Houston-Galveston Area Council

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San Bernard Watershed

to where it empties into the Gulf of Mexico, just past the Intracoastal Waterway, northeast of Cedar Lake. Much of the land throughout the long and narrow watershed is used for crop production and cattle grazing. The watershed boasts good water quality and there is a great deal of fishing and boating along the river. A national wildlife refuge and state wildlife management area contribute to a rich coastal ecosystem as the river approaches the Gulf of Mexico.

History and Development

Archaeological excavations have shown that man has been in the San Bernard River watershed since as early as 450 A.D. The most common Native American tribe found in the area was the Karankawa, who were able to benefit from the natural resources of the region. After early American colonists began to move into the area in the 1820's, skirmishes between the settlers escalated, and eventual expulsion of the tribes to Mexico occurred by 1850.

In 1821, Stephen F. Austin inherited 300 land grants dedicated by Spanish Governor Antonio María Martínez in San Antonio. Austin was to settle 300 families, commonly called the "Old Three Hundred", into the area as planters. German settlers arrived in what is now Colorado County in the 1840's, and Germans and Czechs arrived in Wharton County in the 1880's. Mexican immigration to the area became significant after 1950.

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During the 1820's many of the families of the Old Three Hundred quickly established successful plantations along the fertile San Bernard River bottom. The area of land settled was referred to as the "sugar bowl of Texas", producing the second largest amount of sugar in the U.S. throughout most of the nineteenth century. Cotton was also a very common crop type along the river during this time. After Reconstruction, these crops began to decline, and by 1867, livestock production and grazing became almost as valuable an economic driver in the watershed as the sugar and cotton industry.

Water Quality

Uses:
- Contact Recreation
- High Quality Aquatic Life

Monitoring Agencies:
- Texas Commission on Environmental Quality
- United States Geological Survey

Economic Resources

Oxygen in the water is important to aquatic life. Generally, dissolved oxygen (DO) levels of 5 milligrams per liter (mg/l) or higher are considered good for aquatic organisms. Fish populations can still be supported, although they will be stressed, at levels as low as 3 mg/l. Temperature affects the quality of aquatic life and also dictates the amount of oxygen that can be contained in water. As temperature increases, dissolved oxygen concentrations usually decrease.

Bacteria counts are important when evaluating a water body's suitability for contact recreation, such as swimming. Fecal coliform densities below 400 colonies/100 milliliters (ml) of water are considered acceptable. The Texas Commission on Environmental Quality (TCEQ) has started using E coli for freshwater and Enterococcus for tidal water bodies as bacterial indicators.

Today, small towns among vast open spaces, with no major metropolitan area, characterize the watershed. The major agribusiness types in the watershed are beef cattle grazing and hay production. In fact, the counties in the northern and west central portions of the San Bernard River watershed are among the top cow/calf producers in the state. Other common crops found throughout the watershed include rice, sorghum, corn, cotton, and soybeans.

Minerals are another major natural resource found within the area. Oil, gas, sulfur, and salt are abundant subsurface features. Petrochemical services are another facet of the economy. Of particular geological significance, Boling Dome is situated on the western bank of the San Bernard River, in the easternmost part of Wharton County, near Boling-Lago. This subsurface structure contains petroleum, sulfur, and salt. The associated sulfur reserve has produced more sulfur than any other mine in the world. As of 1990, 80.5 million tons of sulfur had been removed, along with over 6,000 million cubic feet of natural gas, and over 25,500,000 barrels of oil.

Recreational activities bring other economic benefit to the watershed. Fishing, hunting, and water sports, are predominant along the river and its tributaries. The southernmost portion of the watershed contains portions of the San Bernard National Wildlife Refuge, managed by the US Fish and Wildlife Service and the Peach Point Wildlife Management Area, managed by the Texas Parks and Wildlife Department. These preserves encompass a rich coastal ecosystem with opportunities for nature viewing/tourism as well as for hunting in permitted areas.

Historical Water Quality

There are only two monitoring stations along the San Bernard River. One station (freshwater) is near the town of East Bernard, and the other (tidally- influenced water) is just upstream of the San Bernard National Wildlife Refuge and Peach Point Wildlife Management Area.

At both stations the temperature/dissolved oxygen relationship appears to be satisfactory. Dissolved oxygen values in the tidal portion commonly range between 4 mg/l and 8 mg/l, while DO values at the freshwater monitoring location are typically between 5 mg/l and 8 mg/l. These concentrations are adequate for healthy fish populations and other aquatic organisms.

Bacteria counts at both stations are generally low, supporting contact recreation. There are some "spikes" in the data; however, typically, densities are higher after rainstorms, which wash bacteria from many sources into area waterways. Fecal coliform numbers usually decline rapidly after a rainfall, unless there is a continuous source of bacteria present, such as a leaking septic tank or sewer line.

The Importance of Best Management Practices

In May of 2001, a fire to an herbicide and pesticide distributor in East Bernard caused severe water quality issues in the watershed. Water used to put out the blaze ran off with high concentrations of pesticides into the San Bernard River. There were several fish kills, and the river was closed to contact recreation activity for several weeks after the incident. This created an adverse economic impact on the downstream area. As a result, the distributor has instituted "best management practices" (pollution prevention plans) to help avoid this type of environmental and economic problem from occurring again.

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H-GAC/USGS Study

While the San Bernard River does not currently show serious water quality problems, it was placed on the state's list of water bodies not meeting designated standards in 1999. The listing was a result of low dissolved oxygen concentrations, which negatively affect its "high aquatic life use" designation. However, data used for this analysis was collected quarterly from just one station inside the watershed.

Due to limited data, the Houston-Galveston Area Council (H-GAC) Clean Rivers Program is conducting a study in conjunction with the United States Geological Survey (USGS) to fully characterize the watershed and determine if the state listing was warranted.

Data collection at six stations began in late summer of 2000 and continued into 2002. One monitoring meter was installed in the non-tidal portion of the watershed to collect data continuously (every thirty minutes). This allowed scientists to monitor the levels of dissolved oxygen under varying conditions. Other parameters collected with the meter included pH, conductivity, and temperature.

Additional water quality monitoring sites were sampled monthly and included the parameters listed above as well as Biological Oxygen Demand, nitrogen and phosphorus compounds, dissolved solids, bacteria, and flow. Recordings from a permanent USGS station near Boling supplied continuous flow measurements.

The USGS also conducted habitat assessments and collected biological data at three sites within the watershed. These assessments, along with discussion of other man-made stresses to the ecosystem, lends to a better understanding of the aquatic life use within the San Bernard River and its tributaries.

Study Conclusions

Results of monitoring efforts show a healthy ecosystem with no serious water quality concerns. Nutrient concentrations were at or below screening levels. Dissolved oxygen readings fluctuated normally with seasonal variations, and other parameters monitored throughout the study were reasonable. USGS scientists concluded that the water chemistry was "encouraging".

Habitat and biological data collected along the San Bernard River and its tributaries have been summarized and compared with similar data from other streams in southeast Texas. Measures of stream habitat compare closely with other riverine settings, as opposed to tidally influenced, coastal bayous. Similarly, measures of aquatic insect and fish population diversity are similar to water bodies with minimally impacted watersheds. Based on these biological data, along with selected water-chemistry and water-quality data that were also collected during 2000-2002, the San Bernard River does not exhibit significant water quality problems. The river has been removed from the list of water bodies not meeting designated standards for high aquatic life use due to low dissolved oxygen concentrations.

USGS Gage

Watershed Profile

Area	896 square miles
Rainfall	Average annual 40" to 54", amounts increasing toward the coast
Elevation	0'- 400'
Geology	Sedimentary formations consisting of materials deposited by water during the Pleistocene epoch, sediments in the lower half of the watershed were deposited during the Holocene and are still active.
Soils	Sand and local gravel, sandy clay, sand with local clay, clay and silt with local sand, mud and other recent fluvial deposits
Major Ecoregion	East Central Texas Plains (headwaters) Western Gulf Coastal Plain
Subregion	Blackland Prairie (uppermost headwaters) Gulf Coast Prairies and Marshes
Natural Region	Upland Prairies and Woods
Vegetation	Crops, Pecan-Elm Forest
Cities	Eagle Lake Wallis East Bernard Kendleton Needville Wharton West Columbia Wild Peach Village Sweeny Brazoria Jones Creek
Tributaries	East Bernard Creek West Bernard Creek Middle Bernard Creek Little San Bernard River Peach Creek Mound Creek Coushatta Creek Halls Bayou McNeal Bayou Redfish Bayou
Aquifers	Gulf Coast
Issues	Flooding/high moisture retention at surface due to nature of soils in the lower half of the watershed

No matter where we live or work, we are always in a watershed – an area of land that drains to a particular creek, river, bayou or lake. As our population grows, so do the risks to our waterways from activities in the watershed. Understanding our role in watershed management is key to the protection of our waterways, floodplains, and drinking water,

River

plus our recreational and fishing areas.

Conservation – San Bernard National Wildlife Refuge

Keith Ramos © San Bernard National Wildlife Refuge

The San Bernard National Wildlife Refuge is a 27,000-acre sanctuary established in 1968 to protect habitat for wintering waterfowl and estuarine systems for marine species. The United States Fish and Wildlife Service maintains the preserved land. Part of the refuge is open to the public for nature and wildlife viewing, and there are areas of permitted hunting on selected days throughout the year.

A portion of this refuge is in the southernmost part of the San Bernard watershed, and is an important coastal marsh wilderness and shelter for millions of migrating and nesting birds, including over 230 different species annually. Some of these include snow geese, warblers, herons, egrets, terns, and gulls, as well as neotropical bird species. The birds can be found in the marshy bottomlands, on several remote islands, or within the bottomland hardwood forests found throughout the refuge. Visitors may also see a bobcat or an alligator while touring the wildlife sanctuary.

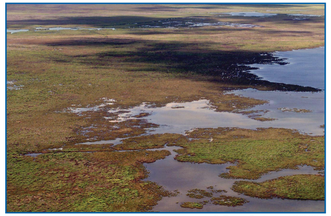
The refuge also supports estuaries that flourish with shell and fin fish and reefs of colonial oysters, supplying a feeding ground for adult fish and crabs.

PeachPoint Wildlife Management Area

The Peach Point Wildlife Management Area (WMA) is another coastal preserve found in the southernmost portion of the San Bernard River watershed. The land, acquired between 1985 and 1988, is dedicated to sound biological conservation of all wildlife resources for the public's benefit. The WMA, managed by the Texas Parks and Wildlife Department, contains over 10,000 acres of coastal prairie and marshes and is part of the Central Coast Wetlands Ecosystem Project (CCWEP).

The CCWEP aims to create and maintain habitat for indigenous and migratory species, particularly waterfowl. Research activities are prevalent throughout the WMA, with resulting information concerning the understanding of coastal ecosystems distributed to scientists, land managers, resource agencies, and other interested parties. Currently, researchers are studying small mammals, snakes, and vegetation within the WMA. In addition, researchers assist in bird banding, which provides data for the Monitoring Avian Productivity and Survivorship Program.

The WMA also provides recreational opportunities within its boundaries. Listed on the Great Texas Coastal Birding Trail, nature trails within the WMA provide excellent bird watching, nature photography, and hiking opportunities. Hunters of waterfowl, rail, gallinule, and snipe are welcome during designated hunting days. There are also opportunities for feral hog hunting.



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The San Bernard National Wildlife Refuge and the Peach Point Wildlife Management Area serve important functions in the conservation of native vegetation and migrating wildlife and in the understanding of coastal ecosystems. These sanctuaries not only provide important information to scientists and the public, but they also provide recreational opportunities for locals and tourists as well as economic benefits to the region.

Contacts

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

Peach Point Wildlife Management Area
(979) 224-7697
www.tpwd.state.tx.us/wma/find_a_wma

US Fish and Wildlife
(281) 286-8282
southwest.fws.gov

San Bernard National Wildlife Refuge
(979) 964-3639
southwest.fws.gov/refuges/texas/midcoast/sanbernard.htm

Attwater Prairie Chicken National Wildlife Refuge
(979) 234-3021
southwest.fws.gov/refuges/texas/attwater/index.html

H-GAC
(713) 627-3200
www.h-gac.com

TCEQ
(512) 239-4491
www.tceq.state.tx.us

Texas Parks and Wildlife Department
(800) 792-1112
www.tpwd.state.tx.us

08/03

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