

SEA GRANT COLLEGE PROGRAM

# TEXAS SHORES

**WARNING**  
**Toxic Texas**



# The story continues ...



Toxic wastes is a subject too important for just one issue. The Spring issue will address more of the questions relating to the problems facing our State.

The article will discuss the impact on Galveston Bay, its fishing and tour-

ism industries, and on our health, as well as where these toxic discharges originate and what the state and federal governments do to regulate them and clean them up.

The story continues in the next issue. Write for your copy today.

## Texas Shores

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WINTER 1993

# TEXAS SHORES

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COVERS — JAMEY TIDWELL

## THE ISSUE: TOXIC WASTES

### 2 SEA NOTES

Highlights include Corpus Christi Bay is designated as part of the National Estuary Program; Graham-Hollin trawl net project wins U.S. Energy Department's top award; Texas Parks and Wildlife issues a zebra mussel warning; and Galveston Bay oyster reef maps and Gulf of Mexico oyster bibliography are now available.

### 4 TOXIC TROUBLE AHEAD

Officials tell us Texas' coastal waters are in pretty good shape. They invariably add that there are not enough funds to monitor water quality on a routine basis, so no one really knows how much of our coastline has been poisoned.

### 34 ADVISOR

Texas A&M officials and those from two institutions in the Crimea signed a Memorandum of Agreement last August that began a joint venture that, hopefully, will last through the 21st century. Sea Grant and the Texas Marine Advisory Service will lead development of a cooperative program in tourism, seafood marketing, environmental assessment and monitoring, marine education, and coastal land planning.

**STAFF** – Dr. Tom Bright, *Texas A&M Sea Grant Director*; Mike Hightower, *Deputy Director*; Amy Broussard, *Associate Director and Head of Marine Information Service*; Pamela Casteel, *TEXAS SHORES Editor*; David O'Neal, *Advisory Publications Editor*; Jamey Tidwell, *Photographer*; Eric Graham, *Distribution Manager*; and Amy Broussard, *Design*.

**MISSION** – *Texas Shores* is published quarterly by the Sea Grant College Program at Texas A&M University 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 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 eight county marine extension agents serving the 10 coastal counties of Texas. These individuals are backed by a group of specialists in marine recreation, fisheries and business management, as well as seafood marketing and consumer education.

**FUNDING** – Sea Grant is a matching funds program. The Texas A&M Sea Grant College Program itself is made possible through an institutional award from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and appropriations from the Texas Legislature and local governments.

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# SEA NOTES

TEXAS A&M UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

## **Corpus Christi Bay designated part of estuary program**

Corpus Christi Bay, the second largest bay system in Texas, is the most recent area to be designated as part of the Environmental Protection Agency's National Estuary Program.

Nominated by Gov. Ann Richards, the proposal to EPA was compiled by Texas Parks and Wildlife Department (TPWD), the Texas General Land Office and The University of Texas Marine Science Institute in Port Aransas.

The Corpus Christi National Estuary Program (CCNEP), which will be similar in concept to the Galveston Bay National Estuary Program (GBNEP), will organize into a management committee, policy committee, scientific and technological committee, and a citizens committee.

Dr. Larry McKinney, TPWD's director of resource protection, explains that a four-year study will now be completed to determine man's impact on the bay system.

"The purpose of the National Estuary Program is to take a look at problems that may be affecting the bay and come up with a management plan to



ensure that these problems do not adversely affect the whole system," said McKinney.

Corpus Christi Bay is heavily impacted by industry, including transportation (shallow water and Gulf barges), recreational and commercial fishing, and, most importantly, petrochemical industries.

"Corpus Christi Bay will serve as a model for the lower coast," said McKinney. "It can help us solve problems that exist in the other remaining estuaries in Texas."

He explained that Corpus Christi Bay is unique in that it does not receive a lot of fresh water and there is a large population base centered around it.

"We have concerns about the freshwater inflows coming into the system because they are being diverted for other uses," McKinney said. "Numerous people want to use this bay for all types of activities, some of which can cause potential problems such as oil spills or other pollution. These are some of the problems that estuary programs try to address."

— David O'Neal

## **Oyster reef maps, Gulf bibliography now available**

Full-sized maps of the oyster reefs in Galveston Bay are available from Dr. Eric Powell, Texas A&M University Department of Oceanography. At present, four 30" x 40" maps of each of three areas can be ordered.

The sets depict reefs and bathymetry showing relief and areal extent; reefs and transect lines detailing the position of data collection and the components of each reef; bathymetry and transect lines detailing the positions of data collection; and reefs of the WES hydrodynamic grid detailing the aerial extent of reefs in each bay area.

The areas include Eagle Point to Red Bluff (Latitude 29°30.0' to 29°36.0', Longitude 95°3.0' to 94°57.0'); Red Bluff to Morgan Point (Latitude 29°36.0' to 29°42.0', Longitude 95°3.8' to 94°57.0'); and Cedar Bayou to Umbrella Point (Latitude 29°36.0' to 29°42.0', Longitude 94°57.0' to 94°51.0').



Further information is available from Dr. Powell, Texas A&M University Department of Oceanography, College Station, Tex. 77843, (409) 845-3921.

Dr. Powell and Dr. Thomas Soniat of Nichols State have compiled a **Gulf of Mexico Oyster Bibliography** that is now available through the Sea Grant Program.

This bibliography is restricted to work on *Crassostrea virginica* conducted on the Gulf coast of the United States. Developed from a project funded by the Galveston Bay Foundation, it is intended for fisheries managers, resource economists, government regulators, oyster biologists and oyster fishermen.

Titles are arranged alphabetically and indexed geographically by state and by subject matter.

Contact Texas A&M Sea Grant Program, P.O. Box 1675, Galveston, Tex. 77553-1675. Copies are \$5.00 each.

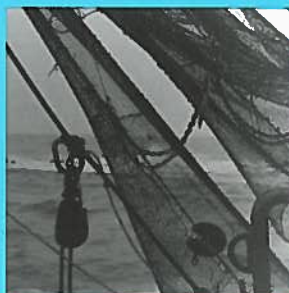


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## **Trawl net project wins national energy award**

An innovative project conducted by the Texas Marine Advisory Service (MAS) has received a national award for energy efficiency. Announcement of the honor was made by Governor Ann Richards in late October.

The Shrimp Net Fuel Efficiency program was judged the 1992 Innovative Energy Award recipient by the U.S. Department of Energy and the National Association of State Energy Officials. The result demonstration project was funded by the Governor's Energy Office under the Texas State Energy Conservation Plan. Designed to improve the fuel efficiency of commercial shrimp trawlers, the project demonstrated a new shrimp net material called Spectra, which is thinner, yet stronger and more durable than conventional materials. The reduced drag and increased strength of the new nets has allowed participating shrimpers to reduce fuel



costs by 10 to 20 percent while increasing shrimp catches by as much as 15 percent.

The project was conducted through a series of workshops in several Texas coastal cities. Catch rates, trawl durability and increased fuel economy were demonstrated by MAS Marine Fisheries Specialist Gary Graham. Dewayne Hollin, MAS marine busi-

ness management specialist, developed data to show economic feasibility of using the new nets.

The commercial shrimping industry in the Gulf of Mexico uses an estimated 250 million gallons of diesel fuel each year. With an estimated 4,000 shrimp boats consuming more than 60,000 gallons of diesel fuel each year, a reduction of only 10 percent would cut fuel consumption 6,000 gallons per vessel. Preliminary results from industry vessels using the Spectra fiber nets have shown fuel savings of between 10 and 20 percent per vessel.

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## **Zebra mussel warning issued for Texas waters**

The zebra mussel, which has caused problems in the Great Lakes, has migrated as far south as Mississippi and Arkansas and could reach Texas waters soon. To date, none of the small shellfish have been reported in Texas waters.

Since invading the Great Lakes in the mid- to late 1980s, zebra mussels, most of which average about 1 inch in size, have spread rapidly.

Zebra mussels live in freshwater but attach to solid objects like some marine mussels. They are a fouling organisms, like marine barnacles. Native Texas freshwater mussels bury in the bottom.

The problem with zebra mussels is that they cover anything they can attach themselves to, Howells said. They multiply so rapidly and cling so tightly that they can clog industrial and municipal water pipes, lines and power plant intakes and attach to boats, trailers, docks and other objects. Many fish farmers in Arkansas ship fish to Texas, and microscopic zebra mussel larvae may be in the water.

Zebra mussels may reach densities of more than 90,000 per square foot. Up to 10,000 have been found on a single native freshwater clam. They also can weigh down navigational buoys. These filter-feeding animals have negative environmental im-



pacts, too. They may completely cover native mussels and other animals, compete for food with desirable native species, alter the food chain, and change aquatic habitats and communities. Zebra mussels consume food needed by zooplankton, which, in turn, is eaten by small game and forage fishes.

Zebra mussels have been described as D-shaped or boat-shaped with a flat side, unlike other North American

freshwater clams and mussels. Their coloration is usually pale yellowish- or greenish-tan with bold black or brown cross bars or zigzag markings like zebra stripes. Some may be completely dark or occasionally completely light colored.

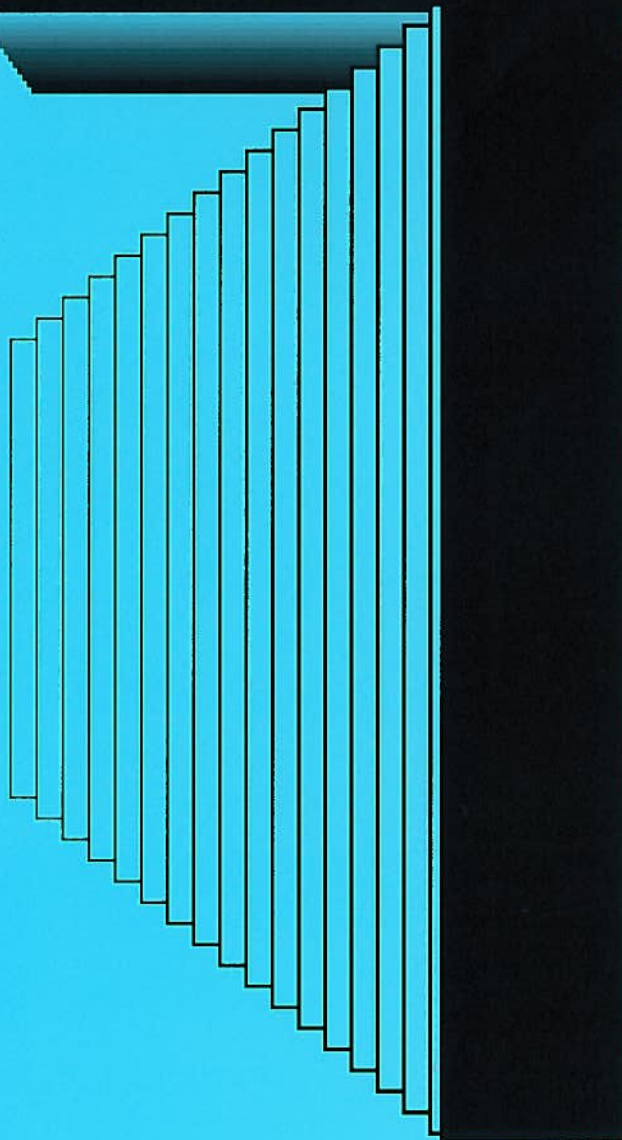
Although their arrival may be imminent, boaters and anglers can help prevent their transportation to Texas. Inspect boats and trailers, destroying any zebra mussels found. Drain bilges, live wells and bait buckets. Clean and sterilize them with bleach, then dry before re-using. Never transport water from one water body to another.

Texas Parks and Wildlife Department officials request that anyone finding a zebra mussel in Texas contact Robert Howells at the Heart of the Hills Research Station, (210) 866-3356.

—Texas Parks and Wildlife Release

# WARNING

## Toxic Trouble Ahead





“When the well’s dry, we know the worth of water,” Ben Franklin penned in 1746. More than a hundred years later, Rowland Howard expanded on that thought with “Do not let your chances like sunbeams pass you by, for you never miss the water till the well runs dry.”

Today, along the sprawling coast of Texas, there’s no end to the volume of water in the abundant bays and estuaries that flank the expansive Gulf of Mexico. By no means have these natural wells evaporated into parched and barren land, but a few have been poisoned.

Ask a host of federal and state officials about the health of Texas’ coastal waters and they’ll say that, generally speaking, our aquatic resources are in pretty good shape. They invariably add, however, that there are not enough funds to monitor water quality on a routine, coastwide basis. Most attention must be paid to putting out fires at environmental hot spots.

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**B Y P A M E L A C A S T E E L**

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**WARNING**  
**Toxic Texas**

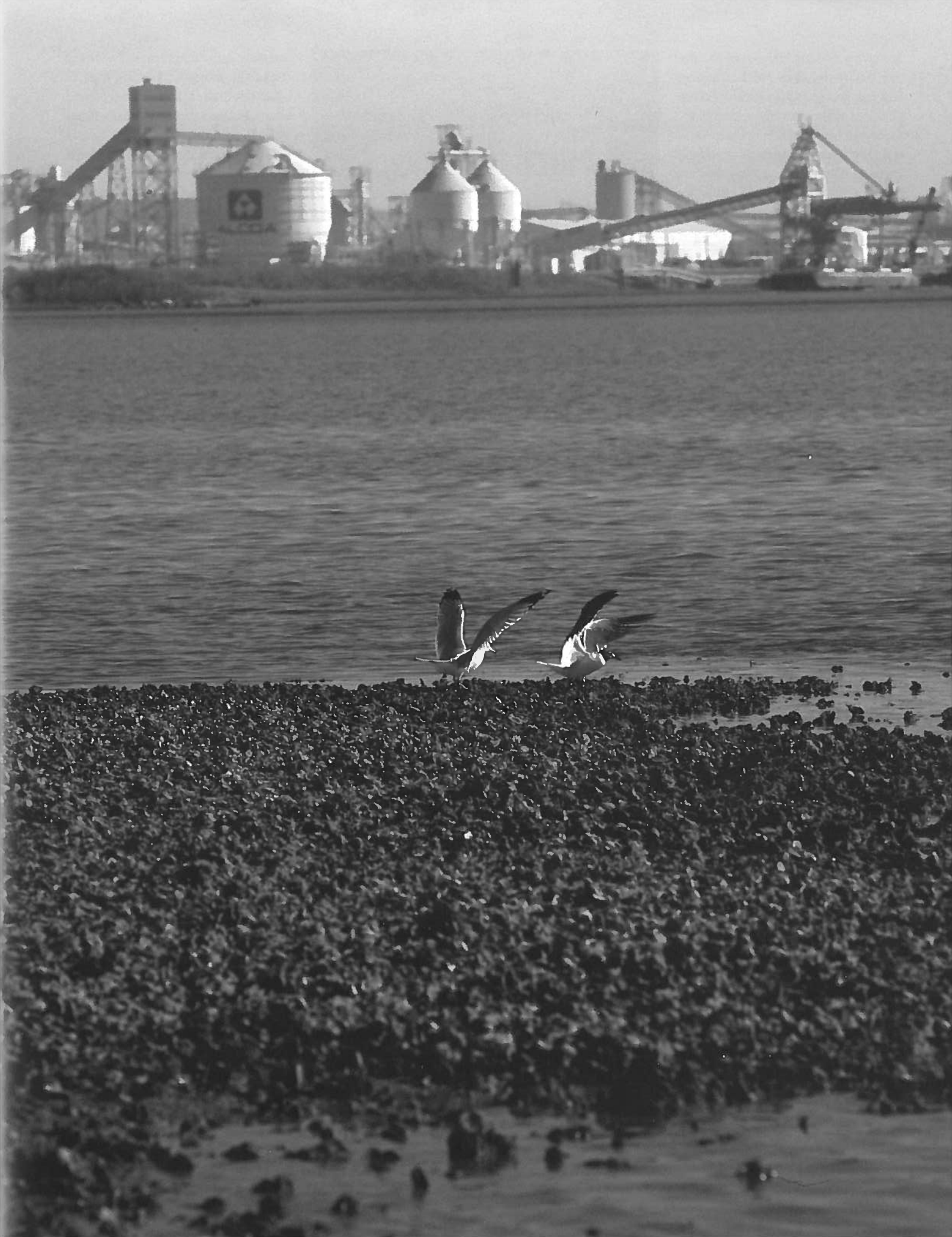


# Locked Horns Over Lavaca

Decidedly the hottest toxic spot to contend with these days is mercury-contaminated Lavaca Bay, situated about mid-coast near the small towns of Port Lavaca and Point Comfort in Calhoun County, a peninsula surrounded by water on three sides: San Antonio Bay on the west side, Matagorda and Lavaca Bay to the east, Espirito Santo Bay to the south. Several small bay systems are associated with each of the major bays. ☹ Other coastal areas seriously impacted by pollutants are the Houston Ship Channel, upper Galveston Bay and the

Arroyo Colorado and Rio Grande rivers along the Texas/Mexico border. ☹ The industrial-age practice of flushing toxic waste products into bays and rivers is catching up with America in obvious ways, such as massive fish kills, but there are hidden dangers building in the sediments or accumulating in the aquatic food chain that pose an imminent threat to human health. ☹ A large portion of Lavaca Bay, for example, has been so contaminated with methyl mercury for nearly 30 years that it is against state law to consume fish and shellfish taken from the area. Also closed to all fishing is the Dallas/Ft. Worth Trinity River, where chlordane levels are dangerously high. The Texas Department of Health (TDH) advises that we avoid regular consumption of fish and eat no more than one meal a month in five other areas contaminated by chlordane, toxaphene, DDT and dioxin. Women of child-bearing age and children should not eat the fish at all in the advisory areas that







include portions of the Arroyo Colorado, Town Lake, Neches River, Brazos River, the Houston Ship Channel and upper Galveston Bay.

From a human standpoint, these hot spots serve as red flags flying the warning that we are doing serious damage to a vital food and water supply. The fish and wildlife make their point by bioaccumulating organic contaminants in their tissues that are then passed throughout the food chain.

Industry is not alone in fouling life-supporting waters — the blame must be shared by the millions upon millions of people who inhabit coastal regions. Non-point source pollution, of which average citizens are the greatest contributors, has become a more menacing threat to water quality than point sources such as chemical plant discharges, agricultural runoff or oil spills.

Lavaca Bay, one of the nation's most productive estuarine nursery grounds, has been spared contamination associated with urban sprawl, but a large portion has been impacted by mercury poisoning that no one knows exactly how to handle.

The trouble began in the mid-1960s when Alcoa's Point Comfort chlor-alkali plant discharged mercury-laden wastes into Lavaca Bay. There was nothing unique about this common industrial practice that took place at similar operations throughout the country. In 1970, Alcoa stopped discharging directly into Lavaca Bay after state and federal agencies as well as industry became aware of problems linked to mercury contamination.

Some of that awareness stemmed from a widespread outbreak of methyl-mercury poisoning among people routinely eating fish and shellfish in contaminated Minamata Bay, Japan. So-called "Minamata Disease" was discovered in 1956; however, the full extent of the thousands of people afflicted was not revealed until the 1970s. Mercury poisoning cripples the central nervous system and can be fatal.

Some heavy metals, such as mercury, tend to sink in bay waters and bind with sediments. Microorganisms that feed on contaminated material are then consumed by bottom-feeding fish and crabs, which, in turn, are ingested by larger animals of



*Across the road from Alcoa are the contaminated reservoirs of Point Comfort's Central Power and Light.*

the food chain. In the late 1970s, the state health department issued fish consumption advisories for the affected portion of Lavaca Bay that remained in effect until 1988 when the area was indefinitely closed to the harvesting of crabs and finfish because of high mercury levels.

Federal Natural Resource Damage Assessment (NRDA) regulations allow several state and federal agencies to attempt to have habitats that have been damaged by a hazardous material restored to their original condition and to recoup damages that were lost to the public during the period the damages occurred. Five NRDA trustee agencies — Texas Water Commission, Texas Parks and Wildlife Department, Texas General Land Office, U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration—have been negotiating with Alcoa since December 1990 to determine the extent of damages in Lavaca Bay. Other agencies involved in the matter are the Texas Attorney General's Office and the Environmental Protection Agency, as well as government consultants and contractors.

"We want to define where the mercury

has gone into the sediments and how it has spread in the bay, as well as how much has spread into the food chain, including carnivores such as fish-eating birds," says Charlie Chandler, NRDA specialist with the U.S. Fish and Wildlife Service (USFWS). "Once we get an estimate or map of where the mercury has gone, then we can try to figure out the best way to restore the bay, but we haven't reached that point yet."

He adds that Alcoa's chlor-alkali operations have also contaminated ground water underneath the facility and it is possible that there is still a continuing release of mercury into the bay.

Meetings with Alcoa have gone "fairly well," but the clean-up issue has become so complicated that cooperative efforts have "slowed down," says Chandler. "It has become very difficult to try to approach Alcoa, partly because they are facing so many different agencies. They've made a request, which is not unreasonable, to face a single, united government front. Their view is that they don't want to have to do

a study to map the mercury in the sediments for Environmental Protection Agency purposes and then have to turn around and do the same thing for the trustees on a different level."

If the trustee agencies can show that there has been injury to the resources and they are able to place a value on those resources, NRDA regulations require the responsible party to pay for damages and the actual cost of conducting damage assessment research, plus the cost of restoring the habitat to its original condition.

"Another complication we're faced with is identifying the worth of a tree, a spartina marsh, a great blue heron or great egret — these are abstract concepts that people are not used to thinking about. It's easier to place a value on commercial or recreational fish that are caught. It becomes a very complex process to try to value the natural resources that we take for granted every day. We admire the beauty of a marsh and the birds there, but we've never had to place dollar values on them that human beings or the courts can understand," Chandler explains.

Restoring Lavaca Bay is an equally complicated issue that will be better un-



derstood when the location of the mercury is mapped and a predictive food-web model is developed that shows how the mercury goes from one step in the food chain to another and the time it takes to get there, according to Chandler. Although it is too early in the planning stages to determine how restoration will take place, options include allowing the mercury to dilute itself naturally or dredging the contaminated sediments from the bay.

“Mercury doesn’t biodegrade like some of the hydrocarbons; it binds to the sediments at the northern end of Lavaca Bay. The mercury slowly gets resuspended because of the extensive shrimping that’s done in the bay and the dredging operations by the Corps of Engineers in which they redeposit sediments in other portions of the bay. Heavy storms can also resuspend the contaminated sediments.

“Normal tidal actions appear to be slowly moving the material toward the Gulf and it’s spreading now down into Matagorda Bay. As the organisms, the fish and birds accumulate the mercury into their tissues, they migrate out of the bay and carry small burdens of it out. So very slowly, the mercury dilutes itself through normal hydrology, wave actions, resuspension of sediments, redistribution

through biological activities and so on. It doesn’t actually go away, it just goes someplace else. Eventually, it may become diluted enough to not harm anything. That’s what we’re trying to determine now — how much is out there, where it is and how much harm is it doing.”

Chandler says USFWS has observed “fairly high exposure rates” in birds that have accumulated mercury. One of the more toxic heavy metals, mercury is very prone to bioaccumulation and can produce serious effects on organisms at fairly low levels.

“The original strategy of the trustee agencies was to try to accept that there is a mercury problem out there and it is hurting fish and wildlife. Maybe we shouldn’t go through the complicated and expensive effort of proving that, but rather just accept it and go directly into restoration planning. We know it’s out there, we know that mercury is pretty bad stuff, we know it’s probably hurting something. If we have to go to court, we’ll have to prove to what degree and even that is up in the air right now. We don’t want to waste a lot of public money or time. Our primary goal is to fix the problem,” says Chandler.

The Environmental Protection Agency (EPA) is evaluating the Lavaca Bay site for inclusion on the National Priorities List of hazardous waste sites. Should the bay be listed,

it could become eligible for cleanup under the Comprehensive Environmental Response, Compensation and Liability Act, known as the Superfund. If EPA designates areas of Lavaca Bay as Texas’ first underwater Superfund site, it would allow collection of triple the cost of cleanup if federal money is used.

Under the Superfund program, the government cleans up a hazardous site, then seeks reimbursement, through legal action if necessary, from the industry identified as the source of contamination. If it’s decided to leave the mercury in Lavaca Bay rather than try to remove it, Alcoa could be forced to reimburse the state for damages to the natural resources. This option could require closing the bay to fishing.

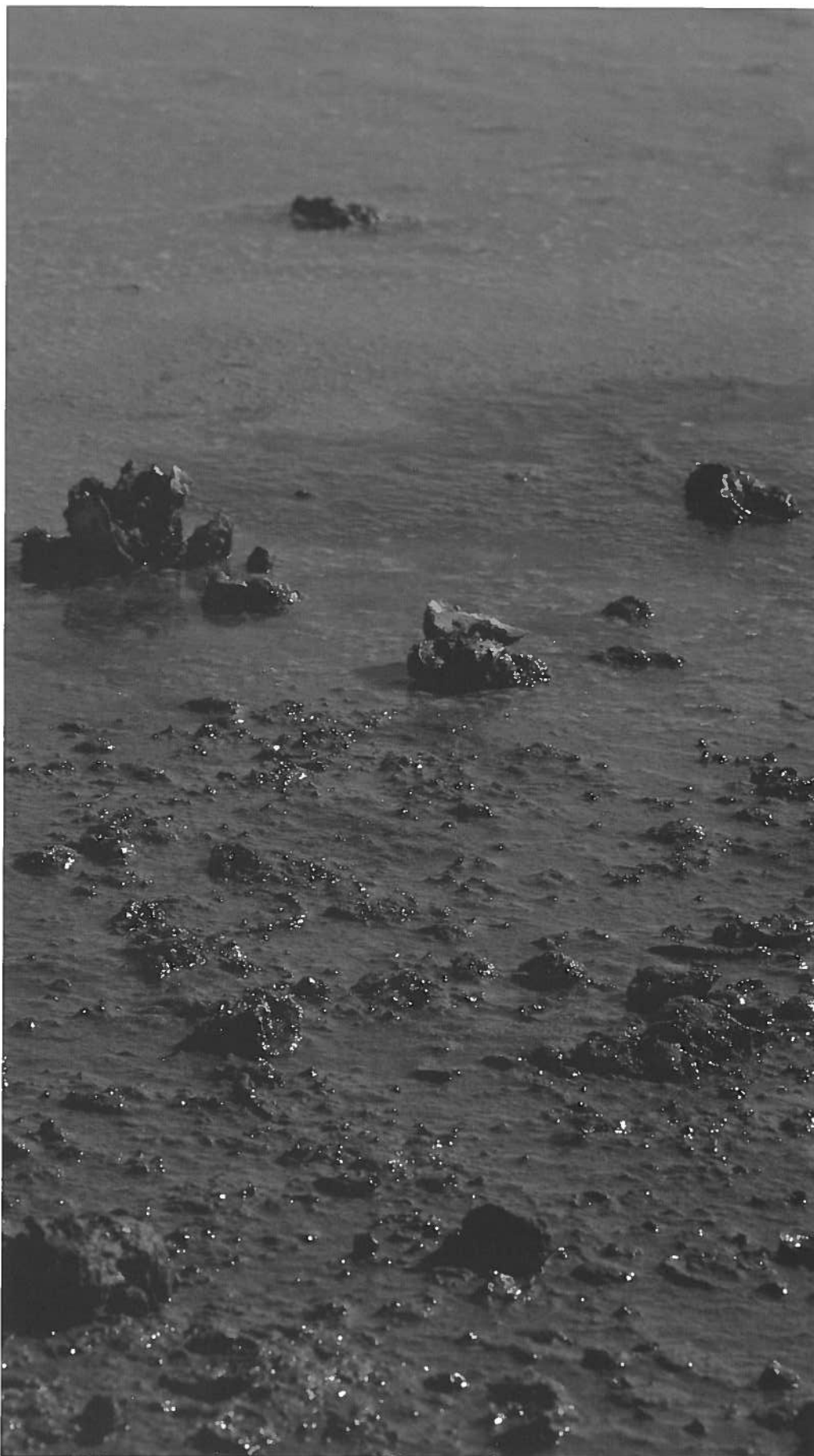
In addition to mercury discharged into the bay, the Mine Safety Health Administration (MSHA) has measured high levels of mercury contamination in the surface soils in the area of Alcoa’s dismantled chlor-alkali facility. MSHA is a federal agency that regulates companies handling mining ores in their operations.

About two years ago, high levels

*Alcoa's Point Comfort operations are responsible for discharging mercury-laden wastes into Lavaca Bay during the 1960s.*







*Oyster beds line the shoreline of a portion of Lavaca Bay contaminated by mercury.*

of polycyclic aromatic hydrocarbon (PAHs) were found in the ground water around Witco, a creosote plant that closed down in 1985. Witco, operating on land leased from Alcoa's Point Comfort Operations, produced creosote oil and coal tar pitch used in the aluminum smelting process. This area is also being examined as a potential Superfund site.

EPA officials are prohibited by law from engaging in any kind of "predecisional discussion" of whether or not Lavaca Bay scores high enough in the hazard ranking system to be placed on the Superfund list, says EPA spokesman Roger Meacham.

"Nobody likes it, but the process of evaluating that site for Superfund listing is going to take another year at the earliest. However, we do have something else going on that is more immediate in nature that is under authority of the federal hazardous waste management law, known as the Resource Conservation Recovery Act (RCRA). This covers how hazardous waste and materials are handled at active facilities. We are looking at our options to address on-site contamination as well as related off-site contamination. There is the potential for some kind of corrective action under the hazardous waste law and that is what we're now in the process of deciding. In a couple of months, we should have an idea of what direction we need to go and what action will be required for the Alcoa site."

Meacham says it is not a question of a lack of cooperation on the part of Alcoa that is slowing down efforts to clean up the site, but rather that "it's like working our way through a kaleidoscope because we don't want to jeopardize anyone's right to due process or jeopardize any kind of evaluation we're doing. We certainly don't want to start pointing fingers and saying some one is guilty. It's a very difficult position to be in."

The federal and state government filing a notice of intent letter to sue Alcoa has spurred otherwise sluggish negotiations to reach an equitable resolution. Obviously, discussing cleanup strategy is a sensitive issue that all parties involved are reluctant to comment on because of impending litigation.

J. P. Schmidt, who heads up the rapidly growing Natural Resource Damage Assessment and Restoration Program of the Texas Water Commission, confirms that state and federal government trustees have filed suit against Alcoa.

The state program is in its formative years and is "little understood by government or industry," says Schmidt, adding that there are some 10,000 known incidents involving the release of hazardous substances and oil that will have to be reviewed and evaluated by TWC, a natural resource trustee agency.

"There is a lot of potential liability that exists out there for many industries that could involve huge sums of money. Part of what government and industry are trying to do is walk this tightrope to get to the other end whereby we deal with some of these matters in an equitable manner, ultimately compensating the public's interests. The whole intent of Congress was to give governments the responsibility to represent the public's interests relative to natural resource damages and that's what we're doing.

"We've worked on the Lavaca Bay case for more than three years and we've gone through two agreements with Alcoa where they have put up substantial sums of money. We've jointly designed studies with Alcoa's consultation and we've expanded our understanding of the sediment mercury contamination in the bay. Routinely, our meetings consist of a collective group of about 15 to 20 individuals with a multitude of interests. We're trying to merge all those interests and allow common sense and reason to prevail. Do what is collectively right for the whole as op-

posed to allowing individual interests to surface and prevail," says Schmidt.

He is "surprised" that public awareness of the contamination has taken so long to surface. "Alcoa recognizes the problem, as obviously the government does; interestingly enough, the public is becoming more



Many people fish around this sign near the Alcoa plant, but state officials say it's nearly impossible to know if they consume their catch.

aware and they are forcing both parties to give even more recognition to the situation. For years, there has been a 'band aid' or a 'head in the sand' approach that's been used — if we ignore this long enough, maybe it will go away, but that's just not the case. I'm appreciative of the public interest that exists out there. We're in an era of education relative to these matters. I have a deep commitment toward seeing that good science related to this process is presented in a fair, factual manner," says Schmidt.

He adds that "we're not talking about a process that consists of bankrupting industry. Clearly, there is a need to balance economic and environmental interests. What happened in Lavaca Bay is something that has happened in other locations across the nation. Through the years, relative to various waste management practices, it used to be that bodies of waters were logical dumpsites — out of sight, out of mind.

"There is a responsibility factor here and Alcoa appears to be willing to take on that responsibility. But, anytime you're dealing with uncertainty as to the extent of the exposure and how much it's going to cost, there's always a certain hesitancy on industry's part. Industry works off the factor that it needs to turn a profit. Any prudent business man is not just going to write you a blank check for hundreds of millions of dollars. Government's responsibility in this matter is coming to grips with placing values on the various services that natural resources provide. We have a much better understanding of that now than we did three years ago. We're moving forward in a proactive fashion."

Alcoa Point Comfort Operations officials declined an interview.

Trace metal expert B.J. Presley, a professor in Texas A&M's Department of Oceanography, is reluctant to talk to reporters because "the slant most writers put on these pollution stories is that everything is horrible and the entire coast has just totally gone to hell.

You're taking a real chance simply driving down the highway that things are going to leap out of the water and kill you and your children. That's what the general public seems to want to hear."

Presley's candid theory as to why horror stories prevail has a lot to do with job security. "There are a lot of people who would be out of business if the marine pollution problem turned out to be a non-problem." So, how do we recognize the truth? "There isn't such a thing," he states. "Both the general public and resource managers want to hear very simple answers to very direct questions asked of scientists. The situation in most cases is much more complicated."

If there are environmental scare mongers on one side of the coin, the other side reflects an industry that is in no big hurry to clean up its mess, says Presley. "Alcoa probably didn't know it was doing some terrible things to Lavaca Bay in the late





*Calhoun County commercial fishermen have taken a severe economic blow because of bad press associated with mercury poisoning.*

sixties. But now, instead of admitting it and saying what we can do to fix the situation, Alcoa has used one delaying tactic after another. They've been able to block any real meaningful activity in the bay for more than two years. That's bad.

"The environmentalists can go overboard and alarm the public unnecessarily, but some of these companies, and Alcoa is an example, can go overboard in screwing up the environment and then try in every way to get out of any liability for it. We've got both situations in the state of Texas."

Presley, who served as a consultant for NRDA trustees, says that once Alcoa stopped discharging into Lavaca Bay, the mercury-contaminated wastewater was diverted into "huge onshore ponds covering hundreds of acres." Starting about 1970, wastewater was retained within the industrial complex and the chlor-alkali plant continued operations for another six years or so.

"A problem certainly developed due to the direct release of wastewater into the bay. There is a question as to whether there is a continuing release or a leak of mercury from the plant into the bay because a lot of contaminated wastewater within the complex is in these ponds. It is well known among the various state agencies that some of the monitoring wells on the Alcoa plant site show high mercury levels in the ground water. However, it has not been established as to whether that ground water actually gets into the bay."

He says mercury contamination in the actual bay water has not been well documented largely because of the specialized techniques and equipment needed for testing. Analyses of soils, sediments and organisms around contaminated sites are fairly easy in comparison.

For Presley, the process of determining how much damage has been done in Lavaca Bay, is "the most frustrating thing I've even been involved with in my life." After two years of meetings, he says, all that was really accomplished was a preliminary plan to develop a larger plan. "The scope of this thing is beyond belief. When you think that this is only one small situation out of thousands going on around

the country, it makes you wonder how we ever get anything done."

As for removing the mercury from the bay, Presley says, "I don't think it's feasible unless we want to start another man-on-the-moon project. It will take another two or three years of discussion before a decision is finally made, but, off the top of my head, I don't think much can be done about it. This is not a situation like an oil spill where if you do nothing and let it sit there awhile, it goes away with no real permanent damage. Mercury has been in the bay for more than 20 years and it's going to be there for another 100 years."

There is no hard evidence that mercury has injured marine organisms in the bay, but it is known that consumption of some of these organisms poses a potential human health hazard. Presley points out that humans are more resistant to contaminants than other life forms. The Safe Drinking Water Act, for example, allows much higher concentrations of metals in drinking water than is allowed in ocean water criteria designed to protect marine life. "In general, marine life is much more sensitive to trace metals than man is, but in this case, as far as we know, it's not doing any damage to the marine organisms. But, we haven't looked very hard or done many studies to substantiate that."

The state's fishery closure in the affected portion of the bay is no cause for panic in Presley's opinion. "I wouldn't hesitate for two minutes to eat an oyster from Lavaca Bay. This is not a situation where the seafood is extremely toxic and will kill you the same day you eat it. It's a chronic toxicity problem that if you eat contaminated organisms weekly for several years, you might accumulate enough mercury in your body to affect the central nervous system."

After sampling marine life in the bay, Presley says he's "very impressed with its abundance and diversity of organisms. Pull a net around and you'll catch all kinds of stuff." On the other hand, he recognizes the need to look more closely, especially around the vicinity of the Alcoa operations, at some of the physiological subtleties in marine organisms, such as tumors, cancers, growth problems, metabolism, reproduction rates and other indicators of chronic influences of pollutants.



*Formosa's expansion project boasts a \$32 million, state-of-the-art wastewater treatment system.*

Across the causeway from Alcoa's contaminated waters is another Point Comfort industrial complex proposing to discharge wastewater directly into Lavaca Bay. Formosa Plastics Corp., Texas, is a saga of burgeoning economic progress pitted against a growing battery of environmental protests.

One of the nation's leading producers of polyvinyl chloride resin, Formosa began production at the 250-acre Point Comfort site in early 1983. Since then the production rate of PVC resin has increased by nearly 67 percent at the facility, which also boasts continuous operations at full capacity without a single work stoppage or layoff.

A \$1.3 billion Formosa Texas Expansion Project was announced by Chairman Y.C. Wang in October 1988 "to a cheering crowd of nearly 1,000 county residents, community leaders and Texas and United States elected officials," according to Formosa literature.

The expansion project has also met a large, jeering crowd highly critical of Formosa's environmental record. The

plastics plant has been subjected to numerous investigations and fines for violation of air and water environmental regulations. In May 1990, the Texas Water Commission levied a \$244,700 fine on Formosa's original plant, the largest penalty the agency has ever assessed against an industry for wastewater violations.

In February 1991, Formosa was the target of the largest hazardous-waste fine ever assessed by the EPA. The corporation paid a \$3.375 million penalty and established a \$1 million trust fund for environmental education in a legal settlement of a proposed \$8.3 million fine.

A year later, Formosa agreed to pay fines of \$297,500 that were levied by the federal Occupational Safety and Health Administration (OSHA) following a six-month inspection of the Point Comfort operations.

Formosa was granted a permit essential to the expansion project by the Texas Air Control Board last June, much to the relief of economic developers and much to the dismay of environmental protectionists. Formosa was promised more than

\$200 million in state and local tax abatements and other inducements to enlarge its facility despite a poor environmental history in Texas, Louisiana and its native country, Taiwan.

Calhoun County is sprinkled with tiny communities that have historically depended upon fishing, farming and ranching to survive. As big industries such as Alcoa, Union Carbide and Formosa began locating along the coast, they brought along thousands of high-paying permanent and support jobs and generated millions of dollars in state sales taxes. When Formosa received its expansion permit from the Air Control Board, Glenn Dobbs, a plant manager, described what the area would be like without the project. "The coastal area needs and wants our plant expansion. Without it our area will become a ghost town right out of a western novel."

Environmentalists and local fishermen have a different view of Formosa's progress — the economy may grow but Lavaca Bay may die in the process. Some people are simply not convinced that the proposed 10 to 15 million gallons of waste-



water discharged into the bay will be free of copper, chlorinated hydrocarbons and other contaminants. Some fear that it will only take one major mistake to destroy an already stressed environment.

Construction of the expansion project is nearly complete, although Formosa is awaiting permit approval from the Texas Water Commission and the EPA. Bob Wallace, director of environmental affairs for Point Comfort operations, is "absolutely" certain Formosa will be granted the state and federal permits it is requesting.

"We have spent a tremendous amount of time, effort and money to assure that our wastewater treatment plant is the best that's on the Gulf coast right now. What we consider to be the uniqueness of our system is that the wastewater treatment plant has a dual design in which all portions of the plant are duplicated. There are two systems designed to run together or separately if one needs to be shut down for maintenance or if there's an upset condition within one system," says Wallace.

In addition to treating wastewater generated in chemical processes, rainwater that comes in contact with the process areas is also collected and sent through the treatment plant. Also, wastewater is monitored throughout the facility to meet certain requirements before it even enters the treatment plant. The plant design also includes holding tanks with a storage capacity of about 22 million gallons. "The redundancy, the additional holding capacities, is done to make sure we do not discharge contaminated wastewater," says Wallace.

He adds that the proposed discharge site is in an area essentially closed to shell fishing because of wastewater discharge by the City of Point Comfort.

As a routine precautionary measure, a substantial area around Formosa's proposed discharge point in Lavaca Bay will be closed to the harvesting of shellfish by the Department of Health, according to Richard Thompson, director of Shellfish Sanitation Control.

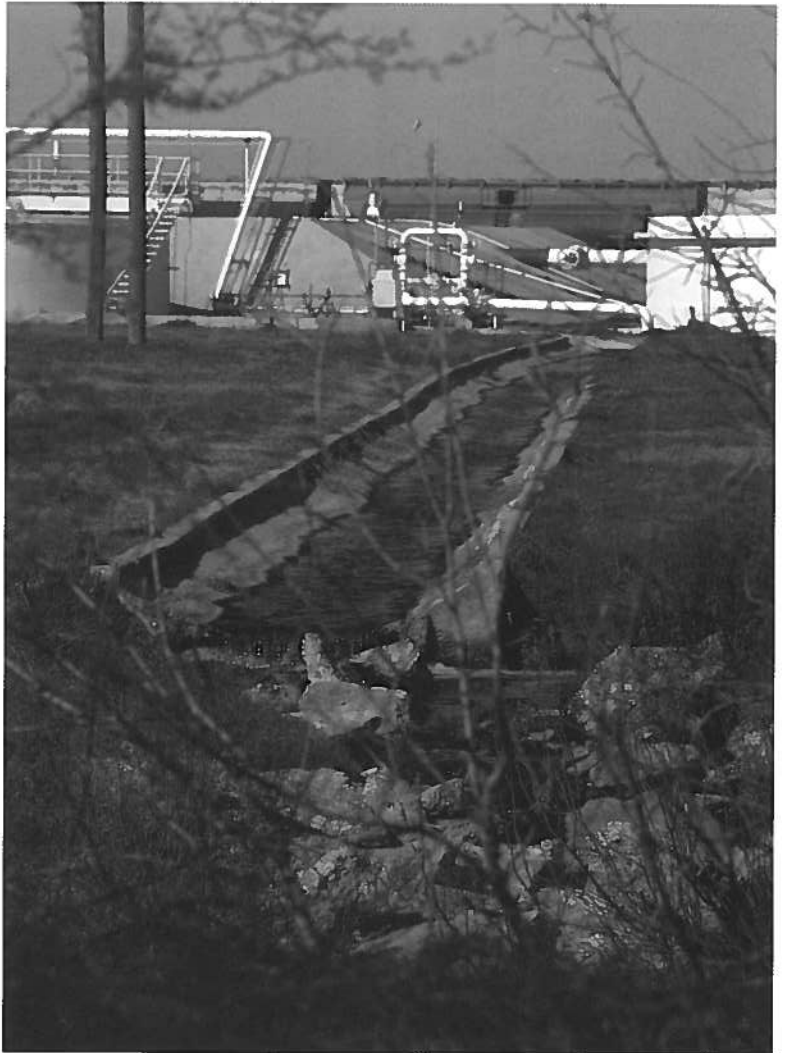
"Formosa's discharge would go into a very fragile area from our standpoint on shellfish. It only takes a quarter inch of rain to close that area down. Adding in the very large discharge of 10 million gallons a day that Formosa is proposing — we simply cannot evaluate that using computer models or anything.

"Once the discharge goes on line, we

will collect samples and evaluate them based on the protocol of the national shellfish program. If there is no effect, which is what the company claims, then we would reopen the area. We have no choice but to take prudent public health action — we

impact of the tides coming in and out. It was determined that our impact on the salinity was almost negligible and also that the impact of the copper was well within safe limits set for shellfish."

Wallace says his firm has a "double



*Discharges from Formosa's operations into a nearby creek are of great concern to environmentalists.*

can't leave the bay open and then find out there's a problem," Thompson says.

Formosa's wastewater treatment system is inclusive of a diffuser that would spread the discharge out over a larger area and provide quicker dilution in the receiving water than having the wastewater flow straight out of a pipe, according to Wallace. "We've looked at the dynamics of the whole Matagorda and Lavaca Bay system through computer models based on our impact on salinity levels and also on the copper content of the water. We ran this model to actually represent 270-some days of discharge into the bay system with the

whammy on copper" because the daily 36 million gallons of water piped into the plant from Lake Texana, located 14 miles to the north, already contains dissolved and undissolved copper that has a tendency to concentrate in Formosa's cooling towers. Copper is also used as a catalyst in one chemical process at the facility.

"We have these two constituents that increase the level of copper in our wastewater. To take care of that, we've got a system called Aquamag, a new technology from Holland, designed solely to remove copper from the water before we discharge it again."



## e've looked at the dynamics of the whole ... Bay system

He responds to those who fear Formosa's wastewater will overburden an already contaminated bay system. "We have to deal with facts. There are a lot of propositions out there and things can be tremendously misconstrued. There is a great deal of hysteria.

"We have designed a plant that's going to meet water quality standards that ensure we do not have an impact on the bay system. We will be doing biomonitoring of the bays that will include analysis of the sediment and its life forms, fish tissues, shellfish — this monitoring system is designed to specifically assure that our water will not have a measurable impact on the water of Lavaca Bay. In order to get the permits, we have to commit to that," says Wallace, adding that Formosa is "paying more and more attention to environmental rules."

State and federal environmental laws are extremely complex and are growing more strict at a steady pace. Often times, Wallace explains, complying with one regulation may mean violating another. Formosa's "being a foreign country with another perspective on the environment" further complicates understanding of the voluminous rules and regulations.

"These laws are even confusing to me on a day-to-day basis, but I think the company tries to address problems as quickly as it can. For example, we received a significant fine after an OSHA inspection last year. The message that we got from the president's office was not to be concerned about the size of the fine at all, but to address every problem. The total direction was, 'yeah, we've made a mistake, but let's make sure we never make it again.' Formosa is very sensitive to the perception people have of them. They want to make sure that they have the respect of the U.S. government, the state of Texas and the people who live here."

Dr. Davis Ford, an adjunct professor at The University of Texas and a recognized authority on the design and installation of

wastewater treatment systems, was retained as a consultant for the Formosa expansion project. "I live on reputation, that's it. I'm not going to get involved with anybody who is going to give a lot of lip service and not follow through. That's my precondition for working with Formosa. There's three things that are going to make this deal work — true capital commitment, the right engineering and design and the actual operation. The money is there, they've got first class engineering systems and they're conducting a very intensive operator training course. That doesn't guarantee success, but the elements are there."

Ford says that Formosa has "a lot of up-front protection" compared to most other industries. "We have it because of bucks and more bucks and engineering. It's not by accident that we have the discharge site upstream because in any complex operation like this there are going to be accidents. Anybody that tells you different doesn't know what he's talking about. We have about 20 million gallons of storage capacity, which is about a 5-to-1 ratio over the capacity of our basic reactors. I've never seen that before in industry.

"We have a lot of belts and suspenders to help us on our spills and leaks that are going to happen. Given all the money in the world, we couldn't do any better than what we're doing based on the technology we have now. Part of my job is to use environmental dollars wisely and I can tell you that, nationwide, we're doing a damn poor job. The funds have to be directed to where they really count. I'll tell you without blinking an eye that the \$32 million for the water treatment plant is well spent; the \$2 or \$3 million it took to process the permit application was poorly spent. You have a bunch of studies that haven't done a thing for Lavaca Bay."

The Texas Water Commission hearing examiner is currently evaluating final arguments involving the expansion plant

and his recommendations will then be ruled on by agency commissioners within the next few months.

In mid-January, the EPA announced its preliminary approval of Formosa's environmental impact statement (EIS) for the expansion project. EPA regional administrator Buck Wynne said, "We have spent two years in an exhaustive evaluation of scientific information and public concerns about the project and we have found no reasons to deny the permit."

Wynne added that a final decision will not be made until an informational public meeting and a formal public hearing regarding the proposed permit have been held. "We want to be sure there is no information out there anywhere, from anyone that we have not considered. Our first responsibility, after all, is protecting people and the environment from threats caused by uncontrolled discharges." A final permit decision is expected in early April.

Major issues considered by the EPA were: potentially harmful impacts; the use of an estimated 30 million gallons of water per day from Lake Texana; public concerns about possible water quality degradation; the potential loss of income from fisheries; and Formosa's record of meeting environmental standards.

"Formosa's compliance history was an important consideration, but not sufficient grounds for denying the permit," said Wynne, noting that the proposed permit would limit discharges of copper — the contaminant of greatest concern — because oysters and other salt water organisms are sensitive to it.

The proposed permit also requires using the best available technology to control discharges of organic chemicals, namely ethylene dichloride, vinyl chloride and associated byproducts. It also limits toxicity in the discharges to protect sensitive marine organisms such as brine shrimp and inland silverside minnows. Testing must show no observable side



# **T**o be recognized as the number one toxic polluter in the industrialized nation is a real irony.

effects to these organisms at five percent dilution, according to Wynne.

Diane Wilson is a fourth generation fisherman and the president of Calhoun County Resource Watch, which she formed in 1989 after reading an article that ranked the county as number one in the nation for total toxic disposal to the land. "This is a small county, maybe 17,000 people at the most, so there's not much to be known for. To be recognized as the number one toxic polluter in the industrialized nation is a real irony."

She is amazed that "in this little bitty county, industry has got to have all the very pristine, very delicate wetlands and bay systems. They talk about industry bringing in jobs? We had Witco. Now they're gone and they left their contamination on the land and in the bay. We gained nothing from them. You've got Alcoa — they started out with 2,700 workers and now they're down to 300. Traces of mercury have been found from one end to the other in the bay system, but we still don't know what's going on because there haven't been enough tests because there's not enough money. Alcoa won't allow the public or reporters in — they're sitting there in the catbird seat right now."

"To be real frank with you, down here they don't want you talking about the mercury contamination. It's a conflict for fishermen because people are going to start wondering what is in our seafood. Who's getting hurt? Who's getting victimized? The fishermen."

Wilson also questions why, after more than 20 years of mercury contamination in the air and water, health assessments haven't been done on plant workers or on fishermen who have been bringing their catch home for supper for decades.

A 1988 state health department report that mercury levels in Lavaca Bay were so

high in some samples that one meal eaten by a pregnant woman could "very seriously damage" her unborn child, infuriates Wilson and "boggles" her mind. So does trusting in the warning signs posted to keep the public from fishing in contaminated areas.

"I'll bet you 50 percent of this county is Hispanic. Those signs aren't in Spanish and I've seen people fishing right off of those signs. The direction here from the officials is don't talk about it, don't write about it. Just keep your mouth shut or you're going to be responsible for shutting down entire operations. That's the irony of it, I'm responsible because I talk about what's been done here. I'm torn in two about it. I could be putting myself and my family out of business because I guarantee you the information on that mercury is going to come out."

There is also a large Vietnamese fishing community in the county that is also apparently expected to read the warning signs printed entirely in English.

As for Formosa's expansion efforts, Wilson says, "They already know what they've done with Cox's Creek. They've increased the chloride level about 20 times in eight years. The copper concentrations at the discharge site are about 10 times the level of anywhere else in Texas. I've got documentation that in 1990, they violated maximum flow 217 times in one year. That's two-thirds of the time.

"You don't get the true picture of Formosa, that's always been my gripe. Industry thinks they've got Carte Blanche around here. Who gives them the right to dictate the future of a county? This is a partnership and, by God, they're going to have to listen to and address the concerns of the people. The only way people can make a difference is to kick in doors."

Wilson is mostly a maverick environ-

mentalist who quotes Thoreau and Ghandi and who has staged two, two-week hunger strikes — one aboard her shrimp boat and another at EPA regional headquarters in Dallas — to protest Formosa's operations. She's also traveled to Bhopal, India, to testify against Union Carbide on violations of human rights. In 1991, she went to Taiwan to testify and witnessed thousands of people demonstrating against construction of a Formosa plant. "Those people despise Formosa because they are so flagrant and non-caring. It's like they take people, wad them up and throw them away. It's an all out war there."

Closer to home, Wilson talks about a safety worker at the Point Comfort plant who tried "four different times to have an incinerator shut down because in the control room the workers were passing out from the fumes. Finally, she succeeded in having operations shut down to fix the incinerator and then she had a window in her home shot out. She's no longer there because it scared the fool out of her. After seven years, OSHA finally went in because four people in three years were killed from chemical releases," says Wilson, who hired a private detective to investigate emergency runs from the plant.

"The emergency services get their ambulances from Formosa, which also buys the police cars for Point Comfort. They own virtually everything and know exactly who to give gifts to. The people have no options, no alternatives because they're sitting here with politicians bought off like beef steak. Formosa is extremely powerful and is doing its job exceedingly well — it's pure profit, no emotion, just progress, progress, progress. Nature has no value, human life has no value. It's all monetary."

Wilson swears that various public officials have "flat out tried to bribe me. They've offered me money and jobs just

to give industry what they want.” She says her fishing boat has twice been sunk, that she’s been under helicopter surveillance, had her house broken into and had a sniper stalking her front yard.

The motive behind her fearless and relentless battle to guard Calhoun County’s natural resources comes from knowing “our agencies and officials are not watching out for our children, our workers or our bay. It outrages me. That’s what keeps me moving. I can hear the bay, it has a voice. If you fight long enough, it makes

Formosa establishes an auditing process to ensure the safety and environmental performance of the existing plant as well as the new construction. In his opinion, Formosa has “a very poor environmental compliance record,” with the exception of its facility in Delaware. He says the firm’s wastewater discharge was not nearly as bad as its air pollution. “Formosa consistently violated its wastewater permit on a flow basis, but not on any type of pollutant basis. That’s not as bad as some of the vinyl chloride and hydrochloric release

ter of Formosa chairman, Y.C. Wang, called to arrange a meeting “to work something out” and a rough draft of the agreement was essentially negotiated in an afternoon. It has, however, “been very difficult to get down the road with this because of all the distrust that exists.”

Wastewater discharge has a very unique provision in Blackburn’s agreement. “My concern all along was that Formosa could make many types of representation on paper and they were probably going to get their water discharge permits from TWC and EPA. Yet, there are no performance guarantees in those permits, no requirement that you not degrade the waters or contaminate the sediments. In the agreement, I have a measuring zone established that’s basically a circle 200 feet out that surrounds the discharge point and Formosa has agreed they will not cause measurable degradation beyond that zone. That’s a stronger provision than you can have under federal or state environmental law.”

The agreement establishes a three member commission: Blackburn, Formosa and Formosa consultant, Davis Ford. On a two-to-one vote, the commission has the ability to bind Formosa to comply with the agreed upon standards. Should Formosa choose not to comply, Blackburn has the ability to file in district court to get the terms of the agreement enforced.

Blackburn says he has received no money from Formosa for settling, nor has there been direct payment for anything other than travel expenses.

“I’m optimistic this agreement will offer an opportunity for a company with a very poor record to do a much better job. It will also offer a level of protection to the citizens that they haven’t previously had.

“I honestly believe that Formosa is trying to change its ways and comply with the agreement. That doesn’t mean we don’t have a number of frank discussions, but they are proceeding in good faith. This is an innovative approach. It’s much easier to fight than it is to figure out a way to address these problems and move forward. Permitting battles do not address a lot of citizens’ concerns and do not help the environment that much. This agreement has the potential to be positive. Ultimately, something like this has to emerge rather than all this legal fighting we do,” says Blackburn.



*Formosa's original plant has been subjected to unprecedented state and federal fines for hazardous waste releases.*

you stronger. There ain’t nothin’ that can stop me other than a bullet, I’ll guarantee you.”

Houston environmental attorney Jim Blackburn, who last year asked state and federal officials to close down Formosa’s operations and bring criminal charges against the company for willfully violating environmental standards, worked closely with Wilson, particularly during her hunger strikes. Blackburn has negotiated an unprecedented agreement with Formosa that received Wilson’s blessings, but she would not sign off on the deal because of past experiences with the corporation.

“I went off the hunger strike because I thought we had negotiated an agreement with Formosa officials and then they renege and violated the contract all over the place. I’ve just completely lost faith in them,” says Wilson.

Blackburn’s exclusive agreement with

problems from an air pollution standpoint.”

He admits that he is nervous about the expansion project, which is essentially why he signed the agreement. “It was the only mechanism that I had to get a foothold on the safety issue. There’s no agency in Texas that regulates construction safety. No one checks to see if these plants are built like they’re supposed to be. Diane Wilson and I had several reports that there were construction problems and the agreement was a mechanism to address these concerns.”

The impetus for formulating an agreement with Formosa grew out of Blackburn representing Wilson in various lawsuits against the corporation and also out of “a lot of bad publicity for Formosa” generated by Wilson’s hunger strike in front of the EPA regional office. During the strike, Blackburn says Susan Wang, the daughter



He believes it's "very important to note the bravery of Diane Wilson. She has taken all sorts of abuse in that community because of her opposition to Formosa. She's been identified as a trouble maker, but I think the Texas coast owes her a nod and a tip of the hat."

Calhoun County Marine Advisory Service agent Joe Surovik also applauds Wilson's "tireless efforts to conserve the bay system. She has created a tremendous amount of awareness of the problems that exist here."

Texas Parks and Wildlife Department (TPWD) biologists are opposed to Formosa discharging its wastewater in Lavaca Bay for several reasons, according to David Sager, chief of environmental quality.

"They are proposing to discharge in a secondary bay, which is one of our most productive nursery areas. In fact, Lavaca Bay is a designated nursery area under our regulations. Formosa proposes to put its discharge in a shallow area of the bay that quite often will have very little water during certain weather fronts that are not uncommon along the Texas coast. This discharge will be going in with fairly minimal dilution at those times."

Sager adds that the agency also opposes the discharge site because it will close off a significant amount of the bay to oyster harvesting. "We think there are better areas that this could go into that would not have the possibility of minimal dilution, that would not be as productive an area and that would not require a closure affecting commercial fishing."

Larry McKinney, TPWD resource protection director, prefers that the wastewater be discharged in a deeper part of the bay to allow for better mixing and dilution. "Our experts testified that in some extreme conditions, the diffuser Formosa proposes would be exposed and out of the water. You're not going to get any dilution if you haven't any water. We aren't convinced that they have done a good job with their science in picking that spot."

Lavaca Bay is home to numerous, highly productive oyster reefs, many of which are restricted to fishing because of elevated fecal coliform levels from sewage discharge. "Further environmental degradation of the bay because of the proposed discharge will result in more economic hardships for the people in the area who depend on commercial and rec-

reational use of the bay," according to McKinney.

More opposition to the proposed discharge into upper Lavaca Bay has been voiced by Stuart Henry, environmental lawyer for the Sierra Club. "Based on Formosa's compliance history, where they put their priorities and where they put their money for environmental issues, quite frankly, I think they spend a lot more on PR than they do on cleaning up the environment. Formosa's deeds do not match up to their words in terms of environmental protection.

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**T**hey are not going to spend the kind of money it takes to protect the environment if it affects production and/or profits.

.....

"As best I can tell, they have run their existing plant down to the point where they're having to abandon it after eight years. That gives me a good deal of concern. I'm extremely worried that Formosa's corporate philosophy is that they are not going to spend the kind of money it takes to protect the environment if it affects production and/or profits. One can say that about a lot of companies, but I think Formosa is the extreme of that."

Something else that worries Henry is a minimal margin for error. "If there's a mistake made in the bay — despite the fact that Formosa may try to clean it up — you end up with contaminants in the sediment and it's almost impossible to dredge those up without causing other more severe problems. I mean, hell, we're talking about the bread basket for the coast."

He has long been convinced that "one of the most critical environmental areas we've got in this state is the coast and it is by far the most ignored resource. You can't point to one agency in Texas that has primary responsibility for protecting the coastal environment. It's split up, so everything falls through the cracks. It seems to me that Lavaca Bay is one of the most productive, as well as one of the most sensitive environmental resources on the

coast. Allowing Formosa to discharge into the bay will be real short-sighted."

Henry's assessment of the value and sensitivity of the bay is best understood by the area's commercial fishermen, who have watched their pockets empty because of industrial pollutants and bad publicity. With some 80 percent of the prime oyster reefs closed to fishing and the public's fear of eating anything out of a contaminated bay, most local fishermen feel the odds for their industry's survival range from slim to none.

Edward Lambright, chairman of the

Calhoun County Marine Advisory Committee, has been a bay and gulf shrimper and oysterman for 30 years. He's seen great economic times when countless truckloads of oysters were shipped around the country; now he sees that he can't give his product away.

Widespread media attention on the dangers of eating raw oysters from polluted waters began to seriously impact the local market about two years ago, according to Lambright, and the bad news only got worse with reports of area fishermen caught and fined for harvesting oysters in officially closed waters.

Although Lambright admits that "some in the business like to fudge on the lines," he says a larger problem is that the closure area is not sufficiently marked. In 1990, a local judge filed an injunction against the state health department on behalf of the oystermen claiming that the lines enclosing the prohibited area were vague and misleading. He lost the case, and the national press ran stories on Texas fishermen bootlegging contaminated oysters on the open market, which led to a ban on Gulf oysters in some states, including California.

The impression that "the entire industry is crooked" makes Lambright angry





because “I don’t think there are any oyster producers in the state of Texas who are going to willfully put a bad product on the market. The best seafood in the world comes out of this area. You don’t need to be afraid of it because the controls are there. Our water and processing plants are monitored, our regulations are enforced—people don’t have anything to worry about.”

Fishermen should, however, worry about where Formosa plans to put its wastewater because if it goes in Lavaca Bay, Lambright says, “it will devastate the oystering, no if’s, and’s, or but’s about it.

“I know everything that goes on out in that bay and not because of a microscope or a computer model. I’ve worked long and hard to get a sanctuary bill passed by the state legislature so that the shrimp, crabs and oysters will have a nursery ground. It makes real good sense to go into a nursery area and pump in 10 million gallons of water a day that’s been processed through a chemical plant. If it’s as clean as they claim it is, let’s put it back into Lake Texana and sell it to Corpus Christi and San Antonio,” Lambright suggests.

He adds that during the winter, tides reach such extreme lows that Formosa’s discharge will dominate bay water.

When the expansion project goes on line, Lambright says he can already see the national headlines. “‘Formosa gets water discharge permit into Lavaca Bay.’ Here I’ll be with this truck load of oysters, trying to sell them to a buyer in Wisconsin. He’ll ask me where I got them, I’ll say Lavaca Bay and he’ll say ‘forget it.’”

Lambright is certain that the nearly completed expansion plant will soon be operating. “There is going to be this wastewater coming across everything in the bay and everything that moves in from the Gulf to get to this estuarine zone. Formosa doesn’t have to have a mishap. We’d be better off in the seafood industry if they did and it killed everything. Then they’d have to pay us. This way, they’ll be doing us in a little at a time. But, the oyster industry in Calhoun County is not that important. The total amount of people affected is only about 1,500. It’s all right, we can get them jobs pushing brooms.”

Commercial fishing in Calhoun County

is valued at \$55 million annually and recreational fishing at more than \$75 million. There are 1,354 commercial fishing licenses issued for the county. An estimated \$12 to \$15 million is lost each year because of closures on oyster harvesting and another \$9 million lost due to crab fishery closures.

Lambright, who has worked for Union Carbide and DuPont, but turned down a



*Commercial fishermen fear Formosa's proposed discharge into Lavaca Bay will put them out of business.*

job offer at Formosa, says he is not against industry and recognizes the need for it. However, because of a poor compliance record, “Formosa has to prove to the people of Calhoun County and the state of Texas that they are doing the best they can do to protect the bay. When they do that, I’ll be the first one to support them, but, they haven’t done that yet.

“I don’t really want to fight them. I just want them to leave Lavaca Bay alone so that my grandson will have the opportunity to go into shrimping and oystering if he decides to. I hope he’s smarter than that, but I want the opportunity to be there for him. Don’t get me wrong, I’m not an environmentalist. I just want to protect what we’ve got for future generations and I don’t see it happening the ways things are going.”

Lee Kalisek has sold shrimp and oysters at his Broadway Fish Market in Port Lavaca for the past 23 years. The combination of oyster reef closures because of mercury contamination and the near certainty that Formosa will be granted a discharge permit into Lavaca Bay has virtually ruined his business. Again, bad publicity and the general perception that contamination affects the entire bay, not just a portion, is blamed for markets on the East and West Coasts refusing to buy Texas oysters.

Three years ago, when America couldn’t get enough raw oysters on the half shell, 24 18-wheel trucks each loaded with 360 sacs of oysters left Kalisek’s market every day. The rosy picture was repeated at several other area fish houses — a survey revealed that Calhoun County’s oyster industry was bringing in \$125,000 per day. Now Kalisek and others shuck oysters for gallon containers maybe three times in two months because hardly anybody wants to eat raw oysters anymore, especially those from Texas.

Several of Kalisek’s family members are employed at area plants and, while he’s “all for industry,” he asks, “Why don’t the agencies make them clean up their stuff? Why do they have to dump pollution in the bay? Why can’t they keep their wastewater in holding ponds, or if it’s as good as Formosa says, why not send it back to Lake Texana? Let them have their permit, but just don’t put the

wastewater in the bay. In a couple of years, they’re going to ruin this bay system where the shrimp are raised and born if they discharge into it.”

Add Sam Clegg, a member of one of the areas’ oldest pioneering families and the owner of a once highly successful seafood processing plant, to the list of opponents of Formosa’s proposed wastewater discharge permit. After more than 50 years in business, Clegg recently shut down operations because of pollution problems in the oyster industry and also because he could no longer compete with foreign market imports of farm-raised shrimp.

“I’ve always felt that Formosa’s proposed discharge into Lavaca Bay is a potential disaster, not just to shrimp and oysters, but to all the marine resources, including the water itself.

# **T**hree years ago, America couldn't get enough raw oysters on the half shell ... now hardly anybody wants to eat raw oysters anymore, especially those from Texas.

"I'm not here to tell you I want Formosa to go away, but there could be a recycling solution that would eliminate the volume of discharge. The big argument has always been that if Formosa is going to recycle the water, it ought to be good enough to stick a glass under and take a drink. I don't think the community is going to buy that. If the water's so good, use it in the facility to cut down on the amount of volume. Formosa felt that was an expense that wouldn't be justifiable," Clegg says.

Just how contaminant-free Formosa's wastewater will be is a critical issue that Clegg believes should be thoroughly investigated by all concerned parties rather than anyone making hasty decisions. "We need proof because there is no margin for error. If they make a catastrophic mistake based on where the water discharge point is now, the effects of that could be around forever and that is what we don't want to see. We'd like to know that industry and the community can have a compatible relationship for centuries to come."

Clegg, once an oyster-lover, says, "I would not consume oysters from this area. I'm concerned because I researched Formosa's discharge permit application and I am aware of all the volatile organic compounds that are present in their process. I know about the side effects of these compounds and I just don't want to take a chance."

Granted, he says, Alcoa made a "bad mistake" by releasing mercury into the bay, "but I think Alcoa has been very environmentally responsible, as have Union Carbide and DuPont. Any of the toxic products they might be handling take a high priority. I went through the Water Commission and EPA compliance reports on Formosa and you can't tell me that company hasn't been a blatant violator."

Clegg thinks Formosa's new construction is "putting the cart before the horse. You don't build a facility without having

all the right permits. The problem goes back to Gov. Clements who came here for the groundbreaking ceremonies for the old plant. The state made a deal even though it knew Formosa's compliance record and I think they sold us down the river. Now that we've brought this all to a head, it's a different ball game today."

The beauty of Lavaca Bay is clearly in the eyes of its beholder. Industry sees it as an economical and logical location to flush highly regulated wastewater. To commercial fishermen, it is the seriously wounded but still productive nursery ground of their livelihood. Neither faction wants to put the other out of business, but there is across-the-board, deep-rooted concern that these two valuable industries are not compatible operating in the same limited body of water.

American companies operate at a "gross disadvantage" in the world market because of increasingly strict environmental laws, points out Formosa consultant Davis Ford. "I've done a lot of work overseas and found that the Koreans and the Japanese are setting their effluent limits based on how much money a company can spend to compete in the world marketplace. American companies might spend 40 percent of their capital investment producing something of value while their competitor is spending half that. Formosa has committed to complying with U.S. law and that is a significant capital investment."

Although he strongly believes in tough environmental standards, Ford understands why a growing number of American industries are moving to Third World countries "where the main water treatment plant is a pump station dumping into a lake. I've spent a lot of time in Eastern Europe and the Soviet Union prior to the fall and the pollution just defies imagination, it's even worse than Latin America. What you have right now is pollution of the world.

"The Chinese have the same philosophy — the bottom line is production and

don't give a damn about pollution. All of a sudden their rivers are so contaminated they can't use them for industrial purposes, so now they're getting the message," says Davis, adding that most Americans are willing to pay the painful price for a clean environment.

In Texas, you won't get much of an argument over the need for a statewide monitoring and research program that would provide solid baseline data on water, sediments and marine life, as well as a better understanding of the ecological processes relating to toxic materials. Such information is essential to making comparisons and drawing timely conclusions as to the state of the environment.

Routinely monitoring and studying water quality in the profusion of bays and estuaries along nearly 400 miles of Texas coast would be an extremely expensive endeavor that requires the skills of expert researchers using costly state-of-the-art equipment. That is why what little money there is must be spent investigating toxic troublespots such as Lavaca Bay.

The state's marine monitoring limitations leads to what TPWDs David Sager describes as a "skewed perception" by a public that hears only bad environmental news. While state agencies agree that the overall quality of coastal resources is good, they do not have the data to substantiate their assessment.

Tourism, a vital source of state revenue, has also suffered from toxic Texas reports, notes Sager. "How many people are going to come to an area and spend recreational money when all they hear about it is bad news?"

Sager would much prefer that the state operate in a "prevention mode rather than a response mode."

Everyone would prefer that industry turn a profit without turning toxins into the marine environment. Given enough well-spent money, that's not such a utopian idea.



**WARNING**  
**Toxic Texas**

# Is the Seafood Safe To Eat?

By now, almost everyone knows that eating raw oysters, mussels or clams from contaminated waters can make you sick, and in some cases, can even kill you. The same can be said for eating raw tainted fish or meat of any kind. What most people are “absolutely shocked” to learn is that Texas cannot afford a routine, broad-based monitoring program for seafoods, according to Kirk Wiles, assistant director of Shellfish Sanitation Control, Texas Department of Health (TDH). ☹ “The public assumes that we regularly monitor seafood and

that we protect people no matter what. Well, it’s really not so. We do the best we can with what we have. I think Texas seafood, for the most part, is really very good, but I can’t just say that without documentation.” ☹ Seafood advisories or closures are within the jurisdiction of the state health department, which essentially relies upon other state agencies for water quality information. If a TDH risk assessment indicates that a contamination level poses an imminent hazard to human health, fishing for whatever species might be affected is prohibited by state law. If a hazard exists only through frequent and long-term ingestion of a contaminated species, then a consumption advisory is issued. ☹ Either way, risk communication is a touchy task to perform without alarming the general public or creating the wrong impression. For example, a relatively small portion of the upper Galveston Bay complex is under a seafood advisory because low levels of

dioxin were found in catfish and crabs. This means there's a risk attached to eating more than eight ounces a month of these two species taken from the restricted area. Women of child-bearing age and children are advised not to consume the affected species anytime. However, the public perception is that if fish in one area are contaminated, then all of the seafood in the entire bay complex must also be affected, despite reports that samples taken from other parts of the bay do not contain dioxin.

It is generally accepted among state and federal agencies that contaminated seafood is found near toxic troublespots, such as industrial and municipal wastewater discharge sites. The majority of seafood harvested away from sources of contamination is considered safe to eat.

Bivalve mollusks, such as oysters, are a particular risk if eaten raw because they contain the naturally occurring bacteria, *Vibrio vulnificus*, that can prove fatal if consumed by someone with a compromised immune system.

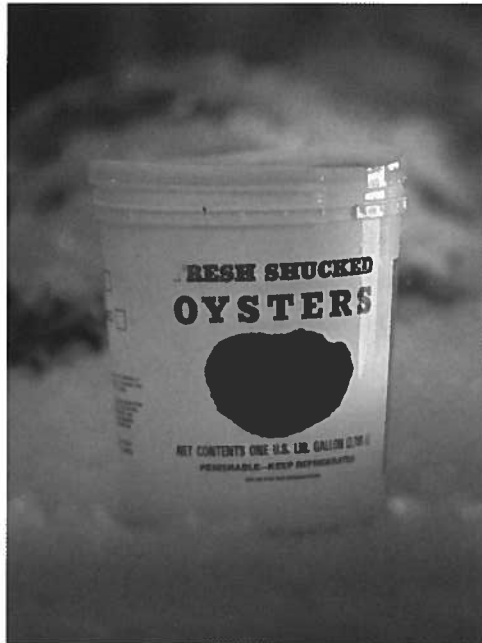
*Vibrio* infection strikes hard and fast in susceptible people with immunosuppressive disorders or liver disease, or those who regularly take antacids. The fatality rate is more than 60 percent and death usually occurs within one to two days after the onset of infection. "By the time you realize you're so ill that you go to the doctor for appropriate therapy and antibiotic treatment, the disease is too far gone," says Beverly Ray, TDH Infectious Diseases Program epidemiologist.

In the case of raw oyster consumption, Ray explains that the *Vibrio* microorganisms multiply in the bowel, then invade the bloodstream causing high fever, shock, drastic drops in blood pressure and other reactions associated with severe infection.

Cholera, also a *Vibrio* illness, is spread through eating food or drinking water that is contaminated with fecal matter. This is primarily a problem along the Texas/Mexico border in poor communities that lack a treated municipal water supply and adequate sewer systems.

In 1992, 25 cases of *Vibrio* illnesses

were reported in Texas: nine were related to consumption of shrimp, crab, oysters or fish, with two fatalities; 10 cases involved direct contact with contaminated sea water, either through an existing wound or one sustained while fishing or swimming; and in six cases, the source of the infection was not clear, according to Ray.



Other illnesses associated with seafood consumption are not reportable to the state health department unless there is an outbreak. Sporadic occurrences of hepatitis A and shigella, a digestive disturbance ranging from mild diarrhea to severe and often fatal dysentery, are recorded at the local level. Shigella disease

is generally associated with consuming oysters that are contaminated sometime after the point of harvest because of improper handling.

So called "red tide" is a naturally occurring, toxin-producing algae bloom that not only causes massive fish kills, it concentrates in shellfish to such a dangerous degree that human consumption can result in serious impairment of the central nervous system. In 1986, virtually all of the Texas Gulf coast was closed to the harvesting of shellfish because of the presence of red tide toxins. Unlike Florida, which endures frequent blooms, Texas averages an episode about once every 50 years.

Prohibiting the harvesting of seafood in an area that is naturally or artificially contaminated beyond state and federal health limits is strong action that has a profound economic impact, particularly on commercial fisheries. The vast majority of Texas fishermen take admirable pride in the quality of their catch; they also understand better than anyone the consequences of intentionally selling an

illegal product. However, many of them criticize regulatory agencies for being overly cautious in their risk assessments and thus contributing to seafood's poor public image.

"Our job is not to put fishermen out of business," responds Richard Thompson, director of TDH's Shellfish Sanitation Control. "Our job is to make sure that contaminated products don't get into the market place for an unsuspecting consumer to buy. This puts us squarely between the consumer and the producer, and a lot of times we're not popular with either side. The consumer wants us to do more and the producer wants us to do less."

Asked his opinion of the water quality in coastal Texas from the standpoint of chemical toxins, Thompson replies, "The basic answer is, we don't know. We have the statutory authority and the technical capability to go out and conduct fish and oyster samples; however, we have never been funded to do this kind of activity



# Natives didn't have to contend with ... urban runoff contaminating the bays ....

anywhere. Back in the early 1980s, before inflation and budget cuts, we had a little discretionary funding within the shellfish program to do some fish sampling. But, we have reached a point in the agency where we simply do not have the funding to collect samples and we're not able to study hot spots or major incidents. We can only respond to an emergency. We don't have a program to do routine sampling statewide. That's the unfortunate situation that we're in."

He adds that the greatest financial stumbling block is tremendously high laboratory costs that would call for a \$3 million budget increase just to provide a minimal sampling capability.

Thompson says that there are "general indications" that toxics in the marine environment are not a widespread problem, but are usually confined to specific areas. "By and large, we do not think estuarine and coastal areas of Texas are contaminated with toxics."

Different feeding mechanisms affect the tendency of various species to either concentrate or accumulate contaminants, that is, a toxic might be present in oysters or clams, but not found in fish, crab or shrimp, according to Thompson.

In the case of mercury contamination in a portion of Lavaca Bay, he adds that the area was closed to oystering in the early 1970s, but the ban was lifted within a couple of years because the oysters had cleansed themselves of the heavy metal. However, finfish and crabs began to concentrate levels of mercury that have consistently exceeded federal Food and Drug Administration guidelines and kept affected parts of the bay off limits to fishing or crabbing.

Thompson advises people to be careful of where they purchase seafood. "Buy from legitimate businesses. Don't buy from roadside peddlers or some guy trying to sell you something in a mayonnaise

jar. This particularly applies to oysters, clams and mussels because they are easily bootlegged from areas that may not be open and they may have been processed in somebody's back yard. Unless these animals are harvested from approved areas and handled under strict sanitary guidelines, they are very hazardous material."

He points out that the molluscan shellfish industry is the "most tightly regulated industry in the nation" because of the human health hazards related to consuming products raw and whole. There are 26 producing states that have programs under which approved dealers are issued a Shellfish Certificate of Compliance. When purchasing shellfish, look for a tag or label that provides the name, address and certification number of the processing plant.

Before ordering shellfish in a restaurant, Thompson says he frequently asks to see a tag that verifies the product's origin. "We recommend that people find out where the shellfish came from. If it's a legitimate business, handling a fresh product, they should have no qualms in bringing you a certification tag."

Giving up shucking and slugging down dozens of juicy, raw bivalves at an authentic oyster bar is just too much to ask of some devotees, which is why oysters are still on the market for those of us willing to take a chance. Thompson says aggressive shellfish sanitation programs, such as the one in Texas, are "reducing the risk to an acceptable level by assuring oysters are harvested from classified waters with low levels of pollution, that they are properly handled, refrigerated and placed on the market in safe containers. The risk is there if you are eating the product raw, but it's at a reduced level that is much safer than if the product were harvested 10 feet away from a sewage treatment outfall."

A couple of hundred years ago, when the Indians left a trail of oyster shells from one end of the coast to the other, Thomp-

son says, the only health hazard they may have encountered was in "eating too many of them."

What the natives didn't have to contend with was urban runoff contaminating the bays and estuaries. "Everybody in Houston wants to flush the toilet and have it go away. Where does it go? It ends up in a river or a channel that goes into a bay. That is the problem. Everybody wants to live on the coast but they don't want pollution problems to exist on the coast. You can't have one without the other. That is why we have been forced to initiate so many fishery closures along the U.S. coastline.

"The biggest problem in Texas is not chemical plants, or even sewage treatment plants. The vast majority of our closures and advisories in Texas are a result of non-point pollution. When it rains, everything — the dog and cat droppings, the leaks from septic tanks, gas tanks, oil tanks, the pesticides — gets washed into the bay systems. We can't regulate it and that's why there are so many closures. If we had some way to control non-point pollution, we might be able to open up additional areas," says Thompson.

"Texas is ranked by some media as the worst polluter in the nation because of all the chemical plants, but that's not what is causing our closures for shellfishing. It is the human beings who want to live close to the coast."

Perhaps if we hear often enough that we are all in this toxic mess together, we might believe it enough to share responsibility in changing our polluting ways sooner than later. In the meantime, the answer to whether the seafood is safe to eat depends upon an individual's state of health, where the product is harvested, how it is processed at the plant and how it is handled in the market or restaurant or prepared in the home.

**WARNING**  
**Toxic Texas**

# Matagorda's Mysterious Mass Strandings

Each year, for a variety of known and unknown reasons, about 200 dolphins strand themselves along the Texas coast. Last spring, the figure spiraled when more than 100 decomposed dolphins were discovered in the Matagorda Bay area alone. Normally there are between five and 10 strandings during March and April along this section of the coast. 🌊 For the past year, marine researchers have struggled to understand why such an unusually large number of the marine mammals had washed ashore in Calhoun and Aransas Counties. Then one day last January, a local paper's front-page headline blared, *Pesticide linked to*

*dolphin kill*. Within minutes, screams of protest were heard from scientists, farmers and fishermen. The community, already alarmed by mercury contamination in nearby Lavaca Bay, became even more agitated by the news that deadly pesticides were killing dolphins in the bay system. 🌊 The following day, the same paper ran a brief inside story with the headline, *Pesticides not yet linked to dolphins*. Apparently, a state biologist's comment that pesticides had been found in dolphin tissues was misinterpreted; actually, traces of the agricultural pesticide aldicarb were found in water samples from the bays, but a cause-and-effect relationship between the dolphin deaths and the pesticide has not been established. Aldicarb is used on cotton and sorghum crops and, according to the National Marine Fisheries Service, does not accumulate in body tissues. 🌊 The rare strandings have spawned several theories, including





speculation that last spring's heavy rains and flooding washed pesticides and other contaminants into the bay.

Rhone-Poulenc, manufacturer of the aldicarb pesticide, TEMIK, takes issue with media reports "that the alleged presence of aldicarb residues in Gulf waters may have played a role in the dolphin kill," according to a January press release.

The company, which has been cooperating with researchers conducting an investigation, makes the following points: "We know of no confirmatory tests or verification procedures done that showed aldicarb residues in waters alleged to be between three and five parts per billion. We understand the analysis for aldicarb was done with a test kit that has recognized limits in its accuracy and capabilities. We know of no test kit analysis that is recognized by the scientific community to be accurate for detecting minute residues of aldicarb."

Further, Rhone-Poulenc says its specially trained staff routinely conducts analyses for aldicarb and its metabolites. Currently, the company's residue chemists are working with the National Marine Fisheries Service "to address difficulties the federal agency is having with analytical methods."

Should the presence of aldicarb in water be confirmed, the company states, "it is highly unlikely that the levels claimed to have been present would be responsible for the dolphin kill. The very conservative health advisory level at which aldicarb can be present in human drinking water is twice the level allegedly detected in the water samples. If aldicarb was in fact present in bay waters at the alleged level, it would not pose a risk to dolphins or other marine life."

Roy Parker, Texas Agricultural Extension Service entomologist, says in the case of aldicarb, "The first level at which any noticeable health effects have ever been measured in mammals is 4,800 parts per billion." Furthermore, he says aldicarb is a very costly material and, at the time of the strandings, there were a relative few cotton crops planted in the area that utilized the pesticide.

The pesticide, which is sown in with the seeds during planting, is expensive, but effective enough to more than pay for itself. It can also be used safely, according to Parker. "The material breaks down even more rapidly than I'd like to see. If you treated every single acre, you wouldn't have enough runoff to kill a dolphin, I can tell you that right now."

Parker describes the news story linking dolphin deaths to aldicarb as "journalism at its worst" adding that within 12 hours of the article, Houston television stations were saying that "the farmers in Calhoun County are at fault here." He publicly challenges "any claims that the dolphin deaths were caused by TEMIK runoff from farmlands." On his list of possible causes, aldicarb ranks "dead last."

Society, Parker concludes, is going through a fundamental change in its perception of chemical science and is entering into "the modern dark ages." He recently read a high school environmental science textbook and says, "There were some good things in there, but the whole tone of the book was that chemistry is evil." He's asked several eighth-grade science classes what they thought of chemicals or chemistry and "nearly everyone said it's bad, dangerous, poisonous. That's where we're headed."

Because dolphins are positioned at the top of the marine food chain, they are considered to be a valuable indicator species, that is, if there are contaminants in the water or in marine organisms, they will likely end up in the dolphin. The marine mammals also suffer from many of the same diseases that afflict humans.

*Scientists aren't sure why some 200 dolphins strand on the Texas coast each year.*





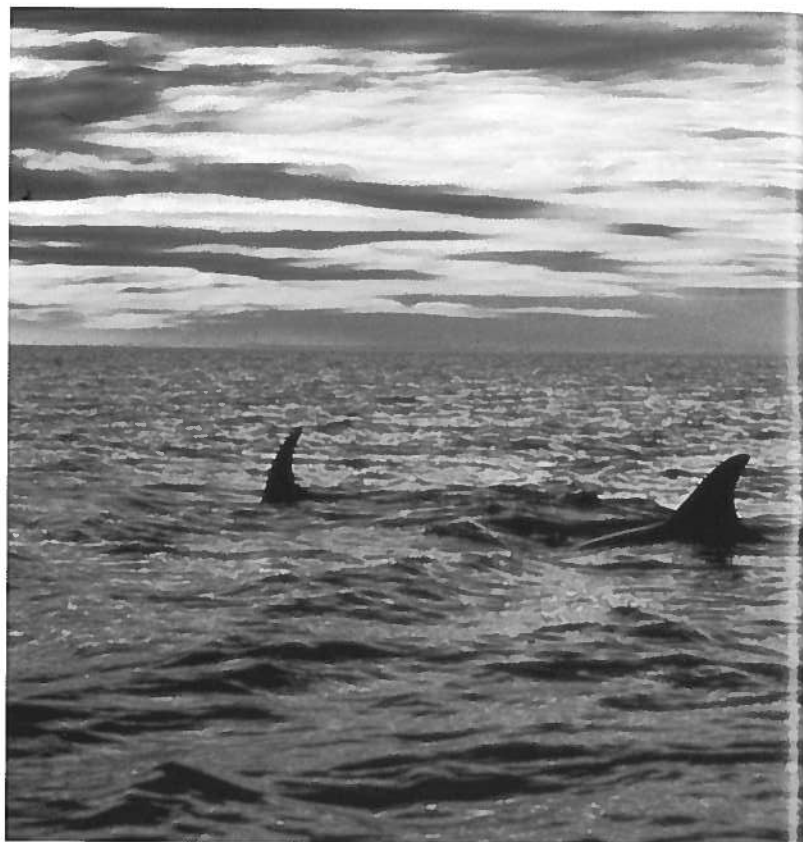
Daniel Cowan, professor of pathology and adjunct member of the Marine Biomedical Institute at The University of Texas Medical Branch, Galveston, is interested in dolphins from the standpoint of their comparative anatomy and pathology. For the past two years he has been conducting necropsies on Code 2, or freshly dead animals, stranded on the Texas Gulf coast.

In his 25 years as a surgical and diagnostic pathologist, Cowan has autopsied a wide variety of exotic animals, including whales off the coast of Newfoundland and dolphins stranded along the southern California coast.

During the 1980s, he participated in a large dolphin stranding investigation in the Los Angeles/Orange County region of California and found that nearly all the animals were diseased. Most striking was an infestation of parasitic worms in many of the dolphins' brains. The same parasites are found living in the sinuses or around the ears of Texas dolphins, but Cowan says they have not been found in the brain tissue.

Some of the California dolphins had scarring of the heart and a form of hepatitis, with one case of advanced cirrhosis of the liver. Cowan says toxicological analyses of the Pacific coast dolphins showed high concentrations of chemicals such as DDT and PCBs in their tissues. Also found in large quantities were heavy metals such as mercury, cadmium and lead.

The different patterns of disease in various strandings around the world implies, in Cowan's view, that "something is occurring in the environment. It may be the result of a natural cycle, or the changes may have something to do with some toxin in the water."



He says that very little is known about the recent Matagorda Bay area strandings, primarily because the animals were too badly decomposed to get a "meaningful necropsy." Three-dozen dolphins netted in the same area last July came up with a clean bill of health. "They were all perfect show specimens."

Cowan's particular interest is in "seeing if dolphins have something we should worry about. They live in the water all the time, they eat the same kind of fish we do. They're at the apex of the food chain, so if there's anything bad in the water it ought to concentrate in the dolphins. It may make them sick or they may die and end up on the beach. That's when I'll be looking for patterns of disease that might or might not be related to anything."

Cowan has found some conditions in Texas dolphins that he hasn't seen before. Out of 17 necropsies, he found three cases of "a bizarre proliferative vascular disorder of the lungs and lymph nodes. There is only one case in the literature of this occurring in dolphins. I am unaware of any report in the literature on a disease called amyloidosis in dolphins and yet I have two cases of it." (Amyloidosis is a metabolic disorder marked by deposits of amyloid, a starch-like complex, in organs

and tissue.) "There are probably no more than 15 cases in the literature of genuine neoplasms (tumors) and I have four cases out of the same population."

He also found a few accidental deaths, such as a catfish spine that had pierced a dolphin's esophagus or what appears to be a fatal stab wound to an animal's chest caused by a stingray.

In addition to examining freshly dead animals, Cowan plans to collect skeletal remains from decomposed animals to see if heavy metals are present in the bone. His hypothesis is that chemical and microbiological contaminants in the Texas marine environment contribute significantly to dolphin deaths. "It's a reasonable thing. We know that mercury and lead are not good for us and both are being dumped in the water. Look through the statistics that are available and there's a lot of stuff being put in the water, year after year. Maybe it just all falls to the bottom and is locked up in the sediments, posing no risk to anybody. Maybe it's diluted and is no risk, but it is important to know."

Texas A&M environmental toxicologist Jay Davis has found a wide range of levels of PCBs, polychlorinated biphenols, in the blubber of stranded Texas coast



*Dolphins are considered to be a valuable indicator species of contaminants in the marine environment.*

dolphins. PCBs include more than 200 chemicals, some more toxic than others. The level of PCBs detected in the animals examined by Davis ranged from a low of 4,000 parts per million to a high of 150,000 ppm. The significance of this is unclear, he says, because baseline data that would establish a toxic limit have not been established.

"We don't know what's high or low for a dolphin. We know there were detectable levels of PCBs in almost all of the 60 samples we studied. If the PCBs stay stored in the fat, there doesn't seem to be too much of a problem. But if there is a stressor, such as disease or scarce food supply, then we're guessing that these chemicals are mobilized, which can diminish the animal's immune system. It seems that there is something that triggers a whole chain of events. It's not a case of a dolphin just rolling over and dying after coming in contact with a release of PCBs."

Davis says a statistically important correlation has been found between PCBs and a dolphin's age and gender. "As the animals get older, they add to their PCB load through food that contains some amount of the chemical. Males continually accumulate PCBs throughout their lives, whereas sexually mature females

can decrease their loads by transferring it to their calves through the placenta during gestation and through lactation."

Near shore dolphins like to travel up and down the coast, migrating in and out of bays. How far they go remains uncertain, though some have been tracked as moving within a 10-mile radius and others at a distance of around 30 miles.

Their location can often be linked to the shrimp boats they diligently follow in the Gulf and bays. "They are shrimp boat junkies," says Bernd Würsig, director of Texas A&M's Marine Mammal Research Program and professor of marine biology at Galveston.

Würsig personally knows about 1,500 dolphins that cruise the Texas coastline, the vast majority of them located in the Galveston County area. He is able to recognize individual animals by the cuts, scrapes and scratches on the trailing edge of their dorsal fins.

The dolphins' day-and-night habit of traveling with shrimp boats may not, in the long term, be in the best interest of their health, Würsig says. "The dolphins are not competing with the fishermen for the shrimp, they're going for fish that are stirred up as the nets scrape the bottom. We know there's a lot of toxic gunk in the

sediments and if the dolphins are consistently feeding on food that is sessile or near the bottom, they could be building up toxins, heavy metals and organochlorines in their bodies at a higher level than if they traveled wider and moved into deeper waters."

The Matagorda Bay area stranding was an "abnormally high" event, but little else can now be said about it. "The fact is, we do not know at this point what killed them," says Würsig, who believes the pressure on the scientific community to come up with an answer is reasonable. A problem, however, involves government agencies funding research. "A political solution is to throw a lot of money into a particular problem area for a short period of time and that's supposed to give us the answer. You know very well that is not the way science works.

"We can't possibly say that aldicarb or some other chemical killed those animals. It could be that they've accumulated toxins all their lives and during the stress of wintertime, when the blubber is reduced in thickness, they could use up some of those fat reserves and send a rush of toxins through their systems. However, I'm quite convinced that we won't come up with any definitive answers," says Würsig.

"We can make some pretty good guesses and some good suggestions, which are generally not good enough for political action and we scientists will be accused of being too wishy washy. We are, but that's because we've been trained to say only what has been decently well proven."

Würsig firmly believes information gathered on dolphin strandings should be used to gain an awareness of some potential problems in the ecosystem.



**WARNING**  
**Toxic Texas**

# Looking for links in all the right places

Calhoun County shrimper and resource watchdog Diane Wilson says she can hear Lavaca Bay because it has a voice. 🗸 This is true. Stand at the southeast base of the causeway leading into Port Lavaca and read the sign Alcoa is required by law to post. In essence it says this portion of Lavaca Bay is so full of mercury the fish are unfit to eat. If you get caught eating the poisoned fish, you're a sick lawbreaker, so pay the fine. Now do you hear a wailing that sounds something like a wounded animal caught in a trap?

🗸 You won't see the mercury in Lavaca Bay because it's hidden deep in the sediments where bottom feeding animals whet their appetites. You won't see it as it moves up the food chain, or when you take your first bite. But it's there. 🗸 Scientists aren't sure to what degree or to what effect, but they're certain mercury has contaminated an area of Lavaca Bay at hazardous levels. They don't need to be scientists to know that's not good. 🗸 What they need is proof that will stand up in a court of law if necessary. It is not enough to be a proven expert in any of the sciences, not enough to make well-educated guesses. To say that toxins in the bays and estuaries are harmful to humans and the environment requires hard evidence, free of bias, that can be proven beyond a reasonable doubt. Now we're talking about a whole lot of money for as long as it takes. 🗸 This plain fact tries the patience of people who desperately want and need a quick environmental fix. And that includes people called scientists.

Down Mexico way, around the border towns of Brownsville and Matamoros, everyone's patience is in thin supply in the race to locate the cause of an outbreak of anencephaly, a neural tube defect that results in infants being born without brains.

Between 1986 and 1991, there were 80 anencephalic births reported in the Cameron County region, a median rate of 20 per 10,000 live births. In April 1991, three anencephalic births within 36 hours, soon followed by six more in a six-week period, alarmed the Brownsville medical community into alerting the Center for Disease Control (CDC) and the Texas Department of Health (TDH). Federal and state epidemiologists armed with questionnaires arrived on the scene and town meetings were held to allay spreading anxiety.

Controversy over the cause has reached a fever pitch, particularly when fingers point to American corporations, known as *maquiladoras*, operating on the Mexican side of the border. International politics, in the form of the North American Free Trade Agreement (NAFTA), have added to the boisterous debate on how to balance the environmental and economic interests of Mexico and the United States. Meanwhile, amid accusations, speculations and investigations, the number of anencephalic births rises on both sides of the border.

There is no scientific explanation for why this birth defect is occurring at increasing rates not only in Texas, but around the world in Wales, Ireland, Hungary and China. It could be a genetic disorder, a poor diet or a lack of prenatal care among an impoverished population. It could be that the air, water and soil are contaminated with a variety of industrial and agricultural toxins that may fatally stunt development of the fetus in the first few weeks of pregnancy.

Dr. Dennis Perrotta, director of epidemiology for the Texas Department of Health, says the state is "saddled by the fact that medical science has not identified anything that is very useful as far as chemicals associated with neural tube defects. There have been associations suggested — and I use that term loosely — with solvents, specifically xylene and toluene. I would not conclude from the work we've done here several years ago that solvents cause it; however, I would say it's worth looking at."

He says that in reviewing Texas Water Commission data, "there have been no significant problems identified historically."

The health department "just doesn't have all the information that would allow us to comfortably conclude that it is or is not an environmental problem," Perrotta adds. "We share the concerns of the communities. I think the public's expectation for medical science to be able to come up with a black and white answer is extremely strong."

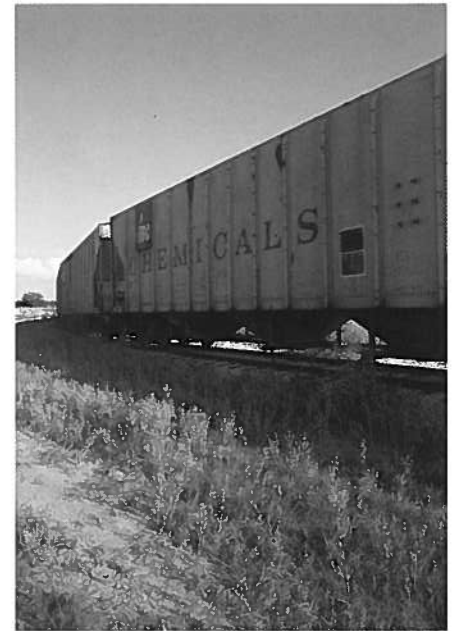
To understand why many Brownsville citizens are convinced that environmental factors play a major role in causing birth defects, just look around, especially at what goes on a few yards across the Rio Grande, in Matamoros, Tamaulipas, Mexico, where there is an even higher incidence of anencephalic births.

Domingo Gonzalez' "toxic tour" of booming Matamoros goes far beyond the most grim expectations. A Brownsville native and grass roots activist, Gonzalez is also an outspoken labor organizer for the fledgling Coalition for Justice in the Maquiladoras, supported by labor, environmental groups and religious organizations opposed to NAFTA.

"These major American corporations came to Matamoros to make a killing, essentially. The population here has increased 10 times in two decades. But the companies did not come here to provide infrastructure. They didn't come to pay taxes. They came to make a quick killing and we're seeing the results — stench, raw sewage running through the streets because the companies refuse to be responsible. Mexico is at the mercy of the U.S. companies. This is what we're seeing."

A series of shallow canals wind around and through the industrial park and neighboring *colonias*. For some 20 years, they have been known dumping grounds for toxins used in *maquila* operations. Many have been covered up because of community pressure and exposure from national and international media investigating the rash of anencephalic births.

With most of the chemical canals covered up, many people on both sides of the border are wondering where the *maquilas* are dumping hazardous waste. Mike Farmer, who manages the Lower Laguna Madre Sanctuaries for the National Audubon Society, believes "they're flushing those toxins down their sewage systems." What is important to realize about



Scientists have been unable to link toxins in the Brownsville area with a recent outbreak of fatal birth defects.



Cameron County firefighters practice decontamination measures during a mock chemical spill.



Matamoros, Farmer says, is that all the sewage is collected in open ditches that empty into what is known as the Big Ditch, which drains directly into the Laguna el Barril, less than 10 miles south of the Rio Grande.

The Laguna el Barril is a large, very shallow estuarine protected by sand dunes and beaches of the Gulf of Mexico. The largest colony of reddish egrets in the world winter here and on the tidal flats of the neighboring lower Laguna Madre, where Farmer has been finding birds suffering from severe birth defects.

"I've been doing a study of reddish egrets for three years and this is the first year that we've picked up fledged birds that were severely deformed. One bird's neck was in a big circle on its chest and the head and beak kind of stuck out of all this mess. The other one had an upturned beak; neither one could feed itself.

"Two out of 200 fledged birds doesn't sound like much, but we're concerned because normally these birds would have died in the embryo stage or in the nest. So, if you have two out of 200 that fledged, you have a much higher proportion that were in the nest."

Farmer worries that the reddish egrets are consuming food contaminated by mercury, chromium, xylene, benzene and toluene found in water samples from the Laguna el Barril. "We're really concerned that these metals are going down this 20-mile long ditch and out into the Laguna el Barril. If it's not a problem now, it will be because you just can't dump toxins into a dead sea and expect there not to be an accumulation of heavy metals that are real bad on bird eggs."

He is also aware of complaints in Matamoros that "this highly volatile stuff is making enough gaseous pressure in the sewer system that it's actually bubbling out of people's homes through commodes."

Fabio Ramos, president of the Maquila Association, strongly disputes Farmer's claim that most *maquilas* damage the environment. There are 62 major corporations in the association that must comply



*In Matamoros, many — but not all — of the canals around maquila operations have been covered up because of community and media pressure.*

with strict environmental regulations, he says, and dumping hazardous waste into canals or into the Rio Grande cannot be blamed on association members. "If anybody is doing that, I can almost assure you it cannot be a U.S. company. It might be a Mexican company, but a U.S. company will not do that."

Ramos argues that the majority of the manufacturing plants located in Mexico are operating under even higher standards than when they were located in U.S. cities, such as Detroit or Chicago. "We get constant audits, so we have to comply with all the laws. Mexican regulations are very strict, perhaps tougher than the EPA's. In order to comply, we have gone through a lot of changes in buying new equipment and bringing in new technology. I can assure you that most *maquilas* located in Mexico are cleaner than many plants in the United States.

"Blaming industry located on the border is logical because it's the largest producer of materials and the largest employer in Mexico. It is a monster, if you

will, that wasn't here years ago. I might agree that any industry in the world has to get better, but nobody is perfect. Every time you manufacture something, anything, you're going to create some kind of pollution. To be completely clean is impossible. With today's technology, we can't do it, but we have improved enormously, I can tell you that. We're learning and fixing whatever has to be fixed, but it won't be overnight," says Ramos, adding that "if you come to my plant, you will be very impressed."

Brownsville Mayor Patricio Ahumada believes the clusters of anencephalic births has little if anything to do with environmental degradation. He worries about the widespread poverty in his growing community and agrees that there's always room for environmental improvement, however, he adds, "There is a price to living on this earth. We need to find better ways to protect this world of ours, but it's going to cost us in some way." He believes the Free Trade agreement will raise Mexico's environmental standards and boost the economies of both countries.

Although *colonias* flank his city, Mayor Ahumada points out that "Brownsville is ranked twentieth in the nation for quality of life by *Money* magazine. Brownsville does not have a problem that should concern the people who live here or who may visit here to the point where they can't eat or drink. We have a mystery, but you're not in danger by coming here or living here."

The critical need to correct the unsanitary conditions of *colonias* on the U.S. side of the border is recognized at all levels and millions of state and federal dollars have been earmarked to provide treated water and adequate sewer systems to help prevent an outbreak of diseases more commonly seen in Third World countries.

An unprecedented, bi-national environmental agreement between the United States and Mexico proposes to clean up some 2,000 miles of the border winding through Texas, New Mexico and Califor-

nia where nearly 10 million people live. The Rio Grande Valley, particularly the sister cities of Brownsville/Matamoros and McAllen/Reynosa, is a key target area for implementation of the officially titled Integrated Environmental Plan for the Mexico/U.S. Border Area.

The bilateral effort is the result of meetings in November 1990 between President Bush and Mexico's President Carlos Salinas de Gortari, who agreed to instruct the environmental agencies of their countries to design an integrated plan that would assess problems on both sides of the border. Last February, the EPA and Mexico's counterpart SEDESOL (Secretaria de Desarrollo Social, Secretary of Social Development), in cooperation with the bi-national International Boundary and Water Commission, unveiled a plan that increases efforts to protect human health and natural ecosystems within the border area.

The United States has announced it will fund \$379 million to address border environmental problems for fiscal 1992-93, while Mexico says it will increase spending by \$466 million during the 1992-94 period.

An initial key objective is a "strengthened cooperative enforcement strategy" that places a high priority on inspecting and tracking hazardous waste shipments crossing the Brownsville/Matamoros border. The strategy also calls for an increase in the number of enforcement actions against companies that are violating environmental standards.

One requirement of the border plan calls for identifying toxic chemicals in the Rio Grande river. Carl Young, EPA environmental scientist and project officer for the Rio Grande baseline toxic study, explains that in addition to examining water, sediment and fish for chemical analysis, water and sediment samples will also be collected for bioassay or toxicity testing. Fathead minnows and water fleas will be placed in samples of river water and if they don't survive, Young says "it is a key indication that there is a water quality problem." A biological assessment of the invertebrate and fish communities will also be conducted and if there are no fish living in a stretch of river where they should be alive and well, it is yet another indication of habitat degradation.

"If you have good water quality and

good habitat, you should see an abundant biological community," says Young, who believes the extensive sampling efforts underway are called for. "There are many assumptions that a lot of toxic chemicals are contaminating the river, but we're not sure exactly where or if that is truly the case. Are only certain areas affected? This study will address the question of whether or not there is a lot of toxic contamination — it may not address it fully, but it will be the best shot we've had to date."

So there you have it, no black and white, instant answers. No tidy direct link between toxins in the environment and birth defects or cancer or numerous other human and wildlife ailments. Assigning an effect to a specific cause must be provable and it's just not there — yet.

We don't need scientific proof to know that too many contaminants in the marine environment, too many poisons in our rivers and water supplies, will ultimately impact our survival rate. The question is, how much is too much? Environmentalists don't want to see any toxins in the water. Industrialists say, impossible. Scientists are somewhere in the middle trying to answer the question.



We need to know, for example, the level of toxins in Galveston Bay, the largest and most productive estuary in Texas, covering 600 square miles and surrounded by three million people in a five-county area. It's a waterway for one of the nation's busiest shipping ports and a discharge point for innumerable refineries and chemical plants. Its reputation for producing the finest abundance of seafood on the Gulf coast has been badly tarnished because of chronic fishery closures. Are there a few polluted hot spots, or is the environmental health of the entire bay at risk?

*Texas Shores* will investigate that unsolved mystery in its next issue. ■



# MARINE ADVISOR

TEXAS MARINE ADVISORY SERVICE

BY DAVID O'NEAL

For Texas A&M University, it enhances the school's status as a world-renowned university, but for the Republic of the Ukraine, it is the start of infusing western ideas and technology to achieve economic and environmental recognition.

It came August 20 when Texas A&M officials and those from two institutions in the Crimea signed a Memorandum of Agreement (MOA), signifying

a joint venture that, hopefully, will last through the 21st century.

The agreement formally designated an exchange program between any department or entity of Texas A&M and the Crimean Institute of Environmental Protection and Resort Development and the Crimean Institute of Agriculture as long as the areas of concern are mutual to both parties.

The MOA calls for joint research in priority fields of science and for technology transfer programs deemed of mutual interest, for joint scientific conferences, symposiums, seminars and workshops, and for collective monographs and publications.



*Texas A&M Executive Associate Provost Jerry Gaston (left), Anatoliy Troschenovsky, president of the Crimean Institute of Environmental Protection and Resort Development (center), and Mikhail Melnikov, president of the Crimean Institute of Agriculture (right) sign the Memorandum of Agreement to designate the joint venture.*

“They are concerned about the environment,” said Dr. Thomas Bright, executive director of Texas A&M’s Sea Grant College Program. “They have a relatively virgin area with beautiful water, high cliffs and sea caves, and they have the foresight to develop it properly right from the start.”

Sea Grant and the Texas Marine Advisory Service (MAS) will take the lead in assisting and developing a cooperative program that focuses on tourism infrastructure, seafood marketing, environmental assessment and monitoring, marine education, and coastal land planning.

A five-man delegation came from the Ukraine and Crimea, in the former Soviet

Union, including the presidents of two university institutes, the director of the Chernomorsk Agricultural Collective, and two members of UTEX-USA, a joint venture of Texas businesses and the Ukraine.

The MOA was signed by Dr. Anatoliy Troschenovsky, president of the Crimean Institute of Environmental Protection and Resort Development, and Dr. Mikhail Melnikov, director of the Crimean Institute of Agriculture. Dr. Jerry Gaston, executive associate provost at Texas A&M, represented the university.

The other members of the Ukrainian delegation were Borus Demus, Alexander

Shabotenko and Igor Taresenko.

“We wanted to establish a link of cooperation between the Texas Gulf coast and Crimea because the conditions and development here (in Texas) resembles that in the Crimea,” said Tarasenko, general manager for UTEX-USA and translator for the delegation.

Tarasenko went on to say the MOA was important for Ukrainians in developing

one of its natural resources.

“The Crimea is the natural treasure of the Ukraine,” he said. “Its peninsula is in the middle of the Black Sea, and it has a wonderful climate as well as agriculture and resorts. There is a great concern that with further economic development, the environment could be harmed. It already has been in some cases.”

While Sea Grant, MAS and the Texas Agricultural Extension Service were key players in formulating the final agreement, most credit is due to two men — Tarasenko and Mike Hightower, deputy director of Texas Sea Grant.

No stranger to Texas, Tarasenko visited in 1991 along with another Crimean



official. While they were in the state, MAS recreation and tourism specialist Ken Pagans organized a bus tour to explain how private and public industries work together with local government and higher educational systems.

"The delegation did not have any concept of a local initiative, private property rights, individual initiative or how partnerships work to better the com-

munity," Pagans said. "I discovered that their university system is not connected with the needs of the people. I explained the concept of the Land Grant university system and they said that was what they needed."

After the tour, the Crimean officials invited Pagans, Bright, Hightower, MAS fisheries specialist Russ Miget and Ingleside's Councilwoman Jane Ward to visit the Ukraine and the region of the Crimea. Ward, who is the president of UTEX-USA, was the host and assisted Pagans during the bus tour.

While there, the Sea Grant team conducted seminars and workshops at different Ukrainian academic institutions and

addressed Crimean government officials.

Bright and Hightower were invited to scuba dive in an uncharted area of the Crimea to get a firsthand view of some of the sensitive underwater habitats. It is believed that the two were the first American scientists invited to this area.

Bright, Hightower and Miget returned home to address the idea of developing an agreement to help the Ukrainians establish a Land Grant/Sea Grant/University system.

"The Crimean officials want to develop their environmentally sensitive coastal areas correctly," said Hightower. "The MOA will help their government understand the Land Grant/Sea Grant/University

system. The Crimeans are quite anxious to establish connections with the West."

"The MAS and Extension programs can serve as a model for the people of the CIS (Commonwealth of Independent States) to establish an information transfer system between the university research community and marine resource user groups," said Miget. "As university consumer concerns grow, the link provided by MAS-Extension-type programs will be invaluable. The signing of a formal agreement to continue this exchange of information will help sustain this cooperative program."

Bright and Hightower both agreed that establishing a co-

operative-type program is possible as well as technological assistance in developing a "draft template" for a coastal master plan.

Hightower addressed other areas of need that will be a priority, including providing direct assistance for offshore net-pen culture demonstrations, technological exchange of information and professionals as dictated by need and funding availability, and aiding in drafting coastal rules, regulations and policies.

"I believe the marine agents can help the Crimea further develop its coastline by showing the leaders how the land grant and sea grant systems have improved the lives of marine resource users in Texas," said Richard Tillman, Aransas/San Patricio County marine agent. "I also believe that we can learn that the people of the Crimea have the same needs as we do and that our marine environment is truly global in nature."

Pagans, who remained in the Crimea for an additional two weeks, assessed the area for tourism and explained the

*(Continued on page 36)*



Sea Grant Deputy Director Mike Hightower (right) listens as Alexander Shabotenko (second from left) interprets a response from Dr. Anatolij Troschenovsky (left). The exchange came during a dinner for the delegation hosted by Sea Grant and Texas A&M-Galveston officials.

## DELEGATION

*(Continued from page 35)*

concept of tourism development to government officials.

"I was struck overall by what I perceived to be a lack of long-term outreach and support that a Land Grant/Sea Grant/University system could provide," said Pagans. "I suspect that far more credit is due to the Sea Grant and Extension institutional process than has ever been recognized. Without the outreach efforts, we, perhaps, would be far less advanced than we are and certainly our quality of life would not be nearly what it is today. The Russians have paid a high price that we as Americans cannot begin to understand."

When the Crimeans came to Texas in August 1992, they toured some of the state's top agricultural and aquacultural facilities as well as some community tourist attractions. The delegation toured several cities, including Galveston where a

dinner was hosted by Sea Grant and Texas A&M-Galveston officials.

During the dinner, Bright became the first to sign the MOA, which signified that Texas A&M was ready to assume the initiative in helping the Ukrainians develop the Crimean peninsula.

Troschenovsky, who accepted Bright's signing as a gesture of goodwill, said, "We consider the signing as a kind of direct assistance from the United States. This means a lot to our country because the U.S. is willing to take part in technology transfer. This is not just practical assistance. It's the start of friendship that is welcomed by Crimeans."

"This agreement is very timely and necessary because we consider it as a good sign for future joint ventures," explained Tarasenko. "The Republic of the Ukraine is going to sponsor this development and the local governments of the region are dedicated to do what is necessary to keep this area precious and productive."

He added that the MOA will help establish a free trade zone and make major ports more productive.

"I am talking about us as a government with a free trade zone already established in four years," said Tarasenko. "It will be discussed at the first autumn session of the Parliament with the first area of importance being port development. We have started plans for this complicated venture of developing the port by 1996."

Although the initial agreement is for only five years, Tarasenko believes the partnership will exist well into the 21st century.

"In 10 years, I would like to see the possibility of different interest groups and entities and even different countries interacting globally, working toward the preservation of the environment in the Black Sea," Tarasenko said. "It would be wonderful to have a joint effort to develop agriculture and recreational facilities. In some cases, the Crimean peninsula is just a virgin land and some areas of the coastline has simply been untouched."

Hightower said he hopes to put together another team to revisit the Crimea in Summer 1993 to begin drafting a coastal master plan for the western portion of the Crimea on the Black Sea. ■



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TEXAS A&M UNIVERSITY SEA  
GRANT COLLEGE PROGRAM

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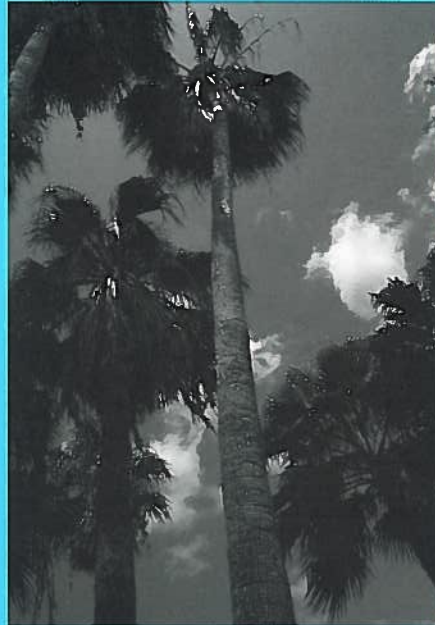
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