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TWRI Research Projects Fund Graduate Students, Faculty Throughout Texas

Projects Address Wide Range of Issues, Including Water Quality, Water Use, Modeling

Research is one of the most essential missions of the Texas Water Resources Institute (TWRI). In fact, the federal legislation that created the National Institutes for Water Research (NIWR), of which TWRI is a part, mandates that each Water Resources Research Institute carry out research, the education and training of students, and technology transfer or information sharing as core activities.

To fulfill the Institute's research mission, TWRI administers several competitive grants programs that provide opportunities, and support, to address water resources issues.

In this issue, we'll provide highlights from these programs.

Since its inception, TWRI has administered funds from the U.S. Geological Survey (USGS) to support research projects at Texas universities. In the past two years, TWRI awarded 21 studies at nine universities throughout Texas.

Photo by Ric Jensen/ TWRI

June Wolfe, a graduate student at Baylor, will study how periphyton influence water quality in Texas streams.

In addition, TWRI also manages other programs that provide funding to researchers, extension personnel, and graduate students.

In 2000, TWRI awarded six "faculty incubator" grants to multidisciplinary teams of scientists throughout Texas A&M University (TAMU). The projects brought together faculty members from the colleges of Engineering, Agriculture, and Liberal Arts.

Last year TWRI awarded 11 Mills Scholarships to graduate students researching water resources issues at TAMU. Soon, we'll announce Mills Scholarship recipients for 2002-03 at TAMU and Texas A&M University–Galveston (A&M–Galveston)

Currently, TWRI is cooperating with New Mexico State University to manage a large study funded by the U.S. Department of Agriculture Cooperative State Research, Education, and Extension Service (CSREES) titled "The Rio Grande Basin Initiative." In this effort, TWRI coordinates the activities of researchers and extension personnel in Texas and New Mexico who are working to ensure that the waters along the Texas–Mexico border are used efficiently.

Last year, TWRI administered funds from the Texas Legislature to support research and outreach efforts to foster soil and water conservation throughout the Texas A&M University System Agriculture Program. This program awarded 23 studies to researchers and extension professionals throughout Texas. TWRI will soon begin selecting projects for 2002-03 for this program.

These projects are just the tip of the iceberg. In addition to these competitive research programs, TWRI is working to build teams of scientists to compete for other studies. During the past year, TWRI secured funds from the U.S. Army Corps of Engineers to study the ecological impacts of removing brush. Two grants were provided from the Texas Natural Resource Conservation Commission (TNRCC) to address total maximum daily loads (TMDLs) and water quality issues, and to market animal wastes from Central Texas dairies for reuse as compost in urban areas. TWRI is working with the United States Environmental Protection Agency, through a consortium led by the Mississippi State University Water Resources Research Institute, to provide technical workshops to train rural water system managers.

The bottom line is that TWRI is passionate about supporting research at universities throughout Texas. TWRI is working to get more faculty members and graduate students involved in water resources studies, both to address water resources problems that are critical for Texas, and to train future scientists.

Recent TWRI–USGS Studies

From 1999 to 2000, TWRI utilized USGS funds to support four research projects at roughly $20,000 each. These projects were carried out through the NIWR.

Highlights of some of these recent studies are recapped below.

• Kathleen Schwer (student) and researchers Peter Santschi of Texas A&M University–Galveston and Bruce Herbert of the Texas A&M University (TAMU) Geosciences Department. This project investigated how radioactive isotopes can be used to date surface and ground water supplies. The research was conducted at the Gorman Caves area in the Colorado Bend State Park. Results show

that groundwater supplies at many sites, including the study area, have distinctly unique isotope signatures. Therefore, by examining isotope ratios, one can identify the sources of various waters at a site.

• Tejal Gholkar and Sabu Paul (students) and researchers Marty Matlock (now with the Agricultural Engineering Department of the University of Arkansas) and Saqib Mukhtar of the TAMU Agricultural Engineering Department. This project involved modeling fecal coliform bacteria populations and dissolved oxygen levels in Leon Creek and Salado Creek near San Antonio. Gholkar used a computer model and a geographic information system (GIS) model to simulate the effects of wastewater discharges on dissolved oxygen levels in Leon Creek. Paul is studying how to model non-point source runoff of fecal coliform bacteria in order to support total maximum daily load calculations.

• Shankar Chellam (researcher) and Ramesh Sharma and Grishma Shetty (students), the University of Houston (UH) Civil Engineering Department. This study examined the effectiveness of membrane filters to treat surface waters. The research provided detailed technical information on how the performance of these filters is affected by water quality parameters. The use of membrane filters provides a mechanism to treat waters without creating disinfection byproducts.

• Chad Thomas, John Burch, Brian Creutzburg (students), and Marshall Jennings and Lance Lambert (researcher), Southwest Texas State University (SWT) Edwards Aquifer Research and Data Center. This project investigated the use of well nests to better determine recharge rates to the Trinity Aquifer. Since the population served by the Trinity Aquifer is growing rapidly, it's critical to know the yield of the aquifer. As a result of this effort, SWT was able to team up with the regional water suppliers to create a regional well-monitoring network.

Photo by Ric Jensen/ TWRI

Jude Benavides of Rice University will develop an improved flood alert system for the Texas Medical Center.

• David Eaton and Peter Wilcoxen (researchers), the Lyndon B. Johnson (LBJ) School of Public Affairs at the University of Texas at Austin (UT). The researchers evaluated the economic effects of surface water transfers on "third parties," focusing on the Guadalupe-Blanco River basin of Texas. The work included using non-economic methods to value surface waters, and estimating the worth people in this watershed placed on recreation, ecosystem maintenance, and other non-consumptive uses. This project was funded by the NIWR and administered by TWRI.

Starting in 2001, TWRI dramatically altered the way in which it administers USGS funds. The emphasis shifted to award larger numbers of smaller grants of $5,000 each. While faculty members competed for research awards previously, the new policy invites graduate students to develop proposals, secure matching funds, and administer the grants and the research.

"What we've done," said TWRI Director C. Allan Jones, "is to put graduate students in the role of a principal investigator, which is very similar to the role they will take on when they become faculty members or scientists. We're funding more graduate students at different universities, and we're providing greater benefits throughout Texas, in large part because we're able to fund more projects and leverage existing studies."

As a result, in 2001, TWRI awarded 11 research grants to graduate students and their faculty advisors at seven universities, including TAMU, UT, Texas Tech University (TTU), Texas A&M University–Corpus Christi, the University of Texas Marine Science Institute at Port Aransas, the University of North Texas (UNT), and Texas A&M University–Galveston.

Here are some brief recaps of the studies funded through this program during 2001:

• Jill Brandenberger (student) and Patrick Louchouarn (researcher), Conrad Blucher Institute for Surveying and Science, Texas A&M University–Corpus Christi, "Arsenic Concentration in Water Resources of the Choke Canyon/Lake Corpus Christi Reservoir System: Surface and Ground Waters." The study investigated the cycling of arsenic and trace elements in the waters of Lake Corpus Christi, Choke Canyon Reservoir, and points along the Nueces, Atascosa, and Frio rivers, as well as the potential impact of arsenic on groundwater quality. Results of the project provide insights into how arsenic concentrations in Lake Corpus Christi are influenced by the geology of watersheds in the region, as well as human activities.

• Bryan Brooks (student) and Thomas LaPoint (researcher), Institute of Applied Science, UNT, "Sublethal Effects of Cadmium and Linear Alkylbenzene Sulfonate Mixtures on *Pimephales promelas* Exposure and Effect Endpoints: Laboratory and Field Assessments." The researchers examined how fish and other aquatic organisms may be affected by exposure to cadmium and other pollutants in North Texas surface waters. Fathead minnows and water fleas (C. dubnia) were used as test species. Results of this study provided new insights into the effects of a number of urban pollutants, including cadmium and pharmaceuticals, on aquatic life in effluent-dominated streams.

• Yesim Buyukates (student) and Daniel Roelke (researcher), TAMU Wildlife and Fisheries Sciences Department, "Plankton Succession: Investigation Regarding New Approaches to Management." This study assessed how releasing treated wastewater in pulses to the Rincon Delta may affect the flora and fauna of coastal wetlands, and examined how nutrient levels in wastewater effluents may affect the growth of phytoplankton. Results of this project will provide guidance about how to manage wastewater releases to best enhance phytoplankton populations.

• Balaji Narasimhan (student), TAMU Agricultural Engineering Department, and Raghavan Srinivasan (researcher), TAMU Spatial Sciences Laboratory, "Determination of Regional Scale Evapotranspiration of Texas from a NOAA-AVHRR Satellite." This study utilized an advanced very high resolution radiometer (AVHRR) sensor aboard an orbiting earth satellite to develop more accurate estimates of evapotranspiration (ET) from different land uses. The satellite is managed by the National Oceanic and Atmospheric Administration (NOAA). Better estimates of ET could improve the accuracy of models now used to simulate water balances, to generate

drought indices, and to schedule irrigation. This project provided an initial assessment of the promise of using AVHRR satellite data to estimate ET, and identified technical issues that need to be resolved.

• Rafael Perez Dominguez (student) and G. Joan Holt (researcher), The University of Texas at Austin Marine Science Institute at Port Aransas, "Fluctuating Environmental Parameters in Red Drum Nursery Habitats: The Influence of Habitat Quality on Larval Growth and Endocrine Function." This project investigated how natural variations in temperatures and storm cycles may affect the growth of larval stages of red drum. The researchers used laboratory studies to examine how climatic variables influence the endocrine functions of juvenile red drum. Findings suggest that larval red drum that were previously exposed to temperature variations were more likely to survive when exposed to a simulated cold front. They found that these fish may have a limited ability to acclimate themselves to oscillating levels of dissolved oxygen.

Photo by Ric Jensen/ TWRI

Kevin Heflin, a graduate student at West Texas A&M, will study if lessening phosphorus levels in cattle feed may reduce nutrient runoff.

• Adalberto Andres Salazar (student) and Ralph Wurbs, (researcher), TAMU Civil Engineering Department, "Conditional Reliability Modeling to Support Short-Term River Basin Management Decisions." Case studies were conducted in the San Antonio, Guadalupe, and Nueces River basins. The goal was to identify how the Water Rights Analysis Package (WRAP) software can be improved to better estimate the likelihood that water supplies may be available at specific diversion points, based on storage levels in reservoirs, streamflows, and other factors. Salazar recently completed his Ph.D. dissertation, which discusses how conditional reliability modeling software tools can be used to assess whether drought management plans and interbasin transfers are viable.

• Kevin Yeager (student) and researchers Bruce Herbert, TAMU Geosciences and Geophysics Department, and Peter Santschi, Texas A&M University–Galveston Oceanography Department. "Resolution of Fluvial Sediment Sources, Residence Times and Resuspension Using Lithogenic, Atmospheric, and Cosmogenic Radionuclides, Bayou Loco, Texas." This study utilized radionuclide fingerprinting to provide insights into sediment production, transport, and deposition within the Bayou Loco watershed near Nacogdoches. The goal was to determine the extent to which such radionuclides as beryllium, lead, thorium, radium, and cesium can be used to distinguish between newly eroded and older sediments. Results discussed how various land uses, hill slopes, and channel processes influence sediment loads in this watershed.

• Daniel Stein (student) and David Eaton (researcher), LBJ School for Public Affairs, UT, "Texas–Mexico Groundwater and Global Policy Applications." The study compared policies multiple political jurisdictions have used to manage transboundary groundwater supplies. So far, policies to manage aquifers which cross national boundaries in the Middle East have been examined. Stein recently published a Master's thesis about this research. In the future, Eaton will identify alternative management plans and will test them in a drought simulation game at the UT campus.

• Jeffrey Johnson (student) and Phillip Johnson (researcher), Agricultural and Applied Economics Department, TTU, "Regional Economic Impacts of Aquifer Decline in the Southern High Plains of Texas." This project examines the short- and long-term economic impact of strategies to limit groundwater pumping in the Texas High Plains. The research is developing dynamic optimization models that will project how the decline in water levels in a 21-county area in the High Plains affects the economy of the region.

• Richard Hoffpauir (student) and Ralph Wurbs (researcher), TAMU Civil Engineering Department, "Incorporation of Salinity in Evaluating Water Availability." This project worked to expand the modeling capabilities of the WRAP computer model to include the ability to assess issues related to natural salt pollution. The study identified how salinity may limit the availability and reliability of water supplies.

• Biswaranjan Das (student) and David B. Willis (researcher), Agricultural and Applied Economics Department, TTU, "Towards an Integrated Water Planning Model for the Texas High Plains." This project is developing a policy and planning model that can be used to evaluate proposed water resources policies and their long-term effects on the Ogallala Aquifer. Das is working to gather county-level data on agricultural water use as well as the economic impact of agriculture on the region. The research team is trying to link this information with a model that simulates the hydrology of the region.

Current TWRI–USGS Projects

In March 2002, TWRI awarded 10 research projects to graduate students at five universities throughout Texas, including TAMU, West Texas A&M University (WTAMU), Texas Tech University (TTU), the University of Texas at Austin (UT), and Baylor University. Brief summaries are presented below.

• Judy Vader (student), and researchers Scott Senseman and Monty Dozier, TAMU Soil and Crop Sciences Department, "Adsorption and Desorption of Atrazine on Selected Lake Sediments in Texas." This grant involves field and laboratory work. This summer, the research team will travel to North Texas to gather sediment samples from Texas lakes thought to be vulnerable to atrazine contamination. Later, laboratory studies will be performed to determine how various soil types affect whether atrazine remains bound or is likely to be released into the environment, as well as the influence of atrazine in sediments on water quality.

• Amanda Bragg (student) and researchers Kevin McInnes and Tony Provin, TAMU Soil and Crop Sciences Department, "Reduced Phosphorus Pollution from Dairies by Removal of Phosphorus from Wastewater Through Precipitation of Struvite." The goal is to determine if wastewater from dairies can be precipitated through the use of struvite, thereby significantly lowering phosphorus levels. This precipitation process could increase nitrogen levels in the treated wastewater, thereby creating a valuable resource for agricultural irrigation. The project involves obtaining wastewater samples from Central Texas dairies and extensive testing at the TAMU Soil, Water, and Forage Laboratory.

• June Wolfe (student), and Owen Lind (researcher), Baylor University Biology Department, "The Role of Suspended Clay in Phosphorus Processing by Lotic Periphyton." This study will examine the effect of periphyton and benthic organisms on water quality, especially in clay-dominated watersheds. The study will assess how these biological organisms influence the transport, uptake, and release of phosphorus in Central Texas watersheds. Wolfe will carry out the research using laboratory streams deployed at the Blackland Research and Extension Center at Temple, where he also works as a scientist. The streams will be seeded with benthic organisms obtained from nearby river basins.

• Jude Benavides (student) and Philip Bedient (researcher), Rice University Environmental Engineering Department, "Enhanced Flood Warnings for the Texas Medical Center: A Second Generation Flood Alert System." Benavides' work is part of a larger study funded primarily by the Federal Emergency Management Agency, and supported to a lesser extent by Rice, the Texas Medical Center (TMC), and TWRI. The goal is to develop an enhanced web-based flood warning system that incorporates new technologies and computer models. The effort involves building new high-resolution NEXRAD (next generation weather RADAR) products into the warning system, as well as the use of a short-term weather forecasting model developed by the Massachusetts Institute of Technology. Through this project, personnel at TMC and Rice will be trained in how to respond to rapidly changing flood threats.

Photo by Bruce Herbert / TAMU

Melissa Roberts studied how arsenic and selenium are sequestered in the Nueces and San Antonio River watersheds.

• Kevin Heflin (student), WTAMU, and researcher Brent Auvermann (TAES, Amarillo). Heflin will investigate whether lowering phosphorus concentrations in cattle rations may also lessen phosphorus levels in manure. This project will be carried out at the U.S. Department of Agriculture Research Service (USDA/ARS) Research Center in Bushland, where samples will be taken from cattle in 18 pens. If weather conditions permit, rainfall runoff data will be collected. If the summer is dry, the site is equipped with a sprinkler system that can simulate rainfall runoff. The researchers believe that if phosphorus levels in manure can be reduced, it could increase the amount of animal wastes that could be applied to farmlands and landscapes without threatening water quality. Cooperators include researchers David Parker and Jim Rogers at WTAMU.

• Jordan Furnans (student) and Ben Hodges (researcher), UT Center for Research in Water Resources, "Higher-Order Statistics in Transport and Evolution of Algae Blooms." Furnans, who is also a Fulbright Scholar, will examine the use of sophisticated computer software to model algal blooms in Texas bays in three dimensions. The research team will try to answer whether these modeling tools can predict the water depth at which "dead zones" (areas with very low levels of dissolved oxygen that result in fish kills) are likely to occur. Furnans will conduct a case study of Corpus Christi Bay using the Estuary and Lake Computer Model (ELCOM), which was developed at the University of Western Australia, where Furnans will spend a year working on the Fulbright Scholars program. The development of ELCOM and other three-dimensional models may assist in TMDL studies.

• Audra Morse (student) and Andrew Jackson (researcher), TTU Civil Engineering Department, "Fate of a Representative Pharmaceutical in the Environment." This project will explore how levels of amoxicillin vary throughout the wastewater treatment process. The researchers will obtain samples from the Lubbock Water Reclamation Plant, which produces effluent used for irrigation at the Lubbock Sewage Farm. This study will explore the sources of this antibiotic as well as the levels of amoxicillin present in the influent, activated sludge basin, and effluent of this plant. The project may yield clues into how amoxicillin may affect ecosystems by increasing resistance to antibiotics. This grant builds upon TTU studies funded by the National Aeronautics and Space Administration in which Morse and Jackson are studying the persistence of antibiotics in closed-loop systems used during space missions.

• Matthew Simmons (student), and Ben Wu and Steve Whisenant (researchers), TAMU Rangeland Ecology and Management Department, "Urban Forested Wetland Restoration." This hands-on project focuses on restoring a wetland near Rowlett Creek in Garland, north of Dallas. The wetland will be developed in a borrow pit, where soil is being removed to cap a nearby landfill. The research team believes the site of the borrow pit was originally a bottomland hardwood forest. The researchers will design and construct a wetland that functions within a complex ecosystem which features an oxbow lake and a series of sloughs and ridges. The project will examine how to assess reference sites and identify the types of vegetation that would naturally be present; documenting the hydrology of the area; and evaluating how well soil amendments and planting designs succeed in such rehabilitation efforts. Lessons learned from this effort may be useful in restoring other urban wetlands.

• Jennifer Hadley (student) and Raghavan Srinivasan (researcher), TAMU Spatial Sciences Laboratory, "Real-Time Distributed Runoff Estimation Using NEXRAD Precipitation Data." This project will develop a detailed database to estimate and display runoff in near real-time. The research team will develop a digital map of Texas represented by a 2.5 x 2.5 -square mile grid. Using the Soil Water Assessment Tool (SWAT), land use data from the USGS, and curve numbers developed by the U.S. Natural Resource Conservation Service, the researchers will create a method to automatically estimate runoff from a variety of site-specific conditions. Runoff maps will be created that can be viewed on the World Wide Web and used by the public. This study will advance ongoing research in developing real-time water balances, forecasting floods, and managing reservoirs.

TWRI Mills Scholarships

In 1967, the family of Mills Cox, a former Chairman of the Texas Water Development Board, created the W. G. Mills Memorial En-

dowment. This fund provides scholarships in hydrology and water resources studies at TAMU. Until last year, this program supported a few graduate students each year. In 2001, TWRI modified the emphasis of this program to provide a lesser amount of aid to many more recipients. As a result, 10 Mills Scholarships were granted during the 2001-2002 academic year. TWRI anticipates funding 15 Mills Scholars during 2002-03. Mills Scholarship recipients are featured below.

Photo by Ric Jensen / TWRI

Audra Morse of Texas Tech will investigate the presence of antibiotics in wastewater effluents on the Texas High Plains.

• Amanda Richmond (student) and Richard Weaver (researcher), TAMU Soil and Crop Sciences Department. Richmond is researching how well constructed wetlands perform as part of on-site wastewater treatment systems located throughout East Texas. She is comparing the treatment provided by constructed wetlands with tire chips and gravel, and is monitoring the use of ultraviolet light and chlorine as treatment methods. Her graduate work is part of a U.S. Department of Agriculture Section study led by Weaver and colleague Kevin McInnes.

• Mary Bhuthimethee (student) and researchers Norman Dronen and William Neill (TAMU Wildlife and Fisheries Sciences Department). Bhuthimethee is trying to determine if parasites found on fish can be used as water quality indicators. Field data are being gathered from the Leon and Salado Creek watersheds near San Antonio. The idea is that several parasite species may be extremely sensitive to subtle changes in water quality. By examining the parasites at a given site, valuable lessons can be learned about water quality.

• Matt Wagner (student) and researchers Ronald Kaiser (TAMU Recreation, Parks, and Tourism Science Department) and Jon Rodiek (TAMU Landscape Architecture and Urban and Regional Planning Department). Wagner is exploring whether voluntary wildlife management associations (WMAs) may be a viable strategy to protect habitat as well as water supplies. Wagner, who also works for the Texas Parks and Wildlife Department, is teaming up with WMAs throughout East Texas to determine if sustainable groundwater sales from these coalitions can help finance habitat restoration, and prevent land fragmentation.

• Christine Burgess (student) and Frances Gelwick (researcher), TAMU Wildlife and Fisheries Sciences Department. Burgess is carrying out instream flow studies throughout the Sulphur River watershed in East Texas, with the intent of inventorying the biological richness of stream segments that have been designated as proposed sites for new reservoirs. A major component of this project is developing an Index of Biotic Integrity (IBI) that will assess fish population and diversity at stream segments, using metrics recently developed by the Texas Parks and Wildlife Department.

• Graciela Lake (student) and Bruce Herbert (researcher), TAMU Geosciences Department. Lake's studies focus on developing methods to quantify, and estimate, the bioavailability of arsenic in the Nueces and San Antonio River watersheds. Lake is investigating whether chelating resins can be exposed to field environments to estimate how different geologic settings affect the likelihood that arsenic may be released into the environment. The research involves detailed chemical analyses to assess arsenic concentrations, including inductively coupled mass spectrometry and atomic adsorption.

• Vance Weynand (student) and Bruce Lesikar (researcher), TAMU Agricultural Engineering Department. Weynand is studying issues related to the use of drip irrigation as a disposal method for on-site wastewater treatment systems. Weynand is now evaluating drip tubing used at several sites to determine why plugging and clogging problems occur, as well as to examine how uniformly drip systems distribute wastewater effluents.

• Raymond Li (student) and Frances Gelwick (researcher), TAMU Wildlife and Fisheries Sciences Department. Li is examining in-stream flow needs for aquatic species in the lower reaches of the Brazos River, near the site of the proposed Allens Creek Reservoir. The study will provide needed data about how the development of this reservoir may affect the ecology of the region.

• Melissa Roberts (student) and Bruce Herbert (researcher), TAMU Geology and Geophysics Department. Roberts' research examines how arsenic and selenium are sequestered in the watersheds of the San Antonio and Nueces rivers, and whether organic arsenic species produced by microbes may affect the mobility and toxicity of this pollutant. She is also studying how algae may take up arsenic contaminants, as well as whether algae may introduce arsenic-related pollutants into higher levels of the food chain, thus adversely impacting ecosystems.

• Brooke Moore (student) and Timothy Kramer (researcher), TAMU Civil Engineering Department. Moore is studying issues related to the planning and design of water and wastewater treatment plants. Her studies involve working with the City of College Station to help analyze how best to expand and rehabilitate lift stations that are part of the wastewater treatment system. In this work, she has analyzed the sanitary sewers used in the Lick Creek watershed and is now carrying out cost-benefit analyses.

• F. John Hay (student) and Don Vietor (scientist), TAMU Soil and Crop Sciences Department. Hay is studying the leaching of phosphorus and nitrogen from transplanted sod grown with composted dairy manure, as well as composted manure applied on the soil surface. Hay will quantify levels of soluble organic and inorganic phosphorus and nitrogen in composted manure and transplanted sod being used to construct golf courses. Hay's work is part of large project funded by the USGS that is led by Vietor and Tony Provin of the Soil and Crop Sciences Department, and Clyde Munster of the Agricultural Engineering Department.

Summary

During the past two years, TWRI has developed innovative ways to greatly increase the numbers of graduate students and faculty members who can be funded through its programs.

Although the size of individual awards is rather small for TWRI

competitive grant programs ($5,000 for TWRI USGS grants and $1,000 for Mills Scholarships), two important outcomes have been achieved. First, TWRI is funding more graduate students than ever at universities throughout Texas. Secondly, through these programs TWRI will be able to address a greater diversity of water-related research issues, thus benefiting the people of Texas.

Information Resources

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Gholkar, T., Modeling the Effects of Low Flow Augmentation by Discharge from a Wastewater Treatment Plant on Dissolved Oxygen Concentration in Leon Creek, San Antonio, Texas. Texas A&M University Master's Thesis, December 2000.

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R. Perez Dominguez, *Effects of Nursery Environmental Cycles on Larval Red Drum (Scianops Ocellatus) Growth and Survival*, TWRI Special Report, 2002.

K. Schwer and P. Santschi, *A Sensitive Determination of Iodide Species in Fresh or Saline Matrixes Using High Performance Chromatography and UV/ Visible Detection*, TWRI Special Report, 2002.

Rice University Texas Medical Center Flood Alert System, http://www.floodalert.org/BraysFAS/

Trinity Aquifer Research Program, SWT Edwards Aquifer Research and Data Center, http://www.rsad.swt.edu/tarp/tarp.htm

Tell Us How You Feel! Win a Book!

As Editor of *Texas Water Resources*, I want to know what readers think about the newsletter. Please take a few moments and fill out this survey form. Fax your answers, along with your name and address, to TWRI at (979) 845-8554. We will conduct a random drawing of those who respond. The winner will receive a free copy of *Isaac's Storm*, a book about the Galveston flood of 1900. The winner of the last drawing was Boyce Gatewood of Cleburne, TX.

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4. Would you still read *Texas Water Resources* if it were only on the WWW–Not printed? (Y/N)
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5. Which topics should be addressed in future issues of the newsletter?

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