PROCEEDINGS
Water and the Future of the Texas Coast

A Water for People & the Environment *Conference*

Saturday, September 25, 2004

Hilton, University of Houston, Houston, Texas

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National Wildlife Federation
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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

Lone Star Chapter staff members Margot Clarke, Jennifer Walker, and Tyson Broad prepared the summaries of the conference presentation that are provided in these proceedings.

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PROCEEDINGS
Water and the Future of the Texas Coast
A *Water for People & the Environment* Conference

Table of Contents

"Environmental Flows" (Freshwater Inflows & Instream Flows): *Lifeblood for the Coastal Ecology and Economy*
Moderator: Glenda Callaway, Ekistics Corporation

Dr. Paul Montagna, University of Texas Marine Science Institute

Dr. Paul Montagna is a professor of Marine Science. He has been at the University of Texas Marine Science Institute since 1986; the UTMSI is the oldest marine laboratory on the entire Gulf coast.

Estuary structure and function: what is an estuary? It is where rivers meet the sea, or more generally, a place in the coastal zone where freshwater mixes with salt water. This creates an incredibly productive environment, more than anywhere else on earth, with diverse habitats. An estuary provides *ecosystem services* (to people). If we end up having to pay to replace these services, it will be very expensive.

In an estuary, there are gradients of salinity of freshwater to salt (sea water has 3.5% salt) – this is very important as it defines habitats and tolerance levels for species. In Texas we have all the types of estuary habitats that can exist. Question: if freshwater doesn't flow in, is it still an estuary? The answer is intuitive – productivity doesn't exist in such a situation.

The productivity of an estuary begins with the sun, because the light reaches all the way to the bottom, and is fed by nutrients from the land (runoff in the river) as well as recycled nutrients from within the estuary. There are two different food chains in estuaries: the chain of phytoplankton to plankton on up to larger consumers, and the grazing food chain of bacteria to deposit feeders to algae to herbivores.

Four to six feet is the average depth of our estuaries. By contrast, the Chesapeake Bay has an average depth of 20+ feet. One cannot ignore the physical influences on estuaries. Unlike the Chesapeake, which has tidal changes of four to five feet twice a day, Texas has a micro-tidal cycle of only about two feet. However, weather and seasonal changes (as at an equinox) have significant effects (on species reproduction, for example) and then there is the wind. The effect of wind on our estuaries is unique – the average winds are double what they are anywhere else in the country.

Ecological services of estuaries: they store huge amounts of water, and even more importantly they clean the water in them. For example, oysters – the Chesapeake Bay used to have enough oysters to clean the bay in three days. Now it takes between 100 days to a year. Estuaries also act as buffers for the coastlines during storms, and as nurseries for fish and wildlife. Ninety percent of all seafood use estuaries as nurseries.

Reduction of freshwater inflows brings changes in the hydrology; the reductions are not just about quantity of the inflow but also the *timing*. There is a pulse ecosystem dependent on spring and summer peaks from high rainfall; these are greatly disrupted by the presence of dams and reservoirs. In addition, the dams trap sediments essential to the coasts. And, of course, reduction of freshwater inflow increases the salinity levels in the estuaries, causing habitat and productivity loss. In Texas, the annual shellfish harvest increases with inflow.

Is there a problem with the Texas estuaries? The northeast estuaries are fine, those central to the coast are okay for now because the population is low in the area, but those in the southwest are already showing signs of stress. And there are many more water projects being planned.

Joe Trungale
J.F. Trungale Engineering and Science

Joe Trungale is a registered professional engineer who worked in recent years with the Texas Parks & Wildlife Dept. on instream flow studies. In 2004 he started his own consulting business. Joe is pictured with Dr. Mitch Mathis on the right.

Riverine components should be addressed to develop instream flow recommendations: there are five components to be studied - biology, physical processes, water quality, connectivity, and hydrology. These components are, of course, interrelated; they cannot work in isolation.

Biology: what do we look at to determine the health of the biological community? The composition, diversity, richness, and function are all elements to consider. The life history of the community includes spawning, feeding, and other habitat use, along with migration patterns and predation and competition. The studies are NOT all about fish.

Physical processes: includes channel and habitat formation and maintenance; sediment transport and flushing; the substrate; riparian cover; and wood debris.

Water quality in Texas is under the auspices of the Texas Commission on Environmental Quality. Its elements include: temperature; dissolved oxygen; sediments and turbidity; nutrients, and other point and non-point pollutants.

Connectivity: river systems exist in space in various dimensions. These are: longitudinal (from headwater to mouth); lateral (the channel to the floodplain); vertical (channel bed with groundwater); plus temporal.

Hydrology: Texas water is permitted on an annual use basis. To establish the flow recommendations, state agencies looked at three years – the worst drought on record, the next year, and two years later.

In the process of assessing these components to develop the flow recommendations, the level of certainty is dependent on the level of effort. The base level uses existing data and desktop criteria – for example, using the existing water permits, plus features such as existing dams, and a computer simulation to produce a Water Availability Model (WAM). Another example of this method is the quantitative assessment done for the regional planning groups for the State Water Plan; the regional planning is bottom-up, so there is a lot of variation in the approaches for the quantitative assessment.

A second level of effort is to use a scientific expert stakeholder process – this process starts with evaluating the current state of the resource (i.e. river). The next step is ascertaining the Natural Flow Regime, capturing aspects of the natural state (not returning to the natural state). Then an adaptive management process begins that is somewhat circular (repetitive) in nature – a stakeholders meeting, followed by a literature review, then a workshop to develop flow

recommendations, implementation of the recommendations, and then data collection. After that, the process begins all over again.

The highest level of effort, leading to the highest level of certainty, is to do a comprehensive study. This is complex and very time-consuming, using lots of pieces; for example, using a hydraulic model and a biological analysis, applied to a habitat area to graph flow vs. habitat predictions. The Texas Instream Flow Program is a comprehensive study mandated by the Legislature for three agencies (TPWD, TWDB, and TCEQ) to undertake. The agencies were directed to establish and continuously maintain an instream flow data collection and evaluation program and to determine flow conditions in Texas rivers and streams necessary to support a sound ecological environment. There are priority studies underway on a number of Texas rivers, including the Middle Trinity, the Middle and Lower Brazos, the Lower Guadalupe, and the Lower San Antonio.

The implementation of instream flow recommendations by the Study Commission on Water for Environmental Flows (with input by the National Academy of Science on the methodology of the Texas Instream Flow Program) has several options. Some of these are: special conditions on new permits, cancellation of unused water rights, the Water Trust, permitting for environmental flows, Basin Environmental Planning Groups and TCEQ rulemaking, a conversion/reservation system, and monitoring and adaptive management. Consideration of these options is ongoing.

Dr. Mitch Mathis, Houston Advanced Research Center (HARC)

Mitch Mathis is Environmental Economist at HARC and has worked for nearly ten years on issues pertaining to sustainable development and water policy. Much of this work focuses on the water needs of the ecosystem.

How Do We Benefit From Inflows? Estuaries, that cover 6% of the earth's surface, do a lot of things for us, providing ecosystem services that contribute 34% of the world's economic value. (Note: we need to get used to the concept of ecological services – the value of the earth's ecological services exceeds three times the global GNP.) One of the challenges we face is how to justify activities and resource expenditure on preserving ecosystems. This requires that we place an economic value on the ecosystem services so they are not overlooked.

Inflows to estuaries is like water that a farmer uses to produce crops. This is often a free input (rain) but we can back out the value of the water by using the value of the crop minus the other inputs to produce it. We can do likewise, for water input to the ecosystem (estuaries), but we don't pay for the ecosystem services so it is not as easy to figure the value of the water input. It should be noted that estuaries are an *extremely* efficient production system.

When considering the situation of multiple water users (as in the ecosystem and humans), we need to know the benefits of different uses; human use is municipal, agricultural, and industrial. Agriculture always uses the most water of human use – in Texas, agricultural is at 75% of all water use. There are trade-offs in these considerations – in the demand curve of water, the range of value of use goes from drinking water, through various crops (e.g. alfalfa is a low-value crop), down to the value of using water to water a lawn or washing a car. The question is, where on the curve do we put the value of water use by estuaries? These trade-offs can be regionally based, in

that there can end up being less water coming to higher value use areas (like coastal regions) because it was used for lower value activity upstream.

Establishing freshwater inflow policy requires setting inflow targets (not a typical activity for economists). Then we need to figure out how to achieve those targets (which are not just simple amounts). There are both regulatory and market approaches; the better approach is determined by which scenario we are facing. The first scenario is when the watershed is already completely allocated – in this case, the market approach of buying the water permits is better. The other scenario has unappropriated water, and the regulatory approach is preferable – it is always cheaper to keep water rights than to regain them.

This policy has uncertainty associated with it; we don't even know how implementing the different approaches will work. Yet we still have to make decisions – how do we deal with the uncertainty? First, use the precautionary principle: if a mistake can be costly, be conservative, try to make sure we have *plenty* of water. Then, use adaptive management: make the best decision possible, then monitor the results along with gaining more and better information, and adjust as necessary. Over time, we can achieve better results.

Determining Environmental Flow Needs: *How much? How often? When?*

Moderator: Bob Stokes, Galveston Bay Foundation

Bob Stokes *is the President of the Galveston Bay Foundation (GBF). Prior to working at GBF, he practiced environmental law for ten years, most recently as an assistant county attorney in the Harris County Attorney's Office, environmental enforcement division. He received a B.A. for Yale University and a J.D. from the University of Texas School of Law.*

Cindy Loeffler, Texas Parks and Wildlife Department (TWPD)

Cindy Loeffler is a registered professional engineer who has worked with TPWD since 1987. Her work as a hydrologist began as a member of the Coastal Studies Program that developed the methodology to determine freshwater inflow needs for bays and estuaries.

Freshwater inflows by definition create and sustain estuaries – they are the lifeblood of the estuaries. The legal basis for the bays and estuaries studies stems from the 69th Legislature: TPWD is the agency responsible for protection of fish and wildlife resources, and sections of the Texas Water Code mandates study of the effect of water permits and collection of data on bay and estuaries. This study, which will contain recommendations for "beneficial inflows" (defined as the "salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment"), is almost finished.

The process of developing the recommendations begins with evaluating the objectives and constraints (fisheries, nutrient, and sediment analyses, along with a hydrographic survey) to create optimization and circulation models. Finally the computer-generated information is compared to what is known about fisheries, hydrology, and wetlands, possibly leading to some adjustments to the recommendations.

Two types of data are used to develop inflow recommendations. Fisheries-dependent data is based on commercial reports on catches; it is extensive but mainly self-reported and there are gaps. Fisheries-independent data comes from the coastal fisheries database on fish abundance but did not originally capture enough information on inflow.

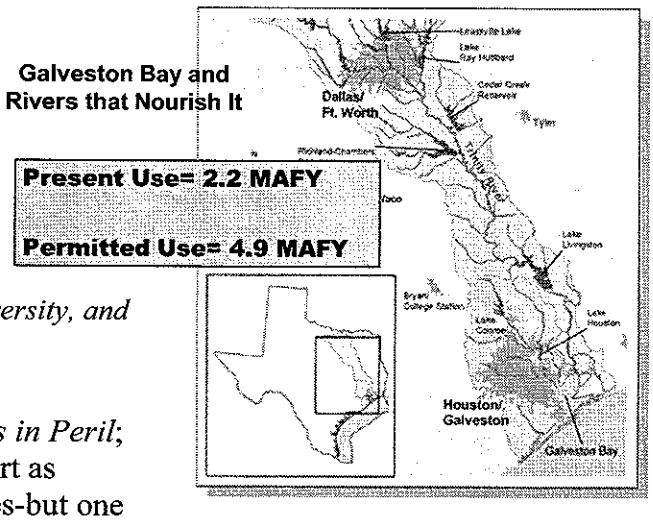
A range of possible solutions lies between two points on the optimization curve. These points are: MinQ, the minimum inflow that maintains 80% of the mean historical harvest; and MaxH, the inflow necessary to sustain the historic fisheries harvest. In addition, the freshwater inflows recommendations must incorporate seasonal variations to have any ecological significance.

The Galveston Bay case study: in addition to developing the MinQ and MaxH recently that were compared to the historical inflows, a stakeholder process was created to address concerns raised primarily (but not exclusively) by the water provider community. The agencies agreed to try an open process facilitated by the Center for Public Policy Dispute Resolution (CPPDR). CPPDR has conducted 38 stakeholder interviews and prepared a Situation Assessment Report. In early September 2004, a stakeholder meeting was held to discuss the report, receive feedback, and discuss the next steps.

It is when considering the pending water rights applications that the theoretical meets reality: the San Jacinto River Authority and the City of Houston have applications for over 270,000 acre-feet of new water rights as well as over 580,000 acre-feet of return flows from the city's wastewater plants using a bed-and-banks permit to transport it. These water rights would affect freshwater inflows to Galveston Bay.

Dr. Norman Johns, National Wildlife Federation (NWF)

Norman Johns is Water Resources Scientist for the National Wildlife Federation's Gulf States Regional Office. He has analyzed water resources issues for the past 15 years, working in Texas government, university, and the private sector.



In September, NWF released its new report, *Bays in Peril*; Dr. Johns summarized the conclusion of the report as indicating a threat to the state's bays and estuaries-but one that can be reversed. In looking at the potential loss of inflows, we see projected population growth as the main cause, with heavy growth in areas feeding the bays and estuaries. Of the ways proposed to satisfy growing demands, the report examined the potential impact of two: fully using existing river water permits, and the reuse of wastewater (return flows).

When we look at the timeline of water permits granted by the State of Texas from for the twentieth century, we can see enormous growth. Few of these permits (for around 23 million acre-feet of water) have any environmental conditions. If these permits were fully untilized, the impact would be enormous; for example, in the rivers that feed the Galveston Bay, less than half the permitted water is currently used. So how do we assess the threat to the bays and estuaries from the use of already-permitted water?

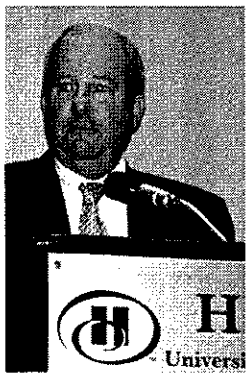
In Galveston Bay freshwater inflows, a high variability from year to year is inherent. The monthly median inflows reflect requirements – the patterns are very important, the spring/early summer pulse is critical. For example, shrimp come into the bays at pulse time; oysters are susceptible to parasites and predators in times of low inflow.

NWF's freshwater inflows assessment of Texas estuaries determined the inflows for various scenarios and assessed the inflow adequacy for key events to assign an overall status/grade. Using a water availability model (WAM), we can run different scenarios, such as natural conditions, current use, or full water rights use. The WAM also allows us to ask, for example, what would the inflow be if we had the same weather patterns and situation of 1964, a dry year. In assessing the springtime (March through June) pulse comparison, in 1964 the pulse didn't come close to meeting the 'naturalized' condition. In the present, the water retention of dams affects the pulse in the same way. For the different bays, NWF plotted the percentage of years with inadequate spring pulses under natural conditions, present use, and future full use. In Galveston Bay, the increase from natural to full use shows a medium impact ratio; in Corpus Christi Bay, the impact ratio is high.

Likewise, in doing a drought analysis, NWF determined a drought tolerance level and compared it with natural conditions and the WAM-predicted future, full-use conditions. This analysis revealed more threat to the estuaries. The overall estuary analysis results showed two of seven major bays in good condition and the other five as threatened. It is emphasized that this analysis is only for conditions with *existing*, not pending, permits.

Luncheon Address: Water and the Texas Coast

Joe Beal, Lower Colorado River Authority/Texas Water Conservation Association



Joe Beal is the General Manager and Chief Executive Officer of the Lower Colorado River Authority (LCRA), a Texas conservation and reclamation district. Previously, Beal led LCRA's Water Services division—which provides water resources management, flood protection, drought management, agricultural irrigation and water and wastewater utility services. A Vietnam veteran, he returned to Texas in 1970. He holds a bachelor's degree in civil engineering from Texas Tech University and a master's degree of business administration in municipal finance from the University of Texas. Prior to joining LCRA, he was senior vice president to a large engineering and environmental consulting firm with national and international assignments. His early career included management of the Galveston Bay Project for the Texas Water Quality Board; this was a fresh water inflow needs assessment and a waste load allocation for the Houston Ship Channel.

Galveston Bay and the Houston Ship Channel began to be studied in 1968 as part of the Galveston Bay Project. We looked at proper productivity, salinity, and other parameters. This was before NEPA and the environmental movement in Texas. We are still looking at the same kinds o issues today when we look at our bay and estuaries.

I met with representative from the Sierra Club, Environmental Defense and National Wildlife Federation in April to review their proposal for meeting the water needs of our rivers and estuaries. We also discussed the Texas Water Conservation Association's proposal. There is a

lot of common ground in these two proposals. The objective of both organizations' proposals is the same, that everyone and every need has enough water. There are differences in the details but we will get them ironed out and come together.

Regarding the LCRA/SAWS project. I firmly believe that there is a way for San Antonio's needs to be met at least partially with water from the Colorado. San Antonio is putting money into comprehensive studies to determine whether or not there will be adverse effects on the environment from the project. Before vast amounts of water can be moved around the state it is good to do these kinds of studies first and I feel that they will become the norm.

We need to be careful when we talk about reuse as conservation. The good news is that people are OK with drinking what is coming out of a sewage treatment plant; the bad news is that there is not enough. Reuse is in vogue now because it is inexpensive. There are tremendous opportunities for reuse, groundwater development, and moving water in this state even though there are environmental impacts with any of these strategies.

I am a member of the Study Commission on Environmental Flows. The report of the Scientific Advisory Committee will be out soon and I will read the entire report. I am not sure that all the questions will be answered in this report and will not be surprised if the legislature continues the Study Commission and Scientific Advisory Committee.

I think that the LCRA Water Management Plan is a template that should be used throughout the state. We maintain and update the WMP every 5 years. We take into account new information and science and adapt the plan as needed.

I pledge to you that will take care of the Colorado River and Matagorda Bay. You should not be afraid of water development, but you should let your voices be heard and advocate for the river and bay.

Managing and Maintaining Environmental Flows: *Current & Alternative Approaches/Prospects for Change in 2005*

Moderator: Dianne Wassenich, San Marcos River Foundation

Dianne Wassenich is the Executive Director of the San Marcos River Foundation (SMRF). She grew up in Wharton and Matagorda Counties, and went to college in Houston at Rice University and University of Houston, graduating UH with a Bachelor of Fine Arts. She worked as a volunteer for SMRF for fifteen years before being hired as its first staff person. She also serves on the Texas Rivers Conservation Board for Texas Parks & Wildlife Department.

Robin Smith, Texas Commission on Environmental Quality

Robin Smith attended the Texas Tech School of Law, where she was on the Law Review Board. She worked as an attorney for the Dallas Court of Appeals and the Texas Supreme Court for several years. She has been an attorney at the Texas Commission on Environmental Quality (TCEQ) or predecessor for about 12 years. In recent years, she has concentrated solely on water rights issues and cases.

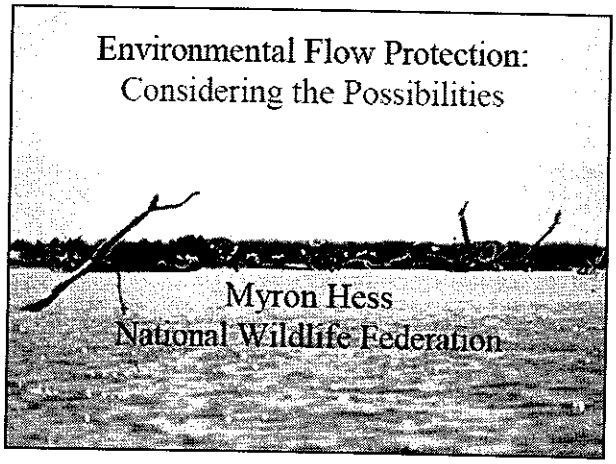
The Texas Commission on Environmental Quality (TCEQ) has general jurisdiction over water and water rights including the issuance of water rights permits, water rights adjudication, cancellation and enforcement of water rights. A water right is a right acquired under the laws of the state to impound, divert or use state water. State water is defined as, "the water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state." What requires a water rights permit? You must have a water rights permit in hand in order to appropriate any state water or begin construction of any work designed for the storage, taking, or diversion of water.

According to state law, the waters of the state are held in trust for the public and maintaining the biological soundness of the state's rivers, lakes, bays, and estuaries is of great importance to the public's economic health and general well being. The legislature has expressly required the commission while balancing all other interests to consider and provide for the freshwater inflows necessary to maintain the viability of the state's bay and estuary systems in the commission's regular granting of permits for the use of state waters. But, the legislature has not expressly authorized granting water rights for instream flows dedicated to environmental needs or inflows into the state's bays and estuaries.

The TCEQ shall grant a water right application only if the application conforms to the requirements prescribed by Chapter 11 of the Texas Water Code, if unappropriated water is available, and if the proposed appropriation is intended for beneficial use. The waer right shall not impair existing water rights be detrimental to the public, and it must consider environmental factors and assessments (TWC Sections 11.147(d) and (e), 11.150, 11.151 and 11.152). The application must also be consistent with the state water plan and the relevant approved regional water plan. TCEQ staff will perform a hydrological review in order to determine if unappropriated water is available at the requested location.

For permits issued within an area that is 200 river miles or less from the coast, the TCEQ must consider the conditions necessary to maintain beneficial inflows to any affected bay and estuary system. For the purposes of making this determination, the commission shall consider the need for periodic freshwater inflows to supply nutrients and modify salinity to preserve the sound environment of the bay or estuary. The productivity of the affected area should be considered.

TCEQ also has the responsibility to consider the effects on water quality when issuing a water rights permit. On application for 5,000 acre feet per year or more, TCEQ shall assess the effects of the permit on fish and wildlife applications and may require the applicant to take reasonable action to mitigate the adverse effects on such habitat. The commission may direct that stream flow restrictions and other conditions be placed in the permit being issued to protect the seniority of water rights.



Environmental Flow Protection: *Considering the Possibilities*

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.

Is putting environmental flow restrictions on water rights too little, too late? It is if that is all we do to protect the environment, but if we use it as a tool that is good. There are three basic ways of protecting environmental flows: setting aside reasonable amounts of unappropriated flows, facilitating conversion of reasonable amounts of existing consumptive rights, and putting some conditions on older permits.

Setting aside reasonable amounts of unappropriated flows (water that has not been appropriated through water rights). This could include conditions on new permits, instream flow water rights and reservations of water. TCEQ could cancel unused water rights and transfer that water to environmental uses. There could be a program set up to facilitate the purchase or donation of water rights for the environment. Entities could also dedicate their return flows to environmental uses (or TCEQ could require such dedication in future permits).

Another option is to formally set aside unappropriated water through a reservation process. Texas Parks and Wildlife with Texas Water Development Board would recommend amounts to TCEQ and they would make the final determination on the amounts. The reserved water would be like a water right and have an assigned priority date and measuring points. There would be limited future adjustments to the permit allowed as science changes. It would be managed similarly to a water right.

Acquiring existing water rights is an option in basins where there is no longer unappropriated water or not enough water to meet environmental needs. These can take the form of permanent transfers, leases, and dry-year options. The state should formally support private transactions and also establish state funding for acquisition of water rights where needed.

Conditions on existing permits pertain to transfers of water rights. Most older permits lack environmental flow protections and these older rights represent a huge portion of the permitted water in the state. The TCEQ could put environmental conditions on permits that change hands. It is especially appropriate to put conditions on unperfected rights when amended (unperfected means a water right that is not entirely used). Exceptions to this would be water rights for municipalities for water supply.

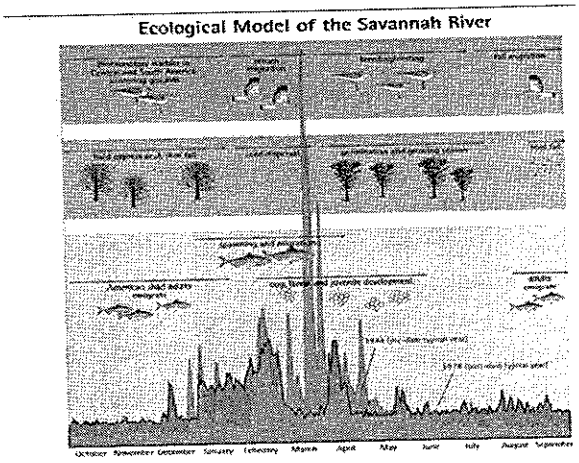
The approach to managing water is changing and the potential for big profits from water deals is real and highly motivating. The worst part is that, with all this pressure, we are not even planning for environmental water needs. A statewide survey conducted by the Texas Living

Waters Project shows that the people of Texas are overwhelmingly concerned about providing water for our rivers, streams, bays and estuaries. They also say that we need to use less water in our everyday lives and are willing to conserve. The question of environmental flow protection really is about what kind of heritage we want to leave for our future generations.

Developing & Implementing Ecosystem Flow Recommendations for the Savannah River (GA/SC)

Ken Kramer, Lone Star Chapter Sierra Club

Dr. Ken Kramer 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 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, regional, and local agencies and officials and currently serves on the Water Conservation Implementation Task Force for the State of Texas.

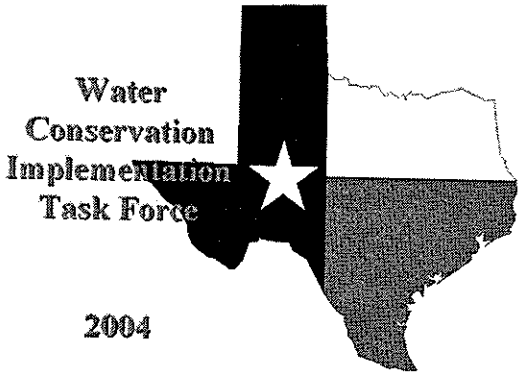


The Sustainable Rivers Project focuses on a coordinated review and alteration of dam operations. There are, at this time, 12 rivers participating in the Project including the Savannah River. The Nature Conservancy and the US Army Corp of Engineers are working together on the project.

Developing and implementing ecosystem flow recommendations for the Savannah River was done in five steps. The first step was an orientation meeting in May 2002. Through this meeting, the group identified a set of key contributors for defining a set of essential flow characteristics needed to sustain the ecological integrity of the Savannah River ecosystem. The second step of the process was a literature review and summary report that focused on the whole ecosystem including the shoals, river floodplain, and estuary. The subsequent report was reviewed by leading scientists in the main component areas. In April 2003, an Ecosystem Flow Workshop was held. The workshop lasted 2 ½ days and was attended by more than 40 scientists, agencies, academics and NGO's. Three break-out groups defined ecological flow recommendations for Augusta shoals, the river-floodplain section from Augusts shoals areas to the estuary and, the estuary. The full group then integrated the flow recommendations across the three river reaches. The goal is not to create optimal conditions for all species all of the time; rather, we want to create adequate conditions for all native species enough of the time.

The flow recommendations for the Savannah River included periodic floods, high flow pulses, and low flows. The groups also developed a strategic monitoring plan to assess how the plan was working and how the river was responding. Modeling also assessed multiple future scenarios. River management can be adapted once it is known how the system reacts to the new management scenario.

Developing Environmental Flows recommendations requires a multi-level approach. It is recognized that river flow is a master variable for maintaining the integrity of freshwater ecosystems. Healthy freshwater ecosystems require that some semblance of the full range of natural flow variability be maintained. The common denominators in developing flow recommendations are low flows, high flow pulses, and floods. The magnitude, frequency, duration, timing, and rate of change of each should be considered.



On the Horizon: *Other State Water Issues Impacting Coastal Areas*

Moderator: Ken Kramer, Sierra Club

Water Conservation Implementation Task Force 2004

Carole Baker, Harris-Galveston Subsidence District

Carole Baker is the Director of Intergovernmental Affairs at the Harris-Galveston Coastal Subsidence District. She is Director of the Board of the Texas Water Conservation Association and Chair of the American Water Works Association Legislative Committee. She is a member of the Water Conservation Implementation Task Force mandated by the 78th Legislature. She was a recipient of the Special Service Award for 2001 from the Lone Star Chapter of the Sierra Club.

Until the passage of Senate Bill (SB) 2, the question was, "*Why* should we conserve water in Texas?" Now the question is, "*How* do we conserve water in Texas?"

In 2003, the 78th Legislature established the Water Conservation Implementation Task Force through passage of SB 1094. The 32-member Task Force was charged by SB 1094 to review, evaluate and recommend optimum levels of water use efficiency and conservation for Texas. In this charge, the Task Force was given six (6) tasks.

1) Develop Best Management Practices

Best Management Practices (BMPs) are management, educational, or structural practices chosen by a water utility to be the most effective and economical means of conserving water. The Task Force was to identify, evaluate and select BMPs for municipal, industrial, and agricultural water users and to evaluate the cost and benefits for the selected BMPs.

The Task Force has developed a BMP Guide consisting of 21 municipal, 14 industrial, and 20 agricultural BMPs. (This Guide is available on the Texas Water Development Board website.) The recommendation from the Task Force is to let the *local* entity choose the BMPs to fit their local conditions. And while critics of the Task Force have said that the BMPs are mandatory, this is not the case. The BMPs are <u>voluntary</u>!

2) Evaluate the Implementation of Water Conservation Strategies

Water Conservation Strategies are recommended in the Regional Water Plans. A survey of Water User Groups indicates that while these Groups realize the importance and the need for the implementation of these strategies, the lack of adequate funding poses a barrier to the full implementation of these strategies by 2010.

3) Consider a Statewide Public-Awareness Program

A survey of Texans indicated that 67% do not know the source of their water, and the vast majority of Texans don't realize water shortages are an environmental problem.
The Task Force has voted to recommend a program modeled after the very successful "Don't Mess With Texas" campaign. The campaign will cost an estimated $10 million the first year, $6.7 million the second year, and $5.7 million per year in subsequent years.
Because of its unanimous support for this Awareness Program, the Task Force has already secured $150,000 from public and private sources to complete initial market research in time for the upcoming Legislative session early next year.

4) Evaluate State Funding of Incentive Programs

The Task Force recommended several ways that the State could facilitate the implementation of BMPs and water conservation strategies. The recommendations include: 1) the authorization of 16 Regional Conservation Coordinators at TWDB to work directly with the Planning Groups; 2) the development of an awards program to recognize exceptional water conservation efforts; 3) the funding of limited grants and cost-share programs to promote the implementation of water conservation plans; and 4) the continuation of the funding of the State Brush-Control Program at current or expanded levels. This last recommendation continues to be a bone of contention between members of the Task Force, as the effectiveness of the Brush-Control Program has not been proven.

5) Advise the TWDB and TCEQ on Per-Capita Water Use Reporting Methodologies and Targets.

Total gallons per capita per day (gpcd) was defined by the Task Force as all water pumped, treated and provided by a supplier divided by the population served. However, indirect-reuse-diversion volumes can be subtracted from the total diversion volumes. Indirect-reuse-diversions are treated return flows from a water user that are conveyed downstream and sold to another user or used by the original water user. This was a big bone of contention among Task Force members as many felt this inclusion skewed the gpcd. Also, after much debate, the Task Force set a Per-Capita Water Use target of 140 gpcd, achieved through average annual reductions of 1% per year.

6) Evaluate the State Oversight and Support of Conservation.

The Task Force recommended that the Legislature pass an Omnibus bill requiring all retail water suppliers serving a population of 3,300 or more to develop a water conservation plan and to

report on the progress of this plan annually. The bill would also develop administrative remedies for those retailers that fail to submit a progress report. In addition, the Task Force proposed the establishment of a Water Conservation Advisory Council to advise and promote water conservation across the State. This Council would be a group of stakeholders that monitor trends in water conservation implementation and development, as well as monitor the effectiveness of statewide public-awareness programs.

The way to measure the success of the exhaustive efforts of the Water Conservation Implementation Task Force will be based on two components. Are the water conservation strategies being implemented? And, has the effort resulted in actual, permanent, and substantial water savings to help Texas meet its future water needs?

Groundwater Management

Laura Marbury, Environmental Defense

Laura Marbury is a Water Analyst for Environmental Defense. Marbury'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. Marbury earned a B.S. in Geological Sciences from the University of Texas at Austin and a M.A. in Applied Geography from Southwest Texas State University.

Groundwater today is no longer in the realm of the "secret and occult", as the Texas Supreme Court stated in 1904, but there has yet to be full motivation to develop the science of groundwater hydrology. As a result, there are only a few places in the state where there are sufficient data to formulate sound groundwater management strategies. While the Texas Water Development Board (TWDB) has created Groundwater Availability Models (GAMs) for most of the major aquifers in the state, these regional scale models are not intended to analyze the effects of large-scale pumping operations on neighboring wells and springs. So, the question becomes: How do we move forward despite not having all the science we need or want?

Environmental Defense believes that it is wise to proceed cautiously, but with the best available science. We believe there are a few principles that can help guide the state's efforts with regard to groundwater management and some steps that need to be taken soon to implement these principles. I'll touch on them here, but they are discussed in more detail in our report, "A Powerful Thirst-Water Marketing in Texas". This report is available on the Texas Living Waters website, www.texaswatermatters.org.

Groundwater Conservation Districts

Groundwater Conservation Districts (GCD) are the State's preferred groundwater management tool. The Legislature has given GCDs the authority to regulate the spacing and pumping of wells and to even deny a permit to withdraw groundwater based on the effect it may have on aquifer conditions. Currently, there are about 80 GCDs, which cover about 55% of the State. Many challenges currently face these GCDs. Some of these challenges are presented here as well as in

"A Powerful Thirst" and another Environmental Defense report, "Spotlight on Groundwater Districts", also available at the Texas Living Waters website.

• Many groundwater districts need more resources to adequately fulfill their statutory mandates. This could be in the form of revenue raised within the districts or grants from the state to assist with technical studies. Districts with $50,000 or even $150,000/year budgets are often unable to adequately perform their function.

• Groundwater districts should cooperate to the greatest degree possible in jointly managing shared aquifers. Oftentimes, the boundaries of districts are defined by the county boundary and not the aquifer boundary. There may be a need to examine whether some single-county districts should be incorporated into larger districts.

• Groundwater districts should be given the authority to put a moratorium on large export proposals if the district doesn't have sufficient science to determine the most appropriate pumping rules for their management goals. These moratoriums could be time-limited, but it should be an option available to districts that are making good faith efforts to protect and manage groundwater resources for existing users, future generations and the environment.

• Groundwater districts should have access to legal opinions and, where necessary, legal representation from the Texas Attorney General's Office. Given that districts are the state's preferred method of groundwater management, it seems highly unreasonable to ask under-funded districts to bear the kind of legal cost that can be imposed on them when they have to defend rules or actions against well-financed interests. The districts are performing a public service, and should have reasonable access to the state's lawyers when required.

Aquifer Sustainability

Environmental Defense believes it should be a management goal of groundwater districts, wherever possible, to manage the aquifer for "sustainability", through the use of annual caps on pumping. We define sustainability to mean that average groundwater withdrawals don't exceed the rate at which they can be replenished through recharge on a continual basis while maintaining adequate spring flows. While withdrawals and recharge need not be balanced every year, the average period should not allow even temporary water-level declines that would adversely affect significant springs or wells. This method of management enables the aquifer to support regional water needs into the indefinite future, protecting the economic future and natural resources of the area.

There may be valid exceptions to this definition of sustainability, the most obvious being the Ogallala Aquifer in the Texas Panhandle. Moving toward a goal of sustainability in that area of the State would have severe economic repercussions, displacing farmers who have long relied on groundwater for irrigation. A balance must be struck between the need to avoid serious dislocation or adverse effects on existing users and protecting the long-term sustainability of the Aquifer for the benefit of future users.

Rule of Capture

Large groundwater marketing proposals are becoming a looming threat to groundwater property rights in many areas of the state. The venerated rule of capture is not suitable for these times. The State needs to move away from the rule of capture to a more sensible system, such as a modified rule of reasonable use (allowing off-tract use of water) or, as Professor Corwin Johnson

recently suggested, something based on Section 858 of the Restatement of Torts (2nd). Under the approach, liability could be imposed for use beyond a "reasonable" share, and there would be some ability to control pumping that dried up springs or streams.

Lease of State Water Rights

There are some special issues associated with proposals to lease groundwater from State lands. This has been a particular issue in Far West Texas, but it may crop up in other areas as well. The 78th Legislature established a Select Subcommittee on the Lease of State Water Rights, chaired by Senator Frank Madia. This subcommittee's review of the leasing of groundwater from lands managed by the General Land Office prompted several recommendations that Environmental Defense is in agreement with. These include: the repeal of the amendment allowing the Rio Grande to be a means to transport groundwater sold to a downstream user; the requirement that the School Land Board adopt a clear set of rules for how they will lease groundwater from Public School Fund Land (PSF); the amendment of the Water Code to require all proposals to produce or transport groundwater from PSF lands be included in regional and state water plans as well as the prohibit the exportation of groundwater from PSF lands in an area where a GCD does not exist.

Seawater Desalinization

Jorge Arroyo, Texas Water Development Board

Jorge Arroyo, P.E. is Director of Special Projects at the Texas Water Development Board (TWDB). He currently directs the TWDB Desalination Program. In that capacity he leads the TWDB efforts in the development of seawater and brackish groundwater desalination supplies. Arroyo is a native of Costa Rica, where he initiated his career as a Civil Engineer with the Costa Rican Water Institute in 1980. In 1989 he began working for the State of Texas, the Texas Water Commission as a leader for the Utility Rate Design Team. In 1993 he joined the Texas Water Development Board. Arroyo holds a B.S. in Civil Engineering from the University of Costa Rica and an M.S. in Construction Management from Loughborough University, United Kingdom.

In the first round of regional water planning that concluded in 2001, several Regional Water Planning Groups considered water desalinization as a potential source of water. The relatively high costs of desalination at the time, when compared to other options, discouraged planners from a wider use of desalination strategies. Nevertheless, several of the regions included brackish water desalination and one of them (Region L) recommended a seawater desalination strategy to meet future water needs. At around the time when drafts of the first regional water plans were being released for comment, the first large-scale seawater desalination facility in the country was being launched at Tampa Bay, Florida. Today, desalination technology has been improved to the point where it is beginning to be cost competitive with other water management strategies. The Governor's seawater desalinization initiative focuses the state's efforts in the development of large-scale seawater desalination as a means to demonstrate its benefits as a new drought-proof water supply in Texas.

The Texas Water Code 16.060 has created a statutory requirement that the Texas Water Development Board (TWDB) undertake research into the feasibility of developing cost effective water supplies from seawater desalination in the state. As part of this effort, a progress report is to be presented to the Governor and the Legislature on December 1st of each even numbered

year. This report is to include: the results of the TWDB's activities; the identification of research, regulatory, technical, and financial impediments to the implementation of seawater desalination projects; and the anticipated revenues necessary for the next biennium.

TWDB has developed screening criteria for selecting pilot desalination plants: need, location, support, costs, and demonstration value of each project. Pretreatment of the water is also a key consideration. As a result of the screening, three projects have been selected: 1) The Brownsville project, providing 25 million gallons per day (MGD), has been selected largely on the basis of the need for additional water supplies to offset the dependency on the Rio Grande. 2) The Corpus Christi project (25 MGD) offered the potential of interregional benefits based on the Corpus Christi water supply system that reaches into multiple basins and planning regions. 3) The Freeport project (10 MGD) is of interest because it would be implemented through a pubic/private partnership involving the Brazos River Authority. Each of these projects is technically feasible. The potential customers for the water from each project are being evaluated.

As part of their desalination research studies, TWDB is also investigating using abandoned oil and gas wells for the disposal of brine resulting from desalination. They have determined that the waste brine is milder than the brine that comes originally from these wells. TWDB is working with the Texas Railroad Commission and the Texas Commission on Environmental Quality on the necessary disposal certification.

TWDB is requesting $3.3 million from the Legislature to fund desalination activities in 2006-7. This includes $2.5 million for the pilot plants, $600,000 to develop small to medium brackish groundwater desalination facilities, and $200,000 to fund two full-time employees to conduct outreach and technical desalination assistance.

Tom Wassenich addresses a question to the panel