

Understanding the concentrations of bacteria in Bastrop Bayou and the potential sources of any bacteria is very important in assessing risks to the public and in preventing water quality impacts from worsening in the future. Elevated bacteria concentrations are used as indicators of pollution caused by human sewage, which can cause serious health concerns like typhoid, cholera and hepatitis. Waterways polluted by human sewage can also pose health

Bacteria problems in Bastrop Bayou can be exacerbated by failing septic systems, poorly managed land application of sludge from wastewater treatment plants and reduction in freshwater inflows. Intermittent flow is observed throughout Bastrop Bayou during dry periods which significantly reduce freshwater inflow. Without the flushing effect from inflow, tidal movement remains stagnant which leads to higher concentrations of bacteria. Along with intermittent flow, temperature also plays a



threats associated with chemicals not treated by conventional waste water treatment systems.

role in changing bacteria levels, as bacteria counts are observed to be significantly higher in spring and summer months compared to cooler months.

The Texas Commission on Environmental Quality (TCEQ) has established *E. coli* and Enterococcus as bacterial indicators for freshwater and tidal waterbodies, respectively. *E. coli* densities below 394 colonies/100 milliliters (ml) of water and Enterococcus densities below 89 colonies/100 ml are acceptable. Bacteria counts throughout the Bastrop Bayou watershed are high, impairing its use for contact recreation. Bacteria counts usually decline over time after a rainfall; however, with a continuous source of bacteria, such as failing or leaking septic systems, counts may remain elevated.

History and Development

Brazoria County was settled in 1836 and became one of the first counties in Texas. Bastrop Bayou has always played an integral part in transporting supplies and enabling agriculture and commerce in Brazoria County. Wooden ferries were drawn by hand and used to cross the bayou before the first drawbridge over Bastrop Bayou was built in the late 1800s. Farming supplies were often delivered by sailboat between neighboring towns with a one-way trip to Galveston taking up to six weeks. A fixed concrete and steel bridge was built in the 1970s and remains there today.

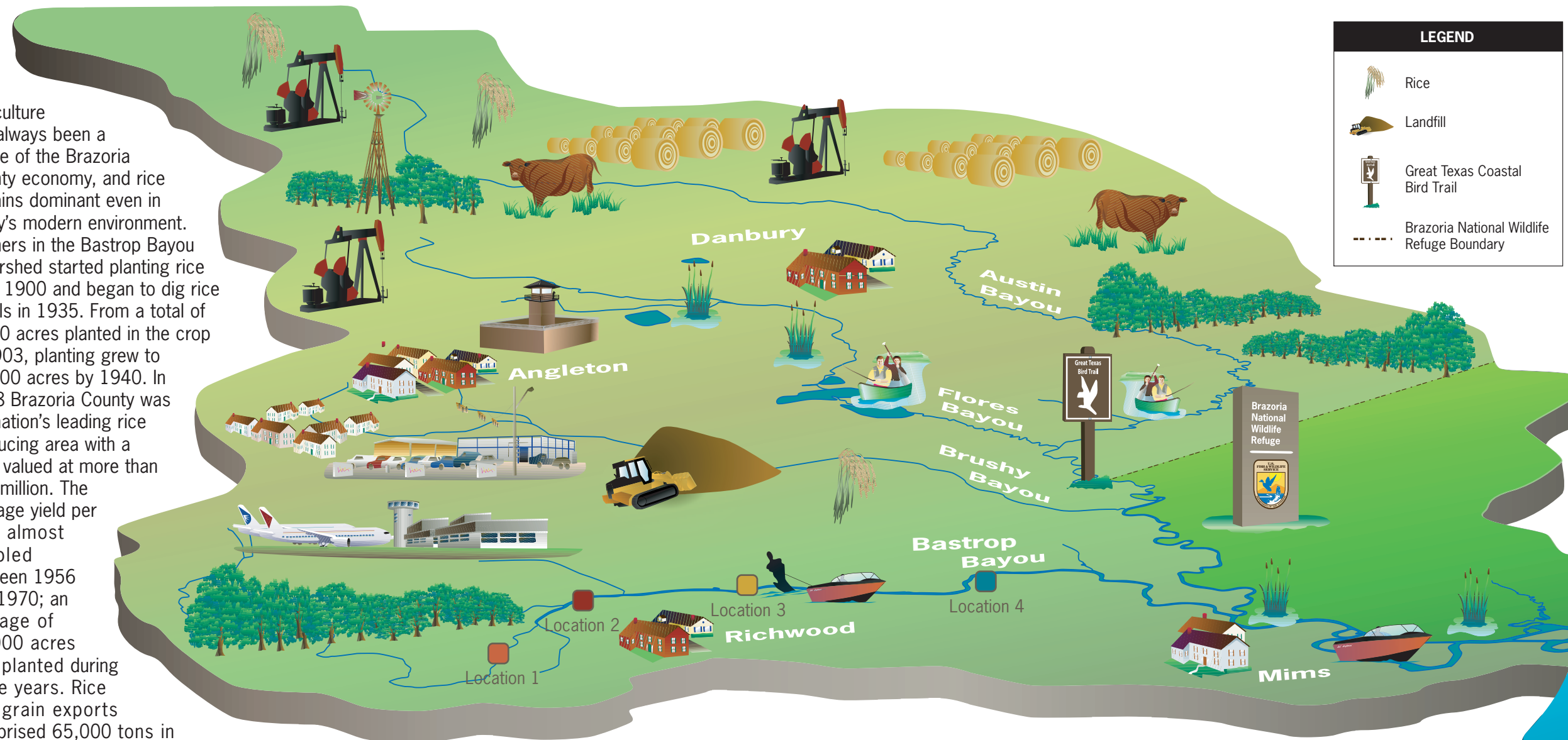
Agriculture has always been a staple of the Brazoria County economy, and rice remains dominant even in today's modern environment. Farmers in the Bastrop Bayou watershed started planting rice after 1900 and began to dig rice canals in 1935. From a total of 6,000 acres planted in the crop in 1903, planting grew to 16,000 acres by 1940. In 1948 Brazoria County was the nation's leading rice producing area with a crop valued at more than \$10 million. The average yield per acre almost doubled between 1956 and 1970; an average of 53,000 acres was planted during those years. Rice and grain exports comprised 65,000 tons in 1968; American Rice, Incorporated at Brazosport, shipped 350,000 tons of rice in 1990. Although agriculture is still an economic driver within the Bastrop Bayou watershed, like Brazoria County as a whole, its economy has become more diversified.

Agriculture

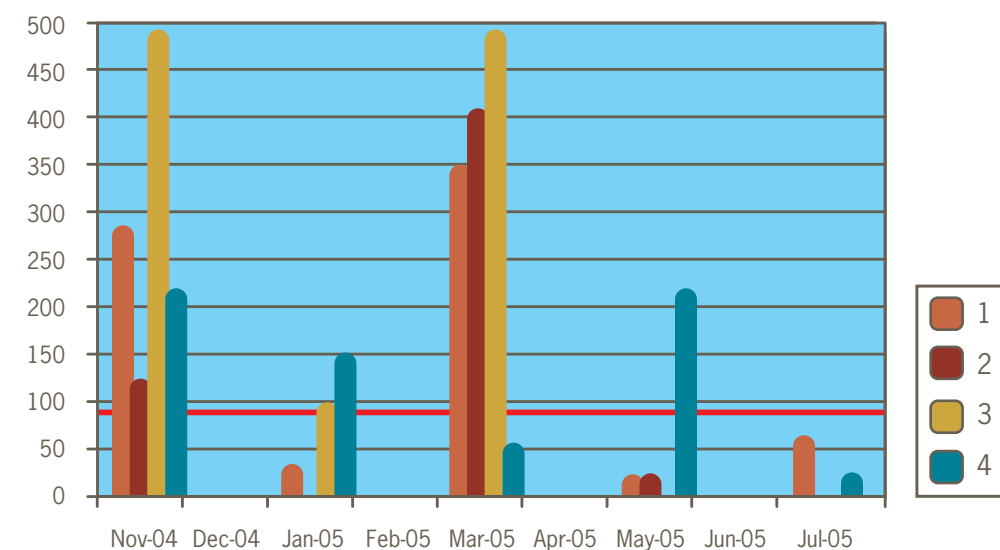
Agriculture within Bastrop Bayou watershed has a long and colorful history. From the rise of major rice farms to the grazing of large herds of cattle, agriculture continues to be a major activity within the watershed. While much of the land formerly supported large scale rice production, sorghum crops and cotton fields, much of today's



agriculture is based around seafood. Aquaculture of shrimp, crawfish and other seafood products brings over \$20 million dollars into the local economy. Specialty products are also taking hold, with a number of farmers raising koi to support the local water garden and goldfish pond industry. Rice production within the watershed (and across Texas) is at an all time low. As a result, many farmers no longer grow two crops a year and prefer to let the land remain fallow. Conservation easements are also becoming more common within the watershed, as farmers look for ways to maintain rural lifestyles and preserve open vistas and natural landscapes.



Bacteria Levels at Four Locations within Bastrop Bayou Watershed



Brazoria National Wildlife Refuge

Brazoria National Wildlife Refuge (NWR) is rich in ecology and habitats including freshwater sloughs, salt marshes and native bluestem prairies. This habitat is important to the many species of birds that can be found during each season. In winter, more than 100,000 snow geese, Canadian geese, pintail, northern shoveler, teal, gadwall, American wigeon, sandhill cranes and mottled ducks fill the ponds and



and offers a variety of activities from wildlife viewing, photography and biking/biking trails to seasonal events.

Birding and Nature Tourism in Bastrop Bayou Watershed

Bastrop Bayou provides an extensive freshwater wetland habitat which is home to endangered or threatened shorebirds as well as waterfowl, grassland species and birds of prey. Bastrop Bayou is part of the Great Texas Coastal Birding Trail, which was completed in 2000 through the cooperation of private citizens, land managers, conservation groups, businesses, government agencies and communities.

The Trail features 308 distinct wildlife-viewing sites. Enhancements such as board walks, parking pullouts, kiosks, observation platforms and landscaping to attract native wildlife have been constructed at a number of sites.

Nature tourism not only benefits the residents of Bastrop Bayou because of the preservation of natural habitat, but its cities

sloughs to capacity. In summer, birds that nest on the refuge include 10 species of herons and egrets, white ibis, roseate spoonbill, mottled duck, white-tailed kite, clapper rail, horned lark, seaside sparrow, black skimmer and scissor-tailed flycatcher.

Alligators can be found year-round in Brazoria NWR, and in dry seasons, their trails through the mud and excavated gator holes are easy to spot. Roseate spoonbills can also be found as they make their way back after near extinction caused by demand for feather hats before World War I. Brazoria NWR is open to the public



Watershed Profile

Area

217.45 square miles

Average Annual Rainfall

40.1 – 50.1 inches

Elevation in feet

Sea level – 55 feet

Geology

Pleistocene-age deeply incised channel-fill fluvial system. Sediments in the area range from organic-rich plastic clays to fine-to-medium grain quartz sand.

Soils

Soils range from clayey to sandy, with clayey soils being the dominate type in the area. Soils are characterized by low infiltration rates and high run-off potential.

Major ecoregion

Western Gulf Coastal Plain

Subregion

Northern Humid Gulf Coastal Prairies, small part of the western edge classified as Southern Subhumid Gulf Coastal Prairies

Natural region

Gulf Coast Prairies and Marshes

Vegetation

The original vegetation was mostly grasslands with a few clusters of oaks, known as oak mottes or maritime woodlands. Little bluestem, yellow Indiangrass, brownseed paspalum, gulf muhly, and switchgrass were the dominant grassland species. However, almost all of the coastal prairies have been converted to cropland, rangeland, pasture or urban land uses. The exotic Chinese tallow tree and Chinese privet have invaded large areas in this region. Some loblolly pine occurs in the northern part of the region.

Cities

Angleton, Danbury, Northern parts of Lake Jackson and Richwood, Eastern edge of Bailey's Prairie

Tributaries to Bastrop Bayou

Austin Bayou (receives water from Flores and Brushy Bayou), Ditch at Sandpiper Rd. SE of Angleton (Holiday Beach)

Aquifer

Gulf Coast aquifer

Issues

High bacteria levels, sludgefarming, failing and leaky septic tanks, loss of native habitat

No matter where we live,

work or play we are

always in a watershed –

an area of land that

drains to a creek, river,

bayou or lake. As a

result, everything we put

on the ground, from lawn

fertilizer to litter, can end

up washing into our

waterways.

Watershed

As our population grows and activities throughout the watershed increase, so do the risks to our waterways.

and county benefit economically, as well. In 2001, the average traveler to the Great Texas Coastal Birding Trail spent an average of \$78 per person, per day. According to a 2001 U.S. Census Bureau report, 2.3 million people observed wildlife in Texas and of those, 38 percent took trips away from home to watch birds. This translates to \$2.7 billion spent on wildlife and bird watching per year in Texas.

Christmas Bay Study

The Christmas Bay system is a group of three small secondary bays at the southwestern end of the Galveston Bay estuarine system in Brazoria County. Numerous species of birds, fish, crustaceans and

mollusks inhabit the three-bay system. These include seven endangered species of birds and an endangered species of sea turtle. Numerous plants also occur in the Christmas Bay system and include several species of seagrass that serve as prime spawning grounds for crustaceans and finfish. During February 1999–March 2000, the U.S.G.S. collected hydrologic, water-quality and sediment-quality data to establish baseline conditions in the Christmas Bay system. Water samples were collected monthly from each of the three bays. Results of laboratory analysis show that most nutrient concentrations were at or less than minimum reporting levels while bacteria levels remained high.

Photographs Courtesy of Harris County Flood Control District, Houston-Galveston Area Council, philip.greenspun.com and U.S. Army Corps of Engineers



Contacts

For more information about your watershed, please contact the following:

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www.gbep.state.tx.us

Texas Commission on Environmental Quality
(512) 239-4491
www.tceq.state.tx.us

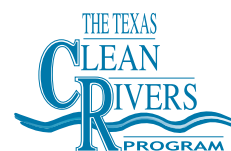
Texas Parks and Wildlife
4200 Smith School Road
Austin, TX 78744
(800) 792-1112
www.tpwd.state.tx.us/

Brazoria National Wildlife Refuge
1212 North Velasco, Suite 200
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Christmas Bay Foundation
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Bastrop Bayou



Bastrop Bayou is a scenic coastal waterway fringed by extensive freshwater wetlands and saltmarshes.

Bastrop Bayou Watershed

The main stem of Bastrop Bayou originates near SH 288 between Angleton and Richwood. Three smaller bayous (Brushy, Flores, and Austin) feed into Bastrop Bayou near the community of Mims. Bastrop Bayou eventually flows into Cox Lake, Lost Lake and Bastrop Bay before entering the Christmas Bay Coastal Preserve – one of the last pristine estuaries on the Texas coast. Christmas Bay is home to one of the last remaining stands of seagrass beds on the upper Texas coast and provides valuable habitat for an abundance of aquatic species. Bastrop Bayou is influenced by the tides of West Galveston Bay and the Gulf of Mexico. As a result, the water within Bastrop Bayou is a brackish mixture of freshwater and saltwater.

The watershed is located in the San Jacinto-Brazos Coastal Basin and contains a mix of agricultural and wooded areas, with abundant wetlands located along the lower reaches of Bastrop Bayou. The watershed is largely rural, with urban development primarily limited to the cities of Angleton and Danbury. Small residential developments are found along Bastrop and Austin Bayous.

The region's relatively flat terrain with sandy clay soils provides a wide and natural floodplain that flows across the landscape before reaching the bayous, lakes and bays.

Bastrop Bayou Risk Assessment

The Bastrop Bayou Risk Assessment is designed to provide a better understanding of how day-to-day activities affect the water quality of Bastrop Bayou, its tributaries, and the numerous lakes and bays located downstream. In addition to gaining a better understanding of how the watershed works, the project will identify specific threats to water quality and provide citizens and municipal leaders with best management practices that will allow the community to embrace future growth opportunities while maintaining a healthy bayou.

Water Quality

Oxygen and temperature levels are important to aquatic life. Temperature affects the quality of aquatic life and also dictates the amount of available oxygen in the water. Generally, dissolved oxygen (DO) levels at or above 5 mg/L are considered good for aquatic organisms. As temperature increases, dissolved oxygen concentrations usually decrease. The dissolved oxygen and temperature relationship throughout Bastrop Bayou watershed appears satisfactory.