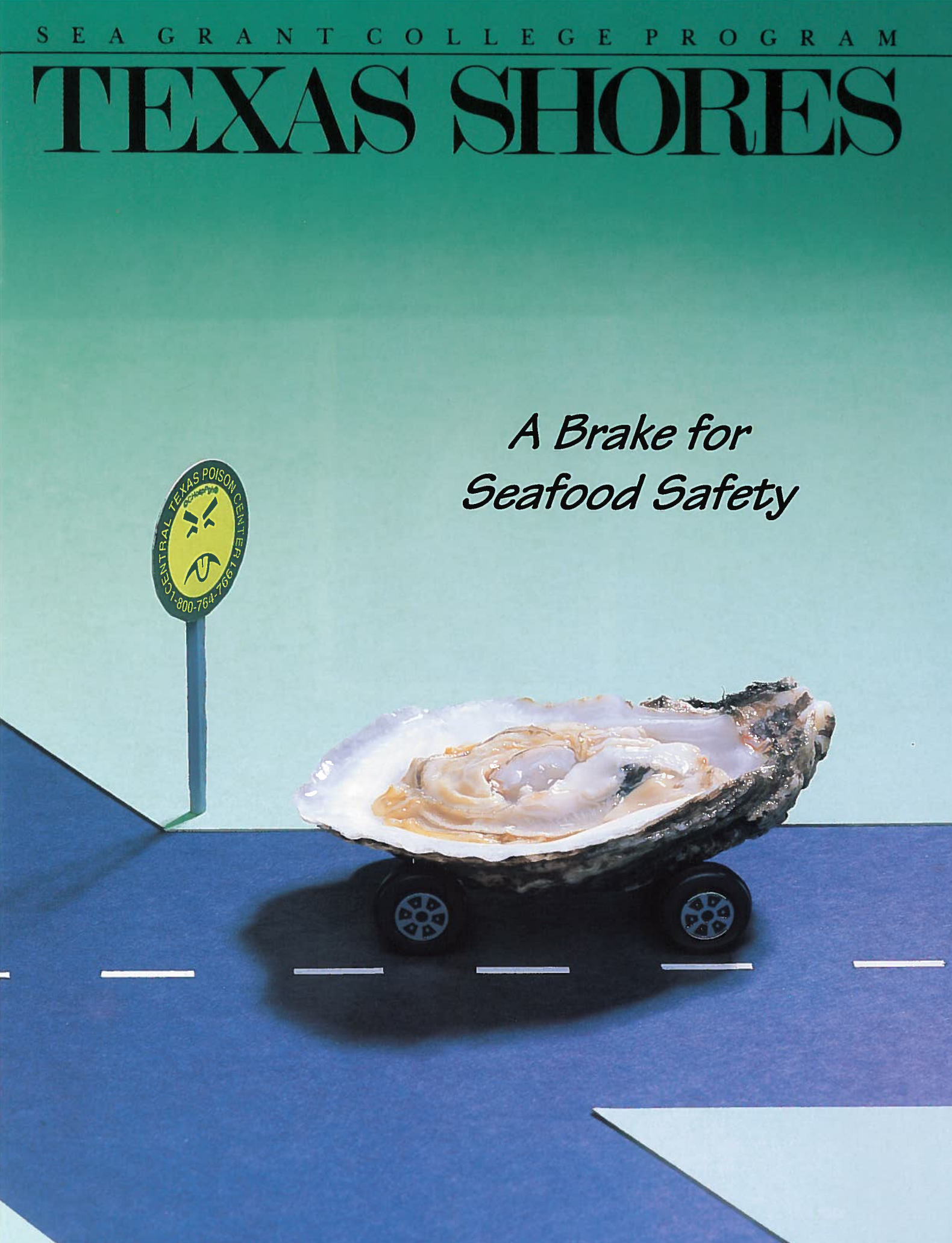
SEA GRANT COLLEGE PROGRAM

TEXAS SHORES

A Brake for Seafood Safety



Sea Texas' Coast Through Texas Shores

We have a purpose at *Texas Shores* — helping our readers understand what's happening on the Texas marine scene.

To do this, we pioneered a newsletter, *The University and the Sea*, 25 years ago to keep people informed. Through the years, this has evolved into *Texas Shores*, an award-winning blend of clear, concise writing and sharp photography that is still the only magazine in Texas devoted exclusively to the marine environment.

We base it on your priorities. Witness the timely themes of recent issues.

Oil spills, bycatch, coastal preserves, sea turtles, redfish, red tide, Galveston Bay, marine debris, oysters.

There were issues on erosion, the Flower Gardens, marine mammals. And more recently, the crabbing industry, marine research and freshwater inflows.

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Texas Shores

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TEXAS SHORES

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FRONT AND BACK COVERS — © STEPHAN MYERS

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THE ISSUE: SEAFOOD SAFETY

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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.

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SEA NOTES
TEXAS A&M UNIVERSITY
SEA GRANT COLLEGE PROGRAM

Vagabond gull makes first known Texas landing

Birders from across Texas and the nation flocked to a Galveston beach since December to catch a glimpse of a seagull that wandered off a bit from home ...

... Something like 2,000 miles from home.

The kelp gull, or *Larus dominicanus* for those of you keeping score in Latin, is usually found along the coasts of South America, from Antarctica to Peru. The bird, also called the southern black-backed gull or Dominican gull is one of the few gulls to breed in Antarctic and Subantarctic zones, according to naturalists John and Gloria Tveten in a Feb. 23 *Houston Chronicle* article.

"In spite of its circumpolar range in the Southern Hemisphere, the kelp gull normally reaches the equator only as a wanderer along the coast of Ecuador," the Tventens wrote.

The footloose gull was first spotted in December. It wasn't hard to pick out. Kelp gulls are 25 to 33 percent bigger than the laughing gulls indigenous to the Texas coast, said Kade Coldren, a doctoral student in Texas A&M University's Department of Wildlife and Fisheries Sciences. The local herring gulls may reach the same size, but kelp gulls have distinctive markings, with a black back, as opposed to the gray, he said.

The first birders thought the bird was a great black-backed gull, which is rare on the Texas coast, but not a total stranger to Texas beaches.

"This is the first sighting (of a kelp gull) in Texas and may, if accepted by the American Birding Association, count as the first fully documented record for North America—north of Mexico," said Peter Gottschling, an avid birder and professional photographer from Friendswood.

Kelp gull sightings were still being reported on Galveston's East Beach as of April 2. The bird was reported on the Bolivar Flats during the height of the Spring Break rush and during the oil cleanup on East Beach, and could not be found at all on some days. The bird returned to its old stomping grounds of East Beach in late March.

There have been one or two reported sightings of kelp gulls along the Gulf Coast in Louisiana and Mississippi but those reports lacked documentation. An adult pair of kelp gulls has also been spotted several times in the Mexican state of Yucatan during the summers since 1987.

The Kelp gull has cousins that inhabit Southern Africa, Australia, New Zealand and a host of islands in the surrounding seas.

Tillman relocates to Brazoria County as marine agent

Richard E. (Rich) Tillman became the Texas Marine Advisory Service's marine agent for Brazoria County May 1, replacing Charles Moss, who retired in January.

Tillman, formerly the marine agent for Aransas and San Patricio Counties, holds bachelor's and master's degrees from Texas A&M in food technology. He served in the U.S. Army from 1972 to 79, retiring from active duty as a captain and a company commander. He remains in the U.S. Army Reserve at the rank of Lieutenant Colonel.

After completing his master's at Texas A&M in 1980, Tillman worked with the Texas Agricultural Extension Service as a seafood technician until his appointment as marine agent in Aransas and San Patricio counties.

"We had an excellent experience with Mr. Moss," said Brazoria County Judge John Willy. "We were concerned that we keep that sort of valuable assistance. With the experience and credentials Mr. Tillman brings, we feel we will still have the top marine extension service on the coast."

Brazoria County was looking for someone to provide advice on marine issues, he said, including shrimp and fishing fleets and bays and estuaries.

"We needed someone with familiarity on these subjects to bring the different interests together, for the best interest of Brazoria County," Judge Willy said.

Moss called Tillman "an excellent choice." Moss predicted that Tillman would enjoy Brazoria County, where he would be met with "the highest caliber folks. They're really first-class volunteers."

Tillman said that taking the job in Brazoria County meant filling Moss's large shoes.

"I hope to continue some of (Moss's) fine programs and start a few of my own," Tillman said, "such as the River Run and water resource education on the Brazos River.

"This is a great opportunity," he said, "but I'm leaving some close friends."

Marine agents serve the coastal counties of Texas, providing information and doing research on all marine issues — from profitable and ecological fishing to safe recreation and from beach restoration to quality seafood processing.

The Texas Marine Advisory Service is a cooperative program of the Texas Sea Grant Program, Texas Agricultural Extension Service and commissioner's courts in participating counties.

PHOTO (TOP) PETER GOTTSCHLING, (BOTTOM) FILE PHOTO

Baird named National Sea Grant Director

Ronald C. Baird, an ocean scientist, educator and businessman, has been named the director of the National Sea Grant College Program.

The National Oceanic and Atmospheric Administration (NOAA) made the announcement March 19.

Baird will assume his new position June 3, after completing his tenure as vice president of university relations at Worcester Polytechnic Institute in Massachusetts.

Baird is no stranger to Texas, having received his master's in zoology from The University of Texas-Austin in 1965. He was also director of research at Geo-Marine, Inc., an engineering consulting firm in Dallas, before joining Worcester Polytechnic.

NOAA administrator D. James Baker called Baird's selection "an exceptional choice.

"Dr. Baird's experience in business and education, as a scientist and college administrator, makes him uniquely qualified to lead Sea Grant, whose continued success in helping to protect and preserve our marine environment hinges on a solid working partnership between business, government and the university research community," Baker said.

Baird will direct the National Sea Grant College Program, a network of more than 300 colleges, universities, research institutions and marine organizations that work in partnership with industry, the federal government and state governments to support marine research, education and extension services.

"In an era of limited resources and global environmental challenges to coastal resources, the products of an active industrial, academic and government research partnership will be absolutely critical to our ability to manage coastal resources on a sustainable basis," Baird said upon his appointment. " Sea Grant is just such a partnership, with a track record of achievements. Being part of an enterprise whose goal is the health and well-being of our invaluable coastal resources is a challenge I welcome."

Baird is responsible for external relations at Worcester Polytechnic, including its news service, development office, corporate relations, alumni programs and university publications. He also serves as an adjunct professor in the school's Department of Biology and Biotechnology and has maintained an active research program.

He received his BS in zoology from Yale in 1958. He attended UT-Austin after a stint in the Navy, and received his Ph.D. in biological oceanography from Harvard University in 1969. His principal research interests involve the organization of oceanic ecosystems and natural resource management.

He is former president of Schuster Corp., an investment concern in the Worcester area and served as a member of the National Sea Grant Review Panel, a 15-member, independent citizens advisory committee, from 1990 to 1995.

Younger to lead Sea Grant's education program

William Younger moved from his position as Matagorda County marine agent to marine education specialist for the Texas Marine Advisory Service May 1. As education specialist, Younger will be based at the Texas State Marine Education Center, located on Matagorda Bay, in Palacios.

The center, which already is a collaboration between Matagorda County Navigation District No. 1, Wharton County Junior College, Texas State Technical College (TSTC) and the Palacios Independent School District, now adds the resources of The Texas A&M University System, through Sea Grant, the Marine Advisory Service and the Texas Agricultural Extension Service.

Sea Grant has always been involved with marine education, but in recent years has not had a specialist to provide focus and coordination for educational programs.

"We want to provide hands-on, field-related marine education," said Younger, "and to extend that programming throughout the state."

Younger sees the marine education center as the "centerpiece" of marine education in Texas. Younger will be developing programs that will enable students in areas of the state far removed from the Gulf to learn about the marine environment, without having to be on the Gulf.

He estimates that the marine center can educate up to 20,000 each year, including those in grades K-12, teachers, 4-H leaders, other youth group leaders, or people just wanting to learn about marine life.

While that many people will definitely have an impact on the economy of Palacios, Navigation District Chairman Thomas Holworth sees that as secondary.

"There are automatic economic benefits," Holsworth said, "which is a good byproduct for the area. What we really want to do is educate people about what's going on along the coast.

"There are people who live on the coast who don't know what is going on in the bays and the Gulf," he continued. "There are people making a living from the Gulf who don't know what's going on. These people need to be educated on what is happening to their livelihood."

PHOTO: (TOP) NATIONAL SEA GRANT PROGRAM; (BOTTOM) SEA GRANT FILE PHOTO

SAFE AT THE PLATE

BY JIM HINEY

Seafood by its nature is generally safe. ...

PHOTO © STEPHAN MYERS

Common scents

... When it's not handled or stored properly, seafood spoils very quickly — usually before harmful bacteria have a chance to grow. In that respect, seafood is more forgiving of human error than are other meats. Other meats, particularly red meat, are infamous for showing no outward signs that they've gone bad. Seafood, on the other hand, sends out a strong signal.

"You really wouldn't want to eat something that smelled that bad," offered Mike Haby, Texas Marine Advisory Service seafood marketing specialist.

Since the mid 1970s the seafood industry has made a concerted effort to push seafood as a safe and healthy alternative to other meats. The push has been working.

From 1978 to 1987, seafood consumption in the U.S. rose from 13.4 pounds per person per year to 16 pounds per person annually. Red meat was the most eaten meat during that time, although Americans dropped their consumption of it from an average of 128 pounds to 118 pounds per person annually. During the same nine years, poultry consumption in the U.S. rose from 38 to 50 pounds per person per year.

As much as 20 percent of the seafood consumed in the U.S. is caught by recreational fishermen, people who fish for sport, and subsistence fishermen, people who fish as a means of putting food on their tables.

A National Academy of Sciences (NAS) report published in 1991 notes that while seafood consumption in the U.S. rose by 23 percent between 1979 and 1989 there was not a corresponding increase in the number of seafood-borne illnesses reported, a statistic that bears out seafood's general safety.

Depending on how you look at the numbers, seafood is safer than any other kind of meat, according to statistics compiled by the Centers for Disease Control and Prevention (CDCP) in Atlanta for the period 1978 to 1987.

Seafood-borne illness accounted for 3.6 percent of reported food-borne illnesses, CDCP figures show. During the same time, beef accounted for 4 percent of food-borne illnesses, turkey for 3.7 percent, pork for 2.7 percent and chicken for 2.6 percent.

Break seafood down into shellfish and finfish and each separately accounted for fewer illnesses than the other meats. Shellfish accounted for 2.3 percent of all cases and finfish accounted for 1.2 percent.

But by 1993 Americans' eating habits changed again. Red meat consumption was down about 5 more pounds per year, to a little less than 113 pounds per person, poultry consumption was up to almost 60 pounds per person and seafood consumption had dropped to 15 pounds per person.

And though the NAS said in its 1991 report that, "Most seafoods available to the U.S. public are wholesome and unlikely to cause illness in the consumer," consumers had given in to the perception that seafood wasn't as safe as they thought. That perception was fueled in large part by fear of *Vibrio vulnificus*, a nasty bacteria that occurs naturally in the marine environment and is blamed for killing an average of 10 people nationwide each year.

Vibrio vulnificus is present in the Gulf of Mexico year round and is most prevalent during warm months. The bacteria isn't limited to polluted or contaminated waters. It can show up in clean waters that are approved for fishing and shellfish harvesting. Most of its victims are infected when they eat raw molluscan shellfish, most notably oysters.

The good news is that *Vibrio vulnificus* is generally harmless to healthy people. Its danger is to people with liver or immune system disorders. In those people the vibrio can cause a very serious blood poisoning disease that results in death 40 percent to 60 percent of the time, usually within a few days after symptoms begin.

It is the threat of *Vibrio* that has led many people to limit or eliminate seafood in their diets, even though there were so few deaths attributed to *Vibrio vulnificus* in the U.S. In Texas last year, one person reported getting the bacteria from eating raw oysters and five people were infected from injuries like pricking their fingers on fish spines while fishing, the Texas Department of Health reported.

Although it is generally safe, seafood, by its abundance and diversity, causes problems not seen in the meat and poultry industries. People tend to lump seafood into one group and they assume the group shares similar hazards. In reality there may be as many as 350 different seafood species marketed commercially and those species have little in common other than the fact that they all come from the water.

"A classic example is crab," noted Haby. "It's cooked before the meat is removed. It is a ready-to-eat product with usually no further cooking step to kill pathogenic microorganisms that may be introduced during the picking step. Plus, any human pathogens, like *Staphylococcus aeureus*, on the workers can get into the meat and there is no further cooking step to kill those pathogens. Of course the risk of inadvertent contamination is the primary reason why federal and state public health authorities routinely monitor crab processing facilities and evaluate the picked meat."

Unfortunately, cooking is not a total cure. It does solve some problems, like killing microorganisms in shellfish, but toxins, some the result of bacterial action, often can't be eliminated through cooking. Fortunately, the toxins can usually be controlled by properly handling the seafood, like making sure it stays refrigerated before cooking.

It would be nice if proper refrigeration and cooking solved all seafood problems, but it doesn't. There are some pathogens, like *Lystiria*, that grow at low temperatures.

Seafood dangers range from bacteria to viruses to natural toxins to parasites and chemical contamination. Toxins can cause ciguatera and scombroid poisoning in fish and four different kinds of poi-

sonings in shellfish. There are two types of hepatitis viruses found in seafood and bacterial cholera dangers to name a few. Yet Americans eat millions of pounds of seafood annually and report relatively insignificant amounts of illness.

Texas is fortunate in that the state's major seafood product — shrimp — is among the safest of all seafoods. The few dangers associated with shrimp include spoilage from not properly refrigerating or freezing the shrimp and shrimpers using too much sodium bisulfite on the shrimp.

Sodium bisulfite is a chemical shrimpers use to keep the shrimp from turning black. Sulfites are used as preservatives throughout the food industry in products like beer, wine and dried fruits. Sulfites are considered generally safe by the U.S. Food and Drug Administration (FDA) but there is an established limit on how much sulfite is allowed on the finished product.

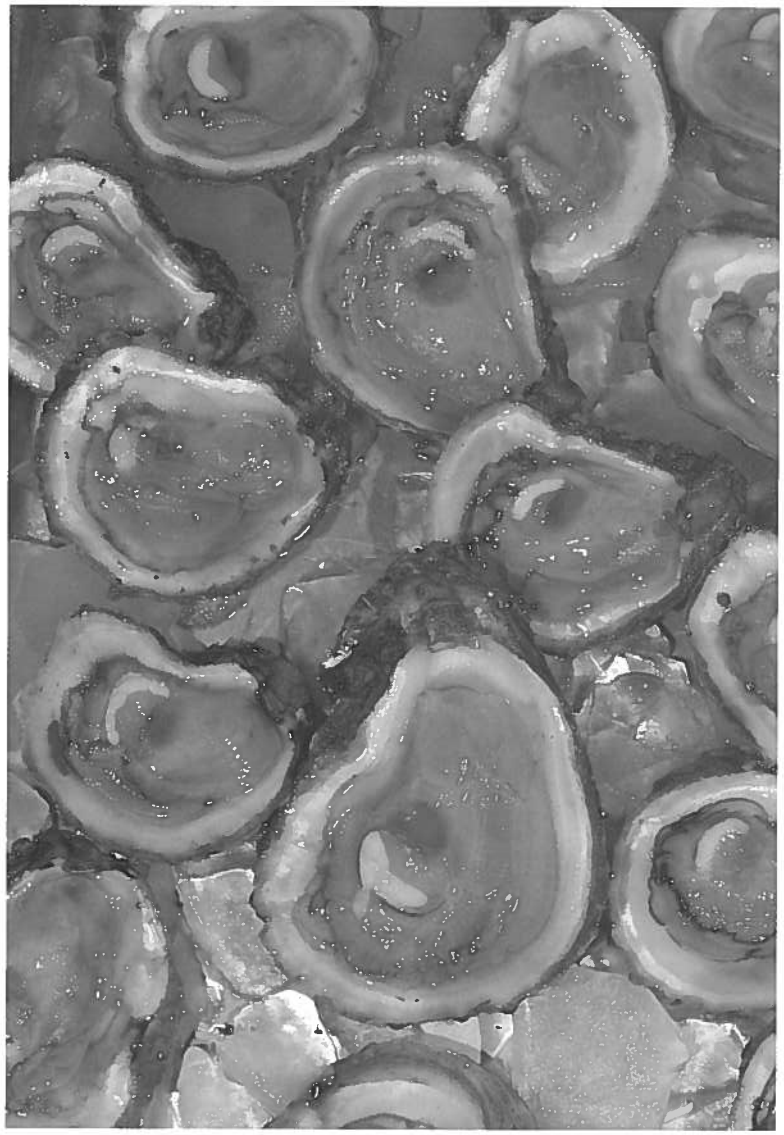


PHOTO © STEPHAN MYERS

Molluscan shellfish, particularly oysters, are responsible for two-thirds of all seafood-borne illness cases for the simple fact that many people eat them raw. Many of the illnesses caused by eating raw oysters, including the one caused by eating *Vibrio vulnificus*, could be eliminated by cooking the oysters first.

While *Vibrio vulnificus* may be the most notorious of the seafood illnesses it is not the most common.

"The biggest problem we're having right now throughout the country and where we've had some problems recently, about two years ago in Texas, is with what's called a Norwalk or Norwalk-like virus," said Richard Thompson, head of the Texas Department of Health's Seafood Safety Division.

Norwalk and Norwalk-like viruses are sort of a catch-all category for unexplained gastrointestinal illnesses linked to seafood.

"These viruses, unfortunately, don't quite fall into our (seafood safety) program," he said. "While the program was designed and will detect these things, our biggest problem has been chance overboard sewage discharges, which are almost impossible to detect unless you're right behind the boat when somebody discharges overboard.

"We've had a few of those chance overboard discharges that have resulted in oysters getting contaminated and then those oysters getting out on the market. The Norwalk virus causes a gastroenteritis — the nausea, diarrhea, vomiting type of illness. It's usually short-lived. It's not life threatening.

"That's been the major illness we've dealt with in the last few years," Thompson observed. "We don't have many bacterial problems anymore."

Most bacterial problems, excluding *Vibrio vulnificus*, are caused by sewage. Oysters and most other molluscan shellfish don't swim; they get their food by filtering water. In waters contaminated by human sewage the bacteria collect and concentrate in the shellfish. The Texas Department of Health (TDH) classification program for shellfish harvesting waters is designed to prevent sewage from getting into open areas.

But Norwalk is a virus caused by human pathogens that can infect clean waters through overboard sewage discharges from boats.

"If you get an overboard discharge from somebody with cholera, the dilution factor is going to be so great that they're probably not going to have much effect. Besides, somebody who has an ongoing, raging cholera case is not going to be out roaming around on a boat. They are so sick they're not out boating," Thompson noted. "But there are people who can have a Norwalk infection who are not physically ill who may be discharging over the side of a boat, so

that's where this chance contamination comes from occasionally."

Overall, seafood-borne illness cases are few in number. But any risk is too much risk where the public health is concerned so the FDA has mandated that the seafood industry implement an industry-wide safety program by Dec. 18, 1997. That system is based on the seven principles of the Hazard Analysis and Critical Control Points (HACCP) system. HACCP, pronounced "hassip" by people in the industry, has been around since the dawn of the space age and has been used extensively in the low-acid canned food industry for about 30 years.

Low-acid canned foods are things liked canned green beans or tuna fish — foods that could cause botulism poisoning if they are underprocessed, which means undercooked during processing. That threat prompted makers of low acid canned foods to implement HACCP voluntarily to make sure that each batch of canned goods is fully processed.

HACCP's stellar record in the canned food industry is one of the main reasons FDA is mandating HACCP for the seafood industry now. FDA experts believe HACCP is the best, most efficient means to ensure greater seafood safety.

The United States Department of Agriculture, which has inspection oversight on beef and poultry, plans to mandate HACCP for those meats sometime after it becomes the norm in seafood.

Until now, FDA and state health department inspectors performed unannounced inspections periodically throughout the year. Those inspections were like snapshots, offered Haby. Inspectors got a good idea of what was going on in a specific plant on the day of the inspection but not much more than that. HACCP, with its required recordkeeping, is more like a continuous videotape of a plant's operation because inspectors can look at the records and see how the plant performed on a daily basis.

Introducing HACCP now also indicates a change in philosophy by the regulatory community, reasons Haby.

State and federal regulators feel the "responsibility for ensuring a safe food supply falls on the shoulders of the plants and it's the regulators' responsibility to make sure that the plants meet that responsibility," Haby explained.

"I think regulators are looking for a little more comprehensive approach, which in theory you get with HACCP."

Possibly just as important as placing responsibility with the processors is the modern reality that in these days of constant budget crunches the state and federal agencies that oversee food safety most likely aren't going to hire more inspectors or inspect more often.

There are no plans now for HACCP regulations to be mandated on shrimpers or other seafood harvesters.

"I think it would be an enforcement nightmare," Haby explained. "You've got several thousand Gulf shrimp boats but you probably don't have more than 100 major processors in the Gulf. So right there you have an order of magnitude difference that you can deal with more easily.

"Processors are viewed as the logical choke point because they buy from numerous vessels. Also, unless the product the fisherman is harvesting has a hazard associated with it by nature, the fishermen aren't introducing any hazard that is not immediately obvious. For instance, just a few ounces of diesel in the fish holds is easily detected by sensory evaluation."

Don Kraemer, associate director of the FDA's Office of Seafood, confirmed Haby's thoughts.

"I think there are a lot of things happening right now that are causing it to move. One is a downsizing of government and government looking at a way to be more efficient," Kraemer said. "Another is a desire on the part of the public as a whole and certainly the industry to have government's role change from a very prescriptive 'you must do it this way' type of role to one where you set broad performance standards and then the industry can achieve those standards however they see fit. That's happening all over the place, not just with FDA. It's happening with all sorts of regulatory agencies because of pressures from different places.

"There's sort of a time of crisis in confidence in the seafood industry that's causing that industry to say, 'Hey, we need a new system here that is going to restore confidence by the consumers in our product.' So that's going on with seafood.

HACCP—

Finding trouble before it begins

The HACCP concept makes sense: Analyze your process from raw materials to end product, identify places in the process where hazards could occur that would cause food-borne illness and implement controls at those places to prevent the hazards from happening.

But HACCP wasn't born until about 35 years ago during the dawn of the space age. And though it has enjoyed much success in the low-acid canned food industry, HACCP is just now catching on in the seafood and other meat industries.

HACCP comprises seven steps, the so-called "seven pillars" of HACCP. Under FDA regulations passed on Dec. 18, 1995, all seafood processors, including foreign processors who export product to the U.S., and all importers must develop and implement HACCP plans by Dec. 18, 1997.

- **Analyze hazards** — Every processor must conduct a hazard analysis to determine of there is anywhere in their processes where food hazards could occur, from harvesting or raw materials to the finished product. These hazards can be biological, such as microbes; chemical, like mercury; or physical, like ground glass or metal shavings. If a processor finds even one place in the process where a food hazard might occur then the processor must implement a HACCP plan.
- **Identify critical control points** — Critical control points are the points in the process where potential hazards can be controlled or eliminated. For example, if one of the hazards identified is a microbe in the food then cooking the food at this point may eliminate that hazard. Critical control points can be anywhere in the process, from harvesting of the raw material to completion of the end product. Critical control points can be inside or outside of the processing plant.
- **Establish critical limits** — Critical

"The low-acid canned food program that we've been operating with a HACCP philosophy for about 20 years now has been very successful and it's sort of buoying people's confidence in HACCP," Kraemer continued. "There's just so many different forces at work that things are just sort of coming together about now."

Regardless of why HACCP is being implemented, the end result will be additional peace of mind for consumers.

"We expect that because processors will have to put controls in place to prevent hazards from occurring ... they will end up with a safer product, the assurance of safety will be greater than it was in the past," Kraemer predicted.

Playing the shell game

The biggest gamble in seafood is eating raw molluscan shellfish. About two-thirds of all seafood-borne illnesses reported come from enjoying one of the few animal meats still consumed raw — oysters.

Oysters don't spend their lives swimming around looking for food. They stay in one place and wait for the food to come to them. Oysters filter water and take out nutrients. Unfortunately, that also means some molluscan shellfish take in harmful toxins and biological agents from the water as well.

In contaminated waters the poisons can concentrate in the oysters and hurt humans unless the oysters are taken to clean waters and allowed to cleanse themselves first or taken to plants designed to cleanse oysters.

Although Norwalk or Norwalk-like viruses have caused the most seafood-borne illnesses in the past few years, those viruses can't compete for notoriety with *Vibrio vulnificus*. Many people credit the vibrio with causing in large part the decline in demand for Gulf oysters during the past decade.

"That makes it sound or it gives the sense of some lurking black cloud over the industry when in reality there are on average 15 deaths a year (nationwide) because of vibrio that are directly related to oysters by departments of health, and that's nothing to be laid aside," said Don Reynolds, marketing director for Hillman Shrimp and Oyster Co. in Dickinson, Texas.

"Strangely enough other industries create numbers way beyond that but don't seem to be getting, from our point of view, the kind of attention that the vibrio is getting," Reynolds continued. "For instance, in a meeting sometime this year chicken was claimed to cause about 5,000 deaths a year [primarily through samonella poisoning caused by consumer mishandling]. Those are serious numbers, particularly to the people who are affected, just as are [the average 10] who are affected by oysters. It's a constant struggle of finding where the oyster industry fits within that niche of what can we do to take action to create a lesser impact on the consuming environment.

limits are nothing more than safe operating conditions or parameters. For instance, if a processor decides that cooking is a critical control point for stopping a microbial hazard then the processor must set a cooking temperature and cooking time that will ensure the microbe dies. The temperature and the time are considered critical limits.

- **Establish monitoring procedures** — Using the same example of the microbe in the food, decide who will monitor the time and temperature at which the food will be cooked. Someone must monitor all critical control points throughout the food's processing.
- **Establish corrective action plans** — In case a critical limit isn't met, for instance if the food wasn't cooked for as long or at as high a temperature as it was supposed to be, the processor must have a plan for what he will do with that food. Alternatives can range from re-cooking the food to throwing the food away.
- **Establish verification procedures** — Develop a way to make sure the processing system is working the way it is supposed to work. That may include testing the time and temperature recording devices on the cooking unit to make sure the unit is working properly. Processors must reassess their HACCP plans at least annually or whenever a significant change occurs in their food process. Verification procedures ensure that the HACCP plan is up to date and proceeding as expected.
- **Establish a recordkeeping system** — Records are HACCP's backbone. HACCP creates a paper trail that FDA inspectors can follow on routine inspections or in case a seafood-borne illness is linked to a particular product that came from a particular processor.

PHOTO © STEPHAN MYERS

"In reality, what we do know is that the vibrio is of no concern to anyone who is healthy and that's more than 99 percent of the people who walk the Earth," Reynolds said. "But if they have liver disease or a compromised immune system, malfunctioning in some way, then vibrio can impact them.

"It's important that we address, in some form, improved safety factors for the consumer. At the same time, the industry has to also take a real hard look at the number of people it employs, the lifestyles provided by the employment and make decisions conforming to the interest of both the consumer and the community," Reynolds noted.

PHOTO © STEPHAN MYERS

In Texas, the open oyster harvest season is Nov. 1 through April 30. From May 1 through Oct. 31, oyster harvesting is closed to the public but the state's largest oyster processors continue to harvest oysters under a leasing program in Galveston Bay, which is usually the state's biggest oyster harvesting area.

Under the lease program, which comprises between 2,000 and 2,500 acres of Galveston Bay, oyster harvesters can take oysters from "restricted" harvesting grounds and move them to the leased areas. Harvesting areas are labeled "restricted" by the TDH when contamination of the waters there exceed TDH's minimum standards for safe harvesting areas and TDH cannot pinpoint the reason why the waters don't meet the minimum criteria.

The state's molluscan shellfish rules provide that oysters can be removed from restricted areas, but only to transfer the oysters to either an approved area where the oysters can cleanse themselves naturally or to a plant specifically designed to cleanse the oysters.

"During the May 1 through Oct. 31 season, the lease holders can harvest oysters from their private leases since it is their property, not public domain. So during that time period we have a fairly well-established program. In fact, the dealers that are involved in that are probably the biggest dealers in the state and historically they will move about as many oysters in the summer season as everybody does combined in the winter season," noted TDH's Thompson.

"It kind of depends on the market demand but if the market demand is there these dealers, of course with their much more efficient methods of move, put, take, are a lot more effective at moving product and for a smaller time period and less investment they can move more oysters than the rest of the industry combined," Thompson added.

The oyster industry's impact in Texas was in jeopardy about two years ago, Reynolds said. At that time, FDA sought to close the oyster harvest for the warmest six months of the year — months when vibrio are most prevalent — in reaction to health concerns.

"We have this concern about the threat of closing down an industry in the interest of consumer safety that affects a very small group of people while at the same time that ought to be done in the chicken industry, which impacts a much larger group," Reynolds said.

Hillman's and a Louisiana company, AmeriPure Oysters, are fighting the battle of the vibrio in their own way and they appear to be winning. Both companies have developed ways to reduce the number of vibrio on oysters to almost undetectable levels. No one knows how many vibrio it takes to cause illness but most experts agree that these two companies have reduced the number of vibrio to probably harmless levels.

Hillman's came across its vibrio reduction technique almost by accident. It appears to be a natural fringe benefit from the company's process of individually quick freezing its oyster meats. Hillman's sells oysters on the half shell and shucked in various size containers.

The company undertook six years ago to individually quick freeze it's products as a way to increase shelf life and deliver a fresh product all over the country, said Reynolds.

The company chose carbon dioxide as a freezing agent for its quick freezing process. After choosing the freezing agent the company heard about studies that indicated quick freezing vibrio might kill them.

No one is sure yet why carbon dioxide freezing kills vibrio, but it does, Reynolds said. Six months worth of random testing last year showed that Hillman's oysters had less than one vibrio per gram of oyster meat. That's compared to some oysters that have as many as 300,000 vibrio per gram of meat.

Reynolds said the experts first thought that the sudden shock of the quick freezing might be what was doing the trick, but since that time they've heard of studies using liquid nitrogen, which freezes at a much lower temperature than carbon dioxide, that show less kill off of vibrio.

Hillman's plans to study further why its quick freezing process kills bacteria in oysters.

"We're right now in a mode of putting together what that study will be and then passing it on to FDA because FDA is

going to have to address this sooner or later and we want them to address our study protocol before we actually exercise it," Reynolds noted.

Since the company began using its IQF process six years ago no one has reported a seafood-borne illnesses connected to Hillman's products, Reynolds added with a bit of pride in his voice.

AmeriPure took a slightly different tact. The three partners who formed the company, all with backgrounds in the seafood industry, sought a way to reduce the number of vibrio in oysters without changing the taste, texture or color of the oysters.

A year of development and laboratory testing later, the men announced their new process earlier this year. It involves taking oysters in their shells and immersing them in warm water for a short period of time followed by a longer dip in cold water.

That's about as far as one of the partners, Patrick Fahey, will go in describing the proprietary process that has a patent pending.

"There had been some research done back in the 1980s that suggested that vibrio can be killed in oysters with the application of heat," Fahey said as he explained the genesis of the AmeriPure system. "We began to fool with it to see if it could be done without affecting the taste of the oyster. That's how we started to fool with it while the oyster was still in the shell.

"It's in the water long enough so that the internal body temperature of the oyster rises sufficiently to kill the vibrio but it doesn't affect the oyster or start to cook it."

Testing by the Louisiana State University Department of Food Science determined that the process reduced the number of vibrio per gram of oyster meat to "non-detectable, which in scientific terms is the best alternative," Fahey said. "They can't find any vibrio using current technology ... It always came up zero.

"The key to the whole thing is that the sensory quality of the oyster is unchanged and the sensory quality of the treated oysters was superior to the untreated oysters after a period of seven days," Fahey beamed.

The reason for that superiority is that the process doesn't discriminate between bacteria. The process kills organisms that cause oysters to spoil while it kills *Vibrio vulnificus*.

Both Hillman's and AmeriPure's processes increase the cost of processing the oysters — AmeriPure's by about 10 cents per oyster and Hillman's by up to three times the cost of normal oyster processing — but both companies say the increase just brings their prices in line with those of oyster competitors along the East Coast.

"The cost is about 10 cents per oyster, which we think is a pretty reasonable price to pay for an increase in consumer confidence," Fahey offered. "It's a safer, more wholesome product for 10 cents more. The price of Gulf oysters has been very depressed since the mid 1980s in large part because of the public perception problem created by the vibrio."

For AmeriPure the results of the process mean they do not have to label oyster containers with a warning of the hazards from *Vibrio vulnificus*. Hillman's never had to attach warning labels because the FDA mandated the labels for oysters harvested during warm months, when the vibrio is most prevalent. Hillman's decided many years ago to harvest oysters only in the winter, when the vibrio was lowest and the oyster quality highest, Reynolds said.

Though both processes hold the hope of eliminating the threat of vibrios from raw oysters, consumers still maintain responsibility for their own actions. That may mean giving up raw oysters in favor of cooked oysters.

"Teaching the public or trying to inform the public to eat only cooked oysters is like trying to say don't put Christmas lights on Christmas trees, it's something that always happens," Reynolds conceded. "In our culture oysters were made to consume raw, that's our attitude today and that isn't the industry talking, that's the consumer.

"When you get out in that consuming public there is a large group out there that think raw oysters are the only thing that makes the world go around," Reynolds continued. "They aren't going to change their habits. They just aren't. So the industry really believes that we can perhaps better serve the public by giving them information regarding their health and they have to be the ones to decide whether oysters should be on the menu.

"Considering that there is a very small number of people impacted per year and there are millions of people who enjoy the product every year, where is the line of fairness and the line of responsibility?" Reynolds asked. "It's a tough one, it really is."

SEA GRANT FILE PHOTO

It's not like we've been working without a net

The Texas Parks and Wildlife staff samples oysters in Galveston Bay.

The combined efforts of the state of Texas, FDA and the National Marine Fisheries Service have been safeguarding consumers' seafood health for many years. Texas Department of Health's Thompson proudly boasts that the state's seafood safety program is one of the most stringent, if not THE most stringent, seafood safety program at a state level in the U.S.

The state's program comprises action by three of TDH's divisions: Seafood Safety, Manufactured Foods and Retail Foods.

The Seafood Safety Division classifies molluscan shellfish harvesting areas based on how fit those areas are for harvesting. Texas has very few commercially harvestable mollusks beside oysters.

Thompson's division also certifies "shellstock shippers" - companies that ship molluscan shellfish that are still in the shell to restaurants, other states or other seafood dealers - and "shucker-packers" - companies that physically open the oysters and either put the meat into containers or leave it on the half shell. The division has the responsibility for certifying crab meat processing plants as well.

"We have a very stringent set of rules for processing crab meat because that activity is different from most other processing activities," Thompson said. "To pick crab meat the first thing you have to do is cook the crab and render it sterile. Then you pick the meat out. Virtually all other food processing activities you process the food and the last thing you do is cook it, sterilize it, right before it goes into the container, or in some cases put it in a container and sterilize it there.

"With crab meat you do it just the reverse, so the processing activity has the potential to contaminate the product and then it goes out ready to eat and most consumers that use crab meat dump it in a salad or put it on a plate or don't do anything else to it in the way of public health safeguard. So the program is very stringent, even more stringent than the shellfish rules, as far as the certification goes," Thompson said.

The third facet of the Seafood Safety Division's job is to sample fish in both coastal waters and freshwater lakes and rivers.

"Unfortunately that's a very limited program, although it's the one you've probably heard the most about recently if you've heard about the mercury in East Texas lakes and some of these other things that are going on," Thompson said.

"When we find a problem, it usually becomes very high profile for a short period of time. It should be a very extensive program. We think that most of the fresh waters in the state ... for that matter most of the waters, period, fresh and coastal ... are not contaminated and are producing fish that are perfectly safe to eat. We are aware that there are hot spots, as we like to call them, some particular areas where we have some very real concerns that contamination of the fish exists. Unfortunately, because of the budget situation with the state, the program is not funded where it should be and we are only able to do a very limited amount of sampling each year."

In the classification program, Thompson's staff conducts a sanitary survey on the coastal waters of the state. The survey comprises four parts that look at possible sources of pollution; the hydrology of an area to determine how deep and which way the water flows so officials can determine where the pollution is going and how it disperses; meteorological events like how much does it rain and what effect the rain has on the pollution; and how much bacteria are in the water and at which specific locations.

So much data exists in the classification system about Texas coastal waters that TDH knows how much rain a given area can take before it becomes unsuitable for oyster harvesting and must be closed.

The program classifies oyster growing areas as "approved for harvesting," "conditionally approved," "restricted" or "prohibited" and TDH provides free maps labeling each growing area in the state.

The classifications span activities from open harvest of oysters during the harvesting season, which runs Nov. 1 through April 30, to prohibiting all oyster harvesting because of contaminated waters.

Shrimp and fish processing fall under TDH's Manufactured Foods Division. The Retail Foods Division takes care of seafood in retail stores in areas where there is no local health department or where a local health department has asked for assistance.

"We have, from a comparison standpoint, a very low number of illnesses in Texas attributed to our product," Thompson bragged. "Nationwide we have a much lower level of illness attributed to our product than other producing states. Partly, if you compare us to Louisiana, of course, the first thing you say is that Louisiana produces a whole lot more oysters than we do. That's true but percentage wise or relative wise, whatever way you want to look at it, we had fewer illnesses. One of the primary reasons for that is the fact that we have an effective, very strong enforcement program."

But TDH isn't the only crusader in the quest for seafood safety. FDA has been monitoring seafood since the agency's inception in 1906 and the National Marine Fisheries Service (NMFS) has had in place an inspection system of its own since July 1992.

In fact the NMFS inspection system is very similar to FDA's HACCP program in many respects but is larger in scope and is a voluntary program.

NMFS inspections: Same song, bigger verse

The NMFS and FDA inspection programs are "extremely similar," notes Steve Wilson, NMFS' deputy director of operations and HACCP program manager. "Both systems are based on the seven principles of HACCP. Also we worked closely with the FDA for several years on a joint program that for many reasons didn't occur and we had a pretty good idea of where the FDA was coming from when we designed our program, so we used a lot of those agreements.

"The FDA system is quite streamlined and it is ... well, let's put it this way, it is not really a system. It's is a requirement. Ours is a system and it does, in fact, work with the requirement. In other words, it will meet those requirements," Wilson said.

Some 88 companies nationwide pay to be part of the NMFS inspection system. As far as the seafood safety part of the program goes, the NMFS plan is so similar to the mandated FDA plan that NMFS will use FDA's hazard guide to make sure participating companies are properly controlling the hazards in their plants, Wilson said.

Some in the seafood industry have questioned why, if the FDA and NMFS plans are so similar, the existing NMFS plan wasn't made mandatory instead of developing a new plan with a different agency.

"Ours did deal with quality and other factors, such as wholesomeness and economic fraud, and FDA didn't need those requirements," Wilson explained. "Plus, some of those requirements are not part of FDA's mandate — their mandate being safety.

"There is also a very large debate internationally on what should be under the HACCP principals — safety only or other factors. We came to the realization that to make our program work and for it to be cost effective it must include all possible factors and become more of a quality management program.

"FDA, however, had reasons that they believed they could only deal with safety and put that fact specifically in their program," Wilson added. "It makes perfect sense to me."

"Our authority is strongest in the area of food safety and we felt that we could implement HACCP for safety quite comfortably under our existing authority," the FDA's Kraemer added. "NMFS, being a voluntary system, can do a lot more with a lot less authority. So their programming goes into economic fraud and quality as well."

NMFS is continuing its inspection program and companies falling under the mandated FDA HACCP program can continue to participate in the NMFS program, assured Kraemer. In fact, Kraemer said he believes many of the companies now participating in the NMFS program will continue because they get more than just close inspections of their operations.

They get a marketing advantage.

"They get an inspection frequency that allows them to indicate they've been government inspected, and these are things that some customers, particularly on the worldwide market, have been looking for and I think will probably for some time to come continue to look for," Kraemer noted. "They have a niche there I think that they are filling. Some folks want to know that the government is in there more frequently than FDA can get in and that's why they turn to NMFS."

One of the companies that turned to NMFS was Gulf King.

"We decided in the late 1980s, about 1988 I guess, that we wanted to target grocery chains," Gulf King president Ronald Herndon said.

"Along with that came the Eastern seaboard and they wanted something special — the grocery chains we started doing business with out there — they wanted a guarantee on the quality, the weight, the count and everything. That's the reason we started paying for NMFS service.

"It's nothing we can charge extra for

SEA GRANT FILE PHOTO

and can pass on at this time and probably never will, and we spend a lot of money for having these guys here, but we felt that it was necessary to give the buyer the comfort, because he gets a certificate of what he's buying with each load of shrimp or half load or whatever about the quality and the declared count and the declared weight is there," Herndon explained.

"And it's also a protection from my point of view because we take temperatures and all of that before it leaves. If it's mishandled by a trucker or a receiver, we know the product left here in good, sellable condition and it was good quality. So it's a two-fold thing there.

"We are going to stay a (United States Department of Commerce) inspected plant rather than just have inspection periodically by HACCP inspectors from the point of view that we do bid work for the government and they mandate inspectors to be there during the full process," Herndon continued.

Whether Gulf King sticks with the NMFS program for the long term depends on a variety of things, not the least of which is whether the United States Department of Commerce, which is the cabinet-level department under which NMFS falls, is still around in the future.

There has been talk in Congress lately of eliminating the Department of Commerce and some of its agencies while putting other agencies under other departments as a means of downsizing government.

If Gulf King must rely on HACCP alone then the company is ready, Herndon said. Several people in the company's quality control division have spent considerable time and effort becoming qualified to oversee Gulf King's HACCP program. While Gulf King could rely on its own HACCP program in the near future, Herndon said he hopes the NMFS program sticks around awhile because he doesn't know if his customers are ready for a HACCP-only system.

"We decided going in that the trade, the retailers of the world, are not ready for a certificate from me. They still like that USDC certificate," he said.

Funny as it sounds, Wilson doesn't see the FDA's HACCP program as competition for the NMFS program. In fact, he believes just the opposite.

"I think FDA's program will enhance ours," Wilson contended. "There are a lot of seafood industry members out there who still don't know how to go about developing a HACCP plan and we provide that service. There are many who will feel that, well, 'We could use help in development of a plan.' We can provide that.

"There are many that will think, 'Since I have to write this HACCP plan now for FDA I may as well go ahead and go just a little bit extra and pay for a service and get a marketing advantage using the USDC program.' We can, again, provide that.

"Plus we can provide consultative services on any aspect as well as training," Wilson continued. "So we believe FDA's HACCP program will actually help our program."

Industry, government band together in Seafood HACCP Alliance

It sounds like a recipe for disaster.

The federal government wants seafood processors and importers to upgrade their current food safety programs using an approach that is new to most of those processors and importers.

The Hazard Analysis and Critical Control Point (HACCP) system concentrates on preventing hazards in processing before they occur and puts the responsibility on companies to maintain records and ensure food safety.

HACCP has been around since the beginning of the space age and has been used in the low-acid canned food industry for many years but not in the seafood industry, which has relied on government inspections for food safety.

That means people associated with the industry — processors, importers, federal and state agencies and their inspectors — need to know the new rules and how to live by them and with them when the regulations formally go into effect in December 1997.

Foreseeing the possible chaos, members of two professional organizations and many seafood specialists from Sea Grant College Programs developed the "Seafood HACCP Alliance." The Alliance's goal is to educate government and the seafood industry about HACCP so the switch to a HACCP system will be smooth and uniform nationwide.

The National Sea Grant Program has even funded a two-year proposal to support plans for the Alliance.

The Alliance is not a regulatory body and does not recommend or set policy. It is more of a catalyst, bringing representatives of the seafood industry who will be inspected under the HACCP program together with the governmental regulators who will do the inspecting.

Among the initial Alliance members are the two professional organizations that were instrumental in developing the Alliance — the Association of Food and Drug Officials (AFDO) and one of its regional affiliates, the Association of Food and Drug Officials of Southern States.

Other Alliance members include the U.S. Food and Drug Administration, the National Marine Fisheries Service, Interstate Shellfish Sanitation Conference, U.S. Department of Agriculture, National Fisheries Institute, other AFDO regional affiliates, and the Sea Grant College Programs.

The Alliance hopes to accomplish its goal by developing a uniform national HACCP education, training and technical assistance program for the seafood industry and the federal, state and local government agencies involved with the seafood industry.

Keep your pocketbook safe, too

Economic well-being may be almost as important as physical well-being and there are economic safety issues inherent in seafood safety. NMFS felt strongly enough about economic fraud to make it one of three parts of the voluntary NMFS inspection program.

Economic fraud was given equal treatment with seafood safety and wholesomeness. NMFS's Wilson defines economic fraud as, "Any time consumers don't get what they pay for."

Economic fraud ranges from shrimp tail counts per pound to species substitution - passing off a relatively inexpensive species of fish as a more desirable, more expensive species. Skinless fillets sitting in a fish market are often hard to tell apart.

"I've heard reports, although I can't confirm them myself, but I've heard reports that as much as 50 percent of seafood sold to some degree has some economic fraud issues anywhere ranging from species substitution to low net weights," Wilson said.

"It could include incorrect shrimp count, and a lot of it depends on what the label says. I've heard stories of it being labeled 'hand-breaded' when in fact the hands didn't touch the product. All of that is included under economic fraud," Wilson continued.

"Sometimes it's innocent. Sometimes low net weights could be part of the processing and therefore could be taken care of. Sometimes it's blatant - selling ocean perch for red snapper and getting several more dollars per pound."

Adding to the problem are local names for fish. Californians, for example, refer to one of their native species as "snapper" but the fish is not a true red snapper, which come only from the Gulf of Mexico.

"That's a common occurrence but many times that may not be done because of economic concerns, it's just that they're used to labeling it by regional names.," Wilson explained. "So the FDA has come out with a seafood encyclopedia and a fish list that makes a difference. It tells you what's an acceptable name for labeling and what's not.

"Unfortunately, a lot of people regionally — like people who never get out of the Seattle area — know certain fishes a certain way. If you label it officially then they don't understand what they're getting. They want a 'rock fish,' you hear that commonly, or a 'redfish.' Redfish are a lot of different species, some are expensive and some are even foreign."

So how do consumers keep from being victimized?

"Sometimes it's impossible to know," Wilson admitted. "For example, could you really tell the difference between skinless haddock and skinless cod? Probably not. It would be very, very difficult for anyone to tell, even experts, because the skin is the telltale sign.

"The best way for a consumer to tell, and this is selfishly pushing our program, but we check those sorts of things and if there is a mark on the product it's a further assurance. It's never a guarantee but it does further assure that these things are being considered. It's difficult in some areas, especially in species substitution.

"Retailers at times will sell the whole fish and then they'll offer to cut it for you for a price. Well, you'll find you pay for the whole fish based on fillet prices and then you cut off the excess so you get very little fish for the price," Wilson continued. "There are a lot of different ways of gouging the consumer."

HACCP: Good for what ails you?

There seem to be two schools of thought on HACCP in Texas: Those who support HACCP's implementation and those who think it's a good idea, but only in other peoples' processing plants.

"I wouldn't classify myself as a fan, but I think seafood needs something like this because we don't need any stigmas or problems," explained Ronald Herndon, president of Gulf King, one of Texas' largest shrimp processors. "We don't need problems in our industry. We are considered a good health food and I think that short of making it difficult on the mom and pop operation — and I hope that HACCP doesn't affect those kinds of people — I think, yes, they need to take good prudent care of their product.

"But I feel we do need certain regulations because there will always be people who are trying to bend the rules and we don't need that kind of product in the market place. We don't need a black eye because of a single incident. So I guess I am a supporter of seafood inspection," Herndon said.

Reynolds sees a similar benefit for the oyster industry.

"We believe in HACCP," Reynolds stressed. "We know it makes everyone in the industry live by a minimum code that isn't going to be devastating to those guys in the industry who live by the book. HACCP will make it extremely difficult to operate for the guy who wants to do things incorrectly just because it's cheap and then run off with the profits."

HACCP isn't a cure-all. It is simply billed as a more practical way of improving seafood safety.

HACCP is so new - the final rules were just approved by the FDA on Dec. 18 - that no one is sure how the regulations will affect the seafood industry. HACCP will apply to all seafood processors and importers but the effects are expected to be different for each business depending on the type of processing or importing done and the size of the company.

PHOTOS BY STEPHAN MYERS

One of the beauties of HACCP is that it can be tailored to each individual company. But no one knows what the new rules will cost or if they will significantly change the way processors and importers do business. Herndon, Reynolds and Keith Ashton, general manager of Seadrift-based crab processor Bo Brooks of Texas, foresee little if any changes to the way they process their products.

Big companies, like shrimp processor Gulf King in Aransas Pass, aren't expected to feel the pinch as much as small mom-and-pop operations. Whether anybody feels a pinch and how big that pinch will be remains to be seen.

Though FDA has mandated HACCP throughout the seafood industry there are segments of the industry that argue they need no new regulations. Most notably among those businesses, perhaps, is the crab meat industry.

Crab meat plants already come under heavy FDA scrutiny and monthly Texas Department of Health inspections because the meat comes out of the plants ready to eat. Crab processing entails cooking the crab first and then picking out the meat and packing it into containers for sale. Most of the time the meat gets no further cooking by the consumer so any human contamination in the meat after it's cooked at the processing plant isn't killed by a further heating step in the consumer's home or in a restaurant.

Monthly state inspections and once- or twice-yearly FDA inspections made for a safety system that worked quite well, mused Ashton from his office at Bo Brooks. Inspectors spent several days at the plant and took away crab meat to sample. Problems in the plant or meat were met with improvements or changes in processing. A clean bill of health meant not seeing inspectors again until their next unannounced inspection. The system worked well enough that no one died or became ill from eating crab meat processed by licensed plants, Ashton asserted.

"We've now come along with a program called HACCP that is probably great for the space program and it's probably not bad from the financial standpoint for the large (seafood processing) plant," Ashton continued. "But I don't know how much crab meat they took on the space flights.

"Then we get into the small operations of crab plants who have been operating for many years without killing anybody, maiming anybody, and now we're going to impose some new rules," Ashton objected. "And those rules are going to be, I think the best word is 'crippling.' There are many safeguards now that are approved by the Texas Department of Health and approved by FDA but now we're going to get into a series of reports more than anything else.

"We're going to have to modify most of the equipment we have to be able to record things all of the time. The first thing we're going to need is a full-time person probably to record all of the readings and, secondly, we're going to have to put thermometers and recording devices (on processing equipment), the results of which will just be thrown in some bureaucrat's drawer as far as I'm concerned and I don't think it will achieve anything for us," Ashton protested.

"It's certainly not, I believe, going to achieve anything for the general public, the consumer. What the consumer needs to be protected against is the unlawful picking of crab meat," Ashton declared. "Once again, it's a bureaucracy thing that's coming down on people who have done no harm. The problem we see in the crab picking business is the illegal picking at houses under no jurisdiction. The product is being sold in stores. The health department can't (by law) address illegal picking at the state level and must refer it down to a local level and the local level doesn't want to close anybody down because they're getting taxes and they're not willing to chase the problem children in the industry," Ashton complained.

The illegal pickers don't obtain any licenses or permits and pick out of houses or garages or other buildings and then market their product without benefit of health department inspections, Ashton claims.

"It's been done off the back of shrimp boats in Fulton," he said. "You know, it's a tourist attraction now."

It's virtually impossible to say how many illegal crab meat pickers operate in Texas, said the state health department's Richard Thompson.

"The crab meat industry maintains, and I can't fully disagree with them although I don't think they'd stay in business long if it was this way, but they maintain that there are more illegal pickers than there are legitimate pickers," Thompson said.

"The problem that I have with that is it would seem to me there would be more crab meat out there illegally then and I'm not sure how (the legitimate pickers) could stay in business if that were the case.

"There are enough illegal pickers out there that we are concerned about it. But we simply don't have the means right now to go about attacking the problem," Thompson lamented. "At our last public hearings that we had a few weeks ago about our proposed amendments to the rules this was one of the issues we discussed. I agreed to call together a meeting of the legitimate industry and the people in the Legislature who are interested to try to find some means to attack this problem. We consider it a serious problem but we just simply don't have the means for a coordinated attack right now."

Thompson thinks Ashton's claim that the state isn't pursuing illegal crab meat pickers isn't fair "but it's sort of accurate."

"The situation is that under our law, under what we do with the state health department in the seafood safety division, we do not have authority at the level where the illegal pickers are working," Thompson explained.

The only jurisdiction that exists to target those pickers is at the retail level, which is normally handled at the local health departments. However, a new state law passed during the last session of the Legislature created a Retail Foods Divi-

sion in the state health department and gave that division authority to act in areas where there are no local health departments and to respond to requests for help from existing local health departments.

"It's not that we don't want to go in and pursue illegal pickers," Thompson said. "It is just that the jurisdiction simply doesn't exist under the law. So we're forced to rely on the local retail jurisdictions.

"What the local jurisdictions do, I'm not in a position to comment on that although I can say I'm certain illegal crab pickers aren't one of their high priority items," Thompson offered. "There are probably more responsibilities at the local health department level than what we have at the state level, so consequently they have to pick and prioritize and choose between the problems they've got to address. I feel certain that going out and chasing illegal crab meat pickers is not one of their high priorities."

Making cases against illegal crab meat pickers is also difficult because, when confronted, the pickers usually say they are picking the meat for consumption by themselves, friends or relatives. The state health department has taken a different approach in an effort to crimp illegal crab meat picking.

"We've opted to go after the sales outlets where it is illegal to sell that product," Thompson explained. "If we walk in a store and find that illegal crab product it doesn't matter what the circumstances are, it's illegal, it goes in the dump and we have the option of pursuing charges against the retail outlet because it violated the law.

"We fully sympathize with the industry in its statement that something needs to be done about it. The problem is we don't have jurisdiction, retail only has it where there is no local jurisdiction and, in many cases, the locals simply don't want us involved in their local jurisdictions," Thompson conceded.

Illegally picked crab meat is easily recognizable. It's usually packaged in plain plastic bags that aren't labeled. Legitimate crab meat comes in containers that are labeled with the crab dealer's state-issued identification number, the processor's name and address and the date the meat was picked, among other information.

Any retailer worth his salt will recognize illegally picked crab meat when he sees it, Thompson said.

When all is said and done, Ashton said the way his company processes crab meat won't change one bit but he estimates it will cost his plant about $25,000 more annually to do the same work. The extra money will be in equipment and manpower to take the readings and create the records that form the backbone of HACCP.

"It's just a load of ... bureaucracy. If we'd maimed anybody or killed anybody (with our product) then I'd say we should be going for HACCP. But that's not what's happening. It's just somebody with a word processor gone berserk," Ashton protested. "I just wish that government, when they're willing to put these programs in, would give me the money to implement them."

Of the eight crab meat plants in the state Ashton guessed the smallest one grosses about $500,000 in business each year and the biggest grosses a little more than $2 million.

Even to a plant grossing $500,000 annually, is an extra $25,000 really a burden?

"When you're not making any money to start with it's another $25,000 we're losing," he said. "This is not a very profitable business. I'm reasonably confident I can say that if you could find eight individuals who would like to buy crab plants then I can find you eight crab plants that will be for sale.

"That may sound like a smart remark but it's absolutely true," Ashton chided. "We're not making money."

FDA's Kraemer disagreed with Ashton's calculations.

"I don't think it's going to cost him $25,000, quite frankly. We've done cost estimates and I don't think it's going to cost him more than a couple of thousand, and maybe even less than that once the system is in place," Kraemer offered. "And quite frankly, and I honestly believe this, I think processors are going to realize that over time once they've gotten used to it and perhaps had some initial capital expenditures I think they're going to find that it saves them some money because they're going to find that if they really buy into the system they have an opportunity to prevent problems from occurring and then they don't end up having to throw product away or have to recall it or have to make good when their customer says it doesn't give them the shelf life they thought it was supposed to and so forth."

HACCP's implementation has nothing to do with how good or bad existing health safeguards are in Texas, Kraemer asserted. Historically, regulations imposed by the state and federal governments have been adequate because they were based on concepts called, "Good Manufacturing Practices," which are steps that good conscientious companies take to ensure they produce quality products.

But even using a good manufacturing practices approach, "there was no emphasis on a firm auditing itself to make sure that they in fact did those things," Kraemer said. "So the only time a processor would, in many cases unless they were different from the norm, really pay attention to what was going on was when the inspector was in the plant. And that's not right.

"The role of government isn't to be in there and watch everything that's going on. I don't think that's an appropriate role of government. And as government gets scaled back, and it's almost surely to be scaled back, that role becomes even less possible," he explained. "So I think we have to look at a role where government is doing the job of verifying whether or not the industry is performing its job right, and its job is to produce a safe food. I think the industry would agree.

"We think that the right way to do that is to put controls in place that ensure that you're producing safe food, not just work the way you've worked for 30 years and hope the product turns out right," Kraemer continued. "By and large a lot of these controls are in place already, so I think industry will find that they're probably fretting more than they need to over just how HACCP is going to be.

"There will be some new records and FDA is going to be looking at some things that maybe they weren't looking at before, but I don't think it's going to be that difficult to comply with this new regulation."

Perhaps the biggest drawback to HACCP is the inequality perceived by processors between American manufacturers and seafood coming in from other countries. The seafood industry in the U.S. is generally a small profit margin business because domestic processors must compete with foreign companies that have cheap labor.

While foreign companies must also implement HACCP plans if they want to export their product to the U.S. domestic processors say there is little the FDA can do to verify that those plans are being followed in other countries.

"A HACCP plan is just that," noted Haby. "It might look real good but what happens on a day-in, day-out basis?

"It seems like in the draft HACCP guidelines or regulations that the choke point on imported products is going to be the importer," Haby said. "Boy, that's pretty unnerving. You've got importers that have done business for generations with foreign companies and now they have to ensure that the foreign companies are complying with HACCP regulations."

Under the FDA's HACCP guidelines, Haby noted, the main responsibility for ensuring that foreign seafood is safe will fall on the importers. At worst, foreign suppliers won't change their processing methods, meaning American consumers will face no greater risk than they do now from foreign products.

"The hazard isn't any greater but now the burden is on the importer if there is any problem with the product," Haby said.

Foreign products also concern Dan Sowards, director of the Texas Department of Health's Manufactured Foods Division.

"I would say one of the biggest concerns is that the domestic industry be treated with the same equality as, or really vice versa, as the imported seafood. That there be adequate protection of the American public from contaminated or adulterated imported seafood," Sowards offered

To that end there isn't much the state health department can do to monitor imported seafood as it crosses U.S. borders. They only have the power to act once the seafood is already here and some problem with it has been found. The department isn't likely to get more power over imports in the future.

"To begin with we don't have the manpower to do it. We have 43 investigators statewide for 9,000 food manufacturers and another 2,700 food wholesalers and so we're pretty short on manpower ourselves," Sowards asserted.

Kraemer contends verifying that a foreign processor's practices meet HACCP requirements will become easier in the future as the U.S. makes memorandums of understanding (MOUs) with its trading partners.

"If we have an MOU with a foreign country that recognizes their system of controls as equivalent to ours then any importer can freely import without any additional controls. We don't have any of those yet but we are in the process of working with a number of the more developed countries and our major trading partners, looking at their programs as they would look at ours to see if we can reach an equivalency agreement," Kraemer explained. "That's one route but that's more or less reserved for the future and because internationally folks are going toward HACCP we expect that's going to be a very significant control in the future, but that doesn't yet exist.

"So what can they do presently? The importer can visit the foreign processor and make sure that they have a plan and that they're following it, and a number of the good ones do that already," he continued. "Or they can hire a third party to do that for them, which might be a foreign government agency. A lot of foreign countries, especially developing countries, have fisheries departments that will, for a fee, certify to whatever requirements you're looking for so they'll audit and see whether they're meeting your requirements. So that's one option. And as a last resort they can perform some finish product testing, which we don't recognize as being as good a control as some of the others because it's sort of after the fact."

Sitting in his office at Gulf King, Herndon is less convinced than Kraemer about the effectiveness of FDA's plans for imported seafood products.

"I was just called the other day from an importer, and they are all over the place, on some foreign product and he said, 'Do

you have a way to cook. I have some (decomposed) product that the FDA has put on hold and they've told me that if you can cook it than it can be certified'," Herndon said.

"I said, 'Look, bub, no I can't do that. I'm not a cooking facility to start off with but if the product is decomposed in the raw state I don't think cooking is going to make much difference.' So there definitely is some product getting caught but how much is not getting caught?

"The prediction is that by the year 2000 Americans will consume 1 billion pounds of shrimp each year. Where is it going to come from?" he asked. "Well, most of it is going to come from foreign ponds or wherever. Unfortunately the infrastructure in most of these third/fourth world countries is they have a great product when it comes out of the pond but they don't have the ability to ice it properly and take care of it properly in many cases.

"A lot of countries have some wonderful facilities and those are fine, but there are also a lot of them that have lots of problems and this is where the cheaper product comes from and this is what I feel is devastating to our local industry. I, for one, feel that our seafood-shrimp industry in Texas is catching hell from government regulations," Herndon continued.

"It's almost like there's a conspiracy to run us out of business. As late as this week there is talk of more turtle regulations, more of this, eliminate shrimping within so many miles ... it's an ongoing vendetta and I just wonder if there's a grand plan to eliminate all of this industry? I don't know.

"I think that in most all taste tests, and some of the major restaurant chains in the country that we supply, without mentioning names, mandate Texas brown shrimp because it has a flavor profile second to none," he added. "But yet we're an industry that is grossly undercapitalized operating under horrendous regulations that make it very difficult, eliminating so much of our catches ... it's just a shame to see something that was really a good industry, a solid industry 10 years ago that is struggling now."

It is the low-margin nature of the seafood industry that could throw a kink in the federal HACCP plan. Regulators assume that most HACCP-related issues will work themselves out over the long term, but in a low margin business short-term considerations often outweigh long-term issues.

"I've been in the shrimp business my whole life and my father has been in it 60 years," Herndon mused. "I've done nothing else. Times are much, much more difficult now then they were 10 years ago and it's getting worse regularly. As I said, it goes back to the fact that the doors are wide open and if they can produce shrimp cheaper in Thailand and bring it over here, I guess they win."

HACCP: The plan for any final frontier

Find out where problems can occur and take steps to stop the problems before they happen. Makes sense, right?

Not in 1959.

Not here on earth, anyway. But up in space ....

The late 1950s were anxiously exciting times. For centuries, men and women had looked to the nighttime sky and wondered, "What's up there?"

In 1959, mankind stood poised to find out. But there were many problems to overcome first, like how to catapult a man free of Earth's hold, how would he breath in the airless, endless blackness, how would he stay warm; how would he get back home; and what kind of munchies would he take along on the trip.

For the food, NASA turned to consumer products giant Pillsbury. Of course, it wasn't as easy as grabbing a can of biscuits out of the grocer's refrigerator case. Since no one had ever been in the weightlessness of space, no one knew how food and water would react.

Some scientists feared food crumbs and water droplets might float through the space capsule and suffocate an astronaut. So NASA turned to Pillsbury, which had already developed an edible food coating that could keep the food together while being eaten.

Pillsbury turned to Howard E. Bauman, then the company's director of science and technology, and his six-person team, to solve NASA's problem.

"The thing was, especially before the first flights, we had no idea what would happen to food, water or anything else up there," Bauman remembered from his Minnetonka, Minn. home. "Just thinking of that part kind of makes you nervous.

"When I think back at my age now I'd have probably thought twice about it before even accepting it," said Bauman, who retired in the late 1980s after more than 35 years with Pillsbury. "But what the hell, when you're young you do a lot of stuff you wouldn't do otherwise."

In 1959, food safety assurance rested on end testing of products. Someone literally pulled a product off the end of the assembly line and tested it to make sure it was safe. But end testing destroyed the product and "the power of the end test is determined by how many samples you run," said the Marine Advisory Service's Mike Haby. "If you wanted to have a 99.9 percent confidence level that there were no pathogens or there were no physical hazards like metal shavings in these food product for the astronauts then by the time you end product tested it you'd have virtually nothing to send up in the command module."

SEA GRANT FILE PHOTO

Bauman remembered that he and his team had the same thought.

"I'll tell you we were running kind of scared because we figured we had to find a new way realizing once we'd gotten into it that if something happened to the astronauts up there and we were producing the food I kind of figured I might not have a job anymore."

To ensure that the astronauts' food was safe Bauman's team realized they'd have to develop a system that would prevent food hazards in the first place. Logical as that sounds today "it was a hell of a radical concept back then," Bauman recalled.

"It just went totally against the grain of the normal quality control systems because it really is based on a prevention system. If you don't let the stuff get in there in the first place then you don't have to worry about it, whereas the system that had been used almost forever was look for it and if it's there then destroy the product or whatever and get rid of it that way, which really isn't a good way.

"But it was really tough to get people to accept it. I don't know how many years I spent ... probably close to 30 years just trying to convince people it was a system that was worthwhile looking at," Bauman said.

HACCP grew as Bauman and his team experimented with the concept, incorporating the things that worked and throwing out those that didn't work.

"We started out making the food sticks and then we made some compressed foods that were rehydrated in containers where the astronauts added the water to it and used it and then also for the moon landing we developed what we called 'space sticks,' which were sticks of food which were balanced nutritionally that could be inserted through the hole in the helmet and they could eat it if they so desired," Bauman remembered.

"I'm not sure any of them ever ate the stuff, but they did have it on board the lunar lander when it went down and landed. I have no idea whether they ate while they were there or not. I never asked them."

The food was a success and so was HACCP.

"As we worked on it we found out it really worked and then I started giving a lot of speeches on it and talking about it. That's the part that took a long, long time," Bauman recounted.

Bauman remembered HACCP taking about eight or nine years to develop from start to finish. By the time he talked to FDA and other food company representatives about HACCP during a meeting in 1971, Pillsbury was already using the system for its food lines.

"We presented the concept at that meeting and then at that point FDA asked us to do some instructing of its people, and then they re-wrote the low-acid canned food specifications, which are in place right now," Bauman said.

"Companies became interested in HACCP and it was pushed pretty hard by people who were responsible for the companies, too, because recalls to pick up bad product are extremely expensive. They can cost hundreds of millions of dollars, depending on what the product is.

"So the officers in the company were very delighted to be exposed to some kind of system that could prevent this. We could show them from Pillsbury's track record that once we'd really gotten into the system we never had any recalls," Bauman continued. "We may have had some but there were none that were dangerous and it was a very rare occurrence so it's a big saving of money."

PHOTO © STEPHAN MYERS

Practice personal safety

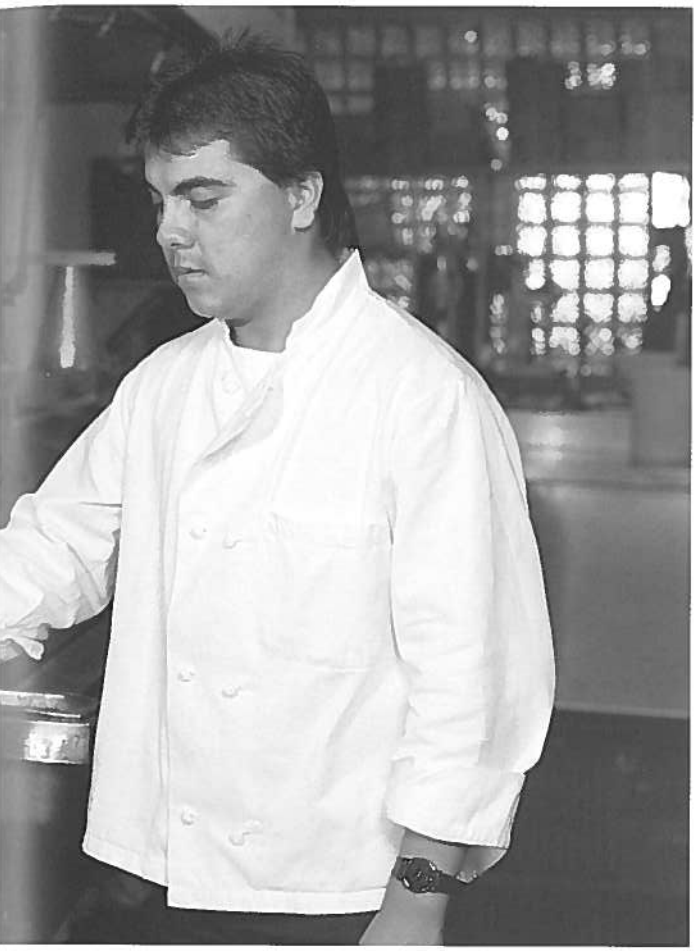
We can't lay all of the responsibility for seafood safety at the feet of those who bring us seafood. Consumers must do their part as well. Here are a few tips for seafood safety compiled from the FDA, Texas Department of Health and other sources:

Shopping:

- Pick your seafood like you do your friends. Another guideline suggests that seafood should smell like a "fresh ocean breeze."
- Fresh fish steaks and fillets should be moist, with no drying or browning around the edges. The eyes of fresh whole fish should be bright and clear, not cloudy or sunken. Gills should be bright pink or red. Scales should not be slimy and should cling tightly to the skin. Frozen fish should not be freezer burned or have damaged packaging.
- Mollusks in the shell should always be alive when you buy them. Shells of oysters, clams, mussels or scallops should be tightly closed or should close tightly when you tap them or put them on ice.
- Buy seafood only from reputable dealers.
- Ask to see the shipper's tag for molluscan shellfish.
- Cook fish no later than two days after purchase.

Storing:

- Keep fresh fish cold. Use the coldest part of your refrigerator, which is usually under the freezer or in the meat drawer, until you are ready to cook.
- Refrigerate fish in the same wrapper it had in the store.
- Store live mollusks in the refrigerator in containers covered loosely with a clean, damp cloth. Do not store live shellfish in airtight containers or in water.
- Canned fish should be stored in a clean, covered glass or plastic



container and refrigerated after opening.

- Smoked, pickled, vacuum-packed and modified atmosphere-packed fish should always be refrigerated.
- Keep raw and cooked seafood separate. Do not put cooked seafood back in the original container used when it was raw. Do not store raw and cooked seafood in the same container.

Cooking:

- The safest way the thaw frozen seafood is in the refrigerator in its own container. Allow about a day for defrosting.
- When baking, broiling, poaching, frying or stewing fin fish allow 10 minutes cooking time for each inch of the fish's thickness.
- Properly cooked fish will flake easily with a fork and should appear opaque and feel firm. Cooked fish should not appear translucent.
- Cook molluscan shellfish. Cooking kills potentially harmful bacteria on the oyster.
- When boiling molluscan shellfish in their shells, boil the shellfish for three to five minutes after the shells have opened. When steaming shellfish, cook them for four to nine minutes from the start of steaming.
- Use small pots to boil or steam shellfish. If too many shellfish are in the same pot it's possible that the ones in the middle won't be thoroughly cooked. Throw away any shellfish that do not open during cooking. Closed shells may mean those shellfish weren't sufficiently cooked.
- Shucked oysters should boil or simmer at least three minutes. Fry them in oil for at least 10 minutes at 375 degrees Fahrenheit. Bake shucked oysters at least 10 minutes at 450 degrees Fahrenheit.

Bauman believes no one developed HACCP before 1959 because end testing was so ingrained in corporate mentality.

"It was what was taught in school. It's what I learned in school," said Bauman, who holds a Ph.D. in food microbiology. "And it wasn't until we were really faced with an issue that we knew testing wasn't good enough and it scared the hell out of us once we realized it because here were a bunch of astronauts up in space and if they get contaminated product and something goes wrong then, bam. So I guess you could say we were running scared.

"It just plain forced us to find a better system. So we just said, hey, we're going to make sure that anything that goes into these products is safe. Of course, we did test product but we never found anything and by that time we really knew the system worked."

Bottom line: It's a matter of trust

When all is said and done, seafood safety is a matter of trust. Every time we put a bite of seafood in our mouths we trust that the seafood is safe. Statistics bear out this trust.

We trust that shellfish harvesters harvest only in approved waters and fill out their harvester tags truthfully. We trust that the processor is confident in the safety of the harvester's product and we trust the processor to keep the product safe from processing hazards.

As HACCP takes over, we trust processors and importers to keep accurate records. We must believe for our own consuming peace of mind that they don't falsify documents for the sake of a few more dollars.

True, there are certain safeguards to keep everyone honest. Both the state and federal government have at their disposal sanctions ranging from seizure of the product to monetary fines and jail time for unscrupulous seafood vendors.

Those in the industry who want to stay in the industry are also aware that their long-term prosperity depends on producing consistently quality seafood that is free from hazards.

"I think most all boat people, the captains on the boats, want the best quality shrimp they can bring in because they're going to get a better yield and a better pay if they bring in a premium quality shrimp," Herndon ventured. "So in most cases, and of course this isn't 100 percent, but in most cases they want to bring the best quality product to the dock they can because in return it's going to grade better across the machines and there are going to be less pickouts of problem shrimp, so they are going to get more pay."

Since so much of our seafood is imported, both into the U.S. and into Texas, we must trust that products coming from other states, especially molluscan shellfish, are as thoroughly checked as our own.

FDA has the responsibility for evaluating each state's shellfish safety program and passing those evaluations to the Interstate Shellfish Sanitation Conference (ISSC), a joint industry, federal and state government effort voluntarily instituted to implement a national shellfish sanitation program. ISSC is responsible for passing the FDA's evaluations on to other states. Though the problem is slowly resolving itself, the knock of late against FDA is that the agency's evaluations are inconsistent and tardy.

George Colvin, director of marine resources for the New York State Department of Environmental Conservation, made those concerns public during a September 1993 hearing before the U.S. House Subcommittee on Fisheries Management. The subcommit-

tee, which is part of the House Committee on Merchant Marine and Fisheries, was considering a bill to reauthorize the Magnuson Fishery and Conservation Act.

"For the current (shellfish sanitation) program to be effective, States must be confident that FDA is providing timely, complete and consistent evaluations of state programs," Colvin testified. "Indeed, the entire integrity of the National Shellfish Sanitation Program depends upon this.

"However, New York and other states have significant concerns regarding tardy evaluations and strong perceptions that, despite recent improvements, FDA's evaluations of a given state are not consistent from region to region. We believe FDA should give much higher priority to completing timely, objective and standardized evaluations to all states," Colvin testified.

"I agree entirely with (Colvin's) statement," Thompson said. "We have real concerns, Texas does. We're lucky, we have a regional shellfish specialist who is conscientious, objective, effective, without question the best specialist that exists in the country today. We're fortunate. There are specialists who are not objective, not effective, not conscientious and a number of other words. There are some problems in the specialist part of the program, in evaluations not being consistent from state to state. You'll have one specialist who gets hung up on flies in the packing room and one in the next region that will get hung up on refrigeration temperatures.

"Obviously, there are going to be differences in people, that's not the issue. But at current, while we are working on it and I agree with the statement that there have been significant improvements recently in standardization of inspections, etc., there are still problems within FDA in that the evaluations are not consistent from region to region, they are not timely and problems are not communicated to other people timely," Thompson admitted.

Though perhaps worrisome to other states, lack of confidence in FDA evaluations isn't a big problem to Texas health officials.

"In Texas, our program helps counteract it. We counteract it pretty strongly because we have a very strong enforcement program. We keep our retail people on top of things. The glitch or the problem, of course, is at the harvest area. If the illness occurs as a result of that we won't catch that with product coming from another state until we have some illnesses," Thompson conceded.

"But from the standpoint of handling and contamination of the product once it gets here we have a very good program that prevents that. It is a problem, I will admit that. It is a problem that FDA doesn't do exactly what they should be doing. It has improved significantly in the last couple of years. It apparently will continue to improve. There have been some personnel changes that indicate that the improvement will continue.

"Is it a problem? Yes, it's a problem. Is it a serious problem? I would say at this point no, as long as progress continues to be made," Thompson said.

"The ISSC was formed in 1982," said Thompson, who was instrumental in forming the group. "The reason it was formed is that FDA, its entire shellfish program, had essentially stopped working.

The national shellfish sanitation program had worked pretty well since the 1920s with a few minor adjustments through the years, Thompson said. But in the early to mid 1970s there were a couple of problems in Virginia. The FDA went in and tried to get those problems corrected but some in Virginia questioned FDA's authority. When FDA officials went back and checked their authority they found they could not force their solutions on anyone.

"So the program just sort of floundered for awhile," Thompson remembered. "FDA went around and did their evaluations but they couldn't do anything about it if somebody thumbed their nose at them — they had no legal authority to go do anything.

"So a number of us in the states got concerned about that. We started talking about it in 1979 and over a three-year period formulated this idea for this national conference and formed the conference in 1982. Its function was to re-invent that national conference, that national shellfish program.

"And we did. We pumped some energy and some life back into FDA, we got some support for them, for what they were doing. Then, unfortunately, we had some personnel changes and some attitude changes and the result was sort of a downswing from the late 1980s until about 1992 or 1993 where the FDA wasn't really out pushing doing what it should and could," Thompson continued.

"All of the people involved in that issue are now gone from FDA and the people who are there now are attempting to swing back to doing more and better with the real issues," he said.

FDA's Kraemer concedes that problems still exist.

"I think in any program where you have auditors or inspectors or whatever they're called in the program, you are going to find inconsistencies," he said. "You've got some people who are very energetic and aggressive and others who are not, that's human nature.

"We recognize that and that's certainly the case in our shellfish program, as it is in any other program. We know it to be true and we have a few systems in place that we think are making some of those improvements. One is standardization, which is a program where we standardize our folks so that they look at the same problems the same way and they standardize the state lead folks and so forth until you have everyone hopefully looking the same way at the same problem.

"And we continue with training and education. I think about the only way you can really address those kinds of issues is to try to get your folks better equipped," Kraemer offered.

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So what is the real story behind seafood safety? Is it a big deal or a big boondoggle?

Almost everyone agrees that our seafood supply is safe and wholesome. The only sharks you must avoid are the unscrupulous few people who want to sell you nothing for something.

Seafood by its nature carries its own spoilage alert device — your nose knows. So how much safer will we be with the new HACCP regulations? And will those regulations help or hurt the economically strapped Texas seafood industry?

The big problem is that there are still so many questions and too few answers. We won't know for several years whether impending federal regulations will help us, hurt us or leave us blissfully indifferent. In the relative scheme of things the issue of seafood safety boils down to one question: Is the money spent worth those few lives affected each year?

What if yours is one of those lives? ■

PHOTO BY RON RANDOLPH

MARINE ADVISOR

TEXAS MARINE ADVISORY SERVICE

Julie Massey happens to be a woman.

With that said, the subject of gender doesn't need to be mentioned again.

"Being a woman hasn't been a problem for me," said Massey, who has been the marine agent for Galveston County for 3½ years. She is the only female marine agent in Texas. "And I don't think it's been a problem for (the people she works with)."

Regardless if anyone saw her gender as a detriment, Massey turned the job into an opportunity for herself and for Galveston Bay.

Seining is just one exercise Julie Massey uses to teach schoolchildren about Galveston Bay's habitat.

Massey decided to become a marine biologist when she took Miss Campanella's oceanography class at Richardson High School in suburban Dallas.

"I had a really good teacher and she sparked my interest in it," she said. "I didn't know exactly what that meant, or where I was going with it. But I knew that it would be something 'different.'"

That difference is what Massey likes most about her job.

"No two days are alike," she said. "That's one of the draws of the job. I'm always challenged by new problems."

Even with a bachelor's degree in marine biology and a master's in marine fisheries, Massey said she is always learning things.

"You get the opportunity to work in different areas," she said. "Sometimes it's working with fishermen and sometimes it's working on nonpoint source reduction. It varies, and that presents opportunities.

"By that I mean new opportunities to look at Galveston Bay in a different way," she explained.

Even though the job boils down to 80 percent office time vs. 20 percent in the field, Julie still figures she has contact with 150 people every week.

"It's a heck of a lot of fun," she admits.

While always environmentally aware, Massey said she didn't know the environment would play such a big role in her life.

"The opportunity to teach people about the environment is a big plus for me," she said.

Educating people about Galveston Bay takes various forms. Sometimes it means taking school groups or scouts to the marshes and beaches around Galveston Bay and explaining the relationship between the two.

Sometimes it involves "Potti-Training" boat owners.

Massey admits that it's kind of a cute name for a serious problem. But the "light" approach is necessary, she said, to get people to talk about the problem of boaters dumping raw sewage into the water. The problem is so bad in the Clear Lake area, the state's largest marina complex, that a fine of up to $2,000 is given to any boater discharging sewage, whether it's treated or not.

Massey not only teaches boaters about why they shouldn't dump their sewage, but also tells them about their particular system, how to pump out their systems, and what chemicals to use and not to use in their boat's waste systems.

The program will soon expand to Potti-Training other boat owners in other parts of the Texas coast.

Yards and Neighbors, an effort to reduce another type of pollution in Galveston Bay is another Massey project. The program teaches people that how they care for their lawns also affects Galveston Bay.

Fertilizers, pesticides and other solutions harmful to the Bay system are called "nonpoint sources" of pollution, because they are not directly dumped or discharged into the Bay, but end up there.

Residential loads, or wastes that start out at homes, are a major problem, Massey said.

"It may not seem like a major impact, but it is," she said. "Oil that is the equivalent to 40 percent of what spilled out the Exxon Valdez comes into Galveston Bay off the streets. That's every year."

The fertilizer from a couple of million lawns can also produce big impacts, Massey said. That can lead to excessive nutrients in the water and eutrophication — the excessive growth of plankton in surface waters. These algae blooms can deplete the oxygen in the water. On a larger scale, this can lead to dead zones, like the one off the coast of Texas and Louisiana.

The Yards and Neighbors program also stresses using native or adapted plants, so that the need for watering is minimal. Water put on plants is water that doesn't flow into Galveston Bay, Massey explains. Fresh water is needed to keep the Bay alive.

"The Bay needs a mix of fresh and Gulf water, especially in the shallows," she explains. "Different animals spawn in different salinities."

The Houston Ship Channel allows a "big slug of salt water" into some of the areas of the Bay that might not otherwise be so salty. This also allows the oyster drill, a snail-like creature that is an oyster predator, into the oyster beds of the Bay.

"Fresh water helps stop that," she said.

One Yards and Neighbors project is a test garden in the median dividing two streets in a Dickinson neighborhood. The neighborhood was chosen based on the interest residents showed at a Yards and Neighbors workshop.

"These yaupons are native," Massey said, pointing out a bush with red berries, "and the berries help attract birds."

Other plants in the garden are ferns, Texas red bud, turk's cap and liriope, all of

PHOTOS © ROBERT MIHOVIL

which are native to the area or "adapted," meaning they fit in well with the Galveston Bay climate.

The area is designed to be low-maintenance, she said.

"They can take the heat, are pest-resistant and can survive on the area's normal rainfall," she explained.

Massey sees her job as a way to make people more aware of the opportunities that Galveston Bay gives to the people that use it.

"It gives us fishing, boating, jet skiing ..." she said. "There are a lot of ways of 'valuing' it. At the same time we learn ways to take care of it. If people are using it, they care about it."

Massey helps care for the community garden in Dickinson, a test plot for the Yards and Neighbors project.

And Massey does love her job.

"It's a great job," she said, with the almost ever-present smile glowing. "All my friends are interested in it now."

And fortunately for Galveston Bay and the creatures that live around it, she is not the only one that cares.

"A lot of people share the same goals," she said. "Thank goodness I'm not the only one."

On location ...

Massey's job is educating the public about Galveston Bay. That involves quite a few different venues. Sometimes that involves organizing a workshop on fishing. Sometimes it can be working with a neighborhood in Dickinson on their community garden.

And sometimes it's wading in an inlet of West Bay, holding one end of a 20-foot seine.

Massey said she treks to the salt marshes of Galveston State Park several times a year, usually with a group of Cub Scouts or some other school-age group in tow.

The point is to show that these marshes are a habitat," she explains while standing in water almost to her knees. "Most kids just see this as kind of an ugly area, not nearly as exciting as the beach. But, when we go to the beach and do the same thing, we won't catch as much, because there's less habitat."

The seining exercise usually produces crabs, small shrimp and small fish.

"This is a nursery area," she explains. "The babies will grow here until they are large enough to re-enter the Bay or the Gulf."

A layer of black soil appears in the prints left in the mud. A sulfuric smell emits from the muck.

"Smell that?," Massey asks. "That's a good sign. That means the vegetation is breaking down. The dead plants are what actually serve as food."

Most of the kids are a little bashful about getting into the water at first, Massey says. But they usually are having a ball by the time the adventure in the marsh is wrapping up.

"The girls are actually a little better than the boys," she says. "I've had girls out here up to their necks in water, while the boys are on the shore trying to look cool."

It's a wonder that Massey goes into the water at all. She tells the story of the time in graduate school that she and a classmate were in a marshy area, pulling a net into a boat, counting the fish and other creatures for some project. Lo and behold, the net contained a dead shark.

At least it appeared dead until it began thrashing around.

"We jumped in the water and let the shark have the boat," she said. "And to think I had my hand right on his head."

Massey points out that the mud itself also serves as a habitat. She serves a shovel of mud into a small sieve. Swishing it around, looking as if she is panning for gold, can reveal other treasures.

"Mostly worms," she says, when asked what she usually finds. "I want to show them that the dirt itself is an important environment."

These organisms also serve as food for the young marine creatures, she says.

The trips also bring their lighter moments.

"I once had a scout troop leader tell his boys not to be afraid of the water," Massey said with a laugh. "He actually said 'don't act like girls.' And here I am out in the water holding a net."

Massey said she does want to be a role model to girls to some extent.

"I want them to know that they can do a job like mine," she said. "Science is not only for boys."

Nothing but praise ...

How important is Julie Massey to Galveston Bay and the people working to save it?

Julie had been part of the advisory board of the Galveston Bay Foundation, a non-profit group working on protecting the Bay, while she served as Galveston Bay program coordinator for the U.S. Fish and Wildlife Service. When she changed jobs, she no longer sat in the service's spot on the board.

"We created a position for her on our community advisory board," said Samra Bufkins, outreach coordinator for the foundation. "We wanted her personal input."

Julie works well with other people, Bufkins said, making her the ideal member for any board.

"We could all learn from her style," she said. "She's so easy-going, yet so knowledgeable."

That knowledge is Massey's main asset.

"She is so knowledgeable about the Galveston Bay ecosystem," Bufkins con-

tinued. "It's an added asset that she can get that knowledge across."

Bufkins credited Massey with "infectious enthusiasm" regardless of the project. Whether it is Yards and Neighbors or manning a booth, Julie "knows her stuff, loves it and wants to share.

"It's my pleasure to say something nice about Julie," she said. "She's not only a colleague, but a friend.

"And a valued volunteer," Bufkins added.

M.A. Bengston, assistant manager of the Galveston Bay Estuary Program (GBEP), a part of the Texas Natural Resources Conservation Commission, called Massey a credit to the Marine Advisory Service.

"She is always out there in the community she serves with the information that citizens need to make better choices in how they treat our Bay waters and the surrounding watershed," Bengston said. "With her low-key approach to educating the public, she could in no way be labeled an environmental zealot. However, she brings an almost missionary commitment to her work, which is solidly backed by her abilities and her belief that the work she is performing is the right thing to do."

Bengston also lauded Massey for her work on boater education, via Potti-Training.

"Her education effort with area boaters has been invaluable," she said. "Because of her outreach, we are beginning to see a change in attitude on the part of boaters who now understand the limitations of Galveston Bay as a receptacle for untreated or semi-treated human wastes.

"This region of Texas could use more Julie Masseys if we ever hope to convince our citizens that protecting our Bay system is an individual responsibility that is vital to the future of both our economy and our environment," Bengston said.

Others with the Galveston Bay Program echo Bengston's praise of Massey.

"She is so pleasant to work with," said Helen Drummond, Water/Sediment Quality Team Leader for the Galveston Bay Estuary Program. "Julie is so gung ho at everything she does and is always willing to pitch an extra hand, whatever the task. Galveston Bay is lucky to have Julie serving as a marine agent in her watershed."

"When I was transferring to Galveston Bay to work for the Estuary Program, a good friend of mine from the EPA said 'When you get to Galveston, I have a friend there I want you to meet.'" said Cynthia Jennings, Natural Resource Uses Team Leader with the program. "'Her name is Julie Massey and she's a great person.' I made that call and my friend was right. All of the characteristics that make Julie a great person also make her a great marine agent. She is a leader in her field, conscientious, dedicated, always positive and helpful, and an asset to the Galveston Bay community. Julie's knowledge and expertise in marine issues have made her an invaluable resource to the Galveston Bay Program and I look forward to working with her as Sea Grant's new representative on the Galveston Bay Council."

Mel Russell is a Public Outreach Specialist for U.S. Fish and Wildlife Service. He has known Julie since he worked with Sea Grant's Marine Advisory Service and Massey worked with Fish and Wildlife.

"I've worked with Julie on several projects," he said. "She always has an excellent working knowledge of the resource. She knows what's out there, whether it involves wildlife or marine."

Russell also credits Massey with "a lot of people skills."

"She's always interested in the people and in the subject she's teaching," he said. "She always comes across well with her audiences."

Russell said he couldn't recall a single time that he has seen Massey express anger.

"Actually, that might be a disadvantage in this business," he said with a laugh.

Fish and Wildlife cooperates with Massey on a number of projects, Russell said, from fishing tournaments to providing funds for Yards and Neighbors and Potty Training.

"That, to me, is her major value," he said. "She takes something that's very important, but that nobody really wants to talk about. That's really important with the pump out program, because of the problems in Clear Lake."

Russell was able to sum up his feelings like this:

"She's one of my favorite people. She makes people look good."

One example of this came when discussing Yards and Neighbors.

"If you write about Yards and Neighbors," Massey cautioned, "be sure and mention that Susan Russell (Galveston County Family and Consumer Science Agent) and Dr. William Johnson (Galveston County Agriculture Extension Agent) that have been helping me with it."

She was smiling — but serious — when she said it. ■

Sulak joins Sea Grant staff as Marine Advisory editor

As has become the custom, let me introduce myself. I'm Phillip Sulak, the new Marine Advisory Editor for *Texas Shores*.

I have degrees in political science and journalism from Texas A&M University and have been working in journalism since 1989. I started at the *Bryan-College Station Eagle* on the same day as *Shores* editor Jim Hiney and while there I covered city hall, politics, police and fire, the environment and whatever else came along. Since then I've served as managing editor for the weekly *Bryan-College Station Press* and in the communications office of the Bryan Independent School District.

I don't pretend to know enough about anything marine yet to advise anyone, but that's my title. As a native of the blacklands of central Texas, my experience in the aquatic industry has heretofore been limited to the catfish I caught with my father on the banks of one of the tributaries of the Brazos River.

But, I consider myself a fast learner. I've already learned that the peninsula near Galveston Island doesn't rhyme with "Bo-lee-jar," but instead with "Oliver."

I've learned a lot about bycatch. I've also learned that I'll never learn all there is to know about bycatch, because there are as many opinions about the subject as there are people who fish commercially or recreationally, are involved in the shrimping industry, or even just live near the coast.

I've also learned Galveston County marine agent Julie Massey's nickname, but that's a secret.

I don't consider my ignorance of marine issues as a handicap, but an asset. I arrive without pre-determined opinions about the issues I'll be writing about. I'll do my best to give every issue and everybody a fair shake.

See ya' on the coast.

The Buffalo Marine Service barge broke in the middle, leaking oil into the channel.

Aerial view of the barge and resultant oil spill.

Ruptured tanker spills 5,000 barrels of oil

North winds helped keep oil spilled from a ruptured tanker in mid-March from causing major damage to ecologically sensitive Galveston Bay.

The tanker, owned by Buffalo Marine Co. of Houston, ruptured March 18, dumping about 5,000 barrels, or 210,000 gallons, of fuel oil into the bay between the Bolivar Peninsula and Galveston Island.

The high winds that may have contributed to the accident blew most of the oil away from the bay and out into the Gulf of Mexico.

The oil that missed Galveston began showing up as tar balls on Matagorda Island in the last week of March, but a quick response enabled the cleanup to be done in two days. Four birds — two blue herons and two coots — were lost due to the oil.

The spill came as Galveston entered the lucrative Spring Break period. While city of Galveston officials worried about negative news coverage — the media was denied access to the cleanup site at one point — the oil had virtually no effect on the tourist areas of the island.

The only land areas affected in the Galveston area were the far southeast end of Galveston Island and the Crystal Beach area of Bolivar Peninsula. Crews attacked the oiled areas with booms, shovels and, in some cases, heavy machinery. Oil skimmers sucked up what oil could still be found on the water. At one point, more than 500 people worked on the spill.

Buffalo Marine will pay most of the cost of cleaning the spill. As of April 2 the cleanup bill had risen to more than $10 million.

—Phil Sulak

An L&L Environmental Services crew disposes of absorbant pads contaminated with oil.

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