Water for People and the Environment

3rd Annual Regional Conference for Southeast Texas

September 27, 2003
Houston, Texas

Conference Director: Ken Kramer, Director, Lone Star Chapter Sierra Club
Regional Conference Organizer: Glenda Callaway, Ekistics Corporation
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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 Southeast Texas
Houston, September 27, 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 working on and 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.

Water issues are everywhere today – the subject of many new books and articles. Texas Parks and Wildlife magazine recently devoted an entire issue to Texas bays entitled The State of Bays. Last year Texas Parks & Wildlife magazine devoted an entire issue to Texas water issues entitled The State of Water. A magazine called Blue also has recently devoted an entire issue to water.

The Lone Star Chapter of the Sierra Club's Facts about Texas Water booklet will be distributed to over 50,000 students in the Harris, Galveston, and Fort Bend County region, and over 20,000 additional copies of the booklet are being distributed elsewhere. This booklet is available in Spanish as well. The Lone Star Chapter of the Sierra Club will soon be publishing and releasing a new water booklet about water decision makers titled Your Water Supply.

Water Challenges Facing Texas, A Keynote Address: Katharine Armstrong, Former Chairman, Texas Parks & Wildlife Commission

Katharine Armstrong is the former chairman of the Texas Parks and Wildlife Commission. Ms. Armstrong is a fifth generation Texan who grew up on her family's working cattle ranch in South Texas. She is a mother of three, an artist and an avid outdoorswoman who loves to hunt, fish and visit Texas State Parks with her children. She was appointed to the Texas Parks and Wildlife Commission in 1999 by Governor Bush and was appointed Chairman by Governor Perry in June 2001.

Her professional background is in investment banking and she has served on many boards including the South Texas Native Plant Restoration Project and the Dallas Zoological Society.

Governor George W. Bush appointed me to the Texas Parks & Wildlife Commission five years ago. George Bush can really bring out the best in people. That is his true talent. I grew up on a working ranch in south Texas. On the ranch I learned out the needs of agriculture and the needs of wildlife.

When you are on the Texas Parks & Wildlife Commission you need to know a lot about many things. Even though this is the case you cannot lose sight about the big issues. Water policy is the big issue! Sound water policy must include fish and wildlife. Water is the most important issue facing Texas today. It pits organization and governments against each other. The battle lines are drawn. We must assure sufficient clean water for all. Questions must be answered.

We can assure water for people and wildlife too. All major rivers in Texas flow from north to south. Origination point is the High Plains in northwest Texas. One inch of rain starts the flow, and it becomes millions of gallons of water by the time it reaches the bays along the coast. It will be used for recreation as well as power plants, used by industries and plants and animals.

Scientific studies are being conducted by the Texas Park & Wildlife Department to gauge the amount of fresh water that is needed in rivers to support fish and wildlife. The science is good. Water policy issues are so huge it is impossible for an ordinary citizen to evaluate many of the water issues we face as a state. The best science must include discovery and peer review. All the scientific information guiding water policy decisions must be credible. The National Academy of Science will review the science that will be used to evaluation instream flow of river basins in Texas. The National Academy of Science approval is the gold standard.

The free market must be allowed to work in the water policy arena. Subsidies deflect the true cost and need of water. Sound water policy must include the free market. Texans concerned with water policy will be fewer and fewer as our state becomes more urban. As the state continues to become more urban the connections between city people and the countryside will diminish. Children must appreciate hunting and fishing to appreciate water issues. We must create connections between city people and rural Texas. Water will pit rural Texas against urban Texas if these connections are not made. Urban areas will determine water policies by their votes, and fish and wildlife will lose out.

We now have a very important opportunity to impact water policy in Texas and you must be involved. The Legislature created an Environmental Flows Study Commission to determine how instream flows and freshwater inflows for fish and wildlife will be meet. The Environmental Flows Study Commission must represent all parties involved in this issue. You will need to present your recommendation to the Environmental Flow Study Commission so that the Legislature will have all the information they need to prepare the legal structure needed to provide the instream flow and freshwater inflow needs of fish and wildlife.

Texas' greatest natural asset is its people. We solve problems the Texas way, and we will solve the water issue the Texas way.

Protecting Environmental Flows: Science, Economics, Policy

Moderator: Jeff Taylor, Public Utilities Division, Department of Public Works and Engineering, City of Houston

Jeff Taylor is Deputy Director of the Public Utilities Division, Department of Public Works and Engineering, for the City of Houston. The Public Utilities Division operates and maintains the City of Houston's regional water and wastewater utility systems. Mr. Taylor holds a B.A degree in Environmental Science and Engineering from Rice University. Mr. Taylor has worked in both the public and private sectors, specializing in the field of water resources. He serves on a number of state and national water committees including EPA's National Drinking Water Advisory Council and the recently created TWDB Water Conservation Implementation Task Force.

Pam Baker, Environmental Defense
"Don't Turn Your Back on Texas Bays"

Pam Baker is a fisheries biologist with Environmental Defense, focusing on the group's "Texas Oceans Program." She works with coastal communities to improve fishery management and aquaculture practices in the Gulf of Mexico region. Her fields of specialization include marine protected, shrimp and reef fisheries, and coastal shrimp farming. Ms. Baker holds an M.A. in Marine Policy from the University of Rhode Island.

Many people do not understand the importance of freshwater inflows to coastal bays and estuaries. There are divisions within communities, not just between the rural and urban parts of the state. Along the coast these divisions revolve around how much freshwater enters the bays and estuaries. Bays need adequate fresh water. Adequate seasonal inflow of high quality freshwater is critical to the living resources of the bay. Freshwater inflow into bays and estuaries is not wasted water. It supports ecosystems so they can continue to provide abundant resources. Approximately 95% of ocean life depends on the range of salinity in the bays. Marine life is dependent on freshwater flow.

Bays support marine life such as 500 species of birds, 200 species of fish, and five species of endangered sea turtles. Bays are both ecological treasures and economic assets. Bays support tourism, fishing, and sightseeing. Bird watchers who come to the Texas coast to view birds spend money along the coast, which helps to support the coastal economy. Sightseers and winter Texans spend millions of dollars along the coast. According to data from Texas A&M University recreation and noncommercial fishing generates approximately $4 billion in Texas annually.

Texas commercial fisheries, which depend on freshwater inflows, produce 87 million pounds of shrimp, crabs, fish, and oysters with a dockside value of $175 million and associated economic activity of $330 million. Texas commercial fisheries support 30,000 jobs. Economic activity associated with Texas commercial fisheries includes the production and selling of supplies such as nets, ice, bait, trucking nets, ice, bait, and trucking. Half of the state's commercial fishing comes from Galveston bay. Galveston Bay is the single most import oyster harvesting area. Seafood related employment is a critical component of the coastal economy.

Sports fishers include one million anglers who take about 10 million trips annually. Sports fishers who seek saltwater game fish such as redfish and sea trout spend $2 billion per year in Texas. These sports fishers spend their money in hotels, restaurants, and other shops, which support 25,000 full time jobs along the Texas coast. Bays are irreplaceable ecological assets. Bays are an irreplaceable economic asset. Estuaries are like factories—they must have fresh water.

Cindy Loeffler, Texas Parks & Wildlife Department
"Environmental Flows Science and Policy"

Cindy Loeffler received her B.S. in Engineering from Colorado State University in 1984 and is a registered professional engineer in the state of Texas. After working with the U.S. Fish and Wildlife Service Instream Flow Group in Fort Collins, Colorado for three years, Ms. Loeffler went to work at the Texas Parks and Wildlife Department in 1987. Ms. Loeffler began her career as a hydrologist at TPWD in the Resource Protection Division's Coastal Studies Program. Beginning in 1991, Ms. Loeffler became actively involved in long-term water planning activities such as Trans-Texas and the Consensus-Based State Water Plan. In 2001 Ms. Loeffler was named the Water Resources Branch Chief at Texas Parks and Wildlife.

Freshwater inflows, which include nutrients, gradients, and wetland by definition, create and sustain estuaries. The legal basis for bays and estuaries studies was created by the 69th Legislature. Section 12.0011 of the Parks and Wildlife Code names TPWD as the agency responsible for protection of fish and wildlife resources. Section 11.147 of the Texas Water Code states the effects of permits on bays and estuaries and instream uses and special conditions. Section 16.058 of the Texas Water Code requires collection of Bay and estuary data and well as completion of studies. Texas Water Code Section 11.147 defines "beneficial inflows" as follows:

> "a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance and productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent."

Legislatively mandated studies to determine freshwater inflows necessary to conserve health and productivity of Texas major estuaries have been completed. According to the studies Aransas Bay need .82 million acre feet of freshwater per year, Galveston Bay needs 5.2 million acre feet per year, Laguna Madre needs 250,000 acre feet per year, Matagorda Bay needs 2 million acre feet per year, Nueces Bay needs 140,000 acre feet per year. Sabine Lake needs 9.5 million acre feet per year, and San Antonio Bay needs 1.15 million acre feet per year.

A range of possible solutions to providing freshwater inflow to bays lies between two point along an optimization curve: MinQ and MaxQ, with Max H at the peak. MaxH is the freshwater inflow necessary to sustain historic fisheries harvest as evaluated against existing fisheries data to meet the legislative definition of beneficial inflows. MinQ is the minimum inflow that maintains 80% of mean historic harvest and all other physical constraints: salinity, nutrient, and sediment needs. The recommended freshwater inflow is often expressed as a single annual number, but is always infers the sum of monthly inflows. Delivery of freshwater inflows must incorporate seasonality to have any ecological

significance. The methodology for determining necessary freshwater inflows is described in Methods for Determining Minimum Freshwater Inflow Needs of Texas Bays and Estuaries by Powell, Matsmuto, Brock was published in the journal Estuaries in December 2002.

According to Dr. E. Estevez, Director, Center for Coastal and Tropical Ecology, Mote Marine Laboratory, Sarasota, Florida, nowhere in the world has the issue of freshwater inflow been studied so systematically, or the results used to guide water management policies and practices so effectively, than in Texas.

SB 2 directs the Texas Commission on Environmental Quality, the Texas Water Development Board, and the Texas Parks & Wildlife Department to jointly establish and continuously maintain an instream flow data collection and evaluation program and to conduct priority studies to determine "appropriate methodologies for determining flow conditions" to be completed no later than December 31, 2010. The National Academy of Sciences will review the methodologies that will be used to determine instream flows.

SB 1639 creates the Study Commission on Water for Environmental Flows. The Environmental Flows Study Commission was created in recognition of the importance that the ecological soundness of our riverine systems, bay and estuary systems and riparian lands has on the economy, health, and well being of the state. The Environmental Flows Study Commission will be composed of 15 members who "shall conduct public hearings and study public policy implications for balancing the demands on the water resources of the state resulting from a growing population with the requirements of the riverine, bay, and estuary systems – including granting permits for instream flows dedicated to environmental needs or bay and estuary inflows, use of the Texas Water Trust, and any other issues that the study commission determines have importance and relevance to the protection of environmental flows." SB 1639 also put a moratorium on the Texas Commission of Environmental Quality from issuing a new permit for instream flows dedicated to environmental needs or bay and estuary inflows. The bill however does not prohibit TCEQ from issuing an amendment to an existing permit or certificate of adjudication to change the use to or add a use for instream flows dedicated to environmental needs or bay and estuary inflows.

Greg Graml, KBR
"Water Availability Modeling"

Greg Graml has a degree in Civil Engineering from the University of Texas. He is a water resources specialist with primary experience in hydrologic and hydraulic modeling. He is employed by the engineering firm KBR and has participated in the development of Water Availability Models for the Neches River Basin, Sabine River Basin, and Trinity-San Jacinto Basin for the Texas Commission on Environmental Quality. As part of the Trans-Texas Water Program for the Texas Water Development Board and SB 1 regional planning for the Region H Water Planning Group, he has studied freshwater inflows to Galveston Bay.

Background: Texas surface water is governed by a system of appropriated water rights that have been granted by the Texas Commission on Environmental Quality (TCEQ) or its predecessor agencies. An adjudication process was conducted a number of years ago to formalize all existing water rights at the time as certified filings. Adjudicated water rights are not based on models demonstrating surface water availability models. Thus, not all water rights are 100% reliable. Priority dates are based on when a

water right was issued. For example, a water right granted in 1906 would take precedence in a drought over a water right in the same basin that was granted in 1980 (in other words, "senior" water rights take precedence over "junior" water rights in times of shortage if cutbacks in water are required).

SB1 created regional planning, water availability modeling requirements, and limitations on interbasin transfers. The most important of these limitations on interbasin transfers was that a water right transferred to an entity outside the basin of origin becomes junior to any other water right in that basin of origin and thus may be the first right cut in times of shortage – which obviously lessens the appeal of an interbasin transfer.

There are a total of sixteen water planning regions created by SB1. Region H includes Houston, Region C is the DFW area, and Region I is East Texas. Regional plan updates are required every 5 years. Regional plans are to address conserving supplies, meeting future needs, and managing drought conditions.

SB1 mandated a look at existing water rights. Water availability models (WAMs) evaluate impacts of reuse on existing water rights, evaluate impacts of cancellation of existing water rights, determine firm yields of major reservoirs, and may be used as a permitting tool.

An advantage of water availability modeling is the ability to consider different scenarios based on different assumptions. Some of the key scenarios (model "runs") include the following:

Run 1 – No Reuse of water; full exercise of authorized diversions of water; diverted water is returned to the streams ("return flows," through wastewater discharges, for example).

Run 3 – 100% Reuse of water; full exercise of authorized diversions; no return flows (because all of the water is reused, it is not returned to the stream).

Run 8 – Current Conditions; uses recent diversion amounts; includes expected return flows; and year 2000 reservoir area-capacity data.

TCEQ has used these water availability models to provide an overview of the situation in several river basins with regard to the amount of water presently permitted and the implications for water remaining for future permitting and for meeting environmental flow needs. The agency has produced charts showing the estimated "naturalized flows" in a basin (those that would have occurred in the river in the absence of human activity), the "unappropriated flows" in that basin (the amount of flow available for appropriation), and, as relevant, the target or critical flows determined to be necessary for bay systems associated with that basin. The charts show what percentage of time certain volumes of flow would be available in the basin.

The chart for the Trinity River at Galveston Bay shows that the amount of flow necessary to meet target freshwater inflow needs (the amount deemed necessary to maintain productivity in the bay) would be met at least 50% of the time, and critical needs would be met about 60% of the time. The chart for the Colorado River below Bay City shows, however, that the amount of flow necessary to meet target flows for the bay system associated with the Colorado would only be achieved about 15% of the time, and critical flows would only be met less than 50% of the time. These are "worst case" scenarios, reflecting full exercise of existing rights and those already applied for, but they represent a picture of what might happen.

Norman Johns PhD, National Wildlife Federation
"Bays at Risk Examination of Freshwater Inflows for Texas' Estuaries"

Norman D. Johns, PhD. is Water Resources Scientist for the National Wildlife Federation Gulf States Regional Office. He has analyzed water resources issues while working in Texas government, university, and private settings for the past 15 years. His topical areas of expertise include hydrology, water supply planning, surface water rights, surface water quality protection, and groundwater hydrology.

Texas estuaries, and their wildlife heritage and tremendous economic values that Pam Baker spoke of, are threatened by the potential loss of vital freshwater inflow. Although general to the entire Texas coast, the presentation today will focus on the future of Galveston Bay due to its proximity and importance to the Houston and Southeast Texas.

The threatened loss of freshwater is due to tremendous growth in population and associated growth in water demand anticipated over the next few decades. Of particular significance to Galveston Bay is the anticipated state total of 3.1 million ac-ft/yr (MAFY) of growth in demand for freshwater, approximately 2.1 MAFY will occur in the Houston and Dallas-Ft. Worth areas. Both of these metro areas currently get nearly all of their water from the Trinity and San Jacinto River basins, which drain to Galveston Bay. The analysis presented today is an assessment of the character and severity of this potential loss of freshwater due to population growth and some of its likely consequences.

There were several primary considerations in the design of this analysis. First, is that freshwater inflows are highly variable; in Texas, flood years and drought years frequently follow each other closely, sometimes with few 'average' years. Even within any given year, freshwater inflows are highly seasonal and to a great extent this is evident in the State's freshwater inflow needs (FIN) criteria as presented earlier.

The second major factor influencing the design of the analysis here, is the great alteration in hydrologic patterns of Texas rivers which have occurred in modern times. These alterations are due to the construction of hundreds of large dams and other infrastructure that have transformed our rivers into a highly managed state. Such management can greatly change not only the magnitude of freshwater inflows to the receiving estuary but also the timing of inflows, even in relatively normal meteorological conditions. Under lower flow conditions, generally aligned with the occurrence of meteorological drought, the severity, frequency, and duration of low inflow conditions can be greatly magnified. Essentially it is possible to have a 'human amplification' of drought conditions.

To accommodate this variability and alteration in the river/estuary systems the analysis approach here is two pronged. First there is an analysis that examines estuary inflow conditions under all years to assess their adequacy for overall estuarine productivity maintenance. The second, parallel analysis is specifically focused on low inflow conditions. This parallel approach is somewhat of a 'fail-safe' tactic. For instance, while productivity maintenance alone may appear to be met in an adequate number of years with good levels of freshwater inflow, this may belie the possibility that these are interspersed with drought conditions made so severe that fish, oyster, and shrimp populations would not be maintained at a level high enough to reinvigorate the estuary when good conditions return.

While the above discussion is focused on the analyses being utilized by the National Wildlife Federation, this project would not be possible without two principal tools that earlier speakers described. First, the WAM

models, as described by Greg Graml, are used to forecast future monthly flows based on a 56-year period (1941-96) under differing scenarios of water utilization and wastewater returns. Two future scenarios are examined both with the full utilization of existing, already permitted water rights (about 4.8 MAFY compared to today's 2.1 MAFY). In the first future scenario, so-called return flows, those emanating from the discharge of wastewater from municipal and industrial use are set at 50 % of the current levels on a fractional basis[1]. This is possibly the future 'most likely' case with the abundance of wastewater reuse projects envisioned in the Dallas-Ft. Worth area. In the 'worst-case' scenario, all of the diverted water is reused and none returns to the stream or river of origin. The predicted inflows from these runs of the WAMs can be compared to historic recorded inflows. Next, the State's freshwater inflow criteria, as described by Cindy Loeffler, are used as the basis for assessing the character and severity of the potential loss of freshwater inflow. Assessments for both the frequency and duration of meeting/not meeting applicable criteria are performed, with more details discussed below. Here are the analyses and some results:

The first analysis is for productivity maintenance with fairly normal inflow conditions. Here we utilize the so-called MinQ criteria on a monthly basis. As described earlier, the MinQ criteria is the freshwater inflow that would assure a harvest of economically important and ecologically characteristic species, each at 80% of their average historic values. It is not the optimal freshwater inflow for estuarine productivity, but enough to ensure a reasonably healthy harvest. As the analysis stands right now, I am focusing on a particular subset of needed MinQ inflows for the three months April-June, a so-called "Spring Freshete." Freshwater inflow during this period is particularly important for the survivability and growth of juvenile and sub-adult shrimp and some other species.

The results of this analysis show that 13 years out of 56 in the historic recorded period have had an inadequate "Freshete." However, this is only slightly different that what would have occurred with so-called naturalized values, wherein 12 years would have had an inadequate Freshete. Again, remember that our river/estuary systems are highly variable even under "natural" conditions, and this result reflects that. The cause for concern comes in the look to the future under the scenarios of full use of existing water rights (about 4.8 MAFY compared to today's 2.1 MAFY). In the first future scenario with a 50% reduction in the fraction of diverted water returned as wastewater, the years with an inadequate Freshete would increase to 19. In the worst case with complete loss of return flows the figure increases to 22 years. Another way of couching these results may help. Since this is an analysis of inflows to support an acceptable harvest (80% of average), it indicates that years of low productivity will increase by approximately 50% (19 compared to 13) under the most likely future case with 50% loss of return flows. In the worst case such low productivity years would increase by approximately 70% (22 compared to 13).

For the low flow analysis, the MinQsal criteria are utilized. These are minimal inflow requirements designed to avoid reproductive failure of economically important species and maintain biodiversity. The analysis here examined monthly inflows to the bay and determined the maximum consecutive number of months below the MinQsal criteria. The results show that historical recorded inflows were below the MinQsal value for a maximum of 8 consecutive months, the same as "natural" conditions. Under the 'most-likely' future scenario, with 50% return flows, this duration increases to 11 months, an approximate 38% lengthening of very low flow conditions. In the worst case for Galveston Bay, with full water rights diversions and complete loss of return flows, the duration, compared to historical, would more than double to 18 consecutive months. While it is difficult to gauge exactly what the consequences of these alterations would be, it is likely that there would be a severe decline in populations and that the estuary's return to healthy productivity after drought would be much slower than that experienced historically.

David Bernsen, Former State Senator
"An East Texas Perspective on Water Resources"

Senator David Bernsen served as State Senator for District 4 from 1998 to 2003. While in the Senate he served on several influential committees, including the Senate Natural Resources Committee and the Texas Water Advisory Council. He has served as chairman of the Partnership of Southeast Texas (POST), an economic development corporation. Under his leadership POST developed a new focus on ecotourism and long-term infrastructure planning. Mr. Bernsen is a partner in the law firm of Germer, Bernsen and Gertz, L.L.P.

Water is the most critical element of life. Our planet is 70% water. Only 2.5% is fresh water. Less than 1% of that water is available to humans. 60-70% of freshwater is used by industry. 8 billion people are projected by 2050. To meet the water demand created by this growth in population there will need to be a 45% increase in available water.

Controlling water is risky business. It carries a price. "Water hustlers" are the people who buy and sell water. Economics, not environmental forces, control the future of water. Water is what every human needs to live but some –the hustlers- view it as a commodity to get rich off. Water must be a shared resource. Water is the difference between existence and death.

The quantity of water is important. If you take water away you have a desert. Consider the 1920 Owens River Story. Back then water hustlers saw the Owens River as a commodity. Water was piped from the Owens River to Los Angeles. People from Los Angeles bought the water rights to the river and built an aqueduct and drained the river. Three additional pipelines were built. As a result the Owens River Valley is now a desert.

There is a water offensive in Texas. At one time Enron was involved in water marketing, and the environmental impact was not good. Providing water has become a premium. Public authorities have hastened this crisis. The supply will become more imbalanced. We need to look at water issues on a broad area. East Texas is usually thought of in terms of surface water, but surface and ground water rights are inter-related.

Water rights on a river are appropriated. A1900 water rights permit (a senior water right) takes a priority over a 1920 water rights permit (a more junior water right) in times of water shortage.

Permits can be bought/and sold by individuals, usually for large sums of money. Water needs of metropolitan areas MUST be met, but not at the detriment of rural areas.
Senate Bill 1 protected areas from which water might be transferred to cities. In times of drought the junior water rights provision (which makes transferred water junior to other rights in the basin of origin) protects the basin where the water originates.

Most rivers in Texas are over-appropriated. Water is used 2-3 times as it goes down the river. Dallas County uses more water than any other county in Texas. Willing buyer and willing seller? Whoever has the money can buy the water. Under this policy poor counties and rural areas will loose their water! Water should not be treated as a commodity for sale.

Houston pipes and water infrastructure are in poor condition!!! As a result Houston loses huge amounts of water through bad piping. Mulhollan thought he was taking care of LA, but he devastated the Owens Valley.

Creeks are formed in the highlands; they nourish all peoples. As a drop of water works it way down to the coast it touches everyone. We must protect that resource and not do harm to others. Surface and ground water policies should be connected. Take care of cities but not at the expense of East Texas and rural areas.

Desalination: Projects, Potential, Issues
Moderator: Mary Ellen Whitworth, Bayou Preservation Society

Mary Ellen Whitworth is the Executive Director of the Bayou Preservation Association (BPA). She holds a M.S. degree in Environmental Engineering from the University of Houston. Ms. Whitworth served as Houston Mayor Bob Lanier's Director of Environmental Policy for five years. She represents BPA on numerous boards and committees that effect water quality in the Houston area. Ms. Whitworth is a former chair of the Houston Regional Group of the Sierra Club.

Ernest Rebuck, Texas Water Development Board

Ernest Rebuck, Ph., 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, Ernest was the Planning and Development Manager for El Paso Water Utilities.

Desalination is any process that removes salts from brackish surface water, groundwater or seawater. Desalination as a water management strategy has been considered by several of the regional water planning groups (Regions B, E, H, J, L, M, N and P). The promise of desalination as a drought-proof source, coupled with the added benefits from a security and reliability perspective of a diversified water supply, makes a compelling case for inclusion of desalination in the overall water portfolio.

There are currently 100 small desalination units operating in Texas. These units produce about 40 million gallons of water per day. The raw water source is either brackish surface water or groundwater. SB 2 included incentives for desalination – grants for desalination projects, allowing tax units to exempt desalination projects from property taxes, and exemptions for equipment, supplies and services for desalination from sales tax.

Governor Perry has also taken an interest in desalination as a way to provide a drought- proof source of water for Texas communities. As part of this initiative, TWDB was requested to recommend a large-scale desalination demonstration project. The board solicited statements of interest from different communities to be considered for this project. The board delivered their report with recommendations to the Governor and the Legislature in January 2003. The proposals from Brownsville PUB, the City of Corpus Christi, and the

Brazos River Authority were chosen for inclusion in the report.

HB 1370 from the 78th Legislative Session directed TWDB to "undertake and participate in research, feasibility, and facility planning studies, investigations, and surveys as it considers necessary to further the development of cost-effective water supplies from seawater desalination in the state." The board will produce a biennial progress report and pursue sources of federal funding as part of this legislation as well.

On September 17, 2003 the board authorized $1.5 million in grants to prepare regional water facility plans with a focus on seawater desalination projects. $500,000 each was awarded to the three proposed desalination projects included in the TWDB report.

Andy Shea: Poseidon Resources
"Seawater Desalination for Texas Water Supply – The Freeport Project"

Andrew Shea is Vice President of Project Development for Poseidon Resources Corporation. His responsibilities include development of large-scale seawater desalination and wastewater reclamation projects in California and Texas. Prior to joining Poseidon Resources, Mr. Shea was the Regional Vice President of Business Development for United Water-Lyonnaise des Eaux. He holds a Bachelor's degree in Human Biology/Environmental Planning and a Master's degree in Civil Engineering/Infrastructure Planning & Management, both from Stanford University.

Poseidon Resources is the largest developer of water and wastewater public/private partnerships in North America. Our focus is to develop local water and wastewater projects that enhance future water supplies. Some of the landmark water projects we have been involved with are; the Cranston, RI desal project, the largest desal plant in North America in Tampa, FL and the industrial/municipal water reclamation project in Mexico known as PEMEX.

The time for desalination is now. It is reliable, diversifies your water supply, provides high quality water, conserves existing ground and imported water supplies, and it has economic benefits. Desal is now more cost competitive.

Desalination is not a new idea. There are more than 12,000 desalting plants worldwide. Over five billion gallons are produced daily. Use is growing 10-20 percent annually.

Poseidon has entered into a public/private partnership with the Brazos River Authority (BRA) to build a desalt plant at an old Dow chemical plant in Freeport. The plant will use the existing intake and outfall infrastructure from the plant. The plant will produce 25-100 MGD. Poseidon will be responsible for the financing and development/permitting for the Freeport project. Dow will be provide the site and power services. An MOU has been signed with BRA for potential long-term wholesale water supply.

There is a need for this water in the Lower Brazos Basin. The Region H plan identifies significant future water supply needs that are recommended to be met by BRA. There are some entities in the basin with inadequate treatment capabilities. Desal in the Brazos basin will provide additional flexibility and efficiency to BRA operation.

We are moving forward with this project and expect to be on-line as early as 2007 depending on area needs.

Bill Norris, NRS Consulting Engineers

Bill Norris, P.E. is a principal and founder of NRS Consulting Engineers. He provides water resources expertise for municipal and industrial entities throughout the Southwest, including the Rio Grande Regional Water Planning Group, and has been instrumental in the development of desalination technology in the area. He has a B.S. in Civil Engineering from Texas A&M University and an M.S. in Environmental Engineering from the University of Texas at Arlington.

In 1995 the City of Brownsville conducted a feasibility study for brackish groundwater treatment. In 1996 the Laguna Madre Water District conducted a study on seawater desal treatment using an open intake from the Gulf of Mexico. In 1999 Valley MUD #2 completed the first municipal desal plant in the valley. In 2001 Southmost Regional Water Authority (SRWA) completed its desal feasibility study. In 2003 the Region M plan was amended to include desalination as a water management strategy.

SRWA was created for the purpose of developing alternative strategies for providing water to member entities. The members currently include Brownsville Public Utilities Board, Brownsville Navigation District, Valley Municipal Utility District #2, Laguna Madre Water District, City of Los Fresnos and the City of Indian Lake. The SRWA study indicated that the cost for treatment of brackish groundwater is competitive with the treatment of surface water. The source for the groundwater is independent of the Rio Grande flows. The regional desal facility should be up and running within the year.

There are currently multiple facilities in planning/design phase in the Valley.

- La Sara (Willacy County), construction Fall '03
- North Cameron Regional, construction Jan '04
- Edinburg, construct by 2005
- Willacy County Regional, construct by 2005

There are cost factors involved with desalination. The cost factors are energy source, concentrate disposal, total dissolved solids in source water, and economies of scale. Desalination does not create an unlimited supply of water. All forms of water supplies are limited and with increasing demand and decreasing supply desalination is just a tool in the toolbox.

Water Conservation in Texas: Progress, Challenges, Prospects
Moderator: Ron Neighbors, Harris Galveston Coastal Subsidence District

Ron Neighbors is the General Manager of Harris-Galveston Coastal Subsidence District and the Fort Bend Subsidence District. He presently serves as Chairman of the Texas Water Conservation Association (TWCA) Risk Management Fund and the TWCA Employee Benefits Trust. He is a Director and Past President of the TWCA and Past President of the Groundwater Management District's Association (GMDA). Mr. Neighbors is also an active member of numerous water and related organizations, including the Region H Water Planning Group. He graduated from Texas Tech University with a B.B.A. and served as City Manager of Carrollton from 1965 to 1968 and as City Manager of Odessa from 1968 to 1977.

Nora Mullarkey: Lower Colorado River Authority
"Water Conservation: What Works Best for Your Community?"

Nora Mullarkey has been with the Lower Colorado River Authority (LCRA) for 16 years and is currently the manager for water conservation programs. She plans and implements conservation programs for LCRA retail water utilities and provides technical assistance to wholesale water customers in the LCRA 23-county water service area. Ms. Mullarkey has also been responsible at LCRA for environmental education programs and special community events such as volunteer water quality monitoring, household hazardous waste collections, and river and lake cleanups. She is currently the chair of the Texas American Water Works Association Water Conservation and Reuse Division. Ms. Mullarkey holds a B.A. in Sociology and an M.A. in Public Health from the University of Texas.

There are three key points to take home from this presentation today:

1. Learn how your community uses water and what it needs
2. Learn about conservation measures, and
3. Advocate for them

The State Water Plan has identified water conservation as a key source of water for meeting Texas' water demands. By the year 2050, 13% of our water will come from conservation. Water conservation also conserves energy. It takes a lot of energy to treat and move water.

Example of Estimated Water Use at Different Soil Depths

What are your community's needs? Are you in an old or new development? Do you live in the central city or suburbs? Who are the water users in you r community (businesses, mixed, single family residential, multi-family residential)?

What are your community's resources? Many smaller communities do not have the resources to implement a conservation program. Are there other organizations that can help promote water conservation?

Some of the biggest opportunities for water savings are in the development phase of new developments.

- Plant native and adapted plants in new landscapes. Plants do not save water, people do. Native plants will survive a drought/freeze and will need less fertilizers and pesticides.
- Reduce or limit turf areas. Properties with 60% non-turf landscapes use 1/3 less water, maintenance, and direct dollar outlays.
- Install efficient automatic irrigation systems. Studies have shown that lawns are typically over watered by 20-30%. Automatic irrigation systems use 2-3 times as much water as "hose-draggers".
- Use an adequate amount of soil in your landscape. A thicker soil will hold more water longer and result in healthier plants too.
- Install rainwater harvesting systems. It reduces demand on current water supplies and provides

reductions in storm water flows. It is great for plants and is salt free and Ph neutral/slightly acidic.

In your community, find out who your water utility provider is and what conservation programs and services they offer. Advocate to your community and water provider to actively promote conservation and provide programs and services.

Ken Kramer, Lone Star Chapter, Sierra Club
"New State Water Conservation Laws and the Water Conservation Task Force"

This presentation is actually 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 entitities 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.

Andrea Casey: Lone Star Chapter, Sierra Club
"Water Loss in Texas"

Andrea Casey is a student at the University of Houston Law Center and is expected to receive her J.D. degree in 2005. She has a B.A. in Classics from the University of Texas at Austin, and she previously worked as a department assistant for the law firm of Brown McCarroll LLP in Austin. During the summer of 2003 Ms. Casey interned with the Lone Star Chapter of the Sierra Club. Under the supervision of Lone Star Chapter Director Ken Kramer, Ms. Casey researched the topic of water loss among water utilities in Texas and prepared a report on her findings.

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 or 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 tuned 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. 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. Samco 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 reseated 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.

Ken Kramer, Lone Star Chapter, Sierra Club
"Wrap Up"

Everyone is encouraged to take the "Principles for Protecting Texas' Water Resources" found in the conference packet and get endorsements from their local governments and/or community organizations and send those endorsements to the Texas Living Waters Project in order to demonstrate widespread public support for sound water policies. The Sierra Club and the Texas Living Waters Project will endeavor to keep everyone informed about activities on the water issue and inform people of opportunities to provide input on actions to be taken by water decision-makers.

[1] For example a current municipal water right in the lower Trinity River basin diverting 1 MAFY, typically would return about 70% or .7 MAFY as wastewater. Under the 50% return flow scenario this fraction would be reduced to 35% even though the magnitude of the diversion could increase greatly from the current level depending on the individual water right.