but Texans have no idea how much water we waste.

As a result of the research the Sierra Club makes three major recommendations:
-Texans should aggressively monitor water loss.

- The State of Texas should require water providers to reduce water loss.
- Texas should make reduction of water loss a priority for meeting future water demands.

Sam Godfrey, SAMCO Leak Detection “Leak Detection and Repair”

Sam Godfrey is the owner of SAMCO Leak Detection Services, Inc., located in Austin. He has 20 years of experience locating leaks in water distribution systems. He has worked extensively with sonic leak detection equipment and water conservation procedures. Mr. Godfrey coordinates and performs all aspects of leak detection in Texas water systems ranging in size from municipal utility districts to large rural water systems. Prior to opening SAMCO, he was employed by the Lower Colorado River Authority and served as Leak Detection Program Coordinator for fourteen years. Mr. Godfrey presently serves on the Texas Water Utility Association Education Committee.

One form of conservation is avoiding the loss of already usable water through the distribution system. This requires a total system audit, to identify the unaccounted-for water and its value. Sam reminds us that water is liquid money. Conducting a leak detection audit requires: Accounting for all water that is produced (by metering all water); Testing all large meters; Performing an assessment of customer meters; Auditing accountability records; and Inspecting the system equipment.

Source meters (large utility meters), if inaccurate, are a big revenue drain. Utilities need to have meter change-out programs – the lifespan of the meters is 10 years or about one million gallons.

For a number of reasons, leaks often do not show themselves by surfacing as noticeable surface water. For example, the pipes can be in sandy or porous soil, or under several layers of road surface. The task of actually locating leaks in a water distribution system requires specialized techniques. Sam uses sound. The sound of water escaping from pipes is the basic tool of acoustic leak detection, but making use of that tool requires both quality equipment and a skilled, experienced technician to be able to pinpoint the location of a leak. Exactly locating leaks is necessary because you don't want to be digging lots of holes in order to fix the problem, especially when having to go through asphalt or concrete. The acoustic equipment would be used to listen at all service connections at a meter box, in order to find small leaks (that could become big leaks in time) and even hear leak sounds on plastic pipe material that does not resonate well. Listening at fire hydrants is also necessary, not only to find leak sounds in the system, but also to check for leaks in the hydrants themselves. When the hydrant has a leak sound, it has to be flushed and resealed in order to tell if repairs are necessary.



Finding leaks in rural and remote areas is another matter. Some techniques are: visual inspection of lines (on foot), testing unusual standing water for chlorine or fluoride, investigating indicative vegetation (like cattails or unusually green) near water lines. Leak

detection can also identify instances of water theft and, if used preventively, avoid emergency repairs with their associated water loss, damage to property, and lawsuits.