

**Texas Clean Rivers Program
1998 Basin Highlights Report**

for the

**Trinity-San Jacinto Coastal Basin
San Jacinto River Basin
San Jacinto-Brazos Coastal Basin
Brazos-Colorado Coastal Basin**

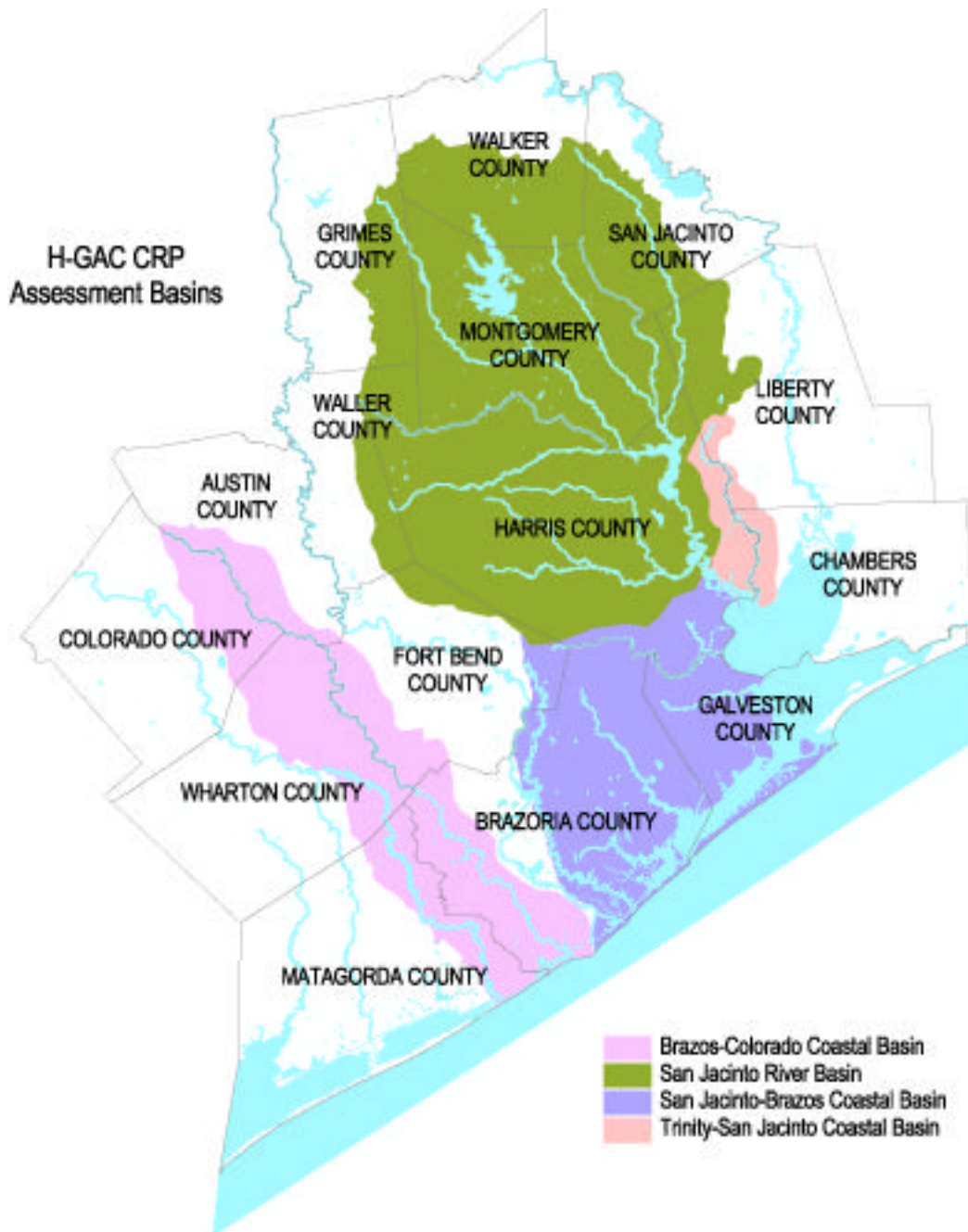
“The goal of the Texas Clean Rivers Program is to maintain and improve the quality of water resources within each river basin in Texas through an ongoing partnership involving the Texas Natural Resource Conservation Commission, other agencies, river authorities, regional entities, local governments, industry, and citizens. The program will use a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action, and work to implement those actions.”

- Texas Clean Rivers Program Long Term Action Plan (1995-2000)

BACKGROUND

The Houston-Galveston Area Council (H-GAC) is the Clean Rivers Program lead agency for the San Jacinto River Basin and three associated coastal basins -- the Trinity-San Jacinto, the San Jacinto-Brazos and the Brazos-Colorado. In many of the state's major river basins, a legislatively created river authority exists and is leading the assessment effort for its basin, as intended by the Texas Legislature through the Clean Rivers Act. In other areas not covered by a particular river authority, either a neighboring authority or some other logical regional entity was to be designated to oversee the assessment. H-GAC is the Council of Governments (COG) and regional planning agency for the Gulf Coast State Planning Region, and has been actively involved in regional water quality planning and public outreach activities for over 26 years. In addition, many of the key agencies and individuals involved in water quality matters in the region already participate in environmental committees and programs. In light of H-GAC's experience and capabilities, the San Jacinto River Authority requested that H-GAC take the lead in the San Jacinto River Basin and the Gulf Coast Waste Disposal Authority likewise requested H-GAC to take the lead in the Trinity-San Jacinto and San Jacinto-Brazos Coastal Basins. H-GAC coordinated its initial work plan for the San Jacinto-Brazos Coastal Basin with the Brazos River Authority (BRA) since the Oyster Creek watershed in the westernmost portion of the coastal basin had been an ongoing area of concern for BRA. Similarly, H-GAC agreed to take on most of the Brazos-Colorado Coastal Basin in the western part of its region after confirming that the Lower Colorado River Authority would be responsible for assessing East Matagorda Bay and the drainage from the western side of the coastal basin into that bay. This coordination between H-GAC and the river authorities continues.

The four basins under H-GAC's oversight comprise a truly diverse region. The basins encompass three major Ecoregions (South Central Plains, Gulf Coast Plains and Western Gulf Coastal Plains) and are home to over 4 million people. Economic activity includes agriculture (forestry, farming and ranching) petroleum refining, petrochemical production, manufacturing, transportation, water-oriented recreation, aerospace and government. This region has the largest concentration of permitted wastewater discharges (municipal and industrial) in Texas, and most



of these discharge to tributaries that eventually flow into Galveston Bay (an estuary of state and national importance) via the San Jacinto River and Houston Ship Channel. In fact, three of the four basins drain into or are part of the Galveston Bay system. The San Jacinto River Basin contains the most highly urbanized and industrialized portion of the Houston metropolitan area. The Houston Ship Channel is home to one of the world's largest petrochemical complexes. The Ship Channel and the many urban bayous and tributaries which drain into it are also the major carriers of urban runoff to Galveston Bay. The region contains examples of high quality, largely unimpacted waters as well as streams and bays that have clearly been degraded by human activity. The Clean Rivers water quality assessment in the four basins shows an overall trend of good and improving water quality, although there are still problem areas to address and issues on which management agencies and stakeholders must focus.

BASIN ISSUES

The 1998 State of Texas List of Impaired Water Bodies (required under Section 303d of the Clean Water Act) includes 137 of the state's 368 designated stream and bay/estuary segments plus 10 other small tributaries with specific water quality concerns. Of this total, 41 of the listed segments -- or 28% of the statewide list -- are within H-GAC's four Clean Rivers Program basins. This includes two segments in the Trinity-San Jacinto Coastal Basin, 14 in the San Jacinto River Basin, 10 in the San Jacinto-Brazos Coastal Basin, and two in the Brazos-Colorado Coastal Basin, plus 13 bay/estuary segments which are in H-GAC's assessment area. Among the segments listed in H-GAC's basins, the identified water quality impairments are related to the following factors (with some segments listed for several reasons): elevated bacteria levels which could pose a health risk to people engaged in contact recreation activities (23 segments), elevated metals (13), fish/shellfish consumption advisories issued by the Texas Department of Health (12, with most related to dioxin concerns in the Houston Ship Channel vicinity), low dissolved oxygen (8), elevated bacteria levels which trigger shellfish harvesting closures/limitations (5), total dissolved solids (2), high water temperature (1), and one unusual listing for Clear Lake involving anti-fouling paints which release tri-butyl tin, which can affect aquatic life near marinas and boat maintenance operations. On a positive note, none of the area's most popular waters for recreational activities have any contact recreation concerns, including Lake Conroe, Lake Houston, Clear Lake, and the open waters of Galveston Bay and West Bay. In addition, none of the streams or lakes designated for public drinking water supply use has any contamination concerns associated with them.

One major issue receiving increased attention in 1998 is the elevated levels of Fecal Coliform bacteria throughout the region and the associated potential risks for contact recreation and closing of commercial oyster fishing operations. Two underlying factors complicating this issue are the number of samples required by state surface water quality standards to determine use support vs. the number of samples actually collected, and the efficacy of the bacterial indicator used to determine impairment (Fecal Coliform). The basic issue question is "can we confidently say the water bodies are in violation of standards and is the indicator used to determine if a stream is impaired the best and most reliable one?" To address this issue, H-GAC is working with local monitoring agencies in a project designed to evaluate alternative bacteriological indicators as part of their baseline monitoring programs. This project is meant to complement a statewide study being performed by TNRCC. Although this issue was raised under Clean Rivers, H-GAC also secured federal grant funding to help address the problem by assisting local communities find ways to prevent bacterial contamination of the region's waters because of poorly operating or failed septic systems.

The second major issue is the low level of dissolved oxygen found in some streams and bayous, particularly in bayous that are secondary tributaries to the Galveston Bay Estuary. There has

been no definitive answer to the cause of the low dissolved oxygen. Is it the result of point and/or nonpoint sources of pollution? Is it the result of the natural conditions exacerbated by the flat topography that results in bayou waters moving upstream and downstream with tidal action and having insufficient flow to flush the bayou clean? There are two examples of this phenomenon in the San Jacinto-Brazos Coastal Basin -- Armand Bayou, a tributary to Clear Lake, and Dickinson Bayou, the major tributary to Dickinson Bay. Clear Lake and Dickinson Bayou are secondary bays off Galveston Bay. Currently H-GAC is working with TNRCC and stakeholders of the Armand Bayou watershed in a TMDL study. There is still some water quality data collection and modeling to be completed as the stakeholders work to create a Watershed Action Plan. It is anticipated the work will be completed in 1999. Another TMDL study, also in the early stages, is underway in the Dickinson Bayou watershed. H-GAC is performing this work using Clean Water Act Section 604b funds, providing another example of how issues raised by the Clean Rivers program are being addressed through state-regional partnerships.

Another basin issue is the effect of physical changes to the urban bayous and other streams impacted by intensive development or agricultural activity, particularly in Houston. This is partly described in the Biological Assessment completed in 1998 in partnership with the U.S. Geological Survey. This project is described under the Water Quality Monitoring section of this report.

Although these and other issues remain for Clean Rivers and other water quality programs to address, the Assessment did show that the region is largely free from drinking water problems, that groundwater contamination is not a significant issue, and there is minimal heavy metals contamination resulting in water quality problems.

OUTREACH

One of the primary objectives of the Clean Rivers Program is to maintain an active program of outreach that creates as much "hands-on" involvement by fee payers and other stakeholders within the basins. An integral part of H-GAC's Clean Rivers activities is reaching out to the region's stakeholders -- the fee payers who support the program financially and the public who directly or indirectly have a stake in the health of the watersheds that comprise the river and coastal basins. H-GAC successfully addresses this objective through the following mechanisms.

Steering Committee

The Steering Committee is the focal point for all meetings give fee payers and other stakeholders to directly participate in the decision making process for Clean Rivers. It is a forum where ideas and concerns are expressed and addressed and where local priorities are discussed and set. The Steering Committee oversees and guides all aspects of H-GAC's Clean Rivers program -- technical and administrative. The Steering Committee has been one of, if not the most active group statewide. Its members represent some of the largest fee payers and most effective environmental groups. Its success is centered on open discussion with all stakeholders and its realistic approach as to what is needed to address water quality issues in the four basins. Most importantly, the Steering Committee is the mechanism for bringing together all the key agencies and basin interests whose involvement and coordination is critical to the Clean Rivers process. The Steering Committee also:

- Sets areawide priorities based on its deliberations of water quality issues, which then translate into work plan and budget priorities;
- Provides a regional perspective and local expertise and experience to the assessment process;

- Serves as a resource to project staff, who consult individual committee members on particular issues, to obtain water quality data and background information, and to identify appropriate contact persons within agencies and organizations;
- Communicates the concerns and priorities of the groups each member represents, solicits input from within those groups, and helps to disseminate information from the Clean Rivers Program back to these groups; and
- Provides another opportunity for public input into the Clean Rivers process by setting aside time for public comments and questions at all committee meetings.

After a Steering Committee meeting in December 1997, which was attended by 50 people, H-GAC then hosted another meeting in March 1998 in which 36 people participated. The focus in 1998 then shifted to H-GAC's other CRP advisory committees, where various CRP initiatives were developed further and special project activities were presented and discussed. H-GAC's CRP Technical Advisory Group met three times in 1998 (January, July and September). H-GAC's regional monitoring group met six times in 1998 (January, April, June, July, August, and October).

Texas Watch

H-GAC uses the Texas Watch program as another significant ongoing outreach activity. It is an excellent example of a "hands on" approach geared toward individual stakeholder involvement in addressing water quality issues. H-GAC's Texas Watch provides citizen volunteers the training, materials and quality assurance they need to participate in water quality monitoring. The volunteer commits to monitoring a site or sites for two years. Monitoring site selection is done by coordination with the volunteer. All new volunteer monitoring sites are selected based on a combination of need for baseline monitoring at a certain location and relative convenience for the volunteer. H-GAC held or participated in eight training events and six QA/QC events in the last 18 months. In that time, H-GAC trained over thirty new monitors and added two new Quality Assurance Officers in the region. H-GAC also jointly sponsored a Regional Volunteer Symposium in August 1998. The event attracted over 60 attendees that included volunteers, local agency staff, and other interested citizens. Currently H-GAC is involved with about 1,500 volunteers. That includes individuals, small environmental groups, non-profit groups, elementary, middle, and high school science classes, boy scouts and many other groups in the H-GAC region.

Trash Bash

An annual event focused on cleaning up the rivers, lakes, bays and bayous in the region. The Trash Bash has increased in the number of sites participating in the clean up. H-GAC was instrumental in creating and coordinating the first event in 1994 and provided direct oversight for over 3 years. In 1997, one of H-GAC's Clean Rivers Partners, the Gulf Coast Waste Disposal Authority took over the responsibility of coordinating the event and directed the activities on Saturday, March 28, 1998. The 1998 Trash Bash included eleven sites throughout the Trinity-San Jacinto Coastal Basin, San Jacinto River Basin, and San Jacinto-Brazos Coastal Basin and had 3,092 volunteers who collected 97 tons of trash. Twelve sites are in the planning for 1999. A contest is conducted yearly to promote learning about water and watersheds through the creation of web pages. Elementary, middle school and high school students researching the role of water in their communities have done exemplary work. First and second prizes won Compaq computers; and third, fourth and fifth place prizes were digital cameras for their schools! The Trash Bash contest is made possible through coordination with Compaq, Houston Lighting and Power, and the Gulf Coast Waste Disposal Authority.

303d list & TMDL Input Opportunities

H-GAC, through the Steering Committee and Technical Advisory Group provided extensive outreach support to TNRCC to get comments on the state 303d list. Following the 303d outreach activities, a number of individual fee payers and stakeholders followed through to provide TNRCC with comments. Late in 1998, H-GAC again provided extensive outreach to TNRCC -- this time regarding priorities for Total Maximum Daily Load (TMDL) studies. A group of fee payers and stakeholders was brought together for intense discussion and developed a list of issues and questions for TNRCC. TNRCC then made presentations to the Steering Committee on how TMDL priorities were set. On receiving the information, the Steering Committee supported how TNRCC set the TMDL priorities, but did raise some longer-term issues.

BENEFITS TO THE FEE PAYERS

The major benefits to Clean Rivers fee payers this year are the result of coordination, water quality monitoring, and partnership. Over the years, H-GAC has developed an excellence in coordination with local governments, other regional entities, state and federal agencies and advocates for the general public. It is this approach that underlies the benefits of Clean Rivers to fee payers of this region.

Coordination

All benefits to fee payers flow through the Clean Rives Steering Committee, which gives “hands on” program direction to stakeholders and is the focal point of program coordination. A perfect example of H-GAC’s ability for effective coordination is the Regional Monitoring Group (RMG) that was created with the approval and participation of the Steering Committee. This group is a collaborative effort, under the oversight of H-GAC through Clean Rivers and the Galveston Bay Estuary Program (GBEP). Participants include local, state and federal agencies involved in monitoring water quality and other natural resources and other stakeholder organizations such as the Bayou Preservation Association and the Galveston Bay Foundation. In addition to coordinating monitoring activities with the Galveston Bay Estuary Program, the RMG is the group that guided the development of the Regional Monitoring Quality Assurance Project Plan (QAPP). The QAPP was approved by TNRCC in July 1998. It was signed by the local agencies involved in water quality monitoring in the region - the San Jacinto River Authority, City of Houston Public Utilities, City of Houston Health & Human Services, Harris County Pollution Control Division and Galveston County Health District. Their signatures on the approved QAPP ensure the data they collect will be used in any assessment of water quality and will affect management decisions. These are active Clean Rivers Partners with H-GAC who were able to reach consensus on making adjustments to their monitoring and laboratory procedures to fit the Regional QAPP while still meeting their local program needs.

Water Quality Monitoring

H-GAC and the Steering Committee have established an excellent process for submitting and reviewing proposals. The Steering Committee created a Technical Advisory Group of technical experts from varied backgrounds who review and evaluate proposals submitted by fee payers and stakeholders for projects to address water quality issues identified in the basin assessment. 1998 saw the completion of monitoring projects that provided direct benefits to fee payers.

Considering the multitude of wastewater discharge permits in the San Jacinto River Basin, H-GAC undertook a project to collect “real world” data to support fee payers in dealing with permit issues. The study addressed flow and water quality in the urbanized tributaries to Galveston Bay. The study was performed under conditions that approximated as closely as possible, the 7-day, 2-year low flows that are the design conditions for issuing wastewater discharge permits. The purpose of this study was to develop first-hand information on the flows

and quality conditions that actually exist on many effluent-dominated tributaries. One of the two major findings of the studies were that the methods used by the TNRCC to approximate the 7-day, 2-year low flows when no long-term gage results are available appear to work reasonably well. The other was that the procedures used by the TNRCC to approximate the hardness concentrations used for trace metal criteria calculations are not necessarily representative of permit renewal conditions, highlighting the need for more collection of local hardness data. Data was collected at some 20 stations on Buffalo Bayou, Keegans Bayou, Brays Bayou, Whiteoak Bayou, Greens Bayou, Cypress Creek Halls Bayou, Hunting Bayou and Goose Creek

Another project targeted to help fee payers was a study to better understand and document the nature of domestic wastewater flow variation in the Metropolitan Houston area. Methods were developed to estimate the dry weather flow and to make projections of the wet weather flows as a function of local rainfall data and historical flow variance. With the procedures that were developed, regulators and dischargers will be in a better position to have permits that can enforce protection of a high quality environment while avoiding unnecessary public cost burdens. The study evaluated monthly average flow for 56 wastewater treatment plants. The study found that the major factor affecting variation in wastewater flow is rainfall and that monthly average flows in wet conditions range from 1.5 to 3.0 times the annual average flow. Analysis of the data collected suggests that residential service lines (located on private property) are the major factor contributing to inflow.

Recognizing the need for accurate data, a cooperative venture between H-GAC the City of Houston, TNRCC, and Texas A&M University sampled trace metals in the Houston Ship Channel using clean techniques. A total of 23 samples were collected on July 24, 1997 and analyzed for 8 important trace metals with ultra-clean methods. All of the results were well below the lowest water quality criteria for marine waters. Quantifiable measurements were made for arsenic, cadmium, copper, nickel, lead and zinc. All were below their respective marine chronic criteria. Silver and mercury could not be quantified with method detection limits roughly 2 orders of magnitude lower than the lowest marine criteria. What should be emphasized is that with the possible exception of zinc and lead, the measured concentrations of metals in the upper Houston Ship Channel do not appear markedly different from the background observations in the San Jacinto River -- all values being roughly an order of magnitude lower than the lowest water quality criterion.

Partnerships

One of the most telling benefits of H-GAC's partnerships is the ability to leverage Clean Rivers dollars to get a more effective project that results in meaningful data. H-GAC has been able so far to bring an additional \$350,500 in cash and estimated in-kind contributions through project partnerships with the City of Houston, San Jacinto River Authority, Galveston County Health District and U.S. Geological Survey.

WATER QUALITY MONITORING

The purpose of Clean Rivers monitoring is to identify significant issues affecting water quality within each watershed and river basin of the state. All Clean Rivers program (CRP) partners are required to develop and maintain a basin-wide water quality monitoring program that minimizes duplicative monitoring, facilitates the assessment process, and targets monitoring to support the permitting and standards process as well as identifying water quality problems and known pollution sources. CRP rules call for, wherever feasible, the monitoring program to be a cooperative partnership between the CRP lead agencies and other political subdivisions, state agencies and the TNRCC. There is no single, regional entity that comprehensively monitors water quality across the San Jacinto River Basin and associated coastal basins. The regional

monitoring approach taken by H-GAC is a coordinated effort among local agencies that monitor water quality in some portion of the region. The participation of the local agencies in the regional monitoring effort has been voluntary, both in establishing a monitoring plan and developing a regional Quality Assurance Project Plan. The Regional Monitoring Group guides all monitoring activities. The group includes participation by the local agencies as well as TNRCC and other state and federal agencies, and organizations. The monitoring conducted in the Clean Rivers program involves collection of baseline water quality data to support trend analyses and development of the statewide water quality inventory; and watershed specific data to address priority water quality problem areas identified by trend analyses or steering committee input.

Baseline Monitoring: water quality data collected by the City of Houston, San Jacinto River Authority, Harris County, Galveston County, TNRCC, and the U.S. Geological Survey as part of routine monitoring programs. This data is collected and transmitted to H-GAC for inclusion in the regional water quality clearinghouse and used in the analyses of water quality trends, to identify potential problem areas, and to identify areas where water quality shows improvement. Please see the map at the end of this report showing the local agencies' monitoring sites.

Targeted Monitoring: water quality data collected through specific projects chosen by the Steering Committee and with the expressed purpose of assisting fee payers with the state permitting and standards process. These are more fully discussed in the section of this report titled Benefits to the Fee Payers.

Special: water quality data collected through special studies with the approval of the Steering Committee that address basin water quality issues and are not necessarily directly associated with the permitting and standards process. There are several worthy of mention in this report.

In partnership with the U.S. Geological Survey (USGS), a phased biological assessment project was conducted to determine the impacts of water pollution on aquatic life. USGS biologists evaluated stream habitat conditions at 56 freshwater sites across the region and inventoried fish and other aquatic species present at each site. The first phase was completed in 1998 and the data collected is being compiled and will be made available on the Internet and through a published data report with all the habitat and biological data. The second phase of this project will be to study the differences in biological health that were observed across the area. This will include analyzing population and land use data for the drainage area of each site using H-GAC's Geographic Information System (GIS) technology. This information along with traditional water quality measures will be used to prepare a full interpretive report on the biological aspects of the region's water quality. This project has been a major effort over the past two years and addresses one core question about how physical changes in urban streams can affect water quality and aquatic life, and associated uses. Please see the map at the end of this report that shows the project monitoring sites.

Other special projects underway or about to start include:

- Intensive monitoring of the Clear Creek watershed (San Jacinto-Brazos Coastal Basin) to locate illegal "cross-connections" between sanitary sewer and storm sewer systems with the goal of improving water quality by eliminating discharges of raw sewage;
- Intensive monitoring and modeling of the Greens Bayou watershed (San Jacinto River Basin) with the goal of gaining a better understanding of oxygen, bacteria, and metals

problems which have caused Greens Bayou to be placed on the 1998 State of Texas List of Impaired Water Bodies (303d list);

- Assessment of current and projected water quality conditions in the Panther Branch tributary to Spring Creek (San Jacinto River Basin) with the goal of predicting future urban runoff impacts in the watershed, identifying appropriate Best Management Practices to offset the projected impacts, and providing insights for larger, more complex watersheds in the region; and
- Monitoring of baseline water and sediment quality conditions in Christmas Bay (San Jacinto-Brazos Coastal Basin), a state-designated Texas Coastal Preserve, with the goal of developing baseline data to refine state water quality standards and determine management actions that may be needed as development occurs in the bay's watershed.

DATA COLLECTION

The objective of a regional monitoring program is to collect data for analysis, data that is quality controlled to ensure its validity in determining long term trends and identifying problems or the lack of problems. The mechanism for securing such data is a Regional Quality Assurance Project Plan (QAPP). In July 1998, the San Jacinto River Authority, the City of Houston Departments of Health & Human Services and Public Works & Engineering, the Harris County Pollution Control Division, and the Galveston County Health District, signed a regional Quality Assurance Project Plan. The development of this regional QAPP is a milestone, marking the first voluntary coordinated effort of its kind. The regional QAPP, which includes the regional monitoring plan, ensures the use of locally collected data in water quality related decision making.

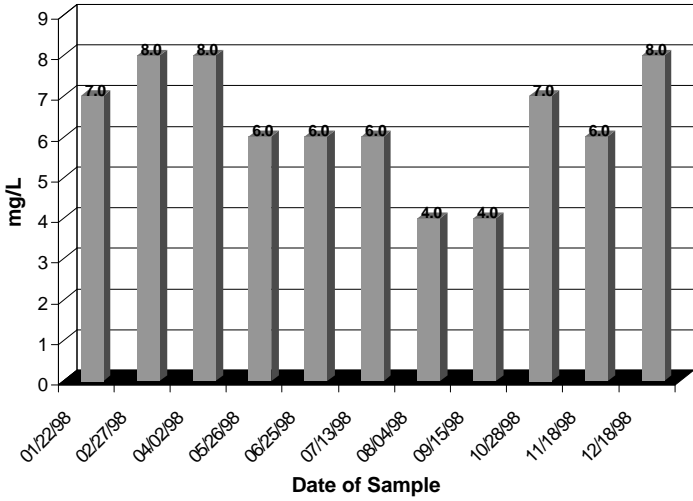
DATA MANAGEMENT

H-GAC's Data Management Plan outlines standard procedures for working with data in the Clean Rivers Program and other regional planning programs in H-GAC's Community and Environmental Planning Department. The plan covers the management of both tabular (non-geographic) data and geographic data sets. The primary focus of the plan is to ensure efficient access and maintenance of data within H-GAC's Geographic Information System (GIS) and Data Clearinghouse environments. The Data Management Plan actually provides the foundation for H-GAC's Water Quality Data Clearinghouse function under Clean Rivers by documenting how data sets will be acquired from various sources, organized for access from one common location, and then made available to many users via the Internet. Linking GIS technology with the Internet is a powerful combination, enabling H-GAC and the Clean Rivers Program to meet their information outreach objectives. GIS is invaluable because it provides a systematic way to capture, analyze, manipulate and store geographic data for a variety of applications, including regional water quality assessment. The interactive nature of the Internet makes it possible for any user to access data regardless of hardware, application or organizational barriers. H-GAC's Data Management Plan remains a working document that can be updated to reflect changing technology, funding, staffing, and project requirements. Through the Clean Rivers Program, this plan is reviewed annually and revised as needed.

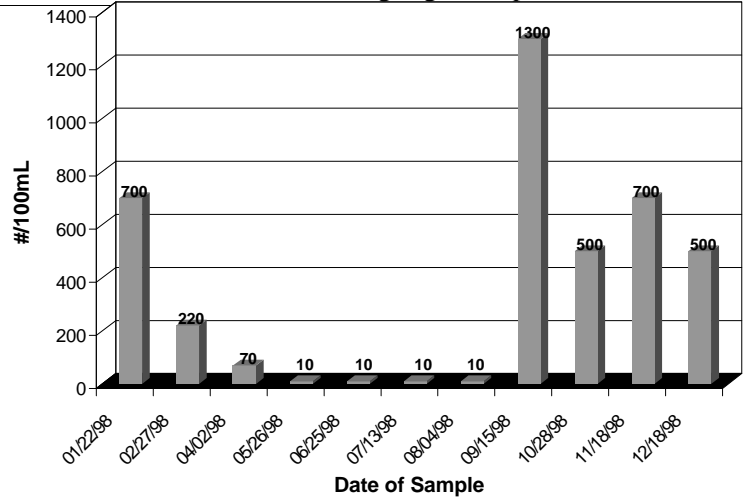
City of Houston Data Transfer

H-GAC in partnership with the City of Houston Public Works & Engineering Department conducted a pilot project to develop a Web site which would demonstrate how local water quality monitoring data might be compiled and made accessible to anyone via the Internet. The Web link for the site is www.hgac.cog.tx.us/resources/wq/crp/cohwqweb/intro.html. Following successful completion of the pilot in March 1998, H-GAC is developing the Internet-based clearinghouse for all local agencies' monitoring data based on the pilot project.

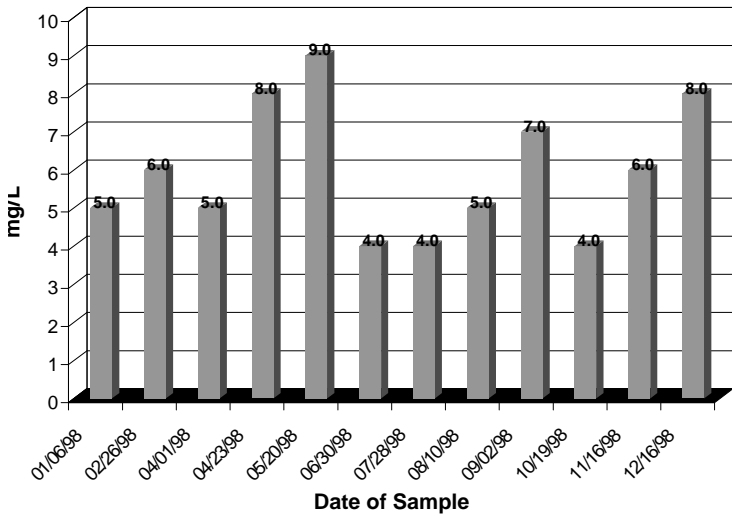
Dissolved Oxygen Data for Clear Lake (midpoint)



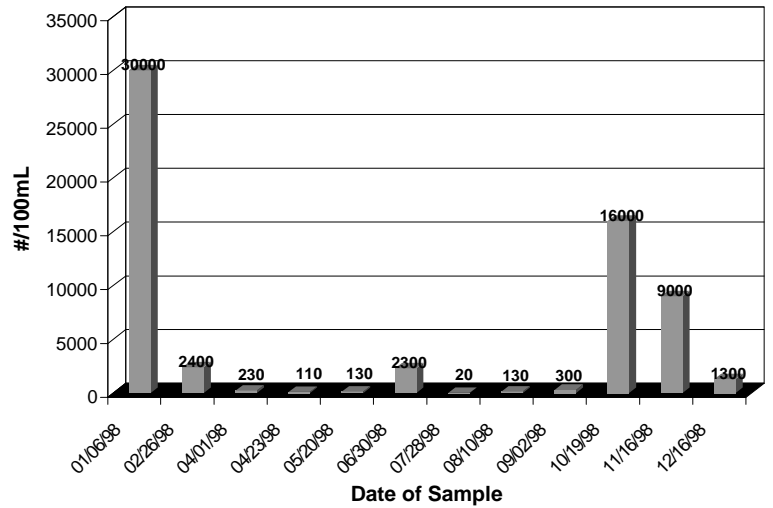
**Fecal Coliform Data for Clear Lake (midpoint)
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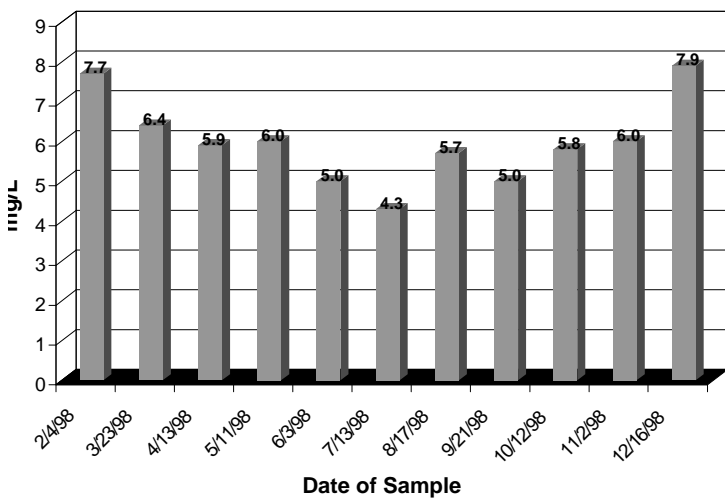
Dissolved Oxygen Data for Dickinson Bayou at I-45



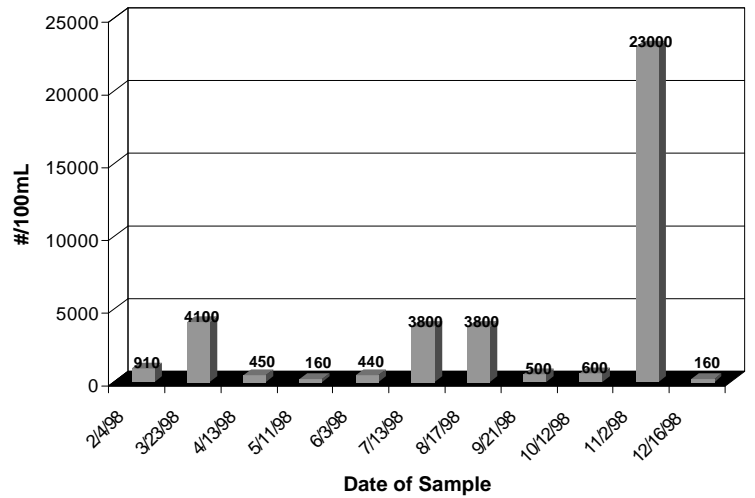
Fecal Coliform Data for Dickinson Bayou at I-45



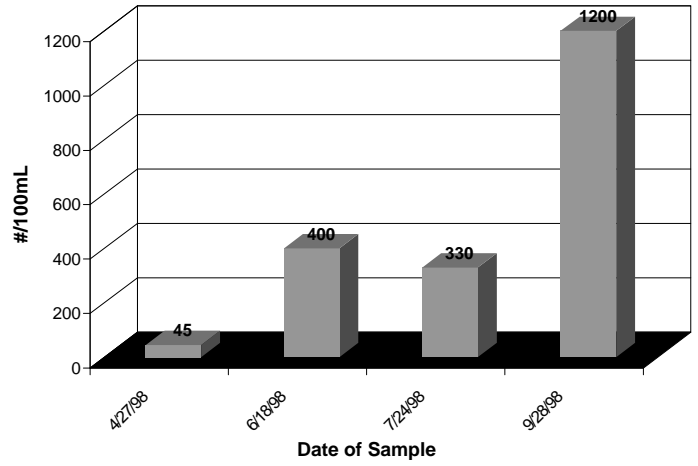
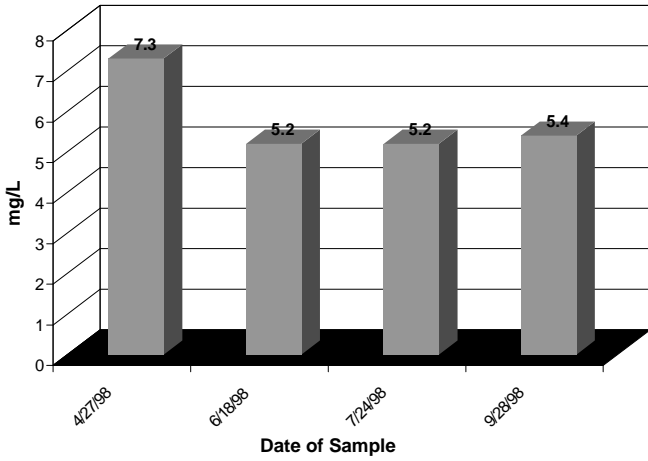
Dissolved Oxygen Data for Buffalo Bayou at San Felipe



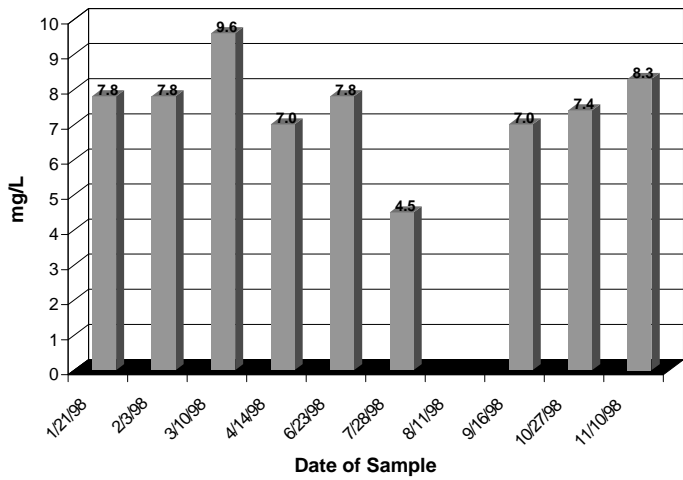
Fecal Coliform Data for Buffalo Bayou at San Felipe



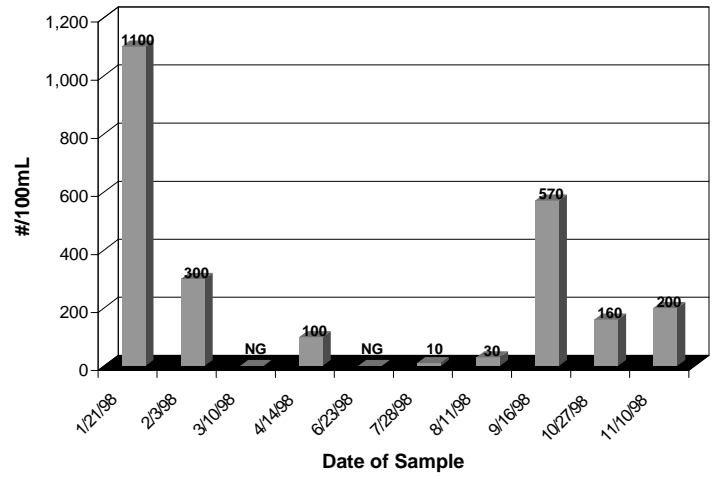
Dissolved Oxygen Data for Greens Bayou at Tidwell



Dissolved Oxygen Data at Mouth of San Jacinto River



Fecal Coliform Data at Mouth of San Jacinto River



Dissolved Oxygen Data for Lake Conroe (intake)

