

S E A G R A N T C O L L E G E P R O G R A M

# TEXAS SHORES

An aerial photograph of a coastal area, likely a bay or estuary, showing a large body of water on the left and a narrow strip of land or beach on the right. The water is dark blue, and the land is a lighter, sandy or silty color. The overall scene is captured from a high angle, looking down at the coastline.

*Uniquely  
Texan*

# N | O | T | E | S

## **Thomas is first statewide Sea Grant fellow**

The Texas Sea Grant College Program and Texas Parks and Wildlife (TPW) have joined forces to sponsor a graduate fellow interested in learning the ins and outs of state environmental policy and research.

As the first recipient of the Texas Sea Grant Fellowship, Renard Thomas will spend a year working alongside Texas Parks and Wildlife researchers at the agency's Sea Center Texas in Lake Jackson.

Thomas, who has a background in chemistry and is working towards a doctorate in environmental toxicology from Texas Southern University, will analyze the water flowing into Sea Center's fish ponds to determine whether dissolved substances may affect fish production. He will study the effects of aluminum, pH and hydrocarbons on fish eggs, embryos and fingerlings. Thomas also will spend time working at the agency's coastal fisheries laboratory in Palacios and its Marine Fisheries Development Center in Corpus Christi.

He worked 20 years for Dow Chemical, so he said he has a lot of experience obtaining, preparing and analyzing samples, but he needs to learn more about the potential impact of chemical contaminants.

"Just knowing what the contaminants are is just the first step," Thomas said. "I have to then go and assess the impact the contaminant would have on the ecosystem, and that's where the toxicological ends to my work really reside."

Thomas said he hopes to use the experience to obtain a university-level professorship in environmental science or environmental toxicology. But, he said, he's not ruling out pursuing a position with a regulatory agency such as Texas Parks and Wildlife, the Texas Water Development Board or the Texas Natural Resources Conservation Commission.

Patterned after the Dean John A. Knauss Marine Policy Fellowship program, which is sponsored by the National Sea Grant College Program, the Texas program will provide fellows with a \$20,000 annual stipend. The program will place graduate students in agencies such as the Texas General Land Office, Texas Parks and Wildlife, Texas Water Development Board or Texas Natural Resources Conservation Commission.

—Mark Evans

## **TAES recognizes MAS' Haby**

Texas Marine Advisory Service seafood specialist Mike Haby was recognized in August for superior service by the Texas Agricultural Extension Service (TAES).

Haby, also an associate professor and TAES seafood economist, received one of the Texas Agricultural Extension Service Superior Service Awards for "steadfast support of Texas' commercial fishing industry through programming for processed seafood marketing and development of special training and certification programs for seafood processors and retailers."

The award was given to Haby in part for his work on training seafood processors in the procedures of Hazard Analysis Critical Control Point (HACCP), a

federal program requiring seafood processors to follow special procedures to ensure food safety. Since 1996, Haby has trained more than 360 people from Texas, 11 other states and Mexico in HACCP procedures.

Haby also recently co-authored "Improving the Performance of Full-service Retail Seafood Departments," a book that explains the effect improved quality management can have on profits and shows the importance of a predefined program that ensures food safety. The book also describes a series of standard operating procedures designed for full-service seafood departments.

Haby's book is available through the Texas Sea Grant College Program.

## **Erosion control focus of meeting in November**

In an effort to help leaders of coastal communities control erosion, the Texas Shore and Beach Technical Conference will give participants the chance to learn what strategies have and have not worked for other coastal communities.

The conference, called "Success Stories and How They Did It," will include sessions on a New Jersey beach nourishment and dune reconstruction

project, the use of breakwaters to prevent erosion in Florida and habitat restoration projects. It will be held Nov. 16-17, 2000 at the Hilton Hotel-Hobby Airport in Houston and is sponsored by the Texas Shore and Beach Association and the Texas Sea Grant College Program.

Rich Tillman, Brazoria County marine agent and  
(Continued on inside back cover)

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BACK COVER: © STEPHAN MYERS

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*Water-borne Education Center hopes to help people develop an appreciation for marshes and the roles they play in the environment.*

**STAFF** - Dr. Robert Stickney, *Director*; Amy Broussard, *Associate Director*; Ralph Rayburn, *Associate Director*; TEXAS SHORES Staff-Jim Hiney, *Editor*; Mark Evans, *Science Editor*; Amy Broussard, *Design*; Eric Graham, *Webmaster*; Jesse Rodriguez, *Distribution*. Summaries of TEXAS SHORES are posted on <http://texas-sea-grant.tamu.edu>.

**MISSION** - TEXAS SHORES is published quarterly by the Texas Sea Grant College Program in an effort to promote a better understanding of the Texas marine environment. Sea Grant is a partnership of university, government and industry focusing on marine research, education and advisory service. Nationally, Sea Grant began in 1966 with the passage of the Sea Grant Program and College Act. Patterned after the Land Grant Act of the 1860s, the Sea Grant concept is a broad-based scientific effort to better the world for all those living in and out of the sea.

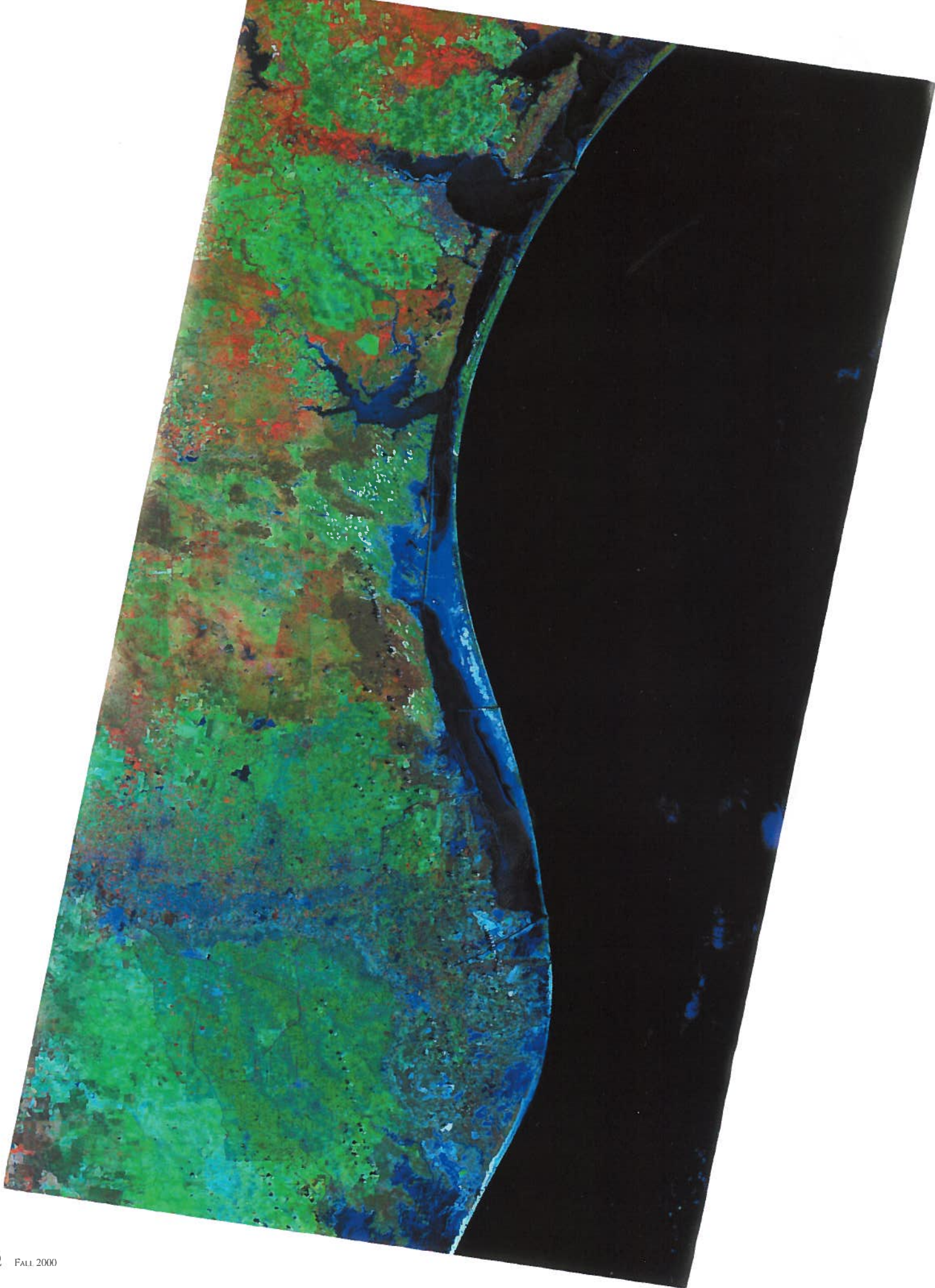
**HISTORY** - In 1968, Texas A&M University received the distinction of being named among the nation's first six institutional award recipients. Three years later the school was designated a Sea Grant College. The university has a rich heritage of oceanography research dating back to 1949 when the program began. In addition, there is an ongoing program to get marine information to the public.

**SERVICE** - The effort is aided by six county marine agents serving eight coastal counties of Texas. These individuals are backed by a group of specialists in marine education, fisheries and business management, as well as aquaculture, environmental quality and seafood technology.

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# The big salty

BY JIM HINEY

**T**he pale blue sky gave way to an incredible indigo blue evening on South Padre Island as the sun set on slightly rippling waters. A blue crab scurried along the shore and tucked itself into its burrow, escaping for the time being from the din of a party outside one of the many waterfront condominiums that stretch the length of this sandy vacation playground.

Across the water, topaz lights studded the landscape of Port Isabel, where charter fishing vessels were pulling into dock after a day out on the water.

It was a typical August night at the extreme southern end of the Laguna Madre, where the hustle and bustle of daytime tourism faded into the hustle and bustle of nighttime festivities. The human activity was in stark contrast to the vast majority of the land surrounding the Laguna Madre. Populations of people anchor the Laguna at each end — Corpus Christi at the north and South Padre Island and Port Isabel in the south. In between there is very little. In fact, it is the lack of human activity for most of the Laguna Madre's 115-mile length that has kept it in near pristine condition. Almost 70 percent of the surrounding shoreline is owned by the state and federal governments, large ranches like the King and Kenedy ranches, and conservation groups.

That is not to say that the Laguna is completely safe from human intrusion. Its very nature makes it susceptible to damage from pollutants that come from in-

creasing human development, particularly near the Rio Grande Valley. Researchers and conservationists say the Laguna is also threatened by maintenance dredging of the Gulf Intracoastal Waterway (GIWW), a claim the Corps of Engineers denies.

The Laguna Madre is one of the most unique bodies of water on the planet. It is a hypersaline lagoon, meaning its waters are saltier than seawater. As such it is one of five hypersaline lagoons in the world, and probably the most famous, believes Dr. Wes Tunnell, director of the Center for Coastal Studies at Texas A&M-Corpus Christi. "You can find mention of the Laguna Madre in textbooks in Russia and Germany."

Freshwater is the biggest difference between lagoons and bays. Bays have a source of freshwater and lagoons do not, or at least they have very limited freshwater inflow. Coastal lagoons have limited circulation and water exchange with the ocean. The Laguna Madre is also extremely shallow, averaging 2.5 feet deep. Due to the lack of water flowing into the Laguna Madre and its shallow depth, water evaporates there quicker than it can be replaced, causing the high water salinity.

The Laguna Madre is home to about 85 percent of Texas' remaining seagrass beds, which draw about 80 percent of North America's red head ducks during their annual migrations. More than 400 species of birds call the area surrounding the Laguna Madre home, either perma-

nently or during migrations. That's more bird species than are found in any other state.

Seagrass is the basis for the Laguna's ecosystem and food web. It provides the basic nutrients for the lowest levels of life forms, which are consumed by higher order creatures. As the plants decompose they release nutrients like nitrogen and phosphorous that fuel the smallest creatures in the Laguna, zooplankton and phytoplankton.

"The thing that makes the Laguna Madre different from Galveston Bay or Corpus Christi Bay as far as zooplankton and phytoplankton populations is the fact that it tends to go hypersaline," explained Dr. Ed Buskey, senior research scientist at The University Of Texas' Marine Science Institute (UTMSI) in Port Aransas. "When we have extended periods of drought, like now, since it is very shallow and there are no permanent rivers flowing into it, the salinity in the Laguna increases very rapidly. But if it gets a big rain the Laguna can become fresh rapidly. It is a very harsh system, a very extreme system. Typically you find smaller species diversity in the Laguna as compared with other bays. There is little exchange of water with the Gulf so fewer species get in. Plus, fewer species can take the change in salinities and temperatures."

The plankton species that inhabit the Laguna are found elsewhere, but those living in the Laguna are different from their kind living in less saline conditions. Buskey pointed to work done by a UTMSI



student comparing a species of plankton that inhabit East Coast bays as well as the Laguna Madre. The student found that the organisms collected in the Laguna were not a subspecies of those collected on the East Coast, “but they are a different physiological race,” said Buskey. “They are specifically adapted to the higher salinity levels.”

Seagrass also acts as a nursery ground and safe haven for juvenile shrimp, blue crabs and recreationally important fish like spotted seatrout and redfish. As a recreational fishing spot, the Laguna Madre produces more redfish and spotted seatrout than any other bay system in the state, including Galveston Bay.

Fishing, hunting, camping, windsurfing and other recreational activities in and around the Laguna Madre have an economic impact on the state of more than \$500 million annually.

The Laguna Madre began life as a much bigger lagoon, stretching well into Mexico and including what is now known as the Laguna Madre de Tamaulipas. It began about 5,000 years ago as sand bars and shoals formed parallel to the shore. Over the next 2,500 years, sea level rose to its current level forcing the shoals and sandbars to come together and form Padre Island, enclosing the Laguna Madre.

The Rio Grande bisected the big lagoon. Sediment flowing down the Rio Grande settled out in the shallow Laguna, building a delta that eventually separated the big lagoon.

In the Texas Laguna, wind and storms pushed sand and sediment landward from the barrier island toward the mainland. The sand and sediment filled in a portion of the Laguna about 15 miles long, gradually forming a large land bridge, or wind tidal flat, just south of Baffin Bay. The land bridge separated the Laguna Madre into upper and lower sections. It remained that way until the 1940s, when the Gulf Intracoastal Waterway (GIWW) reunited the Upper and Lower Laguna Madre by way of a 125-foot wide channel, known as the land cut, that was dredged through the wind tidal flat.

Many of the birds, including endangered shorebirds like the piping plover and snowy plover, and predators like the

peregrine falcon, rely on the Laguna’s wind tidal flats for habitat.

“There are more than 350 square miles of tidal flats in the Laguna Madre, yet most people in Texas don’t know what a wind tidal flat is because of the remoteness of the area,” said Tunnell.

Tunnell uncovered much of the Laguna Madre’s origin while working on the “Laguna Madre Compendium,” a life history of the Laguna Madre written from all of the scientific literature that Tunnell and a team of researchers could find. The



*Blue crabs call the Laguna Madre shoal grass home.*

book, due out in Fall 2001, also covers the Laguna Madre’s hydrology, geology, seagrass meadows, ranching history, bird populations, sea turtles, fish, the barrier island and the Laguna Madre’s open waters, to name a few of the topics.

The compendium arose from a quest by The Nature Conservancy, a private conservation group that boasts more than 1 million members worldwide, to determine the most pressing threats to the Laguna Madre. In early 1998, two officials from the group visited with several researchers, including Tunnell, about the issues facing the Laguna Madre and the research that had already been done. Tunnell convinced the pair that the best way to start was to review the past research and consolidate it.

“There was a lot that was known but it was in a couple of different languages and lots of technical reports, reprints and that sort of thing,” Tunnell remembers. “Nobody had ever put it all together.”

At The Nature Conservancy’s suggestion, Tunnell asked Dr. Frank Judd, a longtime researcher of the Lower Laguna Madre and South Padre Island, to be co-

editor on the project. Tunnell also asked Drs. Kim Withers and Liz Smith, research scientists with the Center for Coastal Studies, to work on the project.

Nine months later the team had compiled a bibliography containing a little more than 1,250 citations and had reviewed about 600 of those documents to come up with the topics that are included in the compendium.

Much of what the Laguna Madre is today comes courtesy of the GIWW and the Port Mansfield Channel, which was opened about 10 years after the GIWW. Increased water exchange and circulation through the GIWW and the Port Mansfield channel led to greatly reduced salinities — low enough to support seagrasses and animal life. Prior to the land cut, salinities in the Upper Laguna Madre reached to about 120 parts per thousand of salt, or almost four times that of seawater, which averages 35 parts per thousand. The Lower Laguna was fresher, but not by much. It recorded salinities that were almost three times higher than seawater. In those conditions, few organisms lived in the Laguna on a long-term basis. No seagrasses could survive the high salinity and animal life was limited to brine flies, some of the hardier worm species and bacteria.

However, Tunnell believes that for short periods of time following storms that brought in large amounts of freshwater, what he refers to as “wet hurricanes,” the Laguna became a fish factory. Although there is no documentation to directly back up his theory, Tunnell believes the Texas Laguna behaved much like the Mexican Laguna, and the history of the Mexican Laguna has been well documented since the 1950s by Dr. Henry Hildebrand. Hildebrand, a noted coastal researcher and founder of the marine program at the University of Corpus Christi (now Texas A&M-Corpus Christi) made many trips to Mexico to test the Laguna’s water and talk to fishermen. He then looked at fish imports from Mexico coming through the fish houses in Brownsville.

What Hildebrand found was that on a cyclical basis, passes between the Laguna Madre de Tamaulipas and the Gulf of Mexico gradually closed, eliminating most if not all of the water exchange between the two. Evaporation shrank the



*There are more than 200 islands, like this one, in the Laguna Madre that were created during disposal of dredged material.*

Laguna, driving salinities up to more than 300 parts per thousand. Then a wet hurricane would blow the passes open and inundate the area with freshwater, drastically lowering the Laguna's salinity. Following the storm, fish migrated into the Laguna Madre de Tamaulipas because they were attracted to the lower salinity. For several years after that "the fisheries would go crazy," said Tunnell. "Incredible numbers of trout, redfish and shrimp made it to the fish houses in Brownsville. Then the passes would begin silting up and the process started anew. That was the boom and bust of the Laguna Madre de Tamaulipas. American researchers felt fortunate to study it because they believed that was the way the Texas Laguna functioned before man dredged the GIWW and some passes."

The Mexican and Texas Lagunas are remarkably similar in other ways. They are nearly identical in length. The Mexican Laguna has the Laguna El Catan, which is very similar to Baffin Bay. Laguna Madre de Tamaulipas also has a large wind tidal flat that almost completely separates it into two sections, known in Mexico as the Northern and Southern Laguna de Tamaulipas.

There are more than 200 islands in both

Lagunas, but their origins are different. The islands in the Mexican Laguna are natural, as opposed to the 10 or so natural islands in the Texas Laguna. The rest of the islands in the Texas Laguna were formed either by material dredged from the GIWW during its initial construction and subsequent maintenance dredging, or dredging of channels for oil and gas wells.

And like the Texas Laguna, the Mexican Laguna is relatively pristine and there is a concerted effort to keep it that way. Mexico lacks the roads and other infrastructure around its Laguna that would attract people. There are a scant few residents living on the islands in the Mexican Laguna — some permanently and some just during the prime fishing season. They have had an impact on the ecosystem there, destroying habitat while clearing brush and introducing predators like dogs to areas that support large numbers of nesting waterbirds.

The Mexican version of the King and Kenedy ranches is Rancho Rincon de Anacahuatas, which occupies a large peninsula in the Northern Laguna Madre de Tamaulipas. It has been in current owner Jorge Martinez's family for five generations. Although the ranch has produced cattle over its entire life, Martinez's fore-

fathers chose to leave the vegetation to its own devices. Martinez has continued the tradition and he wants to ride the wave of eco-tourism. He is working with The Nature Conservancy and a Mexican conservation group to figure out how he can make money from his land by leaving it in a natural condition.

The same human activity that moderated the Texas Laguna's harsh habitat, providing better fishing, is also one of the biggest threats to its continued health.

More of the Laguna's bottom is devoid of seagrasses than 30 years ago, and the type of seagrass present is changing, said Don Hockaday, who grew up on the Laguna in South Padre Island. Hockaday, acting director of The University of Texas Pan American's Coastal Studies Lab, said the change in the nature of the seagrasses is a big concern to wildlife managers. A system that used to be dominated by shoal grass, a favorite food of the red head duck, is slowly being dominated by manatee grass and turtle grass, which the ducks do not particularly like. The big questions are why the change is happening and what will be the fate of the ducks?

"You can't just run out and get answers to some of the questions, but I'm afraid it could be a progressive system, like a barrier island dune blowout where once the vegetation is removed from some areas then the wind will cause that bare area to spread," said Hockaday. "I don't know whether that is happening, but when you have a bare area and the wind picks up it stirs up the bottom and pulls up the silt. The silt buries the seagrass and the seagrass dies, now we have more area that does not have seagrass and the bottom is filled with silt. Every few years they dredge it again and that throws silt up into the water column. It settles out in the seagrass, undoubtedly smothering some of it. It takes a long time for that silt to stabilize and every time the wind blows it kicks the silt back up again.

"We need constant monitoring to see what is happening with the seagrass beds, but somebody has to want to do it bad enough to provide funds for it. People are always asking why we don't study this or that. The reason is because nobody has put the money on the table to study it."



# *It's not easy being green*



*Shoal grass in the Laguna Madre*

Seagrasses have lived a dynamic life in the Laguna Madre. Once incapable of surviving in most of the Laguna's harsh salty reaches, seagrasses now cover 75 percent of the lagoon's floor have become the foundation for the Laguna's ecosystem in a relatively short time.

There are four true species of seagrass in the Gulf of Mexico region — shoal grass, manatee grass, turtle grass and clover grass. All four are found in the Laguna Madre. Shoal grass is a fast colonizer and can tolerate higher salinities than the other species. Those two factors led shoal grass, which had been seen in the extreme upper reaches of the Laguna, to become the first seagrass to take hold in the rest of the Upper Laguna Madre in the 1950s, shortly after the land cut was completed.

By 1994 there were about 62,000 acres of seagrasses in the Upper Laguna. That total included all four species of seagrasses and one species of submerged grass that is not technically a seagrass. The Lower Laguna boasted 120,000 acres and there were 5,000 acres in Baffin Bay.

Ironically, the feature that led to shoal grass initially dominating the Laguna Madre is responsible for its gradual decline. Increased water circulation through the GIWW land cut has lowered the Laguna's salinity enough that manatee grass and turtle grass have taken hold. Those two species are slower colonizers than shoal grass but they can out compete shoal grass for space.

Shoal grass was also affected by the brown tide, an algae bloom that shaded parts of the Laguna Madre for seven years. It is widely thought to be the longest con-

tinuous algae bloom in history.

The bloom was so dense that shoal grass in water more than one meter deep received too little light to survive. Dr. Chris Onuf, leader of the U.S. Geologic Survey's Texas Gulf Coast Research Station in Corpus Christi, estimates that between 2,500 and 3,750 acres of seagrasses were lost to the brown tide, and he has seen no substantial return of the plant.

What caused the brown tide remains uncertain. Scientists first thought that a severe freeze in 1989 that caused a large fish kill in Baffin Bay created a pulse of nutrients to hit the water as the fish decomposed, sparking the brown tide bloom. But since then, researchers at UTMSI have analyzed water samples they took before the freeze. The samples reveal the bloom started before then, although the freeze probably made the tide worse sooner by killing off the brown tide's natural predators and releasing the burst of nutrients.

A number of factors led to the decline of the tide in 1997, said UTMSI's Buskey. An October weekend brought 20 inches of rain to the Laguna, turning the hypersaline lagoon nearly fresh in some places.

"The surprising thing was the tide came back after that," remembers Buskey. "Originally, we would have predicted that once it disappeared like that it would not come back. But it came back quite rapidly, within a year. Then we got another big rain in October 1998 from one of the tropical storms that flushed the Laguna out again. Since then it has come back sporadically in some locations but it has never taken hold of the Laguna Madre like it had for the previous seven years."

Aside from the loss of seagrasses, the brown tide appears to have had no other lasting effect on the Laguna. Texas Parks and Wildlife Department surveys reveal no adverse impacts on the finfish population. In fact, the populations increased because fewer people fished the Laguna during the tide.

"In terms of the things that the public cares most about, there is very little evidence of lasting harm," said Buskey. "The zooplankton and benthic communities changed during the worst part of the tide, but those things recover very rapidly. The zooplankton population has recovered to pre-tide levels."

Between the loss of shoal grass to the brown tide and its gradual loss of dominance to manatee grass and turtle grass, wildlife managers are concerned for the future of the migratory red head duck. They worry that the lack of food at what is the ducks' most important winter resting ground could devastate the birds' population.

Dr. Warren Pulich won't say whether the changing nature of the Laguna's seagrasses is good or bad. The man who is the Texas Parks and Wildlife Department's Coastal Studies Program leader says it is merely a change, and one humans cannot do much about.

"All we can do is just watch it," he said. "We certainly don't want to be presumptuous enough to recommend eradicating manatee grass. I think we have to look at it as part of the cycle of nature. Unless we find out that we are doing things to promote the growth of manatee grass, I think we have to look at it as a natural process."



## *A cause of passion*

Ask people who know him — friends or foes — and they will tell you that it does not take much to get Walt Kittleberger's attention when it comes to protecting the Lower Laguna Madre.

A former office products salesman from Houston, Kittleberger has lived in Port Mansfield for 14 years and been a professional fishing guide on the Laguna Madre for 13 years but his ties to the area go back further than that.

"Port Mansfield was our preferred vacation destination," said Kittleberger. "I was angling for a long time probably to come down here, even though we did it on the spur of the moment. My wife and I came down on vacation one year and never went home. We got down here and relaxed for the first time in a long time. We made a list of reasons to go back to Houston and reasons not to go back to Houston and the list got to the point where we said, 'Well, we guess we've made our decision.'

"When we lived in Houston we had three boats and I was fishing at least twice a week. It wasn't a big leap to figure out what I'd ultimately do. It was just a matter of doing it."

Kittleberger founded and is president of the Lower Laguna Madre Foundation (LLMF), an organization that came together for the express purpose of stopping an ambitious resort development on South Padre Island near the Port Mansfield Ship Channel.

Close to 25,000 acres of land on the extreme northern end of South Padre Island were originally supposed to be part of the Padre Island National Seashore, which was created in 1962. As Kittleberger tells it, the federal government did not appropriate enough money to manage the land, which runs south from the Port Mansfield Ship Channel.

The property eventually landed in the real estate portfolio of American General Insurance Company, which did nothing with it until the late 1980s. At that point, American General decided to make money off the land by turning it into a world class resort that would attract thousands of people a day to the pristine island. Those concerned with the welfare of the Laguna and South Padre Island feared the



*Port Mansfield is the launching point of many avid fishermen. Its location on the shores of the Lower Laguna Madre and its proximity to the Port Mansfield Channel give fishermen easy access to Laguna and open Gulf of Mexico fishing.*

impact that many people and their resulting waste might have on the fragile ecosystem.

Kittleberger remembers the day that state Sen. Eddie Lucio Jr. (D-Brownsville) proclaimed the American General development a done deal.

“We created the foundation based upon Sen. Lucio’s comment that there was no organized opposition to that project,” said Kittleberger.

The foundation won its first major victory when state Sen. Carlos Truan (D-Corpus Christi), helped kill legislation that would have allowed the sale of bonds to fund the project and created of a separate water district.

“We knew that as long as American General had the property, it was always going to be a bone of contention,” said Kittleberger, so the next hurdle was getting the land out of the company’s possession and into the hands of a conservation group. The foundation eventually hooked up with The Nature Conservancy, which made acquiring the property a priority issue.

After almost 10 years of negotiations, The Nature Conservancy bought the land in March of this year for \$7.5 million. The group plans to use part of the property for habitat restoration projects, part as a nature classroom for students and the general public, and hoped to transfer part of the land to the Laguna Atascosa National Wildlife Refuge.

The same passion and commitment to the Laguna led the National Audubon Society, LLMF and five other conservation groups to sue the U.S. Army Corps of Engineers (COE) in 1994 over maintenance dredging that scientists said killed acres of seagrasses, destroying valuable habitat.

The plaintiffs attacked a 1975 environmental impact study done by the COE that found maintenance dredging did not hurt the Laguna. Federal District Judge Filemon Vela basically sided with the COE, which meant maintenance dredging could continue in the Laguna Madre. But Vela ordered that the COE establish an Interagency Coordination Team (ICT), which brought together representatives of state and federal agencies who oversaw dispersal of funds for research that would help the team develop a supplement to the

1975 environmental impact statement. From that, the COE will develop a 20-year plan for how it proposes to dispose of dredged material from the Laguna Madre.

Members of the ICT include the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, Texas General Land Office, Texas Water Development Board, Texas Parks and Wildlife Department, Texas Department of Transportation and the Texas Natural Resource Conservation Commission. The Corpus Christi Bay National Estuary Program, which is now the Coastal Bend Bays and Estuary Program, serves as an advisory member of the team.

Currently, the COE disposes of dredged material in the most inexpensive manner available. Usually that means placing the 30 million to 40 million cubic yards of sediments dredged annually in the state on designated dredge disposal sites or the open bay waters along the 480 miles of navigable channels in Texas.

If Kittleberger and other conservationists had their way, the COE would deposit dredged materials offshore in areas already identified by the federal Environmental Protection Agency in the Gulf of Mexico.

"The volume and nature of the dredged material is such that the offshore interests, like the shrimpers and the turtle people have not had a problem with it," said Kittleberger.

He described the dredged material in the Laguna Madre as having "a fine mushy texture, almost like pudding, and that is why it is difficult to work with when you dump it in a bay. Spoil islands in Laguna are the remains of the original dredging of the Intracoastal Waterway, when they dredged the virgin clays and heavy sands. Ever since then they've been dredging maintenance material. It is a very fine clay. It's so fine you have trouble vacuuming it when you get it in your house. It is so fine it will go through a vacuum cleaner bag."

Dredging stirs up sediments, particularly at the point where the dredged material is placed on the disposal site. The resulting turbidity keeps light from reaching seagrasses, which like terrestrial plants depend on sunlight to survive. The initial turbidity is not the problem, say researchers and conservationists. It usually settles within a matter of hours. But dredged material piled on the Laguna floor is easily stirred up later by wind and waves. In an environment of almost constant wind, such as the Laguna Madre, it amounts to an almost constant cloud of light absorbing silt.

COE studies do not agree with that finding, said Terry Roberts, wildlife biologist in the COE's Environmental Branch.

"We've funded a lot of modeling of the Laguna Madre by people from The University of Texas, Texas A&M and our own Waterways Experiment Station. They found that the background turbidity raised by dredge disposal in the open water decreases quite rapidly," he said. "Depending on where you are in the Laguna and the conditions there, it takes anywhere from

two to three months after you finish your dredging operations before the disposal turbidity settles and you are left with normal background turbidity levels caused by wind and waves. Everyone says, 'Yes, I can see the turbidity out there and therefore it must be caused by dredging.' But there are no scientific facts to back that up. We went to the trouble of doing the modeling to find out if indeed this can be proven one way or the other. We think we have a pretty good handle on this now."

Dr. Chris Onuf does not agree with the COE's conclusions, and he said so in a paper he wrote in 1994. Onuf studied surveys of the Laguna's seagrasses done in the 1960s and 1970s and correlated them with records on dredging activity. He found the intensity of dredging was "much higher in the reaches where these seagrass losses were evident than in other reaches of the lagoon."

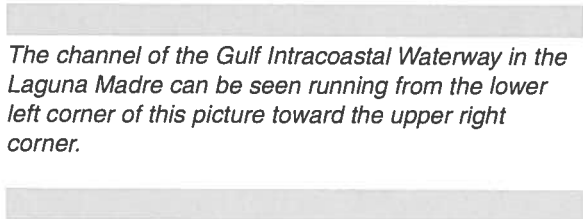
"Dredged material is much more readily suspendable after it has been liquefied in the dredging process," said Onuf, leader of the U.S. Geological Survey's Texas Gulf Coast Research Station in Corpus Christi. "When it is in the channel bottom it is least susceptible to wave attack, that's why it collected there. When it is mounded up over the bottom, clearly it is much more subject to wave attack than when it was in the channel bottom."

Based on his research, Onuf said he believes turbidity caused by dredged sediments has killed 37,500 acres of seagrass in the Laguna Madre since the 1960s.

Ironically, the LLMF is not asking that the GIWW be closed through the Laguna Madre. "We've dreamt about it occasionally but we never suggested it because we do know that in this day and age there are some environmental pluses to the canal, particularly to Baffin Bay folks more so than us," he said, making reference to the increased water circulation made possible by the GIWW.

What infuriates Kittleberger even more is that the COE "typically locates dredged material in such a way that about 80 percent of it drifts away from the disposal areas within a few months after they dredge it," he said. "So the private dredging companies have built-in job security. They are moving the same pudding back and forth, generation after generation, socking it to the American taxpayer. Putting it in a nutshell, the Corps of Engineers is using our tax dollars to destroy our bay to fatten the wallets of a couple of dredgers."

Not so, said Roberts. The COE is only aware of one spot along the length of the Laguna Madre where there is a problem with dredged material flowing back into the GIWW shortly after dredging is completed. At that



*The channel of the Gulf Intracoastal Waterway in the Laguna Madre can be seen running from the lower left corner of this picture toward the upper right corner.*





*Lack of human development along most of the Laguna Madre has left it in near pristine condition.*

spot about seven miles north of Port Isabel there is a strong current pattern that moves dredged sediments back into the GIWW.

The COE did some experimental work at the site in 1999, depositing the dredged material further south away from the current, but there were no clear results.

“Unfortunately, we don’t know exactly what happened because shortly after we finished the experiment, Hurricane Brett came through and ruined everything,” said Roberts.

The draft supplemental environmental impact statement is expected to be finished and distributed to members of the ICT before Christmas. Copies should be available to the public for comment in March. Once the supplemental environmental impact statement is finished, the COE will determine whether a 20-year dredged material disposal plan is needed based on information in the impact statement.

Roberts would not speculate on whether the ICT’s findings will favor continuing dredge disposal practices now in use, offshore disposal or other options.

“We’ve not made any decisions on this yet and I certainly don’t want to second guess the team on this. We have set up a cooperative atmosphere and trying to do things with a consensus.”

Regardless of the findings, the COE is not required to follow the ICT’s recommendations, although Roberts believes the COE will seriously consider the ICT’s recommendations and work with them to build a consensus.

“What we are trying to do is come up with a supplemental environmental impact statement that the ICT will buy into and will have a hand in reviewing and preparing,” said Roberts. “We want something that everyone will adopt.”

If the ICT recommends offshore disposal, Roberts said it’s “conceivable” that the COE will change its dredging procedures.

The word “conceivable” bothers Kittleberger. To him that term is bureaucratic talk that means “there’s no way the ICT will make that recommendation.”

To extent that his group can legally lobby, the LLMF will lobby the Texas Congressional delegation to go to Washington D.C. and try to get the ear of the

new President and convince him that offshore dredge disposal is the most environmentally friendly and politically acceptable option.

“I think we will probably succeed because if Al Gore is elected, then we’re talking to an environmentalist who ought to be sensitive to our pleas,” Kittleberger believes. “If it’s George W. Bush, then he ought to be attentive because (Texas Railroad Commissioner) Tony Garza, who is one of his close advisors, has been a friend and a participant in our conferences for many years. We have a lot of faith in Tony and his honesty, and George fishes down here.

“It is a Texas issue and one that George W. has already stood up for a couple of times for us. As Governor he wrote letters to the Corps of Engineers asking them to take our foundation’s position seriously and look at it. He doesn’t have a good track record nationally when it comes to environmental issues, but to the specific issue that concerns our group, he has a very good track record and we still consider him a friend even if most environmentalists wouldn’t think that way.”



This sign (above) marks the entrance to Padre Island National Seashore, a park created in 1962 and comprising 70 miles of Padre Island. At 110-miles long, Padre Island is the longest barrier island in the world. Roberto Salas (right) works on a saddle at the King Ranch Saddle Shop. The King Ranch was one of several that used Padre Island to graze cattle.



## *It takes an island*

Without Padre Island there is no Laguna Madre, and the island's history is as rich and varied as the Laguna that it encloses.

One chapter in the "Laguna Madre Compendium" goes into great detail about the ranching heritage along the Laguna's shores, including Padre Island. Authors Nancy L. Hilbun and Amy E. Kolterman discuss the various Indian tribes that inhabited Padre Island through the 19th century. Spanish explorer Alonso Alvarez de Pineda found Indians living on the island in 1519, feeding off the bounty of fish, shellfish, birds and bird eggs that the island offered.

Padre Jose Nicholas Balli received a Spanish land grant to the island in 1800. He had visions of establishing missions there and converting Indians to Christianity but his nephew, Juan Jose Balli, who joined his uncle on the island as a business partner in 1829, wanted to build a large ranch. Padre Balli never realized his dream because he died the same year.

Juan Balli started the Santa Cruz Ranch and brought large herds of horses, cattle and sheep to the island. The Ballis continued to ranch on the island until 1844, when they left in response to threats from the United States to annex the region, wrote Hilbun and Kolterman.

The Balli heirs still owned the southern part of the island and Jose Maria Tovar owned the northern part in 1847 when a storm blew John Singer and his family, who were headed for Port Isabel, onto the island. They decided to stay and bought one-seventh of the southern half of the island in 1851.

While ranching on the island, James Singer also funded his brother Issac's efforts to build a sewing machine. It is possible that the very first Singer sewing machine was tested on Padre Island.

Ranching continued on the island for another 120 years. At one point the King and Kenedy families bought or leased land on the island during the Civil War and expanded their mainland opera-

tions. They ranched the land until 1886.

Irish immigrant Patrick Dunn leased his first parcels of Padre Island in 1879 and by 1926 he owned much of the island. Dunn's family ranched the land even after the federal government bought it in 1962 and established Padre Island National Seashore. The last cattle left the island in 1971.

The Padre Island National Seashore continues to dominate the island. Designated a national seashore in 1962, the park comprises about 70 miles of the 110-mile long island. The lightning bolt-shaped park is 130,000 acres of wind tidal flats, beach, grasslands, dunes and wetlands. About 30,000 acres are in the Laguna Madre and another 8,000 acres are in the Gulf of Mexico.

The park boasts a wide variety of wildlife either as permanent residents or as temporary visitors, including all five species of sea turtles and more than 340 species of birds. In fact, the park is part of the Great Texas Coastal Birding Trail.



*Brown pelicans*



*Seagull*



*Tri-colored heron*

During the spring and fall migration the park is home to many of the neo-tropical bird species that are migrating to Central and South America. All of the arctic and peregrine falcons that migrate from Iceland and Greenland stage in the park. Tens of thousands of shorebirds stay year-round, birds like the endangered piping plover and snowy plover. There are about 25 species of colonial nesting waterbirds and the majority of those show up in the park.

There are two annually occurring saltwater populations of white pelicans in North America — populations that nest every year. One is at the Great Salt Lake in Utah and one is in the Laguna Madre on one of the islands created by dredged material.

“You can get hundreds of white pelicans nesting and laying eggs, and then fledging out nearly 100 fledglings a year,” said Darrell Echols, a resource management specialist at the park.

Mammal inhabitants include deer, badgers, coyotes, and kangaroo rats in good numbers. The park even has an alligator.

“It is a 10-foot American alligator,” said Echols “It washed ashore in the park in 1990 and it was two feet long at that time. It migrates through the center of the island. There is a large wetland area generally from Bird Island Basin Road to the south about four or five miles. He generally hangs out in that big pond.”

The park is home to an unknown number of insects, reptiles and amphibians. Echols said park staffers are now working on obtaining grant funds so they can begin an inventory of the insects, reptiles and amphibians.

About 800,000 people visit the National Seashore annually and take advantage of its camping and other recreational areas. One of the most popular sports in the park is windsurfing.

On a blistering hot afternoon, Juan Vu sat under an umbrella next to an assortment of windsurfing and camping gear, watching his brother, Van Vu, guide his sailboard slowly back and forth across a small patch of the Upper Laguna Madre.

“He’s just messing around out there now,” Vu smiled. “There’s not that much wind today.”

Little wind is the exception to the rule on the Upper Laguna, which has become a Mecca for avid windsurfers.

“In the world of windsurfing, this is one of the best places to come,” said Vu, motioning the waters around Bird Island Basin at the northern end of Padre Island National Seashore. “People in the windsurfing world call this place a national treasure.”

Vu, a trauma room physician, and his brother, a trauma nurse, traveled to the Upper Laguna in August for two weeks of windsurfing with friends. A 10-year veteran of the sport, Vu brings friends to Bird Island Basin to teach them windsurfing. It is an ideal location because the water is relatively shallow, the wind is constant and strong, and the flat, muddy lagoon bottom offers a sooth landing for beginners



who find themselves in the water more often than on the sailboard.

If the Nature Conservancy and the U.S. Fish and Wildlife Service can come to terms, the Laguna Atascosa National Wildlife Refuge will expand to South Padre Island. The refuge already occupies about 45,200 acres on the mainland coast, northeast of Harlingen. It began life as the Harlingen Aircraft Aerial Gunnery School, run by the U.S. Army Air Corps during World War II.

When the war ended, the Army divested itself of as much real estate as possible. The Department of Defense transferred the 8,000 plus acre facility to the Department of the Interior, which bought up surrounding land to form the present refuge.

Among other distinctions, the refuge is home to the only known breeding population of ocelots, an endangered cat, north of the Rio Grande. The endangered jaguarundi, a cat that is smaller than the ocelot, also makes the refuge its home.

As with Padre Island National Seashore, the Laguna Atascosa National Wildlife Refuge relies on the Laguna Madre to attract a vast variety of birds.

“Because of the geographical location of the refuge — two major migration flyways converge here, it’s like the neck of a funnel — every spring and fall you get big concentrations of migratory waterfowl, migratory song birds, shore birds and raptors that come through here,” said Melvin Maxwell, a refuge officer. “I guess the thing that points that out is that on this refuge there have been more species of birds documented than on any other national wildlife refuge in the system. We’ve documented more than 400 different species of birds here. You’re not going to find them all here at any given time of the year, but over the period of a year with migration you can find a huge diversity of birds that use this area. A lot of them depend on the Lower Laguna Madre system because of their need for specific types of feeding, nesting or resting habitats.”

Those birds include the endangered piping plover and snowy plover, both shorebirds that rely on the wind tidal flats in the Laguna as habitat. Peregrine falcons use the tidal flats as staging and courting areas, plus they feed on other birds there.

“Thirty years ago we didn’t think these tidal flats were worth anything,” laughed Dr. Wes Tunnell. “Dig them, dredge them, dump on them or do anything you want to them, we weren’t concerned about the tidal flats. Now some people have made argument that the tidal flats in the Laguna Madre, both in the United States and Mexico, are the most important tidal flats in the Western Hemisphere for migrating shorebirds as they move from the North to the South. The two Lagunas are the main stopovers for the birds. Now these sorry tidal flats that nobody cared anything about are suddenly real important.”



*Laughing gulls*



*Black skimmers*



*White pelicans*

# *The ditch called Colorado*

Besides dredging, the biggest threat facing the Laguna Madre is what humans dump into it. While a normal bay may exchange its entire volume of water with the ocean in a matter of days or months, the residence time of the Laguna's waters can be years in times of drought, like now.

Anything that flows into the Laguna stays for a long time.

Inflows to a bay system usually come from rivers, but there are no rivers flowing into the Laguna. The Lower Laguna does receive a limited amount of fresh-water delivered by the Arroyo Colorado. As its Spanish name implies, the Arroyo is a water-carved gully. Its primary water flow comes from the municipal wastewater treatment plants of virtually every Rio Grande Valley community except Brownsville.

"The headwater of the Arroyo Colorado is often called the city of Mission solid waste treatment plant," laughed Kittleberger.

That may be a joke, but it points out something that many people fail to consider: The impact of human development on the Lower Laguna extends beyond the populations that live along the Laguna's shores

"People always think in terms of development that is right on South Padre Island and Port Isabel," said Hockaday. "That development is minor compared to the development of the whole Rio Grande Valley. The vast majority of the fresh-water that goes into the Lower Laguna Madre is through land runoff and wastewater effluent. Every new person who comes into the Rio Grande Valley, other than those in Brownsville because its effluent goes into the Rio Grande, has a certain amount of effect on the Lower Laguna Madre.

"People see the communities of Port Isabel and South Padre Island. What people don't see is that those are just the

ones on the coast. Here you've got a guy whose house is on the bay and then there is the house next door to that and the house next door to that. Those are just the houses on the coast. When you talk about the impact of people in the Rio Grande Valley on the Lower Laguna Madre, the next house is on the other side of McAllen."

The Arroyo's greatest water flow comes after storms, when runoff adds its volume to the municipal load. Last but certainly not least, several shrimp farms take water from the Arroyo at the beginning of every season and discharge water back into the Arroyo at various times of the year.

The shrimp farms in particular have been a target for conservationists and the general public who accuse the farm operators of dumping large amounts of pollutants into the Arroyo with the discharge water.

Kittleberger and his foundation recently celebrated what they call a victory over a new shrimp farm located not far from Port Mansfield. The Loma Alta Trust set up a re-circulating shrimp farm on the El Sauz Ranch and sought a permit from the Texas Natural Resource Conservation Commission (TNRCC) to discharge used pond water back into the local waterways, which ultimately reach the Lower Laguna Madre. The LLMF and the Environmental Defense Fund fought the permit and eventually reached a settlement with representatives of Loma Alta Trust. The settlements provisions were incorporated into the permit and require the shrimp farm to: Limit total discharges of water and waste material into the Laguna Madre system; use best management practices to minimize pollution; and allow citizens to monitor operations. The Environmental Defense Fund is now working to have these three measures added to all state permits.

The most striking aspect of the settle-

ment to Kittleberger is that it reduced by two-thirds the number of days the shrimp farm can discharge water. The original permit allowed discharges year-round. The new permit limits discharges to 120 days.

Kevin DeBault, manager of a shrimp aquaculture group in Arroyo City, said he currently operates under a 120-day discharge limit. As of early September, the Arroyo Aquaculture Association has discharged water just six times this year. Like the El Sauz Ranch, the Arroyo Aquaculture Association uses a semi-recirculation system to maintain close to 85 five-acre ponds.

Asked if there is any truth to the popular belief shrimp farms discharge all sorts of pollutants into the Laguna Madre, DeBault responds with a chuckling "Absolutely not," as if it is a joke he has heard a dozen times. "We have made great strides toward improving water quality. We used to discharge more than 7 billion gallons of water a year and now we are down to less than 500 million gallons each year. A lot of it is due to advances we made out here and a lot of it was because of (former manager) Lewis Hamper working on his own and with Texas A&M and Dr. Tzachi Samocha to find a way to deal with our effluent better and not cause problems environmentally.

"Most of us here are biologists and we don't want to go trashing the system. What we want to do is operate as environmentally friendly as we can. It is feasible to raise shrimp and still be environmentally friendly."

DeBault's group switched in 1994 from what he termed a free-flowing system to one that uses mostly recirculated water. The farm adds water now only to initially fill the ponds, make up for water lost to evaporation or to dilute water that is showing decreased quality.

They have also experimented with us-



*Shrimp farmers say they are often unfairly accused of dumping pollutants into the Arroyo Colorado.*

ing constructed wetlands as natural water treatment plants. The work has paid off. In addition to decreasing discharges, the farm has greatly decreased the amount of ammonia and total suspended solids (TSS) in the water leaving the facility. In 1994, the farm discharged 80,000 pounds of ammonia in its used pond water, DeBault said, compared to the 200 pounds of ammonia discharged so far this year. TSS dropped from 5.5 million pounds in 1994 to about 20,000 pounds annually now, he said.

Kittleberger concedes that the general public's concern when it comes to aquaculture discharges has to do with total suspended solids, but that is not the focus of his group's attention

"Everybody can relate to a big ugly plume of suspended solids," he said. "Here you have clean water and then all of a sudden you have a big ugly plume. That water is not as desirable to swim in or fish in or boat in. But to us, the constituent in the water that we are most concerned about are the viruses."

Viruses can become a problem when any animals are packed closely together in an environment. Shrimp farmers walk a thin line between stocking enough shrimp in each pond to be profitable and stocking too many shrimp, leading to the possibility of disease.

Texas shrimp farms were hit hard in 1995 by the Taura virus, which wiped out most of the shrimp crop. The disease is believed to have begun in the Taura River region of Ecuador, although there are some who believe it started in Colombia. It worked its way up the coast of Central America and Mexico, finally invading Texas farms. There was much speculation about how it spread but there is still no sure answer.

At the time, Gulf shrimpers and conservationists were afraid that the disease would escape the shrimp farms and

wreck havoc on the wild shrimp population. As it turned out, Taura was fairly species specific. It killed 90 percent or more of the exotic Pacific white shrimp that Texas farmers raised, but it only killed about 30 percent of the Gulf white shrimp that it infected. The virus seemed to have no effect on Gulf brown shrimp, which make up the majority of the wild catch. If Taura did escape the Texas farms, it had little or no impact on wild shrimp

However, there are shrimp viruses, such as white spot, that are extremely lethal to a number of species of shrimp.

Kittleberger and others believe the only solution to the threat of viruses in the Arroyo is for shrimp farms to go to completely recirculating systems, where they do not discharge any water into the Arroyo.

That, says DeBault, will most likely never happen because the farms will always need to exchange some water with the Arroyo to cut down the salinity of pond water and to maintain the optimum conditions for growing shrimp.

Shrimp farmers are keenly aware of viruses and the damage that they do. Shrimp are a cash crop. Lose the crop to disease and they lose the cash.

"To keep a virus out of the Arroyo, we have to keep it off the farm to begin with," said DeBault. "One bonus of a semi-enclosed system is that we have a limited intake of water, which lessens the time and chance that we can introduce a disease from the natural environment into the farm. It is highly un-

likely disease comes in with the shrimp post-larvae we stock because it comes from a certified pathogen-free source, which is the Harlingen Shrimp Farm hatchery. The shrimp that we get is disease free. If we can keep from introducing any kind of disease from the outside, then we won't have a disease.

DeBault added that there are genetic programs in place now that are developing shrimp that will be resistant to the Taura virus.

"We are making every attempt to be environmentally friendly to our community and to produce a high-quality product," he said. "We're making strides toward that. We may not be 100 percent there yet but we are definitely on the way."

Despite advancements in wastewater treatment by the shrimp farms and the area communities, Dr. Don Hockaday is still greatly concerned about the increased nutrient load carried by the Arroyo Colorado into the Lower Laguna.

"The Lower Laguna Madre appears to be flexible enough that it is tolerating it, but will we be getting to a point in which the homeostatic balance starts breaking down? That's another thing we don't know.

"The Arroyo Colorado is a lot filthier than it was when I was a kid, as far as nutrient level is concerned. I used to swim in the Arroyo Colorado when I was in the Boy Scouts as a kid in the 1950s and 1960s. When I go there now it is like green milk, you can't see through it. It wasn't like that before.



# Laguna forever?

**T**he Laguna will survive, physically if not as a healthy ecosystem, so long as Padre Island remains a barrier to the Gulf of Mexico. At 110 miles, Padre Island is the longest barrier island in the world. It sits at the convergence of littoral currents from the north and south. It has survived wind, surf and storms for 2,500 years, but whether it survives another 2,500 years remains to be seen. Scientists will not know until early next year how quickly the Gulf of Mexico side of the island is eroding or growing and where. The Bureau of Economic Geology at The University of Texas is in the process of analyzing the latest data for the island.

The last similar study was completed in 1975. At that time, the middle of the island — on the opposite side of the island from the land cut — was growing at an undetermined rate. The rest of the island was eroding at varying rates. North of the land cut and south of the land cut to the Port Mansfield Channel, the erosion rates were less than five feet per year.

South of the Port Mansfield Channel the island was eroding at a rate greater than five feet per year. That does not mean that someone can measure the width of South Padre Island in feet, divide by five and predict when condominiums will begin falling into the Gulf.

“The island continues to get sediment from the north and the south,” said Dr. Jim Gibeaut, coastal geologist with the Bureau of Economic Geology. It is possible that South Padre Island could completely disappear, but “we’re talking on the order of several hundred if not several thousand years for that to happen.”

A more likely scenario is that Padre Island and the Laguna will move landward as the sea level rises, believes Gibeaut. Worldwide, sea level is rising 1-2 millimeters per year, which is probably the rate along the southern Texas coast, said Gibeaut. As sea level rises, the island will get narrower and big storms will move the sediments closer to the mainland shore. In essence, the barrier island will creep toward the mainland. At

the same time, the rising sea will flood what was once dry land on the mainland coast creating new mud flats and wind tidal flats on the backside of the Laguna.

“So you won’t necessarily lose an environment, but things will be shifted landward,” said Gibeaut.

In theory, Harlingen could eventually be another Port Isabel, perched at the shore of the Laguna Madre.

While humans wait a millennia or two to find out nature’s plans for the Laguna, people like The Nature Conservancy’s Carter Smith will find ways of helping people learn about and enjoy the environment that exists now.

“That island is so critically important for people who enjoy going up the shore to fish or beachcomb or birdwatch,” said Smith, the organization’s South Texas program manager. “Helping the communities take advantage of that asset is something that we definitely plan to work on.”

On The Nature Conservancy’s newly acquired island property, Smith plans to begin dune and other habitat restoration projects and he wants to work with the surrounding communities to develop nature-based tourism. Eco-tourism is big business in Texas, accounting for about \$23 billion in revenues annually for the state. It is the fastest growing segment of the Texas tourism industry.

Smith also wants to make the land a living classroom for area students. The Nature Conservancy, through its Coastal Conservation Education Program, has a boat available to take students from Port Mansfield to Padre Island. The group has a similar program now involving Matagorda Island through a partnership with the U.S. Fish and Wildlife Service.

“It will be a good experience. the kids can see the hypersaline bay and will be able to experience the seagrass meadows and the diverse aquatic community. They will come into the ship channel where a lot of green turtles feed. Then they can get up on the island and look at the dune communities and the wind tidal



*Fishing cabins like these dot the Upper Laguna Madre. Some of the cabins actually float on the water and can create hazards when they sink.*

flats, look at the shorebird communities, the wading bird communities and some of the freshwater potholes that are on the west side of the island.

“That is just such a beautiful, unspoiled part of the beach and you really get a sense of the uniqueness of the barrier island and the Laguna Madre and the Gulf of Mexico and how they all come together. It is a very different experience when you go in by boat and then wade in a little bit. It provides a nice perspective.”

The Nature Conservancy wants to work with a variety of public and private partners to determine the best way to preserve the land.

“The hard step was acquiring the land,” Smith chuckled, referring to the nearly 10 years of negotiations that ended in March. “We put a lot of time, resources and effort into that acquisition so needless to say we are pretty ecstatic that it has come to fruition.”

“It’s a really beautiful tract of land with an incredible conservation significance. Without the barrier island there wouldn’t be a Laguna Madre. We believe, and from everything we’ve learned from scientists working in that region, it was critical to acquire this tract of undeveloped barrier island in order to maintain the health and integrity of the Laguna Madre complex. The more we can do to take advantage of the property on South Padre Island to help educate the community and the school children and spread the word about the importance of the Laguna Madre, the better off we are going to be from a conservation perspective.”

The Nature Conservancy knows it will have to deal with un-

wanted attention to its land. Even before the organization bought the land there was trouble with poachers on the property. Even more troublesome are off-road enthusiasts who drive to this remote area to have fun in the dunes and on the wind tidal flats, away from the notice of police and legal retribution guaranteed by dune preservation laws.

“Wind tidal flats are very sensitive habitat for shore birds, particularly piping plovers,” said Smith. “Rutting of the flats disrupts the hydrology or water flow across the wind tidal flat. The dunes are the glue that hold that island together. It is really disquieting to see the extent of that off-road vehicle damage. That problem is much bigger than The Nature Conservancy can handle alone. We just don’t have the staff and resources to try to enforce things like trespass on the dunes. I think it will have to come from a concerted educational campaign that helps elevate awareness of the importance and fragility of these systems.”

In the “Laguna Madre Compendium,” Tunnell and his team include a laundry list of conservation issues facing the Laguna Madre. Water quality in the Arroyo Colorado, development along the Laguna and dredging are all high profile issues that receive the lions share of attention.

Houseboats are a much lessor known environmental issue. They are not houseboats as the dictionary defines one: A boat that is for use as a dwelling. Located at the mouth of Baffin Bay, these houseboats are literally cabins floating in the water.

“Every now and then one of these things will sink and they are starting to litter the bottom down there,” said Tunnell. “There are more and more of them. If you go to the mouth of Baffin Bay now you will see about 15 of them just floating out there in the water, anchored to the bottom.”

If sunken houses weren’t enough of a problem, the Laguna is subject to the trash and waste that are the byproducts of human existence.

Other issues facing the Laguna are shoreline construction; loss of vegetation, especially on South Padre Island; oil spills, although they are infrequent; fish kills and noise pollution caused by seismic testing conducted during oil and gas exploration; and certainly the weather.

Henry Hildebrand theorized for years that wet hurricanes and El Niño years producing lots of storms are the things that govern the productivity of the Laguna Madres, particularly in Mexico.

“This is one of the few places were a hurricane can hit and be good for the system,” said Tunnell, repeating one of Hildebrand’s favorite sayings.

For Hockaday, it is the remaining questions that concern him. “It’s the little cumulative processes over a long period of time. You have to realize that the Lower Laguna Madre’s main flushing action and circulation with the Gulf of Mexico is here at Brazos Santiago Pass. There is some communication with Baffin

Bay through the land cut and there is the Port Mansfield Channel. But it is just that, a channel. The difference in the volume of water that flows through them is considerable. With the imposed southeast wind, the predominant circulation is toward the north. The vague area in here to me is the area way to the north. Each time we put in something like a causeway, what does that do to the circulation?"

And, if most of the water exchange with the Gulf happens in the Lower Laguna Madre, Hockaday wonders how much exchange is necessary to keep the Upper Laguna Madre healthy?

Just as disturbing is the plight of the red head duck, only for a different reason to Hockaday.

"When you see a change like that of the seagrasses over an area as large as the Lower Laguna Madre, you have to think about more than the economically important red head duck. If we have that big of a change, what else is being affected?" he asks.

"People ask if these changes are for the better or the worse, but usually they are just different. When you have that much change in that short of a period of time over this vast an area, then people need to start paying attention to it. They need to put a lot more effort and money into paying attention to it. We don't know what is on the upper part of the curve that we have not noticed yet. Nobody noticed this big change until somebody went out and studied it. Otherwise we would not have known about this much change in the seagrasses. But if we wait 15 years to go out there and do a generalized study, we might find that there are other things that have changed. That's the problem with worrying about a whole system changing — you don't know exactly what you need to be looking at until all of a sudden you find out that there is a major change. You find out about it after it has changed, not while it is changing."

Kittleberger and the LLMF will continue to worry about the changes in their part of the Laguna Madre system using a philosophy that is reminiscent of, although more blunt than the often reprinted prayer:

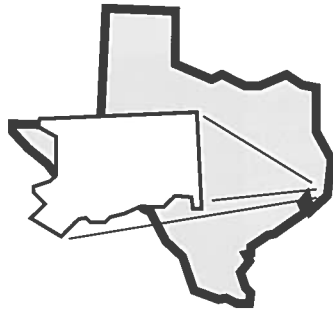
Lord, grant me the serenity to accept the things I cannot change, the courage to change the things that I can and the wisdom to know the difference.

"We have a pretty diverse board with one thing in common: We're trying to protect the Lower Laguna Madre from the acts of man," said Kittleberger. "Acts of nature we have to accept. Anyone who lives along the coast needs to resign themselves to that pretty quick and quit trying to control nature by building seawalls or anything else. If you are that bummed out about it, move inland." ■



*The unspoiled nature of the Laguna Madre attracts thousands of people each year, making more than a \$500 million economic impact on the state.*

# At the Water's Edge



Chambers County

BY MARK EVANS

Only one road, FM 562, connects Smith Point to the rest of Chambers County. The parts of town that aren't bordered by the bay are framed by marsh grasses that stretch as far as the eye can see and are interrupted only by the occasional stand of trees. Only a few hundred people live in this tiny, isolated community that juts out into the east side of Galveston Bay. Those people that do live here have done so for generations.

Sarah Ridge Paschal Pix settled here in the late 1850s when she and her husband, Charles Pix, established a cattle ranch at Smith Point. Even by the standards of today, Sarah Pix led an incredible life. She was born in 1814 near Rome, Georgia as the daughter of Cherokee Chief Major Ridge. She lived to see her father, brother and a cousin assassinated because of the chief's support of a treaty that traded Indian lands for land in

the West. This treaty also led to the infamous "Trail of Tears."

Pix met and married her first husband, George Washington Paschal, in 1837 during the "Trail of Tears," when her tribe was forced to move to the Indian Territory in what is now Oklahoma. The couple settled in Arkansas before moving their family to Galveston in 1847. During the 1850 yellow fever epidemic, Sarah treated many of the sick with an Indian remedy.

By the time of the epidemic, her marriage to Paschal was over. At a time when divorce was unheard of, Sarah continued to live in Galveston until her marriage to Pix in 1856 in the home of Republic of Texas President Mirabeau Lamar.

When the couple settled in Smith Point, they found a land that was probably similar to how it is today – isolated, humid, hot and full of mosquitoes. To support themselves, they ran cattle from Smith Point to Liberty and built a cattle ranch.

While Pix was away serving in the Confederate Army during the Civil War, Sarah expanded the ranch until the collapse of slavery forced it into decline. In 1880, she divorced Pix. The Cherokee princess lived on the ranch at Smith Point with her daughter and two grandsons until her death in 1891.

Her descendants still own the land where she settled, and a historical marker now identifies the site. Among her relatives in

the area are the brothers Joe and Ben Nelson, who also live in Smith Point and are related to her by marriage. The brothers operate oyster leases off of Smith Point, and like their father and grandfather before them, they rely on the bay for their livelihoods.

Between their two families, the Nelsons oversee more than 900 acres of private oyster leases. Texas Parks and Wildlife officials estimate that Ben Nelson has been the largest oyster producer along the Texas coast for the past 10 years, but his brother Joe worries business will suffer as Galveston Bay continues to feel pressure from the expanding development along its shores.

As Chambers County faces the 21st century, it finds itself at a crossroads. Throughout its history, Chambers has been a rural county with a rich natural heritage and an abundance of resources. That is likely to soon change. Sandwiched between the growing populations of Houston/Galveston on the west and Beaumont on the east, portions of the county are already feeling the effects of urban sprawl as people attempt to escape the city. How the county responds to this growing pressure will likely decide

whether it holds onto its rich marshlands and natural resources or becomes just another suburb of a large metropolis.

## A county built on the marsh

County Judge Jimmy Sylvia's family also has a long history in the county. His great-grandfather, Francisco Silveria (the family later shortened its name to "Sylvia" to sound more American), operated a sailboat on which he carried supplies between Old River and Galveston. Sylvia grew up on the west side of the county, which is divided by the Trinity River, and still lives on land that was part of a Spanish land grant given to his family.

Sylvia says he has already seen the county change from the way it was when he was a child growing up along the Old River. On roads where he rode his bicycle as a child, he says, the traffic is now bumper to bumper. The west side of the county is growing because of pressure from Baytown and Houston, he says.

Meanwhile, he says, county officials are trying to bring some of that economic development to the mid-county area around Anahuac. It'll come eventually, he says, but not until the west side of the county fills up. Even then, the development will probably hug Interstate 10 and not make its way down to Anahuac.

Even if development doesn't make it to Anahuac, Sylvia says he hopes the mid-county area will still play a vital role in the county by attracting ecotourists.



This historical marker identifies the site originally settled by Sarah Ridge Paschal Pix.



“In the midpart of the county, tourism is the main industry,” he says. “The more we can develop that the better off we will be here.”

The area attracts hunters and fishermen as it sits not only along Galveston Bay but also the Trinity River delta. Though Chambers County is considered a coastal county by the state, it only has about a mile of frontage along the Gulf of Mexico.

Birding is a big draw for the area, and the Anahuac National Wildlife Refuge attracts 70,000 visitors annually from all over the world. The 34,000-acre refuge is in eastern Chambers County and borders East Galveston Bay.

Andy Loranger, project leader for the Texas Chenier Plain National Wildlife Refuge Complex that includes Anahuac, says Anahuac is an internationally known destination for birders. In an average year, the refuge sees visitors from every state in the United States and from 34 countries.

“Anahuac is a very well-known destination for birding and wildlife observation,” he says.



*The 34,000-acre Anahuac National Wildlife Refuge is a favorite destination for birders.*

The refuge is just part of a complex of parks in southeast Texas that attract ecotourists. Sea Rim State Park and the McFaddin and Texas Point refuges in neighboring Jefferson County also are part of this complex (see Texas Shores, Summer 2000).

The government is currently investigating the expansion of the Anahuac refuge. The investigation is part of a study examining how wildlife refuges are managed and how they are used by the public.

Refuge officials have already identified features in the region that have a high ecological value, Loranger says. These areas include coastal wetlands, coastal woodlots and coastal prairies. However, he says, any expansion of the refuges would only occur if landowners are willing to sell their land.

Area landowners have expressed concern that any expansion in the refuges would interfere with oil and gas exploration and development, Loranger says. However, he says, Anahuac refuge officials have and are allowing these activities on the refuge.

The refuge and similar protected lands can be a significant economic asset to a community, he says.

“Overall, the nature tourism industry is a growing industry in Texas,” Loranger says. “The state is one of the top desti-



*Founded in 1831, Anahuac served as a leading port along the Trinity River and Trinity Bay.*

nations in the country for nature tourists. The Texas coast, with its natural resources, is a tremendously important area. Nature tourism is expanding and is expanding rapidly.”

While the county’s biggest draw is its natural resources, Sylvia says he worries these resources may be threatened by the widening of the Houston-Galveston Ship Channel and a proposed industrial waste disposal site on the western shores of Trinity Bay.

“It could be catastrophic because the water table there is so shallow,” he says.

Ultimately, Sylvia says he hopes the county can attract economic development without sacrificing its natural resources.

Chambers County marine agent Terrie Ling agrees the county needs to protect its natural resources. Chambers County has a lot of beautiful marshes that are ideal stopover points for migrating birds, she says, and this attracts ecotourists. But even beyond the area’s natural resources, Ling says the county’s rich heritage makes the area attractive.

“There’s a history here that you don’t get, even in Beaumont, where people are going 90 to nothing,” she says. “I really like the small town. Of course, if too many people like it, it won’t stay like that way long.”

For most of its history, the lives of Chambers County residents – especially those on the east side – revolved around the water. People relied on the bay, the river and the marshes for hunting, fishing, shrimping and farming, she says. They even relied on the water for transportation.

Kevin Ladd, executive director of the Wallisville Heritage Park, says that before Interstate 10 opened in the 1950s, people either drove up to Liberty to get to Houston or had to take six ferries to get across the Trinity River and its delta. In many cases, it was easier for them to travel across the bay to Galveston.

“Years ago, when the roads were bad, it was easier for people to use the rivers and bayous to go back and forth from here to Galveston,” he says. “They had a lot of natu-

ral trade relationships between here and Galveston.”

Steamboats also carried people and supplies from the bay up the Trinity River, especially in times when the railroads were in disrepair, he says. Anahuac, Wallisville and Liberty operated steamboat landings.

The geography made it tough to get around the county, he says, so when families settled in particular areas, they tended to form their own isolated communities. The families also tended to keep their large parcels of land undivided because it made better business sense for those using the land to raise cattle or to farm, he says.

## Lines between East and West

While the economy of the eastern portion of the county is built on ecotourism, agriculture and fishing, the western portion of Chambers County is home to growing petrochemical and manufacturing industries.

Melissa Malechek, president of the West Chambers County Chamber of Commerce in Mont Belvieu, says the area’s salt domes make it ideal for storing liquid propane gas. Because of these salt domes, she says, every major pipeline in the United States passes through Mont Belvieu. Oil, which was discovered in nearby Barber’s Hill after World War I, also has spurred growth in the area.

For future growth, Malechek says her biggest concern is new, tougher federal regulations on air quality. She fears the tougher standards may deter petrochemical plants from moving in and that may mean fewer jobs for people in her area.

“We have to compete globally for everything we get,” she says. “If we don’t have jobs, we won’t have people come.”

Developers are in her office on a regular basis, she says. In the eight years she has worked at the chamber, Malechek says she has seen steady growth. Many people are attracted by the quality schools while others are attracted by the area’s proximity to Houston, she says.

“The people want out of non-performing districts, and we’re still considered ‘rural,’ though that’s changing fast,” she says.

While the east side of the county remains relatively undeveloped, the west side is providing a large part of the county’s tax base, but it wasn’t always that way.

“We all went through boom and bust,” Malechek says. “It just so happens that

right now the major economic influx into the county comes from the west side.”

One hundred years ago, the Trinity River forced people to spend hours in order to travel from the east side of Chambers County to the west. Even today, more than 40 years after Interstate 10 bridged the Trinity River, Malechek says that same divide between the east and the west can still be seen. Only now the Trinity isn’t as much a physical divide as an economic and cultural one.

“The river has always divided the county,” she says. “It was at one time a physical barrier and now it’s a psychological barrier.”

Part of this difference may be because of different natural resources, Malechek says. On the county’s west side, the area’s salt domes attracted the petrochemical industry, so it grew up with few economic ties to the coast. The east side of the county is closely tied to the coast because of its wetlands and location on the bay. The economy of the eastern portion of the county still relies heavily on coastal activities such as ecotourism, fishing and shrimping.

## Concerns over fresh water

Joe Nelson, owner of Fisherman’s Harvest, operates an oyster lease off Smith Point. He started working the oyster reefs in the late 1960s and currently oversees 360 acres. His crews spend up to 10 hours a day working the reefs.

A year and a half ago, Galveston’s oyster reefs voluntarily closed after they were linked to a case of *Vibrio vulnificus*, a bacterium found in the water that can make humans sick or cause death in extreme cases.

Nelson says scientists were never able to find out where the infecting strain came from or how it arrived in Galveston Bay. But, he says, the oyster industry has continued working closely with the state health department to ensure the quality of its product.

Meanwhile, he worries that too much pollution and not enough fresh water is coming into the bay and damaging the area’s oyster reefs, wetlands and fisheries.

“We’ve lost a lot of our habitat and our wetlands,” he says. “We’ve lost our natural flows on the river because it’s all been dammed.”

Nelson says fishermen are too often blamed for depleting the fisheries while pesticides and fertilizers continue to flow down the Trinity River and into the bays.

“When you reduce your wetlands by



Chambers county leaders hope the river will continue to attract bird watchers to the area.

20 or 30 percent and fisheries go down, they blame it on fishing pressure,” he says. “They don’t consider the wetlands you’re losing or other factors affecting the shrimp. They just look at fishing as depleting the resources.”

Nelson says he’s concerned regulators aren’t studying all of the factors affecting the area’s resources. He says he’s finding shrimp and fish with black gills, lesions and leeches attached.

“There’s things going on in this bay that are not being studied,” he says.

He also fears the widening and deepening of the Houston-Galveston Ship Channel will raise the salinity of bay waters and force the oysters to move higher up in Trinity Bay in search of the lower salinities that they prefer. But, the bay bottom of upper Trinity Bay is not suitable for oysters, he says. The project also may stir up bay sediments, further clouding the water, and take out commercially valuable bay bottom.

Lance Robinson, a fisheries biologist

for Texas Parks and Wildlife, says the widening and deepening of the ship channel will allow salt water to move further up the bay. Studies also support the belief that the oysters will adapt to the higher salinities by moving up the bay, he says.

“If what the modelers have predicted comes true, it will definitely have an impact on the salinity profiles as you move



*Oystermen worry about what too much pollution and insufficient fresh water will do to their livelihood.*

from the upper bay down towards Galveston,” he says. “It will change those salinity gradients, and species will have to adjust to that. We’re changing the system. Without that conduit for salt water to move up into the bay, the bay would be fresher.”

But, he says, the project will not only affect the oysters but also other species, such as shrimp. Though shrimp are at an advantage because they can move around and do not spend their lives resting on the bay bottom, he says, they still need fresh water habitats for part of their life cycles. However, he says, as shrimp move further up the bay, the amount of suitable habitat becomes scarce. This loss of available, quality habitat, especially in a drought, could harm the commercial and recreational fisheries.

Saltwater intrusion becomes a big issue as it moves up the bay because it can not only destroy quality habitat but also threaten freshwater supplies for surrounding areas. A saltwater barrier at Wallisville

on the Trinity River keeps the salt water from moving upstream while allowing fresh water to flow into the bays.

Linda Shead, executive director of the Galveston Bay Foundation, says she is also concerned about the amount of fresh water coming into the bays from the Trinity River. The San Jacinto River system doesn’t have much left in terms of habitat, she says, whereas the Trinity River system still has a lot of marsh habitat, so the freshwater inflows are more critical through that system.

The saltwater balance and the wetlands around Galveston Bay are part of what makes it the most productive bay, in terms of fisheries, along the Texas coast, she says.

“If we upset that balance, then we may lose that productivity,” Shead says. “That’s why there has been so much concern about what happens with the Trinity River in Chambers County.”

Robinson says that when the amount of fresh water entering the bays from the Trinity or San Jacinto Rivers is diverted to provide water for the population or farms, less

water is available to the bays, and water levels fall. That’s happening around the Galveston and Trinity Bays, he says. It’s destroying the nursery areas for species such as shrimp, blue crabs, red drum and flounder.

“When that happens, there is a real potential for a loss of coastal salt marshes,” Robinson says. “From a coastal fisheries perspective, that’s pretty severe because those marshes are the nursery areas for just about every species that people fish for in the bays.”

### **A pounding from erosion**

Eddie Seidensticker, a resource conservationist with the U.S. Soil and Conservation Service, says rapid subsidence — when land sinks as a result of groundwater or oil or gas being pumped out of the ground — over the last 30 to 45 years has accelerated bayshore erosion and has caused the loss of much of the area’s original vegetation. Subsidence also is responsible for a loss of oyster reefs in the area because the reefs

are next to the shoreline, he says.

Seidensticker says he has measured erosion rates as high as 3 to 6 feet a year in some places around Chambers County. Besides subsidence, he says, the pounding of waves against the shoreline’s clay bluffs also causes erosion.

“The biggest problem caused by this erosion is the clay soil washing into the water and contributing a lot to our turbidity in Galveston Bay,” he says.

This muddying of bay waters is a concern not only because it indicates the loss of land and available habitat for animals but it also affects water quality, he says.

“Most landowners can’t afford to build hard structures, such as bulkheads or concrete rip rap, so we’ve been exploring the possibility of using the types of vegetation that were originally there as a natural erosion control,” he says.

The strategy has succeeded, he says, but they still need to build up the elevation at the water’s edge because in many areas the water is too deep to plant vegetation right next to the shore. But it can be expensive. Revegetating an area costs \$15 to \$20 a foot, he says, though it is cheaper than installing bulkheads, which run \$45 a foot.

Besides erosion, much of Chambers County’s habitat is threatened by the invasion of foreign species, such as Chinese tallow trees. The trees can quickly take over abandoned rice fields. Because they produce large numbers of seeds, they take over ecosystems, killing native plants by blocking sunlight with their dense canopies. They also are difficult to kill.

Laura Yarbrough, of the U.S. Soil and Conservation Service, says the county has already lost 40,000 acres to the invader. The problem could get worse as rice farmers abandon their fields because of low rice prices, she says.

“The rice farmers are in a real crisis now,” she says.

### **Too much water?**

Pudge Wilcox, executive director of the Chambers-Liberty County Navigation District, says that in the last three years, the county has seen a two-thirds reduction in the amount of acreage used for growing rice — from 9,000 acres in 1997 down to 3,200 acres this year. In the 1980s, the district irrigated 25,000 acres.

“Unless we come up with some viable alternative crop to rice, agriculture pro-



*Chevron Summer Science Program participants seine offshore in the middle of Trinity Bay near the Eddie V. Gray Wetland Center.*

duction is going to continue to stay down in Chambers County unless we get into a vast shortage of rice," he says. "Right now, rice is the primary, dependable crop of Chambers County."

Ling says that while rice is still the main crop of eastern Chambers County, the current low rice prices mean many farmers may not be able afford to stay in business for much longer. She tells of one farmer who had to work full time at a plant and raise cattle to support his rice farming business. Some farmers are exploring other uses of their land, including growing sugar cane, soybeans and turfgrass or raising crawfish. Others are selling their land.

"It's kind of sad to see all of that real good farmland going and possibly being turned into subdivisions and knowing that that's all grocery land," she says. "Once it's under concrete, you can't get it back – that's my real concern."

With rice farming on a downswing, the navigation district is exploring ways of developing new markets for its water. As a result, the district is participating in studies into raising catfish and freshwater pearls in irrigation canals.

Wilcox says that if these projects prove successful, then they will give local land-owners an alternative to rice farming and create new customers for the navigation district's water.

"If we could, we would rather sell all of our water here locally than having to do so elsewhere," he says. "Right now, there is not a local market for the excess water that we have, so we are looking for ways lo-

cally to utilize the water."

However, an issue looming on the horizon may soon give the navigation district all of the customers it can handle. The issue involves "junior water rights."

In Texas, water rights are bought and sold as a commodity. For example, the city of Houston may hold rights to 20 percent of the water coming down the San Jacinto River to fulfill the needs of its residents. These rights are assigned a "priority date" based on when they were first acquired — the earlier the priority date, the stronger the right.

So, if Houston has a priority date of 1920 on 20 percent of the water from the San Jacinto and Conroe has a priority date of 1940 to 30 percent of the water from the San Jacinto, then Houston's 20 percent will have to be met before Conroe could take its share.

Currently, priority dates cannot be transferred when water rights are sold. New priority dates are assigned based on when the sale occurs. Some state legislators want to change that and allow priority dates to be transferred with the water rights. This means communities with a lot of money could outbid poorer communities for water. It also means that communities that do not consume all of their allotment could make a lot of money by selling their surplus water rights. The Chambers-Liberty County Navigation District would be one of those communities. Some of its water rights date to 1914.

"We're in a position of having surplus water rights and we might be in the position to market some of those water rights,"

Wilcox says. "Our rights would have a lot more value to them if when someone buys them the priority date goes with the water rights. There wouldn't be a whole lot of interest in anybody wanting to buy our water rights if they were going to lose the priority date."

### **The next generation**

Besides overseeing the water rights for the district, the Chambers-Liberty County Navigation District also founded the Upper Texas Coast Water-Borne Education Center (see sidebar). The center operates two, 45-foot boats out of Anahuac that give teachers, policymakers, students and other groups tours of the area's marshes and river delta.

Ling, who often conducts the tours and uses them to train local teachers, says the tours not only let people see parts of the county they can't see from land but also gives them a better appreciation for the natural resources.

"Once you get out there and see it from the other side – the vastness of it — it makes an impression on you," she says. "You also see things that you're not going to see next to roads and buildings."

Water-Borne executive director Joan Walker says tours can accommodate a wide variety of groups, including birders, photographers and civic organizations. The tours focus not only on the biological role of wetlands but also on their roles in the local economy and the area's history. Ladd frequently joins tours to point out historical sites on the trips.

*(Continued on inside back cover)*

# Water-borne cruises put marine life up close and personal

BY MARK EVANS

In 1834, Anahuac was the leading port for Trinity Bay and the Trinity River. The port later became home to three wharves, a shipyard, sawmill and warehouses. Erosion, hurricanes and time have taken their toll, and the port is now home to only two boats – the *Smith Point* and the *Moss Bluff*.

While the boats are only a reminder of the activity that used to surround the port, they are attracting renewed interest in the port and the area by educating students – and the public – about the past and preparing them to meet the challenges of the future.

The Upper Texas Coast Water-Borne Education Center, based in Anahuac, is providing teachers, students and the public with an opportunity to learn first-hand about the importance of wetlands, the history of Chambers County and the ecology of Trinity Bay and the Trinity River delta.

Joan Walker, executive director of the center, says the center hopes to help people develop an appreciation for marshes and the roles they play in the environment. By taking people out into the marshes of Trinity Bay and the Trinity River, she says, the program can give participants a hands-on experience that will stay with them longer than if they had just read about it in a book.

“We want them to walk away with a better understanding of what is in any given river system on Galveston Bay,” she says.

The water-borne education center was formed in 1998 by the Chambers-Liberty County Navigation District. The center operates two, 45-foot, renovated Coast Guard buoy tenders — the *Smith Point* and the *Moss Bluff*. These boats can take groups of 30 into the marsh, making stops along the way for people to collect soil samples, seine for marine animals or get a closer look at sites. The boats also have classroom space.



Both teachers and students are involved in training field trips aboard the *Smith Point* on the Trinity River.

The boats have primarily been used to train teachers or take students out into the marsh. Students respond well to the tours because a trip into the marsh goes beyond classroom learning by affecting how students see the world, Walker says.

“It touches us in a way that goes beyond just the mind,” she says. “It touches us in our minds and in our hearts at the same time, so it’s an experience that goes beyond books and television because it’s real and alive.”

Terrie Ling, Jefferson-Chambers County marine agent and a former high school biology teacher, says students’ senses go much higher when they’re in a new environment, so they absorb new information faster. They also retain it better, she says.

“You can talk about stuff all day long in the classroom and show pictures in a book, but when they get to go out there, they can smell it, see it and feel it, so it becomes real,” she says. “They learn so

much more so much faster.”

Lings says she can take students on a four-hour boat trip, let them walk around the marsh for 30 minutes, and they will have learned more in that time than in three weeks in the classroom studying the same thing.

The teachers love it, she says. The program helps fulfill the state’s new field experience requirement for science classes, and it adds a new dimension to material students study in the classroom. The trips also can be tailored to meet the needs of different types of classes, she says.

“We’ve gone from taking a marine biology class out to sample benthics all the way to taking a photography class out to take pictures,” she says. “Along the way, everybody gets a taste of the history, the economics and the biology that goes with it.”

Ling is currently developing curricula that the center can use as it takes classes on the boats. These curricula would meet the appropriate state educational

requirements. She also leads not only school groups but also trains teachers on how to incorporate the boat trips into their classes.

Mel Moreau, science coordinator for the Texas Education Agency's Region V Education Service Center, conducts workshops for teachers during the summer and says she tries to let teachers know what resources are available locally.

In the past, she has done workshops of her own, taking teachers into the marsh on airboats and showing them the different types of creatures that live in wetlands. Teachers like the workshops because they are about local issues, Moreau says.

"Too many times in science, or any subject, we get our textbooks out," she says. "It's wonderful content, but it may not be specific to our area. If you can keep it to your area, it peaks the curiosity and interest in science. Too many times we overlook what's right under our noses."

Moreau found out about the water-borne center from a brochure. She has taken part in three of its workshops and served as a facilitator on others. Teachers from her region highly rated all of the water-borne workshops, she says.

"It is just so ideal," she says. "It's one of those things that's right under our noses. We have one of the most unique ecosystems in our area."

She said she had no idea about the rich history of Chambers County and the Trinity Delta until she took her first trip with the water-borne center. When she crosses the Trinity River on the Interstate 10 bridge, Moreau said she sees it in a whole different way because she now knows the history of that area.

Moreau said she is always looking for opportunities to get the students out of the classroom and into the environment so they can test water samples, seine for marine animals and see the sites for themselves instead of through textbooks or by studying lab specimens.

"Everything just comes alive, and that's exactly what we're really emphasizing in the state," she says. "We want the textbook to be a resource and let the kids get out there and do a hands-on, minds-on science program."

School administrators have to keep their eyes on the budget, she says, but the water-



*One aspect of the Water-borne field trip includes navigation training.*

borne program is something that's educational for the students and fits all of the state guidelines.

Walker says money is a concern for the water-borne program. So far, the program has relied on grants from agencies such as Texas Parks and Wildlife and the Environmental Protection Agency and money from school districts

to cover costs. Funding is a big challenge for the program, especially because the demand for the program is increasing, she says.

The program has attracted the attention of groups such as scout packs, church groups, civic organizations, corporations and photography clubs. The program already conducts tours for local leaders as a way of educating them about the area's environmental issues. Discussions are even underway to purchase and place a third boat across the bay in Baytown, Walker says. To meet these demands, the program needs money.

"What we need now are partners to come to the table to help fund this," she says. "We've got the ability to do all of these things but at the moment we need help developing and funding these programs."

The program is going so many ways

that it's more a matter of finding the pieces that will fit together the easiest right now, Walker says.

Robert Guy Jackson, president of the center's board of directors, says the ability to go out and study an ecosystem such as that in Chambers County is something that hasn't seen anywhere else in Texas much less the United States.

Jackson says he sees the program expanding to encompass the entire upper Texas coast. By virtue of the center's name as the "Upper Texas Coast Water-Borne Education Center," he says, the program's founders had already planned for the program to move beyond the Galveston-Trinity Bays.

"With a properly managed program, we can take the water-borne education center statewide," he says. "We can go from Louisiana down to Mexico. That would be a very large task, but I can see other groups like us popping up all along the nation's shorelines and doing the same thing that we're doing."

Jackson says he's still surprised at the beauty of the area every time he goes out on the boats, and he has grown up in



*Jefferson-Chambers County marine agent Terrie Ling leads classes in everything from benthic sampling to wildlife photography.*

Chambers County.

"I like that I see something new every time I go out," he says. "For someone who has lived in this area basically all his life, it is an utter amazement every time I go out. I learn something new every time."

Walker says it's this wonder and amazement at the beauty of the area that draws people to the program. People who grew up along the Trinity Bay and delta want to take part in the water-borne programs, she says, and many want to share the experience with their children and grandchildren.

"People don't know why they want to go out there," she says. "They can't put it into words. It's just something they feel drawn to because their hearts and their minds are working. They want to see it. They want to understand it, and they appreciate it."

## WATER'S EDGE

*(Continued from page 26)*

"We have the capability to provide any level of education," Walker says. "We want them to walk away with a better understanding of what is in any river system or in Galveston Bay."

Travis Lovelace, director of the Eddie Gray Wetlands Center in Baytown, says his challenge is to make people aware of the natural resources in their own backyards and to foster an appreciation of these resources.

"The fundamental problem is people don't appreciate what they've got because

## NOTES

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chairman of the association's scientific and technical committee, said organizers hope the conference proves useful to city officials, public works officials, researchers and coastal property owners.

While similar conferences have been held in other coastal states, such as Florida, Tillman said this is the first time such a conference has been held in Texas.

Conference registration is \$50, and people interested in attending may contact Patricia Newsom, executive director of the Texas Shore and Beach Association, at (713) 467-8098 or 9210 Bronco Drive, Houston, Texas 77055 or via e-mail at Pnew1314@aol.com.

### **Sea Grant publishes guide to Texas coastal wetlands**

A new book by Texas Sea Grant, "Texas Coastal Wetlands Guidebook," attempts to bring wetlands into the classroom and educate the public about their importance by describing the different types of wetlands that can be found along the coast.

Single copies of the "Texas Coastal Wetlands Guidebook" by John Jacob and Dan Moulton are available from Texas Sea Grant for a \$2 shipping and handling charge. For information on ordering multiple copies, contact the program at (979) 862-3767 or write Texas Sea Grant Program, 1716 Briarcrest, Suite 603, Bryan, Texas, 77802.

they don't know what they've got," he says.

Part of the problem is people don't often have the opportunity to experience Galveston Bay and its wetlands, Lovelace says. The Trinity River and delta are the jewels of Galveston Bay, he says. Yet, aside from fishermen, few people have a chance to see the area.

The natural resources and the proximity to nature already have sold Lovelace on the area. He says he enjoys the area so much that he is planning to move to Chambers County and commute to work.

"I'm willing to make the 50-minute commute to get to work," he says. "That's the tradeoff to be closer to nature and Galveston Bay. I want to be able to go home, put my boat in the water and go fishing for an hour before dark without it being the big deal it is now."

Shed says Chambers County is her favorite place for recreation around the bay because of its natural heritage.

"Right now to some extent, Chambers County is a little-known gem around Galveston Bay," she says. "It's got some fabulous habitat still left – wonderful marshland, wonderful wetlands and a tremendous potential for ecotourism. I don't think it has even begun to tap into its potential for ecotourism."

The Galveston Bay Foundation sponsors canoe and powerboat trips of the area and also oversees two nature preserves. It also keeps an eye on any planned developments in sensitive areas, Shed says. One of these developments is Marina del Oro, which would be on Smith Point and use canals to connect the Trinity Bay with East Galveston Bay.

### **A balancing act**

County leaders face a challenge in maintaining the area's natural resources and attracting economic development based on these resources while confronting pressures to industrialize or bring urban sprawl to the area, she says.

Ling says that right now, the county has many people who own square miles of property, and the infrastructure is designed for that. If county leaders are not careful in the management of the growth, she says, they could end up being over-

run.

As the county grows, she says, people will have to become bay friendly with their landscaping because in the future Chambers County will become a suburb of Houston. It's already happening on the other side of the Trinity River with Baytown, she says.

"I've seen growth in the last five years that I hadn't seen happen in the last 20 years, so it's coming," she says.

Lovelace says a balance can be found. Community leaders no longer must choose between the economy and the environment. They can do both, he says. And, the environment is getting cleaner all the time as the Environmental Protection Agency clamps down and more people become interested in the environment.

"Chambers County has the opportunity to define in advance what it wants its county to look like in terms of open space and environments," he says. "It's a great opportunity and a challenge, but it's not easy."

Right now, Chambers County – at least the eastern part — probably isn't that different from when the Pixes settled on Smith Point 150 years ago. There are a few more people, and it's easier to get around, but the area is still isolated and full of marshes. No one knows what the next 150 years, or even the next 20 years, will bring.

Sylvia says that whatever happens, he hopes Chambers County doesn't lose sight of what makes it special – its natural resources. He says he likes the small, rural nature of the county. He also likes the fishing, the duck hunting and living close to the bay and the Gulf of Mexico. There are good people in Chambers County and a lot of old-timers, he says, people who have spent their entire lives there.

While some things about the county will likely change soon, other things will probably always remain as they were when Sarah Pix was alive. As Sylvia puts it, "It's hot, humid and the mosquitoes are horrible."

That's not likely to change. ■

