



Big Thicket National Preserve, Water Quality



Village Creek at McNeely Road, May 14, 2010. Image by Joe Meiman.

Water Defines the Preserve

Water is the unifying resource at Big Thicket National Preserve. The 42,640 ha (105,360 ac) Preserve is essentially a series of riparian corridors centered on the Neches River, Beech, Menard, Big Sandy, Hickory and Village Creeks, and Pine and Little Pine Island Bayous. An average of 14,500 visitors find recreation in Preserve waters each year. Preserve managers are met with the task of conserving water resources of 930 km (578 mi) of streams – home to 92 species of fish and 16 species of freshwater mussels – ranging from headwater streams to a major river. The challenge lies in that the Preserve represents only about 1.6% of the 26,000 km² (10,000 mi²) Neches River watershed.

Water Quality

Water quality and quantity is monitored quarterly at six locations within the Preserve, (directed by the Gulf Coast Inventory and Monitoring Network) by the Lower Neches Valley Authority (LNVA), 13 sites proximal to the Preserve by the LNVA, and six stations in the Lower Neches Valley by the United States Geological Survey. Considering the landscape of the Preserve has been completely altered from its natural condition it is encouraging that most waters are in good condition for most measured parameters.

The first water quality survey was done between 1977 and 1981 (Lamar University). Results showed severe impacts from oil field brines (chloride) in Little Pine Island Bayou and depressed oxygen levels in Little Pine Island Bayou and Big Sandy Creek. While large-scale brine events have not been seen in recent years, many miles of streams are still failing to meet standards established by the state of Texas (see map on reverse side).

Each stream is assigned a designated use reflective of how the water is used; recreational, aquatic life, and public water supply for example. All of Pine Island and Little Pine Island Bayous within the Preserve have low dissolved oxygen. Little

Pine Island Bayou and the headwaters of Big Sandy Creek exceed limits for *E. coli*. In March 2010 the Texas Department of State Health Services issued a fish consumption advisory for the entire reach of Village Creek and the Neches River upstream of Evadale due to elevated levels of mercury.

Depressed oxygen may be caused by a combination of natural hydraulic conditions; warm water and low gradients. Reduced summer flows allow little aeration and the warmer the water the less oxygen can be dissolved. Low dissolved oxygen may also indicate eutrophication; the processes of a water body receiving excessive nutrients. Our data suggest that most dissolved oxygen violations are naturally caused. Most freshwater fish need at least 4 to 5 mg/l of dissolved oxygen.

E. coli is a naturally-occurring bacteria found in intestines and feces of warm-blooded animals. While not generally a human pathogen (a substance that causes harm to people), some strains of *E. coli*, 0157:H7 for example, have been linked to illness in contaminated foods. As *E. coli* are associated with pathogens, they are considered an indicator species, and thus used for a measure of water quality. *E. coli* bacteria enters a stream or river by point source (direct entry at specific points), and non-point source (run-off over a broad area). Point sources include failing septic systems and inadequate waste water treatment facilities. Non-point sources include surface run-off from livestock pastures and wildlife habitat.

While the above issues originate from within the watershed, likely mercury sources are atmospherically derived. Coal-burning power plants are the nation's leading emitter of mercury. Mercury is deposited into streams and is converted by sulfur-reducing bacteria into the neurotoxin methyl-mercury which bio-accumulates through the aquatic food chain.

Water Quality Standards

Water Temperature	< 32.2°C (35)
Dissolved Oxygen	> 5.0 mg/l, > 4.0 mg/l*
pH	Between 6.0 and 8.5 SU
<i>Escherichia coli</i>	< 394 MPN/100ml**
Chloride	<150 mg/l (50)
Sulfate	< 50 mg/l [75]
Total Dissolved Solids	< 300 mg/l (200)

(Neches River only) *Pine Island Bayou
[Village Creek only] **Single Sample

What Can You Do?

Water quality issues at Big Thicket National Preserve are similar to many watersheds throughout the nation. Threats are generally local or regional in scope. Do your part and get involved in watershed activities and planning efforts. The fact that our waters at times exceed bacteria limits or fish cannot be consumed is a reminder that we still have a way to go in the conservation of our nation's natural resources.

Water quality data are available upon request to the Gulf Coast Network or our website:
<http://science.nature.nps.gov/im/units/guln/index.cfm>

