Improving Water Quality in Dickinson Bayou

Investigating Low Dissolved Oxygen Levels

In Dickinson Bayou Tidal (Segment 1103), concentrations of dissolved oxygen are less than optimum compared to standards defined for the support of aquatic life. Oxygen, which dissolves in water, is essential for the survival of aquatic life. The amount of dissolved oxygen in water fluctuates naturally, and low dissolved oxygen is a common natural occurrence in some coastal waters like Dickinson Bayou. Various human activities can also cause unusually or chronically low dissolved oxygen levels, which may harm fish and other aquatic organisms.

The TCEQ investigated the causes of low dissolved oxygen in Dickinson Bayou, with the goal of determining the relative contribution of natural versus human causes of low dissolved oxygen in the bayou. Based on the results, the TCEQ worked with stakeholders to determine the most effective management strategy for protecting water quality in the bayou.

Learn more about water quality standards and monitoring by reading *Preserving and Improving Water Quality*, available on our website at <www.tceq.texas.gov/goto/tmdl/>.

Dickinson Bayou Watershed

Dickinson Bayou is located in the San Jacinto-Brazos Coastal Basin. It originates near Alvin, south of Houston, and flows east through Dickinson before joining Dickinson Bay. The bayou has two segments—the tidal portion, Segment 1103, and the portion above tidal influence, Segment 1104.

Upstream of the tidal influence, Dickinson Bayou is a small coastal prairie stream. The tidal segment ranges from a relatively narrow, forested stream in the upper reaches to a very wide and relatively deep tidal stream at, and downstream from, the city of Dickinson.

The tidal portion of Dickinson Bayou is used by local residents for recreational boating, fishing, water skiing, canoeing, and other activities. The lower tidal portions support some commercial shrimp boat and barge traffic.

Rice fields in the upper watershed receive irrigation water via canals from beyond the watershed. The irrigation water returns to Dickinson Bayou in the form of irrigation return flows. Although historically substantial in terms of flow contributions, rice farming has diminished significantly in the upper Dickinson watershed since the mid-1970s.

The watershed of Dickinson Bayou includes portions of Brazoria and Galveston counties and the cities of Alvin, Santa Fe, Dickinson, and League City.

Public Participation

In all its projects, the TCEQ seeks to gather opinion and information from people who represent local government, permitted facilities, agriculture, business, environmental interests, and community and private interests in the watershed.

This project was coordinated with the Galveston Bay Estuary Program and the University of Houston. The steering committee of the Dickinson Bayou Watershed Partnership advised the TCEQ on the investigation. Stakeholders in the watershed formed the Partnership to implement activities that improve water quality in Dickinson Bayou.

Project Development

In 2008 and 2009, the University of Houston (UH), under contract with the TCEQ, collected water quality data in the bayou and its tributaries. In 2011, UH revised a dissolved oxygen model developed previously for the bayou.

TCEQ TMDL staff analyzed the data collected by UH and the revised dissolved oxygen model for the bayou

and concluded that low dissolved in the Dickinson Bayou was heavily influenced by the natural conditions that exists in the bayou, especially during warm and dry periods when flow in the bayou is sluggish.

Based on this analysis, TCEQ TMDL staff recommended to watershed stakeholders that the TCEQ continue applying the dissolved oxygen criteria used to assess support of the High Aquatic Life Use in the Tidal Segment of Dickinson Bayou (Segment 1103), but that the method used to assess the health of the bayou be modified to accommodate periods of sluggish flow.

The TCEQ Standards Team is conducting studies to evaluate the appropriate strategy to address low dissolved oxygen in tidal streams along the Texas Gulf Coast, including Dickinson Bayou.

In 2009, the Dickinson Bayou Watershed Partnership developed a Watershed Protection Plan for Dickinson Bayou. The plan included proposed activities and management strategies to address water quality impairments in the bayou and its tributaries, including low dissolved oxygen.

For More Information

Contact us at 512-239-6682 or e-mail tmdl@tceq.texas.gov. Or visit the project websites at:

<www.tceq.texas.gov/implementation/water/tmdl/17-dickinson.html>

Or:

<agrilife.org/dickinsonbayou/>

Project Development Status

Start Date: August 2000
End Date: December 2014

Project Highlights

- The project to address low dissolved oxygen in Dickinson Bayou began in August 2000.
- The project to develop a watershed protection plan for Dickinson Bayou began in September 2005, when stakeholders formed the Dickinson Bayou Watershed Partnership in December 2005.
- TCEQ and UH collected data and developed revised water quality models in 2010 and 2011.
- In 2012 and 2013, TCEQ TMDL program staff analyzed the new data and modeling results. Based on this analysis, TCEQ TMDL staff recommended, in 2014, that the TCEQ revise the assessment method used to determine compliance with the dissolved oxygen criteria used to assess support of the High Aquatic Life Use in the Tidal Segment of Dickinson Bayou.
- Information about the Dickinson Bayou Watershed Partnership is available on the Web at <agrilife.org/dickinsonbayou/>.