STOP #4: LEONABELLE TURNBULL BIRDING CENTER

The next field stop will visit another wetland environment. This time it is a fresh-water to *brackish*-water marsh environment that was created by the wastewater treatment plant. Once on the boardwalk (**fig. 1**) you will see a cattail marsh surrounding a large body of water. The boardwalk and observation platform is a very popular site for birding enthusiasts who travel from all over Texas and the world to photograph migratory birds. As you make your way out to the observation platform, please stay very quiet. Not only do you not want to disturb those folks enjoying the birding center, you also don't want to disturb the birds or alligators. ***Brackish*** means slightly salty. The salinity of brackish water is higher than that of fresh water but less than that of seawater.

Figure 1. Boardwalk at the Leonabelle Turnbull Birding Center on Mustang Island.

The top image in **figure 2** is an aerial photograph taken in 1958 showing an extensive wind tidal flat that covers almost the entire back barrier of Mustang Island. In fact, if you look at the top image, you just visited the feature labeled Salt Island if you climbed the observation tower at the Nature Preserve. The bottom image is a color infrared aerial photograph from 2002 that illustrates all of the changes that have taken place in the last 50 years. There are now water bodies (salt-water and brackish-water ponds), salt marsh, submerged aquatic environments (seagrass beds), open bay waters, and significantly less wind tidal flat. <u>In fact, Mustang Island has lost almost half of the wind tidal flat environments that were present in the 1950's!</u>

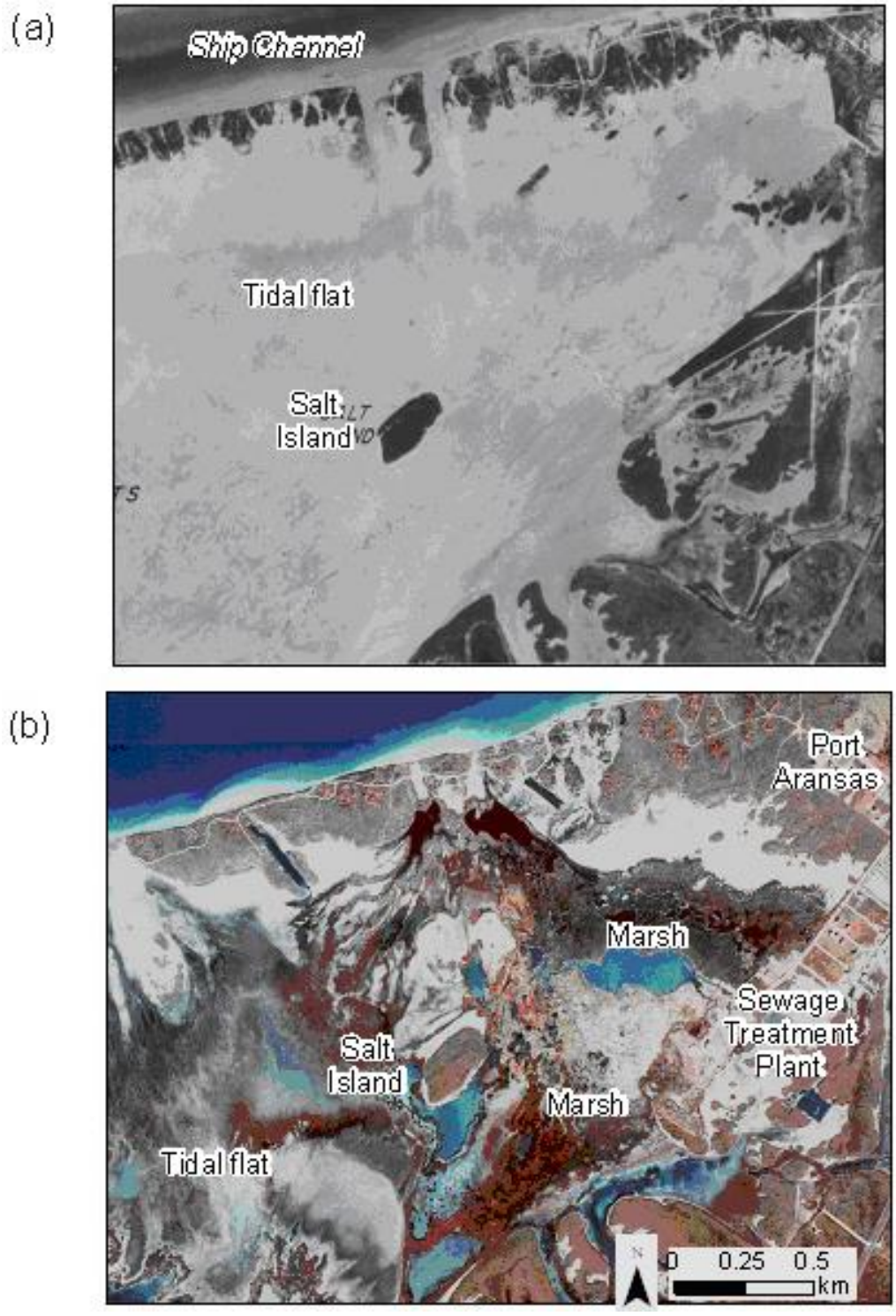

Figure 2. Large wind tidal flat shown on 1958 photo (a), on which an extensive brackish-water marsh has developed due to outflow from the Port Aransas Wastewater Treatment Plant, as shown on the 2002 aerial photo (b).

Why do you think so many changes have taken place in this back barrier area over the last 50 years? First of all there is development of the island. In the 1950's Port Aransas was a fairly small village. As more and more people moved to the island, new infrastructure such as roads and utilities needed to be built. The wastewater treatment plant was one of the new facilities that was built to support the growing population. The pond you are observing formed due to the outflow of fresh water from the wastewater treatment plant.

But where is the salt-water coming from that is mixing with the fresh-water from the plant to create the brackish-water? Why is there now more salt marsh, seagrass beds, and open water? The loss of wind tidal flats and the gain of these other marine environments on Mustang Island is attributed to a relative rise in sea level. Many areas that were tidal flats in the 1950's are now seagrass beds, open bay water because these low-lying flats became submerged as sea level rose. Rising sea level caused the slightly higher elevation flats to be more frequently flooded allowing for marsh vegetation to establish. Salt-water from the bay is mixing with the fresh-water from the treatment plant when the wind tides or storms are flooding the adjacent wind tidal flats.

Global mean sea level is the average height of all the Earth's oceans. A rise in global sea level is due to warming of the ocean (causing water to expand) and the addition of water into the ocean basins from melting ice. Relative sea level (also called local sea level) is affected by global sea level fluctuations, changes in land elevation, winds, and ocean currents.

As sea level rises, environments on barrier islands migrate as well. What was once salt marsh or wind tidal flat might now be completely submerged and have become seagrass habitat or open bay. Salt marshes migrate into what was once low elevation uplands if there is room. Coastal scientists map the status and trends of wetland environments on barrier islands to see how the environments are changing through time and try to determine a probable cause. They also try to predict how continuing sea level rise might impact the barrier. This information is important for coastal planners when determining how best to develop barrier islands while still providing protection for delicate wetlands and allowing room for the environments to migrate.

Did you know? The human eye can see light from only a very small portion of the electromagnetic spectrum. Color infrared (CIR) photography uses a special camera to capture light just beyond what the human eye can see and translate it into the familiar colors of the rainbow. The invisible light becomes visible as red while red colors appear as green and green as blue. Blue colors are no longer visible so they appear as black. When looking at CIR imagery, vegetation appears red while water generally appears black with artificial structures like buildings and roads showing as a light blue-green. Scientists like to use color infrared imagery to help with identifying different species of plants. Different types of plants reflect different wavelengths of light. The color infrared imagery can help in mapping marsh environments from upland environments from areas with mangrove in areas that are hard to access.