TCEQ Aquatic Scientist Pat Bohannon looks out over the bay as he and his team sail through the water toward the seagrass beds.

Natural OUTLOOK
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A HEALTHY ECOSYSTEM

SURVEYING SEAGRASS ON GULF BAYS

After the boat drifts to a stop and the anchor is secured, the TCEQ's Pat Bohannon drops into the water of Christmas Bay, near Galveston, with a splash. Others jump in too. Pretty soon, snorkels come out, and no fewer than six people are wading through the water fully clothed.

Bohannon and his colleagues are scientists—aquatic scientists, marine scientists, and university graduate students—from various state agencies and the University of Texas Marine Science Institute. They're all taking part in research on an important pillar of the bay's health: seagrass.

Bohannon explains that the presence of healthy seagrass usually indicates a healthy bay.

"They're primary producers, which make them part of the base of the food chain," Bohannon says. "They serve as direct food for a lot of marine organisms like manatees, turtles, ducks, and also a lot of small invertebrates that live on the leaves."

Bohannon also says that seagrass beds serve as nursery habitats for fish and crustaceans, including commercially important species like redfish and shrimp. That means that the health of the seagrass can have a substantial impact on the local economy.

TCEQ Aquatic Scientist Elizabeth Kompanik examines seagrass shoots in Christmas Bay.

The vast root systems of seagrass plants keep the sediment in place at the bottom of the bay. Rhizomes, the parts that grow horizontally underneath the sediment, anchor the plants to the bay floor. The entire seagrass system serves as a stabilizing network that prevents erosion, and helps to keep the bay itself clearer.

Testing the Waters

The first order of business for the researchers is testing the water itself for

Three Tiers of Seagrass Research

The state's plan for studying seagrass is organized into three tiers. Tier One is aerial imagery, which is effective but expensive. It allows researchers to examine and estimate seagrass cover from above. Cameras mounted on aircraft take high-resolution imagery, which can then be analyzed to determine the extent of seagrass beds in the shallow waters of the bays.

Tier Two is where the researchers literally get their feet wet, and is the type of sampling and analysis that we're covering in this article. Scientists measure a small number of parameters at a large number of sites scattered throughout a particular bay system.

Tier Three involves more intensive study, both at the site and in the lab. It includes sediment analysis, more sampling of the water and grasses, and transporting more of those samples to the lab.

View a video of TCEQ aquatic scientists conducting research out on the bay at youtube.com/user/TCEQNews/videos.

salt content. They also check the turbidity of the water, which is overall clarity. Salinity and turbidity are key factors in determining water quality, and can have a profound effect on how well the seagrass thrives in the bay.

After water sampling and testing is complete, the researchers toss quadrats into the water. Quadrats are portable frames, typically with an internal grid, used to mark out a small area of habitat for assessing the local distribution of plants or animals. These particular quadrats are quarter-meter squares made of PVC pipe, and strung almost like tennis rackets into 100 individual squares.

The quadrats fly through the air, splash down a few yards from the boat, and sink to the bottom of the bay. Examining the quadrats where they fall randomly at the bottom of the bay allows researchers to make reasonable estimates as to the percentage of the bay floor that is covered with seagrass. Depending on how deep and turbid the water is, researchers sometimes have to put on a snorkel mask, get fully submerged, and feel their way around the quadrats.

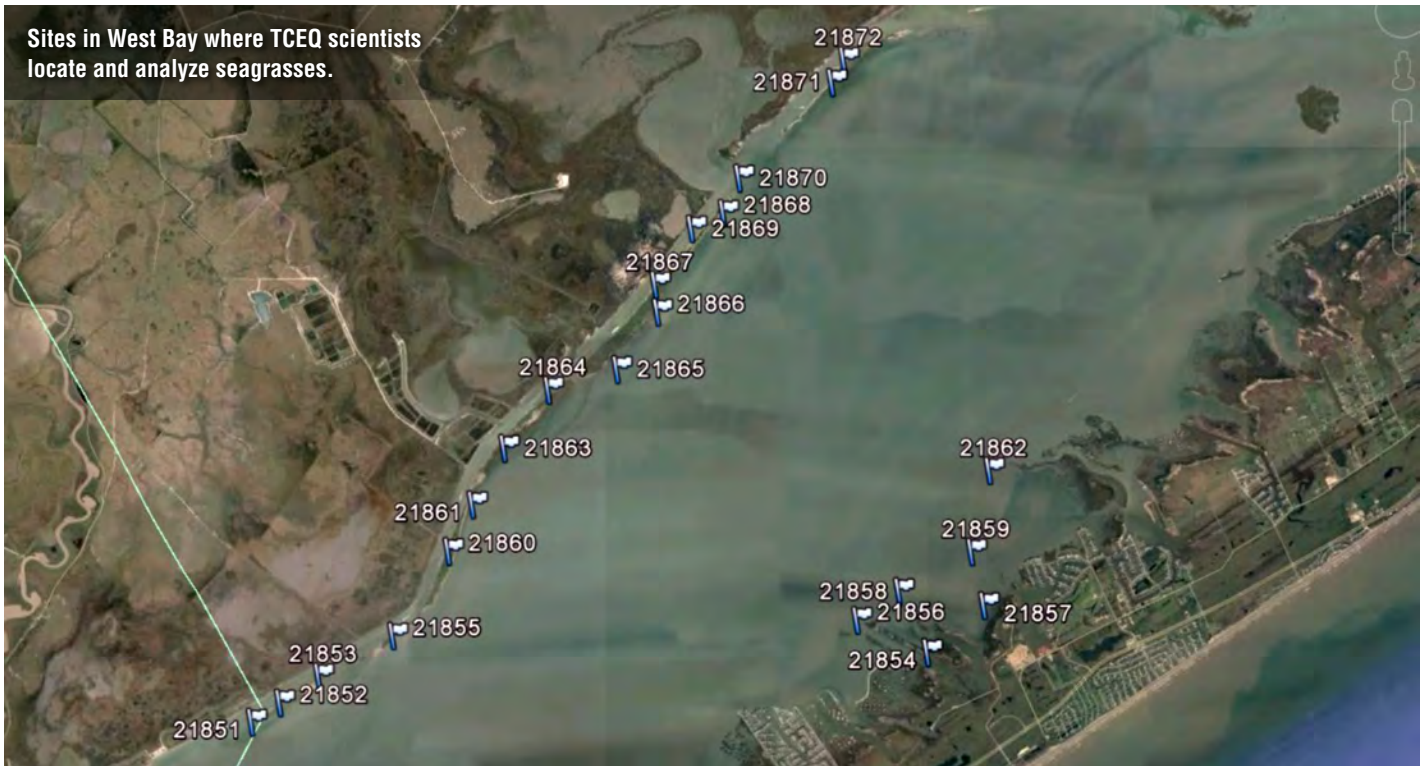
TCEQ Aquatic Scientist Elizabeth Kompanik tosses a quadrat into the water. This is a tool researchers use to estimate seagrass cover on the floor of the bay.

They can then combine data received from all quadrat measurements throughout the bay to arrive at an estimate of the condition of the seagrass beds. “Percent coverage” is an important indicator that can help determine whether environmental conditions are generally adequate to sustain seagrass growth.

Even though they grow under water, seagrasses need light, since they use photosynthesis, just as terrestrial plants do. So the team also measures the levels of sunlight shining down through the water.

Next, they take shoot samples from the quadrats and measure the leaves, taking into account bare spots in the sediment, if there are any. The seagrass leaves and shoots are measured randomly, disregarding the longest 20 percent. This is to avoid a bias in the data that would favor the longer shoots. The data is recorded, and samples are packed up to be taken to the lab for further analysis.

On their first day out at Christmas Bay last September, the team completed seagrass analysis on six sites. During the entire three-day survey, the researchers



Sites in West Bay where TCEQ scientists locate and analyze seagrasses.

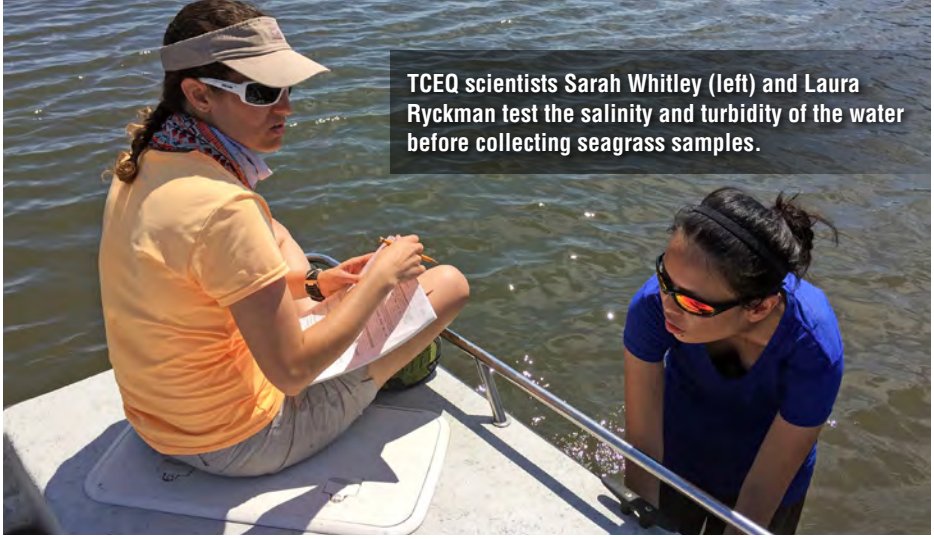
analyzed a total of 42 sites throughout the bay system.

You may ask, "Isn't this stuff just seaweed?"

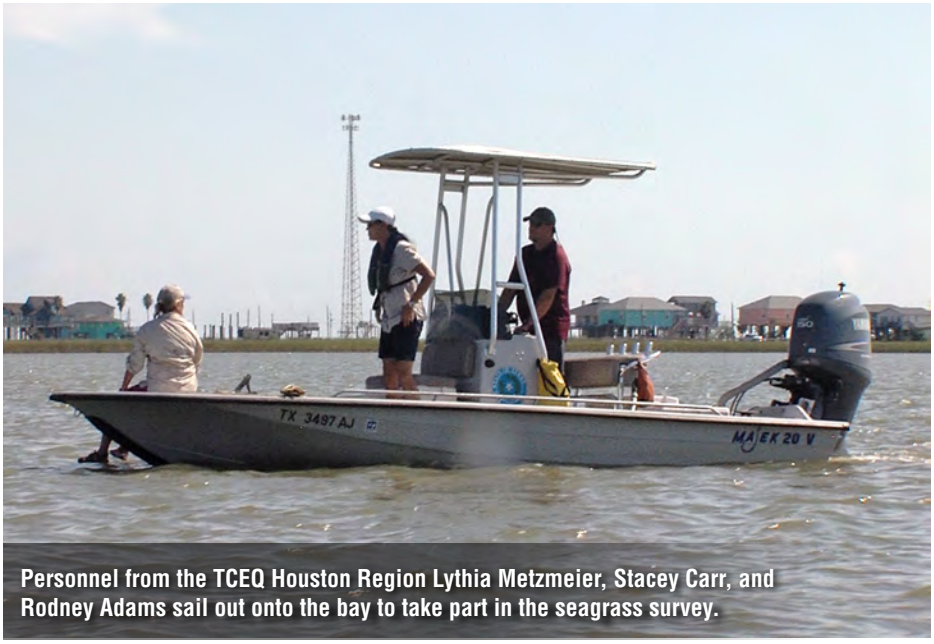
"A lot of people may think that seagrasses are seaweed," Bohannon says, "which is kind of a common term, but they're not, really. Seaweeds are algae."

Seagrasses, on the other hand, are flowering plants that have adapted to living fully submerged in saline environments.

In recent years, the TCEQ has assisted Texas Parks and Wildlife with seagrass surveys in San Antonio Bay. The UTMSI has been monitoring seagrasses along the lower Texas coast for several years, and has extensive data on the health of seagrasses along the Gulf Coast, from Aransas Bay down to Laguna Madre. However, this is the first year that anyone has monitored seagrass in Galveston Bay, and the first year that the TCEQ has led the monitoring efforts.



TCEQ scientists Sarah Whitley (left) and Laura Ryckman test the salinity and turbidity of the water before collecting seagrass samples.



Personnel from the TCEQ Houston Region Lythia Metzmeier, Stacey Carr, and Rodney Adams sail out onto the bay to take part in the seagrass survey.

Threats to Seagrass

Even though there are natural threats to seagrass, such as tropical storms, threats from human activity are more common and more difficult for the grasses to recover from. Storm water, agricultural runoff, and other discharges all elevate nutrient concentrations in the bay, which lead to algae blooms. The algae then crowds out seagrasses and other species in the bay ecosystem.

Dredging is also a danger, as it not only disrupts the bay floor, but also covers seagrasses with sediment, preventing the plants from receiving light.

Another human threat typically comes in the form of recreational boaters. Barreling through the bay in a power boat can wreak havoc on the delicate plants growing in the sediment. Boat propellers can disrupt and even destroy swaths of plants, creating what is known as propeller scars.

That's why Texas Parks and Wildlife has come up with a catchy phrase: "Lift, drift, pole, or troll." It's designed to remind fishermen and other boaters to take it slow and lift their motors out of the water when going through shallow areas in the bay where there are seagrass beds. Instead of using the motor, boaters should drift, or use poles to gently nudge watercraft through these shallow areas. This way, seagrass beds can remain as undisturbed as possible.

The job of a TCEQ aquatic scientist like Bohannon is to collect data that will give the agency a more accurate and up-to-date picture of the health of the bay. The more we know about the plants growing there, including seagrasses, the better we can protect them. And in doing so, we can help protect the health of the entire bay ecosystem.

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