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# Learning from Disaster: Bayland Marina Recovers from Hurricane Ike

By Robert Wilkes

Hurricane Ike taught Scott Johnson, director of Parks and Recreation for Baytown, Texas, home to Bayland Marina, two important lessons. "I learned that a 100-year storm doesn't take 100 years, it can happen tomorrow. And I discovered that a hurricane will rewrite your job description," Johnson said.

Bayland Marina's four-year journey from devastation to re-opening is instructive, particularly to marina operators in the aftermath of Hurricane Sandy. Operators can't anticipate all the consequences of a hurricane, but the experience at Bayland can help them assess their own readiness for a disaster.

Bayland Marina is owned by the city of Baytown and operated by a concessionaire. The tenants of the 100-slip marina enjoy fishing or sailing in

Galveston Bay. The oil and gas industry has a strong presence in this city of 73,000 located 25 miles from Houston. The city has a theme: "Where oil and water really do mix."

Johnson oversees the marina property for the city in addition to managing 1,000 acres of parks. His life got more complicated in the early hours of September 13, 2008, as Hurricane Ike smashed into Baytown.

## Hurricane Conditions

Hurricane Ike was the most intense storm of 2008 and the third costliest ever to make landfall in the U.S. after Katrina and Sandy. Ike flattened Cuba with Category IV winds and headed north over the Gulf of Mexico. Over the next several days it developed an unusually large wind field; as its top

winds diminished it was lowered to Category II.

As the storm approached, Johnson's Parks and Recreation Department team went through its checklist, which included checking chain saws and generators and boarding up buildings. The marina operator secured the boats and stowed loose equipment, and the county and city ordered evacuations of the majority of Baytown.

Hurricanes are categorized on the Saffir-Simpson scale by wind speed, but wind speed is not a sufficient indicator of its true destructive power. Ike was



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rated Category II, but its low barometric pressure, huge wind field and potent storm surge was at the level of Category IV. Ike hit Baytown at 4:00 a.m. with 110 mph winds. The long fetch and shallow depth of the bay amplified the storm surge.

Wind pressure on the boat hulls created enormous forces that were transmitted through the cleats to the docks and then the pilings. As the surge crested the marina's breakwater, it lifted the docks and boats to the tops of the pilings. This is the ultimate test of the strength of the pilings because the full force of the hurricane is at the greatest distance from the fulcrum point at the bottom of the bay. With a few exceptions, most of the pilings held. As the surge overtopped the pilings, whole sections of the marina, docks and boats together, washed ashore. A line of large pine trees prevented the docks and 87 boats from going further inland. Most of the boats were still tied to the docks when the storm receded.

## Massive Cleanup

Johnson's job changed overnight from marina operations to clean up, salvage, security, FEMA coordination, insurance matters and of course, politics. "It took six weeks to figure out what to do and how to do it. I had to comfort distraught boat owners and urge them to be patient. They wanted their boats out of the mud as soon as possible," Johnson said.

The pileup resembled a game of pick-up-sticks. "It was the boat owner's responsibility to get his boat back in the water," Johnson said, "but with the tangle of boats and the legal, insurance and safety factors involved, we insisted on a methodical process. The cleanup took six months. The hurricane hit in September, and the last boat was lifted back into the water in March."

"My heart went out to the boat owners," he continued. "Some of them camped out on the site for weeks to protect their property from looters. You just know they love their boats. Some had insurance and some didn't." After six weeks the salvage operators began

lifting boats back into the water. Some were undamaged and started right up; some were totally destroyed. "It was a very challenging time," Johnson said. "I don't want to go through it again."

## Rebuilding the Marina

Bellingham Marine built the original marina with 100 slips ranging from 35 to 55 feet. "The marina was due for maintenance," Johnson said, "but was otherwise in excellent condition after almost 20 years. Our breakwater does a good job against waves. We never envisioned a 13-foot storm surge."

Andrew Gibbs, Bellingham Marine manager of project development, contacted Johnson after the storm and offered to help. "Bayland asked what we thought they should do next," Gibbs said. "Our first thought was to assess the docks. Portofino Harbour Marina, in nearby Clearlake, Texas, was also destroyed by Hurricane Ike. Most of the docks at Portofino were salvageable. We replaced walers and through rods and made repairs where necessary, and the



*When Hurricane Ike hit Bayland Marina in Baytown, Texas, the marina was lifted above the pilings and floated inland until it was stopped by the tree line. The cleanup began six weeks after the storm, and six months before the last boat was craned into the water.*



salvaged docks were returned to service. We thought they might choose a similar process at Bayland.”

Gibbs’s team determined that Bayland’s docks were indeed salvageable. “We were very encouraged by the strength and durability of the system,” Gibbs said. “Our assessment offered Bayland the flexibility to use the old docks if necessary.”

“Bellingham Marine gave us a cost-benefit analysis and a plan to go forward,” Johnson said. “They did that at no cost. That helped us understand our options for rebuilding the marina. Their analysis was helpful in our initial discussions with FEMA. They also helped us in vetting engineering firms for the project.”

The city decided to keep all options open. It issued a request for proposals for an all-new marina, and asked bidders to include a line item credit to the city for the salvage value of the old docks. None of the bidders chose to include a credit. FEMA funding would help pay for replacement of the original marina and provide additional funding to pay for “mitigation” (changes to the marina to make it more storm resistant.) The city was attracted to the idea of replacing an almost 20-year-old marina with an all new system, and Bellingham Marine was awarded the project. Engineering work began in July 2010, construction began one year later, and the marina reopened in April 2012. The original floats were later sold, refurbished and installed at a marina in Galveston, Texas.

## Engineering a New Marina

Moffatt & Nichol did the engineering and design for the project. Larry Wise was assigned as the engineering project manager. “The original pilings were about 11 feet above mean sea level,” Wise said. “We designed a piling system that substantially increased the strength and elevation of the pilings. The new steel-pipe pilings are 18 feet above water. We specified pre-stressed concrete piles as well as steel,” Wise said, “but Baytown is in the heart of the oil and gas industry, so locally manufactured steel pipe was inexpensive. The pilings have an epoxy coating for corrosion resistance and are colored battleship gray to blend with the

## PREPARATION FOR A WEATHER DISASTER

Below are some lessons learned at Bayland and other suggestions from professionals interviewed for this article:

- Bayland Marina now requires all tenants to show proof of insurance. Review the marina’s insurance with the insurance company and understand the coverage.
- Understand what happens (and who is responsible) when a tenant’s boat ends up on the shore. Make sure this is clear in tenant leases.
- If the marina anticipates waves greater than two feet in the marina, boats may have a greater chance of survival when anchored out in open water than left in the marina.
- Some marinas and clubs use a “buddy system,” in which boat owners help look after each other’s boats.
- The city of Baytown hired a contractor to do the cleanup. The contractor set up as a marine salvage business and sold its services to the boat owners. This proved to be very convenient for everyone involved.
- In some cases cities have pre-placed contracts with companies to do salvage and debris removal. A pre-placed contract may put the marina first in line and may offer lower costs for these services.
- The city hired a coordinator of customer service to act as a liaison between the boat owners, the city and the insurance companies.
- The Saffir-Simpson scale doesn’t tell the whole story about the strength of a hurricane. A shallow approach and a long fetch can create a storm surge greater than the category would predict. A qualified marine engineer can help you understand how a shallow approach or a long fetch can affect the marina and make recommendations to improve storm resistance.

If you have good suggestions for how you prepare your facility for a storm, share them with us on LinkedIn or Facebook, or tweet your suggestions to @MarinaDockAge. You may also email great ideas to [atownshend@marinadockage.com](mailto:atownshend@marinadockage.com).

concrete docks.”

Ike flooded the basin with silt and it needed dredging and the storm debris on the bottom of the bay had to be cleared. Dredging required extra coordination because scheduling conflicts complicated access to the area controlled by the Port of Houston for placing dredging material. The Port of Houston was doing its own dredging, and it had priority.

Bayland solicited suggestions from slip tenants during the design phase. Wise lives in Houston and enjoys sailing. He knew firsthand that the prevailing winds in the marina were often on the beam. “A 15-degree change in slip orientation made a difference,” Wise said. “The winds are more down the bow.”

“Moffatt & Nichol provided a helpful service beyond just engineering,” Johnson said. “It understood the ‘post-disaster’ process and how to work with FEMA. Some of its personnel are certified by FEMA for monitoring and

compliance. It helped us coordinate with the agency.”

In addition, the design reserves space to expand the number of slips at a later date. Bellingham Marine provided all new floats with 20-inch freeboard, two inches more than the floats it replaced. The new marina has state-of-the-art utilities and beefed up timber walers.

## Aftermath

Johnson said that if he had to do it all over, he would prefer that the cleanup take less time. He is pleased with the new marina. “We just had our one-year walkthrough,” he said. “Bellingham Marine gave us a good proposal and did a good job. Even though the marina has the same number and sizes of slips, the changes we made have improved our functionality and storm resistance. Bayland is a state-of-the-art marina.” ⚓

*Robert Wilkes writes about the marina industry from Bellevue, Wash.*