

# TEXAS SHORES

## Shipwreck!

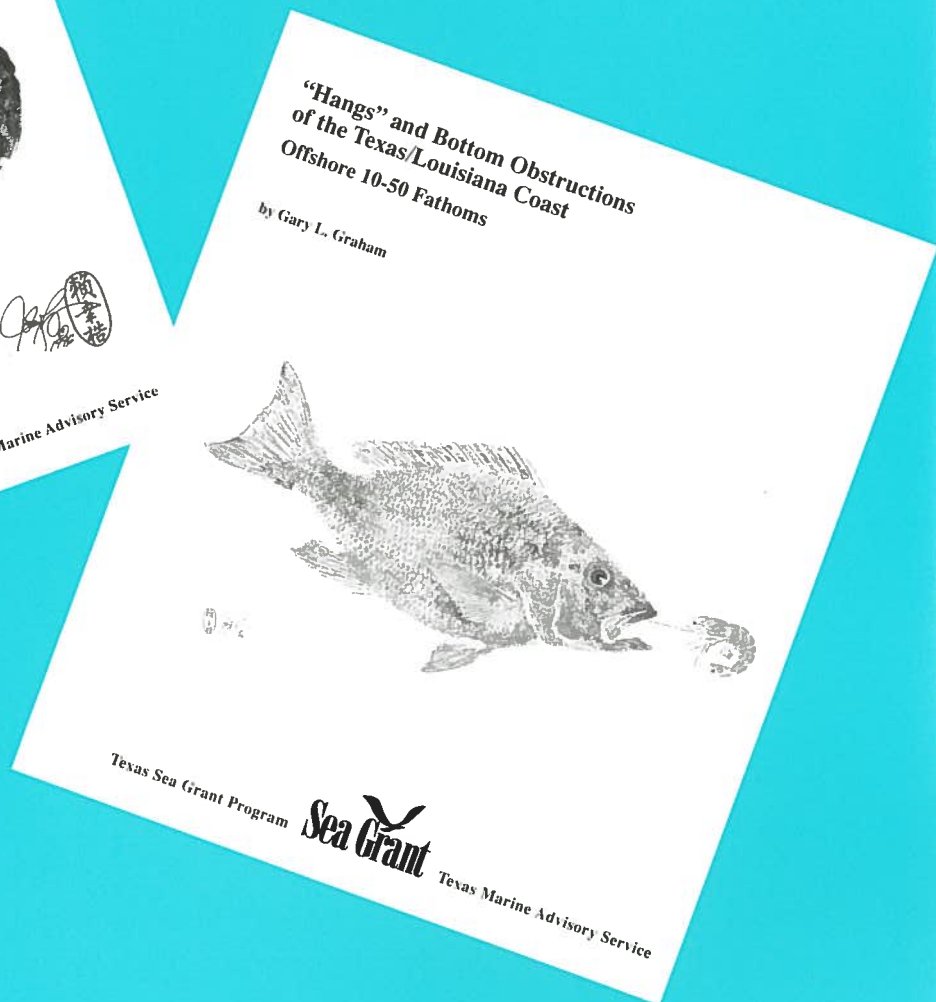
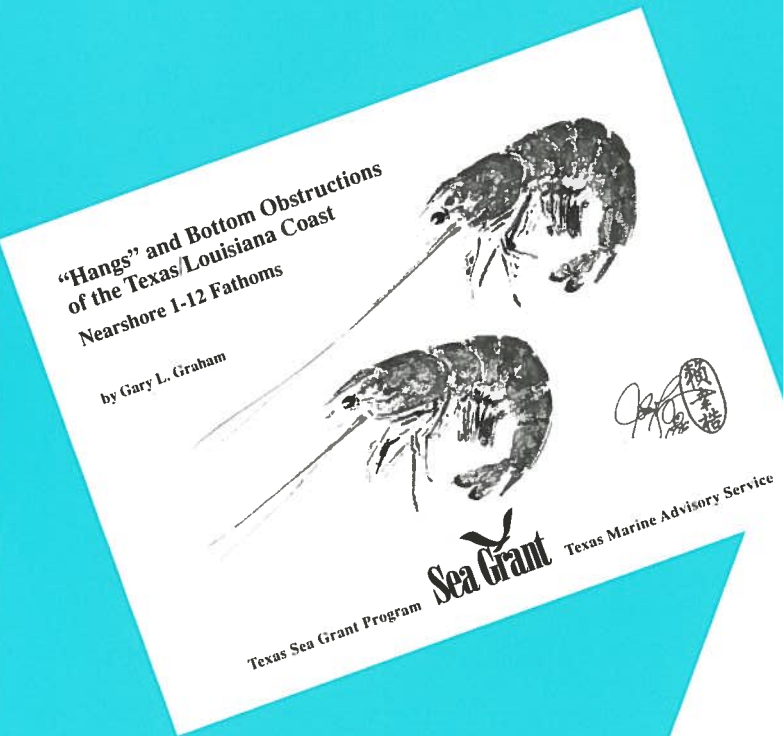


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SUMMER 1996

# TEXAS SHORES

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## THE ISSUE: SHIPWRECKS

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Highlights include the release of Kemp's ridley hatchlings from Padre Island National Seashore; the recurrence of a deadly virus among the dolphin population; announcement of a Fall conference on restoring shellfish and their habitat; and a third incidence of an extensive catfish kill in coastal waters.

### 4 SHIPWRECK!

There may be as many as 2,000 shipwrecks along the Texas coast, from those of the earliest Spanish explorers to World War II-vintage German U-boats. One of the most historic, the French explorer La Salle's *La Belle*, is being salvaged now in Matagorda Bay.

### 22 ADVISOR

Nancy Webb feels most at home near the Gulf of Mexico, thus her new job as Matagorda County Marine Agent seems tailor-made for her.

**STAFF** – Dr. Robert R. Stickney, *Director*; Mike Hightower, *Deputy Director*; Amy Broussard, *Associate Director*; TEXAS SHORES Staff—Jim Hiney, *Editor*; Phillip Sulak, *Marine Advisory Editor*; Amy Broussard, *Design*; Eric Graham, *Distribution Manager*; Anessa Heatherington, *Editorial Assistant*.

**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

## **Ridley hatchlings at Padre Seashore headed for Gulf**

By July 8, the Padre Island National Seashore was incubating 505 Kemp's ridley turtle eggs in its effort to protect and establish an second nesting colony for the endangered species. And 58 had already been released into the Gulf.

The eggs came from six nests found along the Texas coast, said Donna Shaver of the National Biological Service. After the nesting, biologists retrieved the eggs and sent them to Padre Island National Seashore for a 48- to 50-day incubation period.

Two of the mothers found nesting along the National Seashore were "headstart" ridleys, meaning they were released at the Seashore after being incubated. One mother was from the 1983 year-class Shaver said, while the other being incubated in 1986. The turtles were identified by the "living tags" they were marked with prior to their release.

Both headstart turtles returned to the general area of their release, Shaver said, which is the point of the program.

The primary Kemp's ridley turtle nesting area



is about 150 miles south of Brownsville, near Ranch Nuevo, Mexico. By establishing the Padre Island National Seashore as a second nesting area, Shaver said, the hope is the species will survive should there be a disruption near their Mexican home.

Eggs were transferred to the National Seashore for incubation and release from 1978 until 1988. Researchers theorize that the turtles will return to the area where they were first incubated and waded into the ocean. This year's two headstart turtles may be proving the theory to be true.

All six turtle nests have been found by visitors to the beach. Shaver encourages anyone seeing a turtle nesting or turtle tracks on North Padre Island to contact her immediately at (512) 949-8173. If a nesting turtle is found on South Padre Island, contact Don Hockaday at The University of Texas-PanAmerican Coastal Studies Laboratory, (210) 761-2644.

Kemp's ridley turtles begin nesting in April and continue through early August. The turtles nest between the hours of 6 a.m. to 6 p.m.

## **Morbillivirus hits Gulf dolphin population again**

A virus that caused a record number of deaths in dolphins in 1994 is believed to be causing problems again along the upper Texas coast.

As of July 1, 183 dolphins have washed up on Texas shores this year, said Ann Bull, State Operations Coordinator of the Texas Marine Mammal Stranding Network. That compares to 116 for all of 1995.

"The speculation is that the morbillivirus is the culprit," Bull said in a telephone interview from the Network's Galveston office. "That was the cause in the 1994 kill-off and these dolphins appear to be in the same condition."

A record number of dolphins—297—washed up on Texas shores in 1994, with most of them bloated and badly decomposed. The dolphins coming ashore now are in a similar condition. Bull said 150 dolphins wash ashore in a "normal" year. Not all the dolphins washing ashore have the virus, Bull said, but the virus is believed to be contributing to the elevated number.



Lung tissue samples are being sent to Washington, D.C., Bull said, to determine the cause of death. A few dolphins, found before they were badly decomposed, had full necropsies at the University of Texas Medical Branch in Galveston. The local tests indicated that the dolphins were infected by the morbillivirus.

Most of the dolphins have beached between the Bolivar Peninsula and Freeport, she said, and have been coming ashore on a "regular basis" since late December.

Only one dolphin with the virus has been found alive, Bull said. The female spotted dolphin eventually was euthanized because of parasites in her brain.

The virus affects the animals' immune systems, Bull said. The stronger ones can survive it, she said, but the weak ones fall victim to diseases.

"The dolphins are probably coming ashore here because of the currents," she said. "We think that the dolphins are actually dying off the Louisiana coast, but that's just a theory."

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**Fall conference  
to focus on  
restoring shellfish**

Hilton Head Island, S.C., will be the site of the first International Conference on Shellfish Restoration, Nov. 20-23, 1996.

The conference (ICSR '96) will focus on restoring molluscan shellfish and their habitat.

Often referred to as "the canary in the mine shaft" of the marine environment, shellfish and waters they populate serve as excellent indicators of environmental health, according to Dorothy Leonard of the National Marine Fisheries Service (NMFS), who is organizing the conference. NMFS is a division of the National Oceanic and Atmospheric Administration.

"There is a growing commitment to the restoration of degraded coastal ecosystems throughout the world," Leonard said. "Political pressure by shareholders in the future of the world's coastal



areas has resulted in renewed interest in preserving and enhancing coastal resources by all levels of government."

The conference program will feature invited and contributed oral and poster presentations and workshops. Sessions will be organized around three general themes:

- Shellfish habitat assessment and restoration;
- Shellfish stock enhancement, management and restoration; and
- Shellfish/habitat remediation through watershed management and pollution abatement.

Contact Elaine Knight at South Carolina Sea Grant, 287 Meeting Street, Charleston, S.C., 29401, for registration and other information. She can be reached by phone at (803) 727-6406, by fax at (803) 727-2080 and by e-mail at knight@musc.edu.

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**Extensive catfish  
kill recurs in Gulf  
coast waters**

For the third time in as many years, there has been an extensive catfish kill in the Gulf of Mexico. Each event has covered a larger area, with increasing numbers of dead fish.

The latest episode began in early May, with fish dying from San Antonio Bay, Tex., to Crystal River, north of Tampa Bay, Fla. Dead fish washed up on beaches in Louisiana, Mississippi and Alabama, as well as Texas and Florida. The kill apparently ended in mid-June.

The first kill, in May 1994, was confined to the Sabine Pass area at the Texas-Louisiana border and affected primarily catfish. A second event, in October-November 1995, stretched from Sabine Pass to Matagorda Bay in Texas. There were reports of a similar kill in the Tampa Bay area at the time, followed by reports from Brazil and Belize earlier this year.

This year's kill included millions of fish said Dave Buzan, a Kills and Spills team leader with the Texas Parks and Wildlife Department. Ninety-five percent of the dead fish were hardhead catfish, he said, with the rest being gafftop sail catfish. There are also a few reports of blue catfish, a freshwater fish that can tolerate some salinity, dying near the mouth of the Lavaca River.

"Externally, they look very similar," said Dr. Jan Landsberg, a research administrator at the



Florida Marine Research Institute of the Florida Department of Environmental Protection, about this year's catfish kill and the 1995 incident. Fish were found with bloody lips, bloody fins and other signs of hemorrhaging, and displayed signs of disorientation shortly before dying, she said.

The culprit doesn't appear to be pollution or any other man-made cause, but tissue samples taken last year contained an amoeba-like organism that isn't normally found in catfish. Research is now ongoing to determine if the same amoebas are in this year's samples.

"Biologists found amoebas in the fish during the last kill," Buzan said. "We don't know how they are affecting the fish, other than they are infecting and damaging internal organs."

Landsberg said that if amoebas are found in this year's dead fish, it's likely the two events are connected. Finding amoebas in fish is uncommon, Landsberg said, and there are no clues so far as to what is triggering this phenomenon.

Even if the amoeba is present, Landsberg said other tests will continue on water and sediment samples from around the Gulf, to see if some other cause for the kill can be found. Tissue samples are being screened for viruses and bacteria. Other, healthy catfish are also being sampled from areas not affected by the kill.

# Shipwreck!

BY JIM HINEY

The 45-foot cabin cruiser pitched and rocked in the moderate seas that were Matagorda Bay on a windier than normal day this past May. Passengers milled around the boat as it made its 90-minute trip, traveling 15 miles and 300 years into the bay.

Once the boat got to its destination, several hundred yards from Matagorda Peninsula and a few scant miles north of Pass Cavallo, the divers on this boat still had 12 feet to go ...

... Straight down.

Their destination: the remains of one of four ships that brought the French explorer La Salle to this bay in 1685. *La Belle* was the smallest of the four ships that made up La Salle's final trip to the New World. It was also the only ship that was his outright, a gift from King Louis XIV of France.

*La Belle* is but one of about 2,000 shipwrecks known to lie along the Texas coast. In strict legal terms, only about a third of those wrecks are considered "historic" under Texas law, confides the state's

own wreck hound — marine archaeologist J. Barto Arnold III.

Only ships wrecked before the year 1900 are protected under the state's antiquities act. Under that law, the ships and their artifacts belong to the people of Texas and cannot be excavated without the state's permission and governance.

The other two-thirds of Texas shipwrecks, all sunk after 1900, are fair game for anyone who wants to salvage them.

Arnold's job is as unique as the man and his name. He is the marine archaeolo-





gist for the Texas Historical Commission, the state agency charged with preserving Texas' historic heritage on land and sea. It's a job Arnold has loved for 24 years.

Arnold's name represents a bit of historic preservation itself. His great grandparents named his grandfather after a Civil War general they knew and the name has been passed down since.

Arnold doesn't look the part of the intrepid archaeological maverick, an image conjured up by too many *Indiana Jones* movies. Tall, lean and bespectacled

with a bit of a thinning hairline, Arnold more resembles the stoic, even-tempered scholar one expects to find teaching in a college classroom. So he seems just a bit out of place dressed in khaki and sitting on a long bench seat atop this rocking boat with his gaze cast forward toward a spot he can't yet see but that glows in his eyes.

His quiet facade belies a youthful exuberance that bubbles to the surface as soon as you get him talking about *La Belle* in particular and nautical archaeology in general. He talks at length about what he

hopes to find and why he hopes to find it. How even the most mundane object can be a treasure to someone.

And how "historic" doesn't apply only to boats sunk before 1900.

"Historic," to Arnold, means "being associated with a famous person or event or being an interesting design in engineering terms or architectural terms."

In that vein, Arnold said some of the most interesting historic shipwrecks to him are the 12 liberty ships intentionally sunk along the Texas coast to create arti-

ficial reefs for sports fishermen and recreational divers. Though not built until the 1940s, the ships “had very interesting lives or events associated with them in World War II,” Arnold proclaimed.

There are wrecks of all ages along the coast, from the Spanish silver galleons of 1554 near the Mansfield Cut of Padre Island to *La Belle* of the 17th Century; from Texas Navy ships to Civil War vessels from both sides, all marking the 19th Century; all the way to a Mexican liner sunk by a German U-boat in the Gulf off Matagorda Bay during World War II.

Each has its own story. They are stories that can teach us much about our past and ourselves, if we let them, gleams Arnold.

While education is a noble goal, shipwrecks also fulfill an economic need. They draw dollars from tourists curious to see cleaned and neatly-arranged artifacts in museum displays. There are already plans for permanent and traveling exhibits of La Salle artifacts, though the final locations for the exhibits haven’t been set yet.

Undoubtedly, artifacts in the traveling exhibits will tour not only Texas but the rest of the country. Current plans also call for at least one exhibit to take some artifacts full circle — back to France.

No one at the Historical Commission will venture a guess at how many tourism dollars the exhibits will generate; there are just too many variables. It is possible that the wreck will bring in more than the \$4 million Arnold and his people will spend excavating and conserving *La Belle*, though the excavation isn’t intended as a money-making proposition.

Excavation funds are a combination of \$1.7 million in public money approved by the Legislature and \$2.3 million in private contributions. The excavation itself will be gloriously public. The structure that will surround the wreck during the excavation will have a public observation deck. Boaters need only pull up, tie up and walk up to watch the work.

No reservations required.

Matagorda Bay locals are also busy trying to attract tourist dollars by putting together tours to the excavation site, said Renée Peterson, director of communications for the Historical Commission. Those tourists will also fill local hotels, dine in area restaurants and shop in stores around the bay.

Shipwrecks are capable of providing



J. Barto Arnold III

education and generating tourist money because their very existence tugs at humans’ most basic spiritual need — adventure.

“Most people may not get to hunt shipwrecks, but at least reading about them is sort of living the adventure, like an arm-chair adventurer,” believes Tom Townsend, a self-described adventurer and wreck hunter whose book, *Texas Treasure Coast*, relates tales surrounding many famous shipwrecks along the Texas coast. The book, the latest edition of which is due out this summer, found a popular niche when it first came out in 1979. It was then, and remains, about the only book that looks exclusively at Texas shipwrecks.

“I don’t think there’s any question that people like to read about things they would like to do,” Townsend said. “Treasure in general has the same appeal to people. It always has and I guess it always will. I don’t really think it’s the possibility of untold wealth. I think it’s the thrill of the hunt. If a person really wanted untold wealth they’d study the stockmarket or they’d study politics or something like that.

“Much as fishing has an attraction, I think treasure hunting is one step beyond that. You get to do all of the things you do when you go fishing but you always have that possibility of that great find.”

## To touch history

What brought La Salle to Matagorda Bay more than 300 years ago?

And what brings a small army of archaeologists, volunteers, engineers and construction workers to this bay on the mid-Texas coast today, or at all?

There is nothing outwardly remarkable about this place. A handful of shrimp boats seem to pull their nets randomly through water colored as coffee, heavy on cream. The only precision here belongs to the squadron of brown pelicans flying close maneuvers a scant few feet above the choppy waters.

La Salle came to Matagorda Bay by accident more than anything else. He was looking for the Gulf entrance to the Mississippi River, a river he had only seen traveling from the north. Whether he trusted his maps too much or his senses too little, arguably the greatest of the French explorers overshot his mark by about 400 miles.

That’s less than a six-hour detour on today’s high-speed interstates. In 1685 it was maybe a month or so by foot. For La Salle and his expedition it turned out to be an eternity.

History portrays La Salle as somewhat aloof, cold, impersonal or any number of similar adjectives. One of the few people he seemed warm to at all was Nika, his



faithful guide and hunter, an Indian brave he first met while opening up the great Canadian expanses for the French fur trade. Some historians characterize La Salle as a pure explorer, a man who didn't like to stay in one place very long, one who explored for exploring's sake. And a scant few paint La Salle as a military man bent on conquest, though that is probably furthest from reality.

Noted Texas historian and La Salle biographer Robert Weddle offers something else. Weddle believes La Salle was manic depressive. Look at the journals of the men who followed La Salle on his expeditions and each one is rife with instances where La Salle, presumably in the manic phase, went forward on his explorations, "Like a house on fire," Weddle explains. But let something go wrong and La Salle dropped into a deep depression. That's classic manic-depressive behavior offers Weddle, who said he has made much study of the illness.

"Overachievers are often afflicted with this disorder," Weddle asserted.

Whether La Salle was standoffish, eccentric or even mentally ill, it's almost certain that what accidentally brought him to Matagorda Bay was plain old everyday greed.

He was, after all, an entrepreneur — a trader by profession. His motivation primarily was commerce among the Indians, "though I don't know why he felt he needed to go to such great lengths except that he envisioned a trading empire that would span from the Great Lakes to the Gulf of Mexico," Weddle explained.

That's not to say that early explorers were just a bunch of money hungry thugs. Leaving the relatively safe shores of Europe to trek thousands of miles into wilderness took more than a little courage. Sea travel was often perilous. There were chronic shortages of fresh food and water, marauding pirates to avoid and the fear of the lurking unknown, to say the least. Those adventurous enough to explore the New World braved inaccurate maps, poor

seamanship and poorly constructed ships — some sent to the New World knowing they would never return.

Once travelers got where they were going there were harsh living conditions and the ever-present threat of natives who had already had poor experiences with foreign visitors.

But the "civilization" that explorers



left in Europe wasn't all that great, either, noted Donny Hamilton, head of Texas A&M University's much-respected Department of Nautical Archaeology and conservator of the university's conservation research laboratory, which will do part of the restoration work on artifacts from *La Belle*.

Whether talking about the conquistadors from 16th Century Spanish ships or colonists from France and England, there was one constant.

"It's the same reason people went to California during the Gold Rush," Hamilton mused. "At this particular time [16th Century] this is where the opportunities were and that's why you have a

whole lot of people migrating from Spain to the New World. Spain had been around for a long time so there weren't a whole lot of opportunities for advancement. You're not going to get out of the mold you were born into.

"Basically it was the golden opportunity to make a lot of money that was not available in Spain. That's why you have all of the people coming to Ottawa from France in the fur trade and the English coming over here. It's just a way of getting out of the feudal system they were in where everybody was pretty much locked into a class system," Hamilton continued. "A lot of the people on the 1554 Spanish silver wrecks were actually some of the original conquistadors who had arrived with Cortez and then they'd made their fortunes and were returning to Spain, but they didn't make it back."

What brings the present day explorers like Arnold to the spot that claimed La Salle's last ship is a bit more abstract. They are here to bring any remnants of *La Belle* from the bottom of the bay. They're looking for more than treasure. Likely there was very little money aboard the boat.

Instead, they are interested in the mundane, everyday things like knives, forks and spoons. They will leave no cannon shot, armament or even sewing supplies ungathered. They will even bring up the remaining timbers that were *La Belle*'s hull.

They will do this for *La Belle*, as they do for other historic wrecks, because doing so gives modern people a glimpse of what things were like in past eras. These glimpses won't help us make better utensils, weapons or even boats, but they do offer us other rare opportunities, muses Hamilton.

"It allows us to actually touch history."

# The legacy of La Salle

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René-Robert Cavelier, Sieur de La Salle, was born into a wealthy merchant family in Rouen in November 1643. He was one of six children in a family whose “thrift, solidity and seriousness of purpose, aided by the high price of cloth, had provided such affluence over the generations that, in the reign of Louis XIV, the head of the family was able to dedicate two of his offspring to religious and intellectual careers,” notes New York-based writer Anka Muhlstein in her book, *La Salle: Explorer of the North American Frontier*.

La Salle was one of the children picked for this religious and intellectual life and his mental gifts showed early. He proved himself a master of mathematics and he quickly adapted to the rather regimented life of the Jesuit schools he attended. By the age of 17, La Salle entered a holy order.

It was in those Jesuit schools that he learned of navigation and cartography, or map making, for which he also had amazing aptitude. As he grew into his vocation for cartography — he drew the first world map for King Henry II and also founded a school of mapmaking — so grew his wanderlust.

In fact, La Salle spent time dreaming of exploring China, a corner of the world he would never visit. He began to tire of the Jesuit classroom life—he taught grammar in several French towns — and he longed to explore.

Restless and quickly losing patience with his holy superiors, who refused to let him travel as he wished, La Salle quietly resigned from his order. It was the first step in his journey to the New World.

That La Salle opened much of the Canadian wilderness to exploration and trade is well known. His northern exploits

are of interest to Texans in that they were the genesis of his eventual arrival in Texas waters. Had La Salle not discovered, traveled and claimed the length of the Mississippi Valley for France he would not have had the knowledge, desire or means to approach the river from the southern side, the Gulf of Mexico, and Texas would be without a rather fascinating chapter in her history.

La Salle arrived in the Great Lakes area in 1671 and explored there for 10 years, helping establish several forts from as far northeast as Montreal to as far south as present day Illinois. In the process he also helped establish an expansive fur trade industry. By January 1682, he began his journey down the Mississippi. He found the mouth of the river about four months later. In September of that year he headed back to Illinois.

He returned to find things different in the north than when he left. Powerful allies were out of power and it was with some shame that La Salle was sent packing back to France in November 1682. But he no sooner arrived back home than he began planning a triumphant return to the New World. That return depended on selling his idea to the king, and that was no easy feat. Exploration and colonization had been popular causes when he first left for North America, but those ideas were falling out of favor at home as France focused on its military and cultural dominance in Europe. The religious fervor that had spurred, in part, France’s forays to the New World had diminished in the years La Salle was away.

The French, it seemed, were now more interested in making strong impressions at social gatherings than influencing the religious lives of New World savages.

To convince the king that a new expe-

dition was needed, La Salle seized upon a more immediate problem — the French and Spanish had just declared war on each other. La Salle offered his services to establish a colony at the mouth of the Mississippi as a trading post and, more importantly, as a base from which France could launch assaults on weakly held Spanish possessions in what are now northern Mexico and Texas.

Louis XIV jumped at the chance, giving La Salle four ships. There was the *Joly*, a 36-gun man-of-war; *L’Aimable*, a 300-ton storeship; *Saint-Francios*, a small two-masted merchant ship called a “ketch”; and *La Belle*, which the king gave to La Salle outright. *La Belle* was a six-gun barque longue, the smallest class of fighting ship.

The four ships, carrying a total of about 300 people, began their voyage to the New World in August 1684 but the *Saint-Francios* never even reached the Gulf of Mexico. She became separated from the other three ships and was captured by Spanish pirates in the Caribbean in late September of that year. The remaining three ships arrived off Matagorda Bay in February 1685 and *La Belle* safely entered the bay through Pass Cavallo in the middle of the month.

Two days later, the *Aimable*, under the command of a captain whose courage, skill and good sense poured from a wine bottle, ran aground on a sand bar and sank as she tried to navigate Pass Cavallo, taking with her many crucial supplies needed to establish the new French settlement. Parts of *Aimable* are thought to still exist under the brooding waters of the area, making her as attractive a prize for archaeologists as *La Belle*.

*Joly’s* skipper, a military man with whom La Salle had already had many

squabbles, turned his ship for home in March 1685 after completing his mission to deliver La Salle and his expedition safely to the New World. The skipper, Tanguy Le Gallois de Beaujeu, offered to sail for more provisions for the new settlement but La Salle refused the offer. Beaujeu had no choice but to set sail for home with about 120 people, including the crew of *Aimable* and some disenfranchised colonists. That left about 180 colonists, La Salle and *La Belle* to establish a new Fort St. Louis, which La Salle began building on Garcitas Creek at the head of Lavaca Bay.

Less than a year later, while La Salle was out exploring the area, *La Belle* lay broken on the bay floor, the victim of a great storm and human frailty. Her crew, drunk on brandy that was far more plentiful than fresh water, ran her aground during a violent storm. Had the crew been physically fit they might have had a chance to float *La Belle* before her seams opened completely and her hold filled with mud and water.

But the crew, like most of the colonists, were weak from illness and lack of food and water. With their last ship gone, the already struggling French settlement was doomed. A handful of people, mostly children, survived the expedition. For the rest of the colonists, those who didn't succumb to disease or the elements ultimately succumbed to the local Indians.

Arnold calls *La Belle's* discovery one of the most important in the New World for many reasons, not the least of which is the possible affect La Salle could have had on the region.

Had La Salle successfully colonized the Matagorda Bay area, "the second language in Texas might be French instead of Spanish," Arnold speculated.

Ironically, the very situation that clinched the king's support for La Salle may have led to the explorer's ultimate fall. La Salle may well have succeeded in colonizing Texas if he'd had the king's continued support, but that support relied in large part on the war between Spain and France.

"You have to remember that while La Salle was on his way over peace was made between France and Spain and he didn't know it. He was left hanging high and dry," Weddle noted. "It's just not very likely that it could have happened, that he would have had the support that he needed

and been able to gain a toehold here, given all of the factors that we know."

Besides the king giving up on La Salle, the Spanish were none too happy he was in their territory. The Spanish sent out an expeditionary force to find La Salle and do whatever necessary to end this French threat. But by the time that force arrived in



A La Salle statue stands guard overlooking Matagorda Bay at Indianola.

Matagorda Bay in 1687 they found nothing but the rotting remains of *La Belle*. Another Spanish force in the area two years later found the ragged remnants of the now destroyed Fort St. Louis and the Spaniards managed to rescue the scant few survivors, mainly children, who had not been killed by the Indians.

*La Belle* is also important because it was La Salle's personal ship and its type,

a *barque longue*, "received very little attention in the historic records and went out of use in the 1720s and 1730s," Arnold noted. "There's only one set of line drawings for a similar ship to this one in the archives in Europe so every construction detail on the hull remains is new knowledge. That's one of the most interesting things about it."

And *La Belle* represents kind of a Twilight Zone of shipwrecks.

"As far as I'm aware this is probably the first 17th Century French ship excavated in the New World," offered Texas A&M's Hamilton. "In fact, the 17th Century is the least known in terms of ships of any period. We have more 16th Century Spanish ships than 17th Century Spanish ships. We have more 16th Century English ships than we have 17th Century English ships.

"I have no idea why (there are fewer 17th Century shipwrecks found) but it is the big gap," Hamilton continued. "Nautical archaeologists are very interested in how the French built ships as opposed to how the English built their ships. What did they have in common? What were the subtle differences? They're looking at the whole evolution in ship design and the 17th Century was a time when they were making rapid changes. This is still early enough when they didn't have plans.

"By the time you get to the 18th Century you start having formal plans that are laid out and you can look at. Of course, having a plan doesn't mean the ship was built that way. It's kind of a best educated guideline that they followed to some degree but still almost no ship is going to follow its original plans exactly."

La Salle's end was far less auspicious than that destined for *La Belle*.

After his last ship sank, La Salle realized the only hope for his decimated colony was to find the Mississippi and follow it north to the French forts of Canada and the Great Lakes. He set out with a small party in January of 1687 but didn't make it more than a few hundred miles.

Several of his men, more than a little disgruntled with their strong-willed boss and certain they could survive without him, lured La Salle into an ambush. He died of a gunshot wound to the head. The assassins left his body in disgrace on the ground for wild animals.

No one is quite sure where La Salle met his end. Most people agree that it was somewhere between the Brazos and Trin-

ity rivers, though the *Handbook of Texas* puts the spot at Larrison Creek in present day Cherokee County, near the Neches River.

As far as the French government is concerned, La Salle died on the Navasota River near present day Navasota. The French government conducted a historical survey of its own in the late 1920s and named Navasota as the spot of the ambush. To commemorate that finding, the people of Navasota, along with the Daughters of the American Revolution, erected a statue to the fallen explorer in 1930.

The bronze statue stands today, keeping a silent watch over downtown Navasota.

In a bit of justice, the power struggle that ensued after La Salle's death claimed another eight or so lives among the disgruntled, including the two ringleaders, who killed each other.

Much of what we know of La Salle's death survived with his old friend and aide, Henri Joutel, who made his way back to Canada with his journal of the ill-fated Gulf expedition.

## Modern technology meets historic artifacts

Finding *La Belle* ended a nearly two-decade quest of sorts for Arnold. He began researching the wreck in the early 1970s by reading, among other things, the journals of the Spanish explorers who found *La Belle*, "keeled over to starboard and down by the bow with part of her deck still above water," Arnold recalled from the vast database he keeps in his head.

The Spanish journals, as well as some kept by survivors of the doomed French expedition, gave Arnold a pretty good idea of where to start looking for *La Belle*. He began that search in 1978 with a helicopter, a boat and a magnetometer — an electronic instrument that detects distortions called "anomalies" in the Earth's magnetic field caused by ferrous metals, including iron artifacts.

Problem is, magnetometers can't tell the difference between a 20th-Century wellhead and a 17th-Century cannonball. So archaeologists must spend time and money checking out the anomalies they consider promising. In Arnold's case, he found artifacts from several old shipwrecks, including two pre-Civil War wrecks, but none historic enough to divert his attention from *La Belle*.

Arnold had the drive and determination to find *La Belle*, but in a time of diminishing budgets the state didn't have the money to continue looking. *La Belle* had to wait while Arnold turned his attention to his other preservation duties.

Fortunately, Arnold never lost his desire to find *La Belle* and a few years ago put together about \$75,000 in private funds and equipment donations. In June 1995, Arnold and a team that included archaeol-

ogy students from several universities, widened their search area in Matagorda Bay and located several promising anomalies. They anchored their boat above one of the anomalies and began exploring in water so murky that it was "disorienting," according to one diver.

Early on, using the propellers on the boat to gently blow away sediment on the bay floor, divers began finding artifacts like thin pieces of wood and lead bullets. These were definitely old artifacts, but were they old enough?

Arnold got his answer when a diver brought up a bronze belt buckle of a type common before the 1800s. Then came the clincher.

One of the divers, Florida State archaeology student Chuck Meide, grabbed another diver, 20-year-old Sara Keyes, and began "gesticulating wildly," recalled Keyes, who had recently graduated with a degree in archaeology from The Univer-



Dr. Toni Carrell, archaeologist with the Corpus Christi Museum of Science and History, (above) with the completely cleaned canon recovered from the wreck site. A closeup of the canon is at left.



sity of Texas. "He put my hands on a large metal object that was cylindrical."

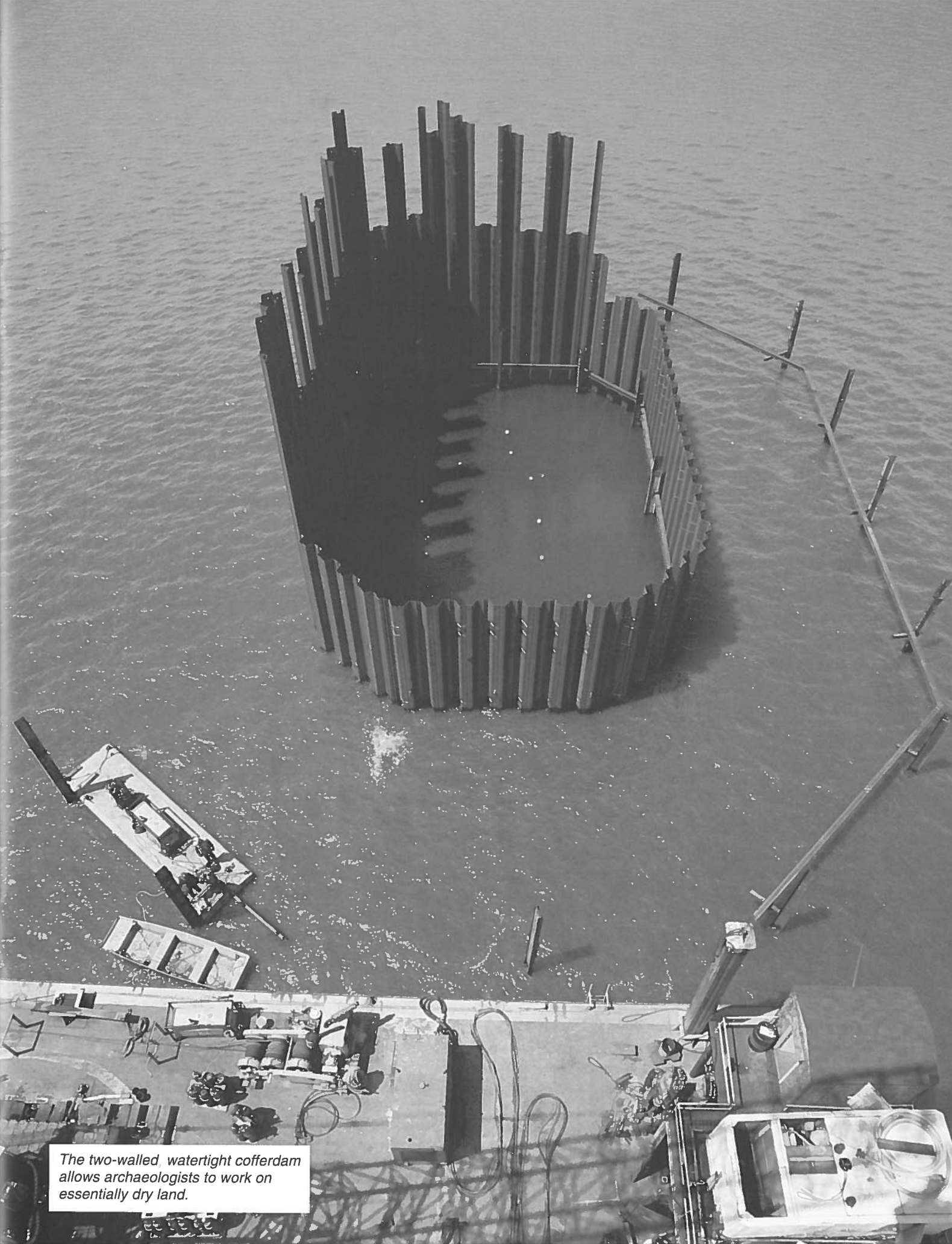
They had found what has become the pictorial symbol of the La Salle wreck — a 6-foot bronze cannon with ornate lifting handles shaped like dolphins. On the cannon they found the name of a French admiral who had served in the French Navy until one year before La Salle left for the Gulf Coast.

"Something like that wouldn't be on any other ship beside *La Belle*," Keyes said.

Excavating *La Belle* may prove as historic as the wreck itself. The state is spending about \$1 million to surround the wreck site with a two-walled cofferdam, a watertight structure used to keep water out of an enclosed area that has been pumped dry.

This cofferdam will be only the second ever used in the Western Hemisphere to excavate a shipwreck and will be the first from which the water will be completely pumped away, leaving archaeologists to excavate on more or less dry land.

The first cofferdam built in this hemisphere was part of a late 1970s excavation of a Civil War ship sunk in Virginia's James River. In that project, the water was pumped out, filtered to clear it and returned to the cofferdam.



*The two-walled, watertight cofferdam allows archaeologists to work on essentially dry land.*

Arnold is using a cofferdam at the *La Belle* site because of incredibly poor visibility, which at best is no more than about one foot. Visibility becomes virtually zero when any movement by the divers stirs up mud on the bay floor, and there is no way to excavate the wreck without stirring up the sediment.

The outside wall of the cofferdam will be 148 feet wide by 118 feet long. The inner wall will measure 82 feet wide by 52 feet long. Though the metal sheets that make up

the cofferdam are 60 feet long, the outer wall will extend just five feet above the water's surface. Engineers estimate they must sink the pilings 41 feet into the bay floor to keep water from seeping back into the excavation site.

A moveable crane sits on a track in between the walls and will be used to lift artifacts from the site to transport barges. In somewhat of an irony, the state couldn't begin the project until it waded through a bit of governmental red tape, much of it federal. For help, the Historical Commission turned to the Texas A&M Sea Grant College Program and its deputy director, Mike Hightower.

"We needed permits from the Historic Commission to ourselves, for our own files, just like anyone else does, but the main permits that Mike Hightower helped me to understand and make sure we had were a dredging permit from the Corps of Engineers, a surface lease from the General Land Office to more or less rent the area we're working in and we also had to contact the Texas Natural Resources Conservation Commission (TNRCC) to find out if we needed a permit for dumping the water back into the bay," noted Layne Hedrick, the Historical Commission assistant archaeologist given the duty of obtaining the required permits.

Hightower knows his way around both the state and federal governments. He



Unidentified diver at La Salle site.

spent six years in the state's General Land Office, two of those as assistant land commissioner and more than two decades working for private firms, research institutes and public offices focused on government and its regulations. His Sea Grant duties require that he work closely with local, state and federal officials for the benefit of the marine and coastal environments.

It was his knowledge of government and regulations that Hightower gladly lent to the state of Texas, cutting what could have been a year-long process down to less than four months, Hedrick estimated.

"Mike was very useful in letting me know who I needed to contact because some of these people I never would have thought much about," confided Hedrick. "I knew I needed to get in touch with the Environmental Protection Agency ... but the TNRCC about moving water? I would have never thought of that. I'm a grad student, I just got out of grad school so this is a completely new thing to me. Mike sat me down and went through the whole procedure, what it all means, who I had to talk to, what they were going to ask and

what they were going to expect from this excavation as far as being in control of what happens.

"He did a wonderful job. We wouldn't have gotten our permits without Mike."

Excavation was expected to start in early August and take about four to six months. After that the cofferdam will be dismantled and the metal walls resold, refunding part of the state's construction expense.

But excavation is the first, and shortest, step in the preservation process. Archaeologists will spend the next four to six years conserving the artifacts. That means tedious hours with small pneumatic chisels carefully chipping away the mass of accumulated minerals that encase the artifacts.

Archaeologists refer to the amorphous masses of minerals and arti-



Archaeologist Sara Keyes cleaning pewterware from the La Salle.

facts as "concretions." It's a fitting term because the objects look like variously shaped chunks of concrete. They are made up of the minerals in the surrounding water and the byproducts created as the original metals corrode. The combination encases the artifacts.

The task facing archaeologists is separating the artifacts from their stone-like tombs. That means using x-rays and trained eyes to cleave relics from rock.

"Every metal artifact has three to four times the weight of the original artifact just in encrustations," Hamilton said. "It's like laying artifacts on the floor and pouring concrete over them and then saying, 'Okay, get them out.'"

It is the seawater and its effect on man-made objects that sets nautical archaeology apart from other archaeological disciplines, notes Hamilton.

"Nautical archaeology is the only

branch of archaeology that is totally tied to the conservation laboratory. You cannot do the archaeology without the conservation laboratory," Hamilton asserted. "You can go out and dig a land site, get the artifacts, identify them, take photographs and analyze them without doing much conservation."

Many times, nautical archaeologists must make something out of nothing.

"It will be a common occurrence on the La Salle wreck, given its age, that the smaller iron artifacts will completely deteriorate, there won't be anything left of them at all. But the encrustations around them forms a perfect mold of the original artifact," Hamilton noted. "So even though the artifact isn't there the mold is. You have to break it open, fill it up with epoxy and then chisel it back out.

"We have keys, scissors, chisels, hammers and there's not one bit of metal left. They're all now completely epoxy. But you have to cast every natural mold you come across and you have to do that to get a full inventory of everything that was there. There could be makers' marks, for instance, on a pair of scissors or on a key and these marks will show up in the epoxy cast that you make," Hamilton observed. "In fact, if I laid them down on the table you couldn't tell me just by looking at them which ones were the epoxy casts and which ones were actually metal artifacts. There is an awful lot of casting, especially for a wreck that is at least 300 years old."

For artifacts found before they totally corrode, conservation doesn't end with chipping away the encrustation. Archaeologists then use a few different treatments, primarily electrolysis, to reclaim some of the corroded metal. Ferrous metals, those with iron in them, cannot be turned back into iron. But the corrosion products can be changed into magnetite through electrolysis.

"With all of your non-ferrous metals you can actually take the corrosion products and convert them back to metals," Hamilton explained. "Silver sulfite can be converted back to silver, lead sulfite can be converted back to lead, copper can be converted, so all of your non-ferrous metals can actually convert the corrosion products back into the original metal,

though it's not as dense as it originally was."

Conservation of artifacts never really ends, noted Arnold. Artifacts must be re-treated from time to time. For example, iron artifacts must go through electrolysis every three or four years because there is no way to ever remove all of the corrosive substances from the artifacts, said Arnold.

In a way, nautical archaeologists are part scientists, part engineers and part alchemists.

Even the timbers that used to be *La Belle* will be conserved, and their con-



*An artifact, probably the hilt of a sword, awaits conservation at Texas A&M's Conservation Research Laboratory.*

servation will take the longest time, by far. After spending more than 300 years under water, water is about the only thing holding the timbers together. If they were exposed to air and allowed to dry the timbers would most likely shrink and shrivel into nothing.

To preserve the wood, Hamilton and other archaeologists must immerse the timbers in any one of several substances that will replace the water and stabilize the wood. How long this will take is anybody's guess, admitted Arnold. Conservationists will take core samples from time to time to check the solution's progress but Arnold said he believes the wood will have to soak for at least four or five years.

But at least they have an opportunity to preserve part of the ship's wooden structure. Arnold and Hamilton weren't that lucky with the last shipwreck they worked together — the 1554 Spanish silver fleet found in South Texas.



*Archaeologist Donny Hamilton chips encrustation from a recovered artifact.*

## The silver galleons

The oldest shipwrecks yet found along the Texas coast were three Spanish silver galleons found near the Mansfield Cut, a man-made channel across Padre Island about 45 miles north of the mouth of the Rio Grande. In fact, these ships were the genesis for the state's antiquities law passing in 1969.

The ships, part of a four-boat fleet headed for Spain from Mexico in April 1554, found themselves sailing into a horrific storm near Cuba.

One of the four ships, the *San Andrés*, limped into Havana harbor in sinking condition. The other three, the *San Esteban*, *Espiritu Santo* and *Santa Maria de Yciar*, apparently tried to turn and outrun the storm as it pushed westward through the Gulf of Mexico.

They ran out of time and room.

The wrecks were part of the cost of doing business, the risk that had to be taken to further commerce and profits. In fact, a certain amount of losses were expected. But these three wrecks cost more than the cargo of precious metals, valued at about 2 million pesos then. Two million pesos is worth about \$250,000 today. It's hard to say what 2 million pesos in 1554 would be worth in today's economy,

though it's safe to say it would be a bit more than \$250,000.

The wrecks also took a high toll in human lives. More than half of the 300 passengers on the ships died while trying to walk back to Mexico, the victims of Indians and harsh conditions.

The 1554 wrecks were really the first historic wrecks in Texas that were excavated using strict scientific guidelines and protocols — the same type of intense attention to detail that will characterize *La Belle's* excavation. *La Belle* also brings Arnold and Hamilton back together. The pair worked together on the 1554 wrecks while Hamilton ran the Texas Archaeological Research Laboratory at The University of Texas and Arnold was an assistant archaeologist for the state.

The 1554 fleet left Spain in 1552 on what was more or less a regular run to the silver mines of Mexico. "There were 52 or 54 ships in the 1552 fleet and of those ships only six of them were designated to actually return back to Spain," explained Hamilton. "What was happening at that particular time was that you have the merchants in Spain and they would buy an old decrepit ship and totally load it up with goods to get it to come to the New World. They would insure it to the gills also so if it sank they made money and if it made it over here they would sell the products, but there was no intention of the ship coming back.

"They could then use the ship for a few months or a few years here or even abandon the thing," Hamilton continued, almost as if lecturing one of his archaeology classes. "A lot of these ships never got over here, they sank along the way. Of the original 52 ships only six were designated to come back.

"These ships were really designated to return in 1553 but when they arrived at Vera Cruz they found it had been hit by a hurricane and the port was almost completely disabled. They were only able to unload one of those ships and one of those ships did return in the 1553 fleet back. The rest of the ships were put off until returning in 1554. There were the four ships in the fleet and this was one of the earliest convoys because you have the French corsairs and everyone else attacking them, so they started going in these small fleets."

The Spanish fleets took advantage of prevailing currents in the Gulf, Hamilton explained, and after leaving Vera Cruz



they, "went straight north, following the coastline more or less. When they saw Padre Island then they took a right turn and headed due east until they spotted Florida. When they saw Florida they turned straight south and came directly into Havana. So essentially from the time lag it was about two weeks after these ships left and they were probably on the eastward route to Florida when the storm hit."

That early in the year, April, it was unlikely the storm was a hurricane. It was probably a spring norther, what the Mexicans call "El Norte."

"There was some speculation that the storm came up and they tried to run before it and just ran out of water and ran into Padre Island or something washed them up on Padre Island," Hamilton mused. "In that area of Padre Island there are things called 'Blind Guts' that when a storm hits you actually have channels running across the islands.

"If you get in one of these guts it will actually funnel you into the island in certain types of storms. There are two blind

guts where the Gulf currents in certain storms actually comes straight into the island. Where the Port Mansfield cut is now is a natural area that gets cut through all of the time," Hamilton noted.

The ships ended up within about five miles of each other, with the *Santa Maria de Yciar* at what would become the Gulf opening of the Mansfield Cut and the other two ships a little further north. Unfortunately, dredging of the cut in the late 1950s obliterated the *Santa Maria* site. The only artifacts that survived were a coin found on the beach and an anchor left on the jetties of the Mansfield Cut.

A Spanish salvage expedition arrived at the site about three months after the wrecks in 1554 and recovered most of the silver and gold cargo.

Through the years, storms and tides washed artifacts from the ships toward the beach. Beachcombers often found coins and other artifacts as they strolled the area after storms or after dredging. In fact, the beach near the Cut became known as "Coin Beach."





“I’m sure you can go out there after a major storm and still pick up coins on the beach,” guessed Hamilton. “Every time they dredge the Mansfield Cut people go out there to the spoil banks on either side, or after a heavy storm, and just go beachcombing through the spoil banks.”

Once the dredging project of the late 1950s hit the *Santa Maria* site, most people realized what had been found. But no organized artifact recovery effort began until late 1967, when a commercial firm from Indiana tried to excavate the *Espiritu Santo* site. What happened next depends on who you talk to.

The salvage company thought it was operating under a valid contract with the state and the state disagreed. The state ultimately ended up excavating the site in the summers of 1972 and 1973 and briefly in 1975.

A court case over the wrecks dragged on from 1967 until the mid-1980s when it ended in what Arnold calls a draw. The state got ownership of the artifacts but was ordered to pay the salvage company \$350,000.

Between the Spanish salvage expedition of 1554 and the state’s excavations most of the artifacts were recovered. What remains are those pieces still scattered between the wrecks and the shore.

Things weren’t much better for the lone ship, the *San Andrés*, that made it to Havana, albeit in sinking condition.

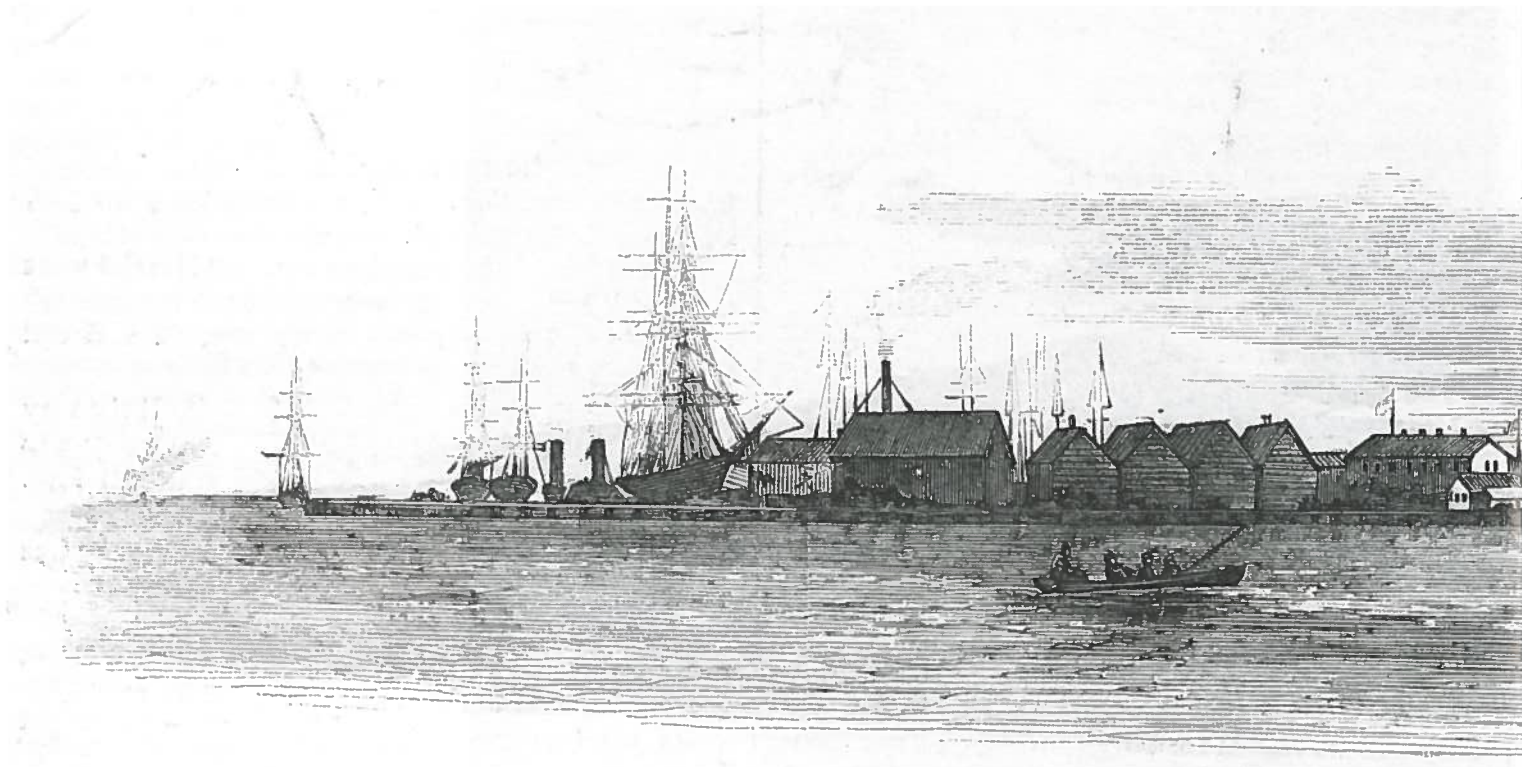


*Painting depicting the salvage operation on the 1554 fleet. The operation began three months after the ships sank.*

Sailors transferred the cargo from the *San Andrés* to another ship that then headed for Spain.

That ship sunk off the coast of Portugal.

No one has found any older shipwrecks along the Texas coast, but there are plenty of newer ones to explore.



An early Galveston skyline as depicted by artist Theodore Davis.

## The Texas Navy

Texas was a fledgling republic in the late 1830s with an even more fledgling navy. Though history remembers much about the land battles, like the Alamo that led Texas to freedom from Mexico, few people know of the Texas Navy's contribution, which was considerable.

"Some of history's greatest achievements are not given due credit for their influence on events because the spotlight was playing on some other actors at the moment," wrote Theodore Roosevelt Jr. in 1936 in his forward to the book, *The Texas Navy in Forgotten Battles and Shirtsleeve Diplomacy* by Jim Dan Hill. "The halfback who tears down the field with the football tucked under his arm and makes the touchdown gets the headlines. The guard who opened up the hole which made the run possible gets never a sentence.

"This has been the fate of the Texas Navy, the Navy of the Lone Star Republic. Books have been written on Sam Houston. The battles of the Alamo and San Jacinto have been celebrated in prose and verse. Hardly anyone, however, has heard of the contemporary Commodore Hawkins, the *Independence*, the *Invincible* or the *Brutus*," Roosevelt wrote.

"The Navy was unquestionably largely responsible for the victory that Houston won at San Jacinto. It blocked reinforcements for Santa Anna. It forced him for lack of supplies to alter his plan of campaign at a crucial moment. While doing this (the Texas Navy) was struggling under tremendous handicaps. It was makeshift. Its material was wretched. Its personnel was picked up haphazard."

But those faults didn't stop the Texas Navy from putting up a game fight against the Mexican Navy. By the end of the war for independence, the Texas Navy's four original ships were no longer fit for duty. So the Texan Congress in 1837 appropriated \$287,000 to acquire new ships.

Among the most remarkable of these was the sidewheel steamship *Zavala*. The *Zavala*, which began life as the *Charleston*, may well have been among the first steam-powered warships in the Western Hemisphere to take part in a military campaign, asserts Elizabeth Baldwin, who is making the *Zavala* the subject of her graduate work in nautical archaeology at Texas A&M.

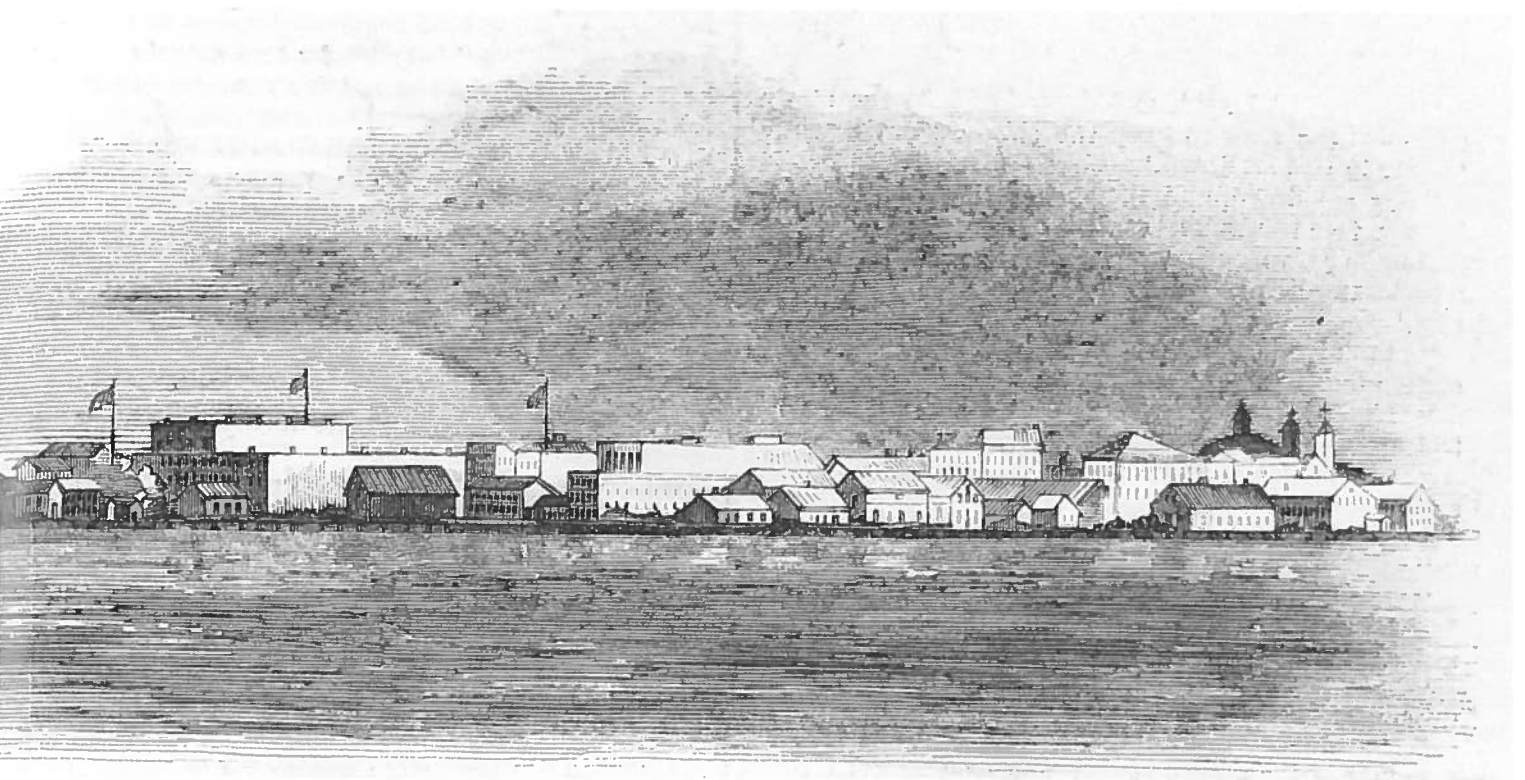
The ship, which died of neglect in the early 1840s, now lies beneath 12 feet of

earth at Pier 29 in Galveston. Baldwin hopes to raise between \$25,000 and \$50,000 for a limited excavation of the ship within the next year.

Excavation will be limited because there isn't much of the ship left. "It was deteriorated at the time (the Texas Navy) left it there," noted Baldwin. "There are good reasons for excavating it but preserving it as the best example of the Texas Navy is not one of those reasons. The Texas Navy bought a used car, so to speak, and didn't have any good luck with it, shall we say."

Even before the *Zavala* became a Texas Navy warship it was part of a historic period in shipping that would make her worthy of excavation. Built in 1836, the *Zavala* came at the end of a 20-year period of radical changes in steamship construction and at the beginning of a 20-year period where builders tried to refine these changes.

"In the 1830s through the 1840s builders really tried to make this technology work for the long haul, going overseas, across the Atlantic, and the ship that became the *Zavala*, the *Charleston*, was built for the coastal packet route, which was a new thing at that time," explained



Baldwin. "Packet ships were a new thing. They were ships that sailed on a regular schedule. They were a new idea and using steamships on the ocean was a new idea because steamships were so very, very long and thin. They were more vulnerable to the wear and tear that ocean waves, currents and tides take on a vessel as well as the saltwater on the machinery."

And, as most archaeologists point out, the objects of excavations tell us much about our earlier selves.

"The politics of the Republic of Texas are very well reflected in the life, use and misuse of this vessel," Baldwin said. "The political scheming, the changes in administrations and the changes in naval policy that occurred because of those changes in administration really affected everything that happened to her. The records that chronicled all of those things are often very contradictory. They are very contradictory between what a commander said, what the captain of the vessel said, what the navy secretary said or what other officials who did work on her said. So somebody was lying and I think it's indicative of the period that there was a lot of wheeling and dealing and a lot of it was

under the table. It's reflective of the economy of the period, sort of the Jacksonian bank crisis.

"That's one of the things that forced the bankruptcy of the original company that owned the *Charleston* and that's one of the reasons Texas was able to buy her," Baldwin continued. "There was a large bank crisis going on at the time. The economy was failing miserably."

And so the young republic bought the *Charleston* from the Charleston and Philadelphia Steam Packet Company in Philadelphia and she sailed into Galveston in March 1839, the first ship in the new Texas Navy, and was placed under the command of J.C. Hinton. In October of that year, the *Zavala*, with about \$9,000 in her safe, headed to New Orleans trying to recruit sailors for the Texas Navy. But the funds weren't enough to recruit sailors and pay for some strengthening of the boat so she could bear the recoil of her guns.

Sailors in Louisiana knew that pay-days were sporadic during the Texas Navy's first incarnation, a fact not lost on the New Orleans ship chandlers asked to work on the *Zavala*. They all asked for cash for all work and supplies.

Within a year after her purchase, repair bills for the *Zavala* topped \$21,000, including the need for a new foremast, engine parts and paddlewheel components that should have been replaced when the ship was converted to a warship in New York.

Hinton wrote many letters to the Texas naval secretary pleading for funds to repair his ship, but to no avail. When Hinton returned to Galveston he found that his commission had been withdrawn and he was dismissed from the navy. He also found a growing sentiment among some in the Texas Congress, particularly the once and future president Sam Houston, that no more of the republic's money need be spent on the Texas Navy.

Houston felt the solution to Texas' economic and military problems was through annexation by the United States. But President Mirabeau B. Lamar successfully quashed legislation that would have effectively withdrawn the navy from service, leaving the navy's top officer, Commodore Edwin Moore, with an opportunity to prove his navy worthy of life and at the same time gain money to keep the fleet afloat.

The new navy left for Yucatan in June

1840 set on capturing the city of San Juan Bautista. “The city favored the centralist government of Mexico, which both the Yucatan and Texas were fighting,” Baldwin said. Commodore Moore expected to capture the city with the help of Yucatan forces in return for \$25,000 in prize money.

Moore also planned to use the *Zavala* to patrol Mexican waters and seize ships, which would be taken as prizes and used to raise funds for the Texas Navy. But Moore took San Juan Bautista in November 1840 without firing a shot and the *Zavala* was dispatched back to Texas, where she arrived in April 1841.

Though the navy had proven itself ready for action, politics held the navy from combat, Baldwin contends, and Moore was “ordered to remain in Galveston and refrain from even routine maintenance on the fleet. During this time the Texas government had been engaged in diplomatic

negotiations with the British government for official recognition of the Republic of Texas. Once Britain offered both formal recognition and to mediate a truce with Mexico, the Texas Congress felt that the navy was no longer needed as an offensive force.”

Texas entered an alliance with Yucatan in September 1841 and Moore was ordered back to Yucatan to take part in maneuvers against Mexico’s centralist government, but he went without the *Zavala*. She needed too much work to take part in the campaign and the Yucatan government had agreed to pay Texas only \$9,000 for the navy’s services, far less than Moore needed for provisions and general expenses, Baldwin noted. Moore pleaded to new President Sam Houston and the Congress for more funds but his urgings fell on deaf ears.

“*Zavala* subsequently sank further into disrepair and in May 1842 she was run

aground in Galveston to keep her from sinking,” recalled Baldwin. “The deteriorating hulk was eventually stripped and allowed to sink into the harbor’s mud flats.”

The ship appeared on maps in the 1840s through 1860s as a hazard to navigation. Through natural and man-made processes Galveston Island slowly began moving out into the bay, eventually swallowing the ship. She stayed a fading memory until November 1986, when a joint project of the Historical Commission and author Clive Cussler’s National Underwater and Marine Agency located the *Zavala*’s remains. Baldwin read an article by the Historical Commission’s Barto Arnold about the *Zavala*, became interested in the ship and ended up writing a lengthy paper on her. In fact, Baldwin was so taken by the *Zavala* that she made it the focus of her master’s thesis.

Americans who stayed at home during

## U-boats in our backyard

World War II lived the war to end all wars through rubber and metal drives, rationing, occasional air raid drills and the many friends and relatives they sent to fight overseas. America read about the war in all of the major papers. It was the fighting that was going on thousands of miles away in Europe and the Pacific, wasn’t it?

The West Coast feared, and with good reason after the attack on Pearl Harbor, that the Japanese might invade the American mainland. And sure, America would have been a hot target for the Germans but she was out of reach of Hitler and his savage Nazis, right?

Whether Americans wanted to acknowledge it or not, Adolph Hitler brought World War II to American shores in a very frightening way — through his much-vaunted U-boats. Between May 1942 and December 1943 a total of 24 U-boats hunted allied ships and there were up to 10 U-boats in the Gulf at any one time.

German U-boats, in the feared wolfpacks, had already carved up trans-Atlantic shipping, nearly starving the Brit-

ish to death in the early days of the war. After America entered the fray, and the Atlantic became too hot for Hitler’s silent service, the Führer sent the wolfpacks to America’s eastern shore and eventually into the Gulf.

The theory was to sink as much allied shipping as possible, robbing American factories of raw materials and forcing America to spend time and money replacing the ships she lost. Americans viewed this strategy with detached disbelief, especially on the Gulf Coast.

The military established gun implacements in Galveston and built bases along the coast, conducted invasion drills and artillery practice, but surely the Texas coast was far enough removed from World War II to be safe, wasn’t it? Throngs of soldiers and sailors, with no apparent fear of attack, strolled along Galveston’s beaches enjoying the warm sun, stiff breeze and cool waters.

Sure, everyone knew that Galveston especially could be a German target because the port played such an important

role in the movement of oil along the coast. But it was a distant worry. A Sure-that-could-happen-here-but-it-will-never-happen-here type of worry.

“What do you remember about the war years in Galveston?” author Melanie Wiggins asked several Galveston women for the preface to her book, *Torpedoes in the Gulf: Galveston and the U-boats 1942-43*. “Were you terrified about the U-boats sinking so many ships?”

“Oh no,” the women answered. “We were too busy having a good time.”

That was the prevalent attitude: Believing disbelief.

Japan attacked Pearl Harbor on Dec. 7, 1941. Germany declared war on the United States five days later. The U.S. Army asked all key cities in the danger zone — which was the area within 300 miles of the Gulf Coast — to conduct blackout tests as soon as possible. After all, the glowing lights of American coastal cities perfectly outline allied merchant ships for marauding U-boat commanders, Wiggins explained.

On Dec. 13, the Galveston Jaycees announced they needed seven more entries for the Christmas lighting contest.

City fathers proceeded with a blackout test on Jan. 7, 1942, and proclaimed it a success, save a few dimmed headlights. A week later, Wiggins noted, a U-boat sank a Panamanian tanker 60 miles off the coast of Long Island. The war had reached America's shores and would invade the Gulf shortly.

In the 18 months or so that German U-boats patrolled the Gulf they sunk 56 ships and damaged 14 while losing only one of their own, the U-166. Another U-boat, U-157, was sunk in the Florida straits, just barely outside the Gulf. But it was the U-166 that may have become one of Texas' most unusual historic shipwrecks and she joined the Mexican liner *Oaxaca* as the only World War II victims on the Texas coast.

Wiggins, like many people, had no idea that German U-boats prowled the Gulf as freely as they did. The revelation led her on a two-year long mission to research and write her book.

"The way it came to my mind is that I had no plans of writing anything about the war but I had been driving back to Galveston from Eagle Lake one day with Fletcher Harris, a Galvestonian who had been in the war, and he showed me what was left of the old blimp base at Hitchcock and told me that blimps had patrolled the Gulf during World War II looking for U-boats," recalled Wiggins, a one time Galvestonian who now lives in League City. "I was so flabbergasted. I thought he made it up because I had been to Galveston every summer as a child from Arkansas and I had no idea. No one ever told me any of that. I was just amazed."

Part of the fun of wreck hunting is finding the stories that may never be confirmed but make for high adventure. Stories like the cloak and dagger tale told to Wiggins by a man who lived in Galveston during the war.

It seems a Galvestonian sailor based in New Orleans got a call from his pregnant wife. She said he needed to come home immediately. Seems a Commander Cunningham from Naval Intelligence was there with an FBI agent. Cunningham arranged for the sailor to take a train that



*Remains of military installation at Galveston.*

night to Galveston. The next morning, Cunningham and the FBI man appeared at the sailor's Avenue O home wanting to rent an upstairs bedroom, saying they'd pay whatever the couple asked.

When the wife said the bedroom wasn't for rent the men replied that they were taking over the bedroom and would be there for anywhere from three weeks to three months. Then wife decided to charge the men \$1 for the length of their stay. The deal done, the sailor went back to his base.

The sailor's wife called her husband a few days later and told him the men moved all the furniture, save two chairs, out of the bedroom, brought in all sorts of equipment and ordered that no one be allowed in the room. Two men – one navy and one FBI – were on duty in the room 24 hours a day. The wife had no idea what the men were doing.

Five weeks later the men thanked the woman for use of the bedroom and left. Shortly afterward, Commander Cunningham, who was stationed in New Orleans, called the couple to explain what had happened, so long as they promised to tell no one as long as the war lasted.

He said there had been regular sinkings of convoy ships that left Galveston on Tuesdays and Fridays. Intelligence agents learned there were clandestine radio signals from someplace on Galveston Island to the German U-boats. Agents narrowed the

location to a 12-block area, rented three different rooms and used equipment in the rooms to pinpoint the radio location.

Cunningham said they found a tall radio antenna at a house on Avenue O, where the German brewmaster for Southern Select Brewery lived. The antenna was telescoped down during the day and raised at night. The spies (Wiggins never learned the number of spies) were captured and sent to a concentration camp in Oklahoma.

Meanwhile, U-166, captained by Kapitänleutnant Hans-Günther Kühlman, left Lorient, France, on June 17, 1942. His mission was to lay mines and conduct warfare in the Gulf. After first sailing through the Caribbean, where her crew is credited with sinking one ship, U-166 crept into the Gulf.

Kühlman and his crew laid mines, none of which did any damage, at the mouth of the Mississippi River on July 24-25, 1942. He reported completing that goal to his superiors on July 27. Nothing more was ever heard from U-166, though she was given credit for sinking the cargo-passenger ship *Robert E. Lee* off the Louisiana coast on July 30.

The *Lee* was built for coastal trade. Its deck houses had wooden sides and heavily painted canvas tops. The Promenade deck had square windows instead of port holes across the top. On that fateful day, as the



View of the Gulf through remains of Ft. Travis in Galveston.

*Lee's* crew radioed New Orleans to tell port officials of their expected arrival time, a few crew noticed something streaking along in the water close to the surface and parallel to the *Lee*. They were having a lively debate about whether it was a dolphin or shark when the object made an abrupt 90 degree turn and hit the *Lee* just aft of the engine room.

The resulting explosion destroyed the number three hold and blasted through the "B" and "C" decks, put the engines out of action, damaged the steering gear and demolished the radio. Most of the ship's windows were open so water quickly rushed in as the ship began listing.

The crew managed to lower six lifeboats and 16 life rafts from the quickly sinking *Lee*.

The Germans apparently knew nothing of the U-166's fate for many months because they posted two stars by the sub's name in January 1943. Two stars meant they assumed the sub was a total loss.

All of this would be no more than interesting conversation, with no real tie to historic Texas shipwrecks, if it weren't for the mystery that wreck hunter Tom Townsend calls the most addicting wreck he's ever chased. That's the story of the mystery submarine said to have sunk off Galveston.

Townsend believes this submarine to be the U-166, though the first official government story had the U-166 being sunk by a Coast Guard plane off the Louisiana coast on Aug. 1, two days after the *Lee* went down.

"I saw some information after the Freedom of Information Act, it was after *Texas Treasure Coast* came out, which indicated that the published historical reports

of the sinking were not accurate," Townsend explained. "They never confirmed the wreck by sonar at the time. U.S. forces hit that sub three times and the only reason they hit it three times was it insisted on going back on its original base course. If you extend that base course into Texas you come to the wreck that is off the Texas coast."

The official story had pilot Henry White and radioman George Boggs Jr. patrolling in a Coast Guard plane about 20 miles south of Isles Dernieres, off the Louisiana coast, on Aug. 1 when White saw a submarine sitting on the surface. White began turning the plane to make an attack from the stern. At that point, Kühlmann spotted the plane and began a crash dive. That forced White to change his plan and try to hit the sub on a broadside.

They started the dive from 1,500 feet. At about 250 feet, White shouted at Boggs to release the 325-pound depth charge hanging under one of the plane's wings. They couldn't tell if the depth charge did any damage at first. They circled and noticed a light to medium oil slick.

They sent a message that they had attacked and possibly damaged a sub, then they circled the area for two hours until relieved by another Coast Guard plane. Back at base, the pair were questioned by the FBI and then warned not to divulge any information for security reasons. They wouldn't find out until after the war that they had indeed sunk U-166, or so the story went.

The mystery remains today about why a submarine lay exposed on the surface during the day. Theories are that the boat may have been laying more mines or was just up getting fresh air and recharging her batteries.

Based on recently declassified documents, Townsend believes U-166 escaped its brush with the Coast Guard plane and headed into Texas waters on a very specific and important mission that forced Kühlmann to return to his base course after each attack by U.S. forces, an ultimately fatal move.

Townsend has never been able to find the phantom submarine wreck, though there are plenty of people who say they know where it lies.

"In all of these years I've talked to several people who swore up and down that they dove on the U-166 out there and I've never had one that really convinced me of it yet," Townsend laughed. "People are strange when it comes to treasure stories. After a while you get to the point where you don't believe anything you hear. I also talked to, I guess, a dozen people who claimed to have sunk the U-boat off of Texas during the war and I've never really believed one of those."

The phantom submarine holds a unique fascination for Townsend because "I was an Army brat and I grew up in West Germany during the 1950s and so my primary interest in history is World War II, if I had to pick a period that was my favorite. Plus the U-boats themselves always held an interest for me as a kid. I read everything there was to read about German submarines, I visited the U-505 in Chicago and the U-1 in Munich, which were the only two German boats that you could see at that time, so the possibility of finding one off of Texas was fascinating to me."

There is a tangible symbol of World War II sitting at the bottom of the Gulf off Matagorda Bay. The Mexican liner

## More history in the future

*Oaxaca* went to a watery grave on July 26, 1942, the victim of U-171. Carrying what was reported as “general cargo,” the *Oaxaca* became the only ship sunk by a U-boat on the Texas coast.

Unlike the phantom submarine, the *Oaxaca*’s final resting place is known to the Texas Historical Commission and many recreational divers, though there are no plans now to excavate the ship.

What lies ahead for Arnold and his crew after *La Belle*? If he has his way, Arnold might go after the *Hatteras*, a Union Navy ship sunk by the confederate ship *Alabama* during the Civil War.

The *Hatteras* lies about 25 miles south and a bit west of Galveston and carries with it a bit of controversy more than just how a proud and powerful Union warship could be sunk in 30 minutes by an outlaw Confederate ship.

The *Alabama* had surprise on its side as twilight set in on an early January night in 1863. Federal troops had just gone through the ignominy of losing Galveston to a ragtag Confederate force, including makeshift gunboats that sank some of the Union’s proudest warships.

As the steam warship *Hatteras* made her way through Gulf waters she spotted another steamer making her way along the coast, away from Galveston. The



Bill Pierson and Layne Hedrick, both with the Texas Historical Commission, use satellite positioning equipment to pinpoint the wreck site.

*Hatteras* followed. As night set in the mystery steamer turned toward the *Hatteras*. When the *Hatteras*’ skipper challenged the mystery ship to identify herself the reply came back, “Her majesty’s steamer *Petrel*.”

The *Hatteras* put a longboat overboard but it hadn’t gotten very far before the same voice yelled out that the mystery steamer was actually the Confederate warship *Alabama*. The *Alabama* then spoke quickly, and often, with her cannons.

Though pursued by many archaeologists and wreck hunters, the *Hatteras* stayed lost until the late 1970s, when Rice University physics professor Paul Cloutier and two other men found the wreck. The trio collected a handful of artifacts but never fully excavated the site. Cloutier filed a salvage claim in federal court but the court ruled that the wreck belongs to the U.S. Navy.

The Historical Commission and the

federal Minerals Management Service have an ongoing joint monitoring project that provides for yearly trips to the *Hatteras* so divers can check on her well-being. Arnold said those trips reveal that the *Hatteras* is in more or less the same condition she was when Cloutier found her.

All of the *Hatteras*’ artifacts, as well as those from all Historical Commission and Corps of Engineers

projects, will ultimately be stored at Corpus Christi’s Museum of Science and History. The museum is the official repository for the Historical Commission and the Corps of Engineers because it is an accredited museum and has a conservation laboratory.

And after the *Hatteras*? Well, with more than 500 historic wrecks along the Texas coast, Arnold, Hamilton and their contemporaries aren’t hurting for things to do. As long as these wrecks can teach us anything, nautical archaeologists will be out there learning.

“Conserving these artifacts satisfies human curiosity more than anything else,” contends Hamilton. “It allows people to actually touch history.

“That’s why people go to museums. You go to a museum to get a feel for what life was during a given point in time. If you go to a museum and all you have are

(continued on page 24)

# MARINE ADVISOR

TEXAS MARINE ADVISORY SERVICE

BY PHILLIP SULAK

It happens almost every time Nancy Webb sees the open water.

"I've got to get out on the bay," she said excitedly, looking out over Tres Palacios Bay.

Webb moved to Bay City, county seat of Matagorda County, in late May and assumed duties as the county's marine agent June 1. Bay City is nice, she said. The people are friendly and easy to meet and there are plenty of tree-lined streets to walk her chocolate Labrador, Gordo, on. Living there puts her close to her office. But it's nearly 30 minutes to the open water, so she bought a house in Palacios.

She chides a visitor for not staying in the historic Luther Hotel, which faces the bay, or at a bed-and-breakfasts in Palacios.

Raised in La Porte, and with much of her adult life spent working near, or for, Galveston Bay, Webb feels most at home when she's near the Gulf.

She did most of the work on her master's degree from Texas A&M in fisheries science, while working part time for the Galveston Bay Foundation. That made for a long commute from La Porte to College Station. She finally moved to College Station in the spring of 1994 to take the last 12 hours needed for her degree.

She knew College Station could only be temporary, but not because the town or the people weren't nice. It was simply too far from the beach.

"But every once in awhile there would be a south breeze and I could smell the Gulf and think of home."

Webb said she needs the open water to "recharge her batteries."

"Besides, since it makes me so happy, it would be ridiculous to not live near the water," she said.

"Everything I've done has been a series of steps that has led me where I am,"



Webb said about becoming a marine agent.

That includes growing up on Galveston Bay; cleaning oiled birds as a child; three-and-a-half years as a teacher; working with the Galveston Bay Foundation in volunteer and paid positions; graduate school and a chance meeting with Sea Grant Marine Advisory Service (MAS) Marine Fisheries Specialist Gary Graham; and working with the U.S. Department of Agriculture. Webb said she knew she wanted to be a marine agent almost as soon as she learned about MAS from Graham.

"Every day is something new," she explains. "It's all I thought it would be and more. It uses all your skills and everything you've learned."

She likes working with both kids and adults and favors a hands-on approach.

"I can't learn anything by having it explained to me," she said. "I have to get in there and touch it, taste it and smell it."

One of her first projects will be replanting Sargent Beach.

"Some people think this can't be done," Webb said. "My attitude is that we won't

know anything unless we try."

The coastline at Sargent has been steadily eroding for years and was threatening to take all the land separating the Gulf from the Intracoastal Waterway. Many ideas have been proposed to stop the erosion, but nothing was actually tried as blocks of cottages and beach houses became part of the Gulf floor.

The Army Corps of Engineers is building a granite revetment wall to keep the Gulf from breaching the Intracoastal Waterway. But the Gulf will probably take the strip of shore remaining on the outside of the wall. Unless Webb and the Sargent Beach Volunteer Demonstration Planting Task Force, spearheaded by Theresa McManus, can stop it.

Webb has spent most of the past five years using cordgrasses to create marshes in Galveston Bay. She will now attempt to put some of that knowledge to work in Sargent.

Webb started her work in marsh creation while a volunteer with the Galveston Bay Foundation. The volunteer position turned into a paid one, allowing her to further her education. Webb put her master's degree — which emphasized restoration, conservation and management of natural resources — to work in a job with the USDA's Natural Resources Conservation Service. That job included leading members of the AmeriCorps Conser-



vation Program — President Clinton's stateside Peace Corps — in a marsh creation project in Galveston Bay. That project has already won one national award of merit and is up for another.

In July, volunteers harvested two native species of cordgrasses — marshhay cordgrass (*Spartina patens*) and Gulf or big cordgrass (*Spartina spartinae*). Unlike smooth cordgrasses, the two species are adapted to the clay soil found just above the high tide mark on Sargent Beach.

Under the guidance of Webb, who first developed the concept while working with Galveston Bay Foundation, the plants will be placed in pots and taken home by volunteers for "nurturing."

Come October, volunteers will head to the beach again, this time to plant the now mature plants along the beach, but above the high tide line.

Hopefully, the plants will spread roots and hold what is left of Sargent Beach in place. Maybe what little sand that comes Sargent's way will be trapped in the grasses and the seeds of a new, improved Sargent Beach will have been sown.

Webb calls the Sargent Beach project a perfect example of her educational philosophy of hands-on training.

"They'll be on the beach at least twice, working with their hands and shovels," she said. "They'll know what they're doing by the end of the second trip."

Webb has also found a use for worn out shrimper's nets. A call from Leonard Lamar, Matagorda County's recycling coordinator, about people burning shrimp nets, put Webb to thinking.

A call to the Houston's Pappas Brothers restaurant chain put her in contact with the chain's interior decorator. It turned out that the chain's restaurants were looking for some nets for decorations. A deal



*Walking along the shores of Tres Palacios Bay with her dog Gordo is one of Nancy Webb's favorite activities.*

was made, helping the environment and private business.

Although her job deals with educating people about the environment, she doesn't like the label "environmentalist." She prefers "steward."

"When I think of 'environmentalists,' I think of people at a wine and cheese party talking about rain forests," she explains. "Instead of people talking about some place across the world, why don't they volunteer to help improve what's in their back yard?"

Her students not knowing about their own back yard is part of what prompted her to become involved with efforts to protect Galveston Bay, which, in turn, led to her career as a marine agent.

Once, only one student out of five classes could correctly identify the body of water outside the classroom building as Galveston Bay. A few got Gulf of Mexico.

Another time her class was disturbed by a strange sound.

"You've never heard foghorns?" she asked the class. So the class adjourned outside to learn something that textbooks weren't teaching them about their own homes.

"The bays are just as productive as the rain forests," she said. "But you don't see much information on the bays."

Preparations for the meal were already in progress when Webb arrived at the Texas State Marine Education Center in Palacios. The Palacios Independent School District was hosting an aquaculture workshop that particular night, which brought about 50 aquaculture teachers from around the southwest to Tres Palacios Bay.

Within five minutes Webb was helping the various PISD teachers and administrators peel 30 pounds of shrimp. When that was finished she helped bread shrimp and the various types of fish about to be fried. Along the

way she introduced herself as the new Matagorda County marine agent.

After the work was finished, Webb circulated some more, pausing briefly to watch a fish-cleaning demonstration. Then she sat on the porch overlooking the bay.

"The purpose of the trip was to meet the people in Palacios," she explained the next day. "To say 'I'm here' and that I'm accessible."

But why the helping hand?

"It just needed to be done," Webb explained, "and to show them I'm not afraid of pitching in and doing my share."

"Besides I'm a participant, not an observer," she continued. "That's why I couldn't watch the fish-cleaning lessons. It was frustrating. I wanted to touch the fish. I needed a knife in my hand. That's my philosophy on education."

Webb calls being a marine agent the best possible job — for her.

"There's variety," she explains. "It's working with the public. It's educational. Basically, I'm assisting people."

Another thing that Webb likes about the job is that she is constantly learning something new. What happens when she knows it all?

"I don't see that happening," Webb said. "But I guess that's when I quit and write my book." ■

## SHIPWRECK

(Continued from page 21)

the silver coins and the gold bars then you're not really getting an accurate interpretation of what was going on at any given period in time," urged Hamilton. "As archaeologists we're trying to



*La Salle artifacts — pottery (left) and ceramic (right).*



*Coins salvaged from 1554 shipwreck.*



*Cleaned hawk bells La Salle's crew used to barter with Indians.*

recreate lifeways. Lifeways are just simply everyday existence. So what was everyday existence like aboard the *La Belle*? You can only recreate that by knowing pretty much what was on board the ship, where it was located on board the ship, where did they play games, where did they cook?

recreate lifeways. Lifeways are just simply everyday existence. So what was everyday existence like aboard the *La Belle*? You can only recreate that by knowing pretty much what was on board the ship, where it was located on board the ship, where did they play games, where did they cook?

"Essentially we're interested in reconstructing lifeways and this means preserving everything and not just what you can sell for money," Hamilton pressed. "I don't know if archaeologists are a bit more interested in these artifacts than others but have you ever found anyone who wasn't interested in archaeology to some degree?"

And what's a museum without archaeology? Basically it's a big, empty building.

"There is a thing about touching history," Hamilton explained. "The fact that you can actually see an artifact that you know came from La Salle's

ship or came from the 1554 silver fleet. It has to be the object. If you go to any museum and there are, say, Paleo-Indian points (hunting dart points used by Paleo-Indians who lived between 12,000 B.C. and 7000 B.C.) and you say they are replicas then people will not even stop and look in the case. They only want to look if it's the real thing."

Those who stop to look in museum cases validate the archaeologists' work while at the same time improving their own lives, whether they know it or not. That is because, as the late anthropologist Margaret Mead said, "A traveler who has once been from home is wiser than he who has never left his own doorstep, so a knowledge of one other culture should sharpen our ability to scrutinize more steadily, to appreciate more lovingly, our own." ■

## State makes wreck hunting available to all

Hunting and surveying shipwrecks sound like your idea of weekend fun?

Then the Texas Historical Commission wants you for the Southwest Underwater Archaeological Society (SUAS).

J. Barto Arnold III, the Historical Commission's marine archaeologist, started the SUAS about three years ago as an inexpensive way for the state to hunt and survey shipwrecks while getting ordinary people more involved in archaeology.

The SUAS is "A volunteer society of sport divers who work with trained archaeologists to do shipwreck surveys," says Layne Hedrick, the Historical Commission's assistant archaeologist who is coordinating the SUAS. "The archaeologists are also part of the SUAS.

"There are so many cutbacks in state government now that Barto's office doesn't have the funds to go out and look at all of the shipwrecks in Texas," Hedrick explains. "There are thousands of shipwrecks in the state of Texas. The SUAS is a volunteer society so there is no money exchanging hands. We go out as individuals and look at some of these wrecks that Barto tells us about and we survey them, get measurements from them, we try to determine what they are and the extent of the wreckage and then we'll turn that over to Barto."

Once Arnold looks through the society's data he determines the wreck's historical significance and decides if anything more needs to be done.

But Arnold also depends on SUAS members, and divers of all sorts, to help him find wreck sites. Many of the wrecks now identified were accidentally found by people out diving for fun.

The SUAS is open to anyone, not just divers. Arnold says non-divers are needed for any number of jobs on shore, like taking data from divers exploring in areas that have limited visibility, which makes it tough for the diver's to write underwater.

"We're now working on a steamboat wreck in Caney Creek," Hedrick says. "This was the first project the SUAS had and it has gone over exceptionally well. Since then, Barto has given us 15 other wrecks to look at in Texas. Slowly we'll go over each one of those, determine what we can from them and then turn our findings over to Barto."

For more information on the SUAS contact Hedrick by calling 512-463-7021, or write to him at the Texas Historical Commission, P.O. Box 12276, Austin, Tx. 78711-2276.

# PUBLICATIONS

TEXAS A&M UNIVERSITY  
SEA GRANT COLLEGE PROGRAM

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