

BIG

BACTERIA IMPLEMENTATION GROUP

ANNUAL REPORT

MAY '13



This annual report for the **Implementation Plan for Seventy-Two Total Maximum Daily Loads for Bacteria in the Houston-Galveston Region (I-Plan)** is prepared by the Houston-Galveston Area Council's Community and Environmental Planning Department in collaboration with the Bacteria Implementation Group (BIG), a stakeholder group appointed by H-GAC's Board of Directors and charged with the I-Plan's development and oversight.

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More information about the project, including a the full I-Plan report, can be found at:
www.h-gac.com/BIG.



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INTRODUCTION

What is the BIG I-Plan?

The State of Texas sets standards to establish whether waterways are safe for recreational activities, such as swimming or wading. Most water bodies in the Houston-Galveston region have bacteria levels that are higher than those deemed acceptable by the state. In 2008, a group of leaders from government, business, and the community formed the **Bacteria Implementation Group (BIG)**. The regional partnership aimed to develop a plan for reducing bacteria in area waterways.

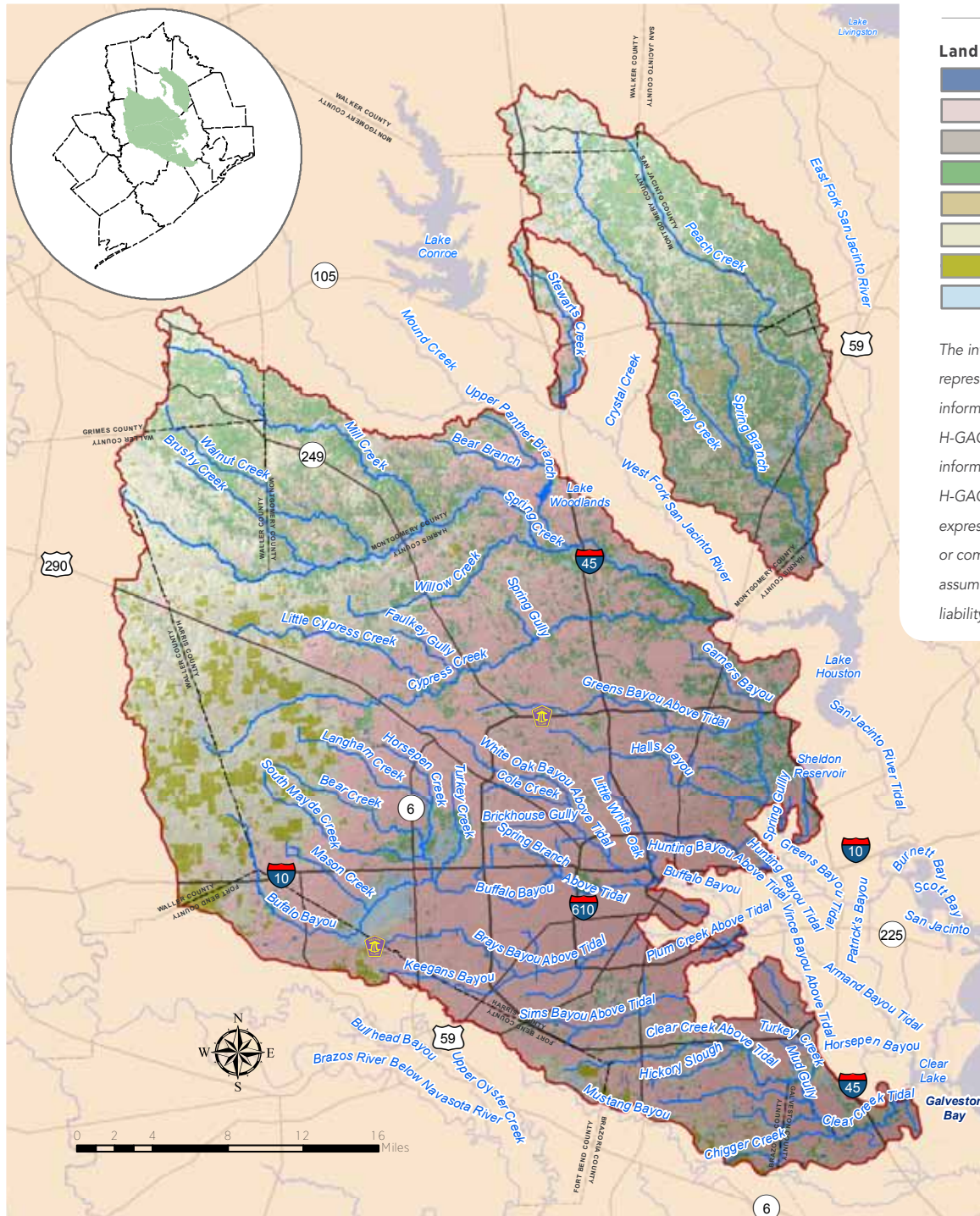
On August 16, 2011, the BIG submitted the **Implementation Plan for Seventy-Two Total Maximum Daily Loads for Bacteria in the Houston-Galveston Region (I-Plan)** to the Texas Commission on Environmental Quality (TCEQ) for approval. By May 2012, almost 100 organizations representing local governments, business, and environmental interests passed resolutions in support of the document. The TCEQ formally approved the I-Plan on January 30, 2013.

The I-Plan is a common-sense approach for reducing bacteria in our waterways and providing better services to citizens. It offers a menu of water protection activities to be completed by municipalities, industries, landowners, and residents. The I-Plan includes provisions for assessing progress and updating document elements. As a result, the Houston-Galveston Area Council (H-GAC) publishes this report on an annual basis.

Implementation Strategies

1. **Wastewater Treatment Facilities.** Increase monitoring requirements, impose stricter bacteria limits, increase enforcement, and require updates to facilities not able to comply with limits.
2. **Sanitary Sewer Systems.** Require all systems to develop and implement utility asset management programs and to protect against power outages at lift stations.
3. **On-Site Sewage Facilities.** Identify failing systems and address inadequate maintenance through owner education and enforcement of regulations.
4. **Stormwater and Land Development.** Expand stormwater management programs, develop a recognition program, and petition the TCEQ to facilitate reimbursement of bacteria reduction measures.
5. **Construction.** Improve compliance and enforcement of existing stormwater management permits.
6. **Illicit Discharges and Dumping.** Increase efforts to address direct and dry-weather discharges, and better control waste hauler activities.
7. **Agriculture and Animals.** Expand existing cost-share programs and the management of feral hog populations.
8. **Residential.** Expand public education efforts.
9. **Monitoring and I-Plan Revision.** Maintain databases of ambient and non-ambient water quality monitoring data and implementation activities, review I-Plan progress, and update the I-Plan.
10. **Research.** Examine effectiveness of stormwater activities, bacteria persistence and regrowth, and appropriate indicators for use in water quality monitoring.
11. **Geographic Priority Framework.** Consider recommended criteria when selecting geographic locations for projects.

BIG PROJECT AREA



- BIG Project Area
- Waterways
- County Boundary
- Major Highways
- State Highways
- Other Roads

- Land Cover**
- Open Water
 - Developed Land
 - Barren Land
 - Forest
 - Shrub/Scrub
 - Grassland/Pasture
 - Cultivated Crops
 - Wetlands

The information on this map represents the most current information available to H-GAC and is for general informational purposes only. H-GAC does not implicitly or expressly warrant its accuracy or completeness and neither assumes nor will accept liability for its use.

The BIG project area is approximately 2,200 square miles and has a population of about four million people. The area encompasses much of the City of Houston and part or all of another 55 cities and 10 counties.



YEAR IN REVIEW

Highlights

The BIG has made significant progress in the past year. On January 30, 2013, the Texas Commission on Environmental Quality (TCEQ) approved the **Implementation Plan for Seventy-Two Total Maximum Daily Loads for Bacteria in the Houston-Galveston Region (I-Plan)**. BIG stakeholders did not wait for approval of the I-Plan to begin implementation. They continued the work that started during the planning process and began additional activities that were identified in the I-Plan. Bacteria sampling data indicate that, in general, bacteria levels are decreasing in the project area (as illustrated on the following page).

While progress has been made for each of the I-Plan strategies, the following accomplishments are most significant:

- Stakeholders have worked to address those waterways with the highest bacteria levels in the region. Almost all 10 of last year's "Most Wanted" Streams list have seen improvement. In some instances, the improvements appear to be directly tied to bacteria-reduction actions of BIG stakeholders.
- BIG stakeholders began analyzing self-reported bacteria data from wastewater treatment facilities. To identify potential problem facilities, this information was compared to new limits for bacteria in effluent.
- H-GAC and other stakeholders hosted a conference in Houston on utility asset management programs for sanitary sewer systems. Plans are in place to hold this conference annually.
- H-GAC contacted all operators of permitted municipal separate storm sewer systems (MS4s) in the region to collect and share annual reports and evaluate how well the MS4 programs align with the BIG. The information is being used to guide the successful Clean Waters Initiative Workshop series for MS4 operators.
- Working with stakeholders, H-GAC developed an interactive map of permitted on-site sewage facilities, or septic systems, in the H-GAC region, and is using the information to identify possible "hotspots" for failing systems.

The efforts of BIG stakeholders appear to be reflected in the decreasing level of bacteria in the project area overall. An amalgamation of bacteria sampling data show that bacteria levels continue to decrease, albeit not as quickly as last year.

Progress Status

Do ambient water quality monitoring data indicate that bacteria levels are changing? If so, are the bacteria levels rising or falling?

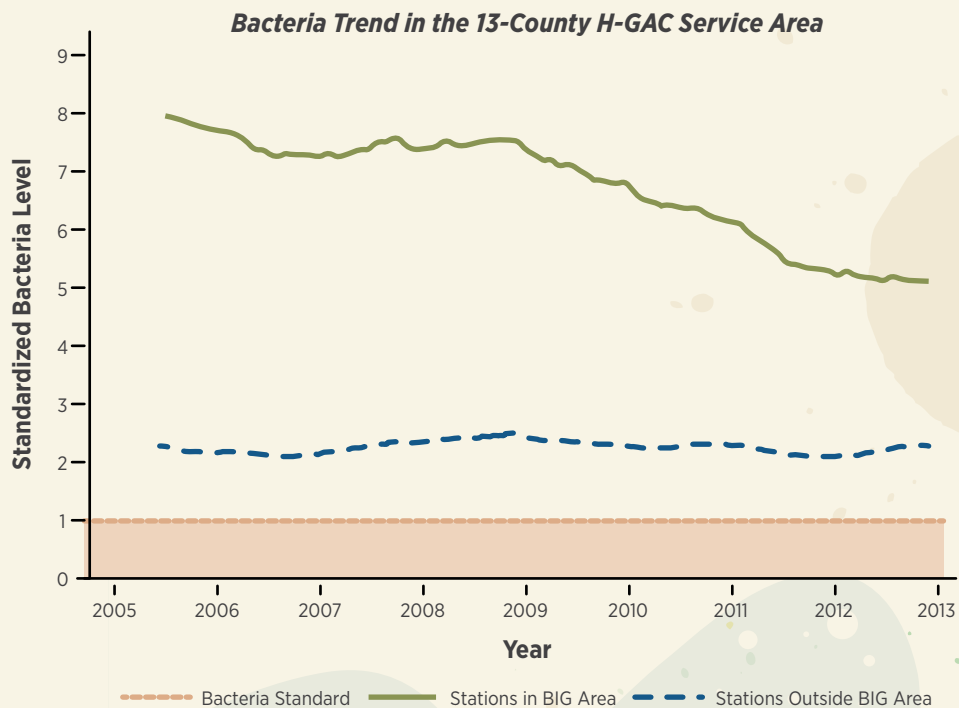
The following chart illustrates how the seven-year geometric mean for bacteria levels has changed over time. It is based on ambient water quality data from all Clean Rivers Program monitoring stations within the BIG project area. Because results include two different indicator bacteria — *E. coli* and *Enterococcus* — the results have been calculated as a multiple of the applicable TCEQ water quality standards.

While overall water quality is still a long way from meeting the standard, the trend appears to be improving based on data that go back to 1998. Bacteria levels have decreased from almost nine times the standards to less than six. While the line showing changes is not intended to be predictive, it does suggest that a 25-year timeframe might not be an inappropriate goal for attaining water quality standards.

This line largely generalizes and over-simplifies water quality trends in the region. H-GAC has identified the 10 monitoring stations with the highest bacteria levels in the BIG project area—the Top 10 “Most Wanted” Streams list. This list is more fully discussed later in this report.

Because, from a regulatory perspective, H-GAC would like to remove waterways from the state’s list of impaired waters, H-GAC has developed a similar list, called the Top 10 “Most Likely To Succeed” Streams, which identifies waterways that are closest to meeting the state standard. Descriptive information is also provided for each of those stations.

More information about ambient water quality monitoring data is available in the “Monitoring and I-Plan Revision” section of this report, and in the separate publication, “How’s the Water?,” H-GAC’s annual report on ambient water quality monitoring in the region.



Do non-ambient water quality monitoring data indicate that implementation activities are reducing the load of bacteria?

At this time, H-GAC has received no reports of non-ambient water quality monitoring data that indicate that implementation activities are reducing bacteria loading.

Stakeholders including the Harris County Flood Control District, the City of Houston, and the University of Houston at Clear Lake have begun various projects to examine the effectiveness of implementation activities in reducing bacteria loading. Descriptions of some of these projects are described in the "Research" section of this report.

In 2012, H-GAC began working with stakeholders and the TCEQ to develop a regional, non-ambient quality assurance project plan (QAPP). With input from stakeholders, H-GAC drafted a QAPP and sent it to the TCEQ for consideration. Because the concept of a regional non-ambient QAPP is new, H-GAC expects that the process to finalize a carefully crafted and meaningful QAPP will not be quick.

Are implementation activities and controls being undertaken as described in this I-Plan? Which activities have been implemented, and which have not?

Before the I-Plan was approved by the TCEQ in January 2013, stakeholders had already begun implementing its recommendations. Almost all recommendations have been initiated to some degree.

The bulk of this annual report includes information about implementing the recommendations. Most of the information is based on reports given to H-GAC through the work group process by stakeholders who are already involved in the BIG's planning effort. All 13 work groups met in eight separate meetings between November 2012 and March 2013 to discuss progress towards implementation.

In the future, electronic surveys and written requests for information will be used by H-GAC staff and BIG stakeholders to gather additional information. This annual report, in addition to describing progress toward implementation, lists stakeholder groups, such as cities and water quality permit holders, that provided information.



WASTEWATER TREATMENT FACILITIES

1

Main Summary

Regulation and monitoring of wastewater treatment facilities (WWTFs) directly influences bacterial levels in area waterways. This is significant as most of the region's waterways have minimal natural flows and consist primarily of wastewater effluent, except during storm events. Until recently, the level of bacteria loading from WWTFs has been largely unknown because state permitting processes did not require bacterial testing (except in specific circumstances). Results from limited monitoring in the BIG project area suggest that three percent of all results reported exceed the geometric mean or grab sample limit. This is typically the result of insufficiently treated effluent and unauthorized or accidental discharge.

BIG stakeholders have focused implementation strategies on permitting, Texas Commission on Environmental Quality (TCEQ) compliance and enforcement, facility design and upgrades, "regionalization" of WWTFs (i.e., consolidation of multiple smaller plants into larger facilities that serve broader areas), and re-use of effluent to reduce the volume discharged into waterways. Recent efforts have involved examining permit limits, effluent data, compliance, and enforcement.

Work Group Activities

Meeting February 28, 2013. 10 attendees, including four BIG members and six alternates.

Progress

Progress has been adequate. Activity has begun and is ongoing for several implementation activities.

Achievements

- H-GAC and BIG stakeholders:
 - Implemented a system for checking new permits for conformity with BIG recommendations.
 - Identified data sources for tracking compliance and enforcement activities.
 - Began analysis of self-reported bacteria daily monitoring report (DMR) data.
- Harris County implemented strategies to conduct supplemental checks of WWTF plans.
- 271 facilities, representing 47 percent of facilities in the BIG, now have bacteria limits in their permits.

Focus

- H-GAC and BIG stakeholders aim to:
 - Participate in the comment process for Title 30, Chapter 217 of the Texas Administrative Code, which proposes changes to the Design Criteria for Domestic Wastewater Treatment Systems.
 - Work with the TCEQ on facilitating compliance and enforcement.
 - Continue checks of permits and analysis of DMR data.
 - Provide more training for operators.
- Harris County will continue development of a new program to review design plans for new and modified WWTFs.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

1.1 Impose More Rigorous Bacteria Monitoring Requirements

- *Within five years, all of the WWTF permits should have had renewals initiated to include more rigorous monitoring requirements.*

- Not Started
- Initiated
- **In Progress**
- Completed

- Behind Schedule
- **On Schedule**
- Ahead of Schedule

WWTFs in the BIG project area must increase their monitoring frequencies. This chart shows the number of facilities (Y) that have increased frequencies in their permit or facilities (N) that do not have increased frequencies in their permit.

Monitoring Frequencies

Flow (mgd)	Y	N	Not Indicated in Database
0.0-0.1	1	55	18
0.1-0.5	3	67	8
0.5-1.0	0	45	11
1.0-5.0	0	35	19
5.0-10.0	0	3	2
>10.0	1	1	2
Total	5	206	60

1.2 Impose Stricter Bacteria Limits for WWTF Effluent

- *Within five years, all of the WWTF permits should have had renewals initiated to include more stringent limits for bacteria in effluent.*

- Not Started
- Initiated

In Progress

- Completed

- Behind Schedule

On Schedule

- Ahead of Schedule

DMR Findings. H-GAC analyzed DMR for WWTF permits in the project area. The following observations were made:

- There were very few reported values for *Enterococcus*.
- The largest bacterial loads came from large WWTFs.
- Exceedances at small WWTFs were proportionate with the percentage of permitted flow. Therefore, the higher the flow relative to permitted capacity, the more likely an exceedance. This correlation did not apply to medium and large facilities.
- H-GAC identified flaws in some of the data that needs to be addressed in the future.

Future Research. BIG stakeholders asked H-GAC to conduct further research on the following topics:

- Age of WWTFs to identify any potential correlations with exceedances (or bacteria levels in general);
- Correlation to rainfall events; and
- Differences between ultraviolet (UV) and chlorination disinfection.

1.3 Increase Compliance and Enforcement by the TCEQ

- *Each year, TCEQ can address low numbers of investigations and renewals by increasing:*
 - *The number of unannounced inspections conducted;*
 - *The number of focused sampling investigations;*
 - *The percent of plans and specifications reviewed;*
 - *The percent of DMRs reviewed;*
 - *The number of other investigations conducted; and*
 - *The ability of the TCEQ to conduct focused sampling investigations.*

- Not Started

Initiated

- In Progress

- Completed

- Behind Schedule

On Schedule

- Ahead of Schedule

No Progress Reported. BIG set a goal of inspecting facilities every two years. To meet the goal, the BIG recommended that the TCEQ might need to allow for less time-consuming inspections or to increase the number of staff conducting investigations. Information describing TCEQ enforcement activities is available through three sources: the local TCEQ office, the TCEQ's Annual Enforcement Report compiled in Austin, and the EPA's Integrated Compliance Information System. Recent data has not been compiled at the time of this report.

1.4 Improved Design and Operation Criteria for New WWTFs

- Every five years, at least 20 percent of local governments should consider whether to adopt stricter requirements. Note: The I-Plan indicates the revision process should start in year six of implementation.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Harris County's New WWTF Program. In 2013, Harris County will implement a new WWTF program that reviews select WWTF plans. When a WWTF construction permit is submitted to Harris County, a percentage of WWTF plans will be reviewed in detail to confirm compliance with state and local requirements.

New State Design Criteria of Domestic WWTFs. The TCEQ's proposed new Chapter 217 of the Texas Administrative Code is intended to update WWTF standards and criteria with modern-day engineering practices, and to reflect the current permitting practices of the TCEQ. Stakeholders are encouraged to provide input during the ongoing comment period.

1.5 Upgrade Facilities

- WWTFs not meeting effluent limits should upgrade or repair their facilities to comply with individual permits.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Permit Amendments. BIG stakeholders recommended that H-GAC staff track permit amendments. This process could be used to determine if WWTF upgrades were made to address bacteria. Harris County Pollution Control enforcement may be able to provide assistance.

1.6 Consider Regionalization of WWTFs

- Regulators should develop criteria for identifying chronically non-compliant WWTFs.
- Regulators should document the number of non-compliant WWTFs identified using said criteria.
- Regulators should document the number of chronically non-compliant WWTFs that have considered regionalization.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

No Progress Reported. If a WWTF continues violating bacteria limits set in its Texas Pollutant Discharge Elimination System (TPDES) permit, the BIG encourages the TCEQ or any local government with jurisdictional authority to require the WWTF to consider regionalization. This practice involves the consolidation of multiple smaller plants into larger facilities that serve broader areas.

1.7 Use Treated Effluent for Facility Irrigation

– Every five years, one WWTF in the project area shall install a new irrigation system that uses treated effluent.

- Not Started
- Initiated**
- In Progress
- Completed

- Behind Schedule
- On Schedule**
- Ahead of Schedule

Requirements for Reclaimed Water. H-GAC staff examined Chapter 210 of the Texas Administrative Code to identify ways facilities are reusing water. The rules apply to producers, providers, and users of reclaimed water.





SANITARY SEWER SYSTEMS

2

Main Summary

Failure of sanitary sewer systems (SSSs) often results in sanitary sewer overflows (SSOs). SSOs result in discharge of untreated sewage into the watershed system before the sewage reaches a treatment facility. The microbial pathogens and other pollutants present in SSOs can cause or contribute to contamination of drinking water supplies, water quality impairments, beach closures, shellfish bed closures, and other environmental and human health problems. Based on estimates in total maximum daily load (TMDL) reports and/or draft technical documents, an average of 77 overflows were reported in the project area each month. These SSOs occurred in all but two of the project area's watersheds and represented a monthly average of over 700,000 gallons discharged without treatment.

To address these infrastructure deficiencies, BIG stakeholders recommend improvements to SSSs and lift stations, increased reporting of (and potential penalties for) SSO violations, and stronger controls on subscriber systems. Efforts in the past year have focused on developing capacity to increase both education and data collection activities that support implementation.

Work Group Activities

Meeting March 8, 2013. 13 attendees, including two BIG members and two alternates.

Progress

Progress has been adequate. Activity has begun and is ongoing for several implementation activities.

Achievements

- H-GAC hosted a conference on asset management for SSSs. Planning has already begun for the 2014 conference.
- The Galveston Bay Foundation initiated coordination with the City of Dallas to share information about its award-winning "Cease the Grease" program.
- The Texas Commission on Environmental Quality (TCEQ) began conducting focused investigations to identify SSOs.

Focus

- H-GAC and BIG stakeholders aim to:
 - Work with the TCEQ to develop the SSO reporting system.
 - Participate in the comment process for Title 30, Chapter 217 of the Texas Administrative Code, which proposes changes to the Design Criteria for Domestic Wastewater Treatment Systems.
 - Identify appropriate contact information for tracking utility asset management programs (UAMPs) and identifying subscriber systems.
 - Develop a coordinated fats, oils, and grease (FOG) education program for the project area and region.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

2.1 Develop Utility Asset Management Programs for Sanitary Sewer Systems

- Within five years, H-GAC, the TCEQ, or another appropriate entity shall offer at least eight educational workshops for owners, operators, and engineers.
- After 10 years, all wastewater treatment facility (WWTF) permits will have UAMPs.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **UAMP Requirements.** The BIG suggests that all permits for new WWTFs discharging to a project area stream include a UAMP plan, and all permit renewals for WWTFs discharging to a project area stream include a UAMP plan starting five years from the approval of the I-Plan. As such, the TCEQ is not expected to require UAMP plans of existing facilities for SSSs until 2018.
- **TCEQ's Voluntary SSOI.** The TCEQ's voluntary Sanitary Sewer Overflow Initiative (SSOI) allows eligible municipalities to direct resources toward corrective actions rather than paying enforcement penalties. Program participation has more than doubled since program implementation in 2008.
- **EPA Listening Sessions.** In 2012, the U.S. Environmental Protection Agency (EPA) held listening sessions to seek stakeholder input to help determine whether and how to modify the National Pollutant Discharge Elimination System (NPDES) regulations as they apply to municipal sanitary sewer collection systems (MS4s) and SSOs.
- **CUPSS.** The EPA's voluntary "Check Up Program for Small Systems" (CUPSS) is a simple asset management tool for small drinking water and wastewater facilities. Desktop computer programs and training modules are available for free download from the Internet. The program provides a tailored asset management program based on a record of assets, schedule of required tasks, and financial management strategies.

2.2 Address Fats, Oils, and Grease

- Within five years, H-GAC and other local entities will:
 - Compile and share all existing regulations within the project area;
 - Examine each community's regulations and policies;
 - Distribute flyers or other collateral material; and
 - Develop and distribute a website.
- Within five years, one community shall adopt new regulations.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Model FOG Programs.** H-GAC staff and BIG stakeholders identified the following programs or entities as model programs or resources:
 - San Antonio Water System's "Don't Feed the Grease Monster" program (www.saws.org/our_water/ResourceProtComp/FOG/index.shtml).
 - City of Dallas' "Cease the Grease" program (www.dallascityhall.com/dwu/Pretreatment/grease_abatement.html).
 - City of Houston's FOG ordinance that passed in 2007.
 - Clean Waterways' "Fats, Oil and Grease & the Environment" brochure.

2.3 Encourage Appropriate Mechanisms to Maintain Function at Lift Stations

– Every five years, 10 percent of SSSs shall be compliant with recommendations.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Emergency Power Requirements. The TCEQ is in the process of upgrading portions of Title 30, Chapter 217 (previously Chapter 317) of the Texas Administrative Code. Of importance to SSSs is Subchapter B, which addresses emergency power requirements.

2.4 Improve Reporting Requirements for SSOs

– Within five years, the EPA and TCEQ will develop appropriate database structure and technology for collecting and sharing information regarding SSOs.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

SSO Reporting Requirements. H-GAC and BIG stakeholders have been tracking House Bill (HB) 824 and Senate Bill (SB) 584, two companion bills from the 83rd legislative session* that would limit SSO reporting requirements to spills involving 1,500 gallons or more. This change would reduce the burden on operators of SSSs, but it might make it more challenging to track the impact of SSOs on bacteria loading.

*Note: HB 824/SB584 can be accessed online at: www.legis.state.tx.us/BillLookup/History.aspx?LegSess=83R&Bill=HB824.

Electronic SSO Reporting. Connected Texas completed a statewide inventory of broadband Internet connections. It is now expanding broadband access for various purposes such as emergency services and economic development. H-GAC plans to participate in the process to facilitate electronic SSO reporting and other considerations.

2.5 Strengthen Controls on Subscriber Systems

– By year three, H-GAC will work with attorneys for WWTFs, municipal utility districts, and stakeholders to develop model contract language.

– Within five years, H-GAC will develop a list of subscriber systems.

– As funds are available, H-GAC will initiate a circuit rider program.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Subscriber System Information Exchange. H-GAC continued to identify contact information for WWTF permit holders. This information is being used to collect information about individual subscriber systems and subscriber system contracts. H-GAC will also collect and share information relating to the BIG, WWTFs, SSSs, and water quality.

2.6 Penalties for Violations

– Within five years, the TCEQ will have an appropriate penalty policy in place.

- Not Started
- Initiated
- In Progress
- Completed**

- Behind Schedule
- On Schedule
- Ahead of Schedule**

Annual Progress and Applicable Programming:

■ **TCEQ's Revised Criteria.** In December 2012, the TCEQ released a revised version of its "Enforcement Initiation Criteria." This guidance document included criteria relating to SSSs, grease blockages, and power outages, among other considerations.

■ **SSO Investigations.** TCEQ inspectors now have the ability to conduct focused SSO investigations. For instance, they can visit SSS facilities during rain events even if the SSS facility has never reported an SSO.

■ **Future Tracking.** As funds are available, H-GAC and BIG stakeholders intend to track the occurrence of and penalties for SSS violations. Information will be derived from the TCEQ's annual enforcement reports and other information resources.





ON-SITE SEWAGE FACILITIES

3

Main Summary

Nearly 20 percent of east Texas' on-site sewage facilities (OSSFs), commonly referred to as septic systems, are failing according to the Texas On-Site Wastewater Treatment Research Council.¹ Properly functioning and maintained OSSFs contribute negligible amounts of bacteria to waterways. Therefore, BIG stakeholders have primarily focused on unpermitted, failing, or poorly maintained OSSFs.

One of the biggest challenges to improving the OSSF situation has been a lack of inventory and monitoring practices. Starting in 2009, H-GAC staff partnered with local governments to create a comprehensive geographic information system (GIS) of OSSFs. The mapping and database records also helped to identify probable locations of older, unpermitted systems at risk of failing. BIG stakeholders continued to focus on education and regulatory action to prevent and remediate failing systems. Efforts are already underway to provide education programs to a variety of audiences. Examples of regulatory measures are also being collected and shared for potential enactment in the future.

1 Reed, Stowe, and Yanke, LLC. *Study to Determine the Magnitude of, and Reasons for, Chronically Malfunctioning On-Site Sewage Facility Systems in Texas*. Austin, Texas: Texas On-Site Wastewater Treatment Research Council, 2001.

Work Group Activities

Meeting November 14, 2012. 18 attendees, including one BIG member and three alternates.

Progress

Progress has been good. Activity has begun and is ongoing for each of the three implementation activities.

Achievements

- H-GAC and BIG stakeholders:
 - Continued ongoing data collection.
 - Created initial maps ahead of schedule. These maps help to set the stage for analysis and identification of target areas.
 - Pursued grant funding opportunities.
 - Compiled regulations and policies online at: www.h-gac.com/go/septic.
 - Hosted an annual local meeting established with continuing education unit (CEU) credits from the TCEQ.

Focus

- H-GAC and BIG stakeholders aim to:
 - Update maps, collect complaint data, and establish target areas.
 - Secure and distribute grant funds.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

3.1 Identify and Address Failing Systems

- H-GAC will work with the TCEQ, authorized agents, and other interested parties to create an inventory of OSSFs with a focus on identifying known or suspected failing systems.
- Within one year, H-GAC and local authorized agents will create an initial map.
- Within two years, H-GAC and local authorized agents will identify target areas.
- Every five years, owners will repair or replace 500 failing OSSFs.
- Authorized agents will continue to collect and share OSSF data on an ongoing basis.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Mapping.** H-GAC staff, with the input of BIG stakeholders, continued to develop an OSSF permit database that was first initiated in 2009. The mapping system allows the public to view OSSF permit data and access basic analyses. Highlights of the system include:
 - Layers that show permitted OSSFs by age, authorized agent, and number of OSSFs per square mile; and
 - A layer showing residential properties with a high chance of having an old or otherwise unpermitted system.

Future efforts will focus on collecting and mapping complaint data. This GIS system will also serve as a tool for prioritizing system repair and replacement. For example, the data is already being used to inform water quality projects at Armand Bayou, Oyster Creek, and Cedar Bayou.

3.2 Address Inadequate Maintenance of OSSFs

- Within five years:
 - Each community will examine its regulations and policies;
 - Existing regulations will be compiled and shared among BIG stakeholders; and
 - Flyers or collateral material will be distributed among BIG stakeholders.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Online Regulations and Policies.** H-GAC continued to compile OSSF regulations and policies online at: www.h-gac.com/go/septic. These serve as model regulations and policies.
- **Homeowner Education.** H-GAC created a website (www.h-gac.com/go/septic), to share educational material. In addition to providing general information, the site offers content specific to homeowners/homebuyers, local governments, and real estate professionals. The first phase of website development focused on gathering and sharing existing information (e.g., fact sheets, code language, alternatives analyses).
- **Repair and Pumpout Logs.** H-GAC continued to identify education campaigns encouraging homeowners and maintenance providers to keep repair and pumpout logs. These records track OSSF problems and solutions, which help to increase accountability and identify best management practices.

- **Real Estate Industry Coordination.** H-GAC developed a curriculum for real estate inspection professionals to learn how to properly inspect a septic facility during a point-of-sale home inspection. In 2011, H-GAC conducted a pilot workshop based on the curriculum. It was well received and resulted in new improvements to the curriculum.

3.3 Legislation and Other Regulatory Actions

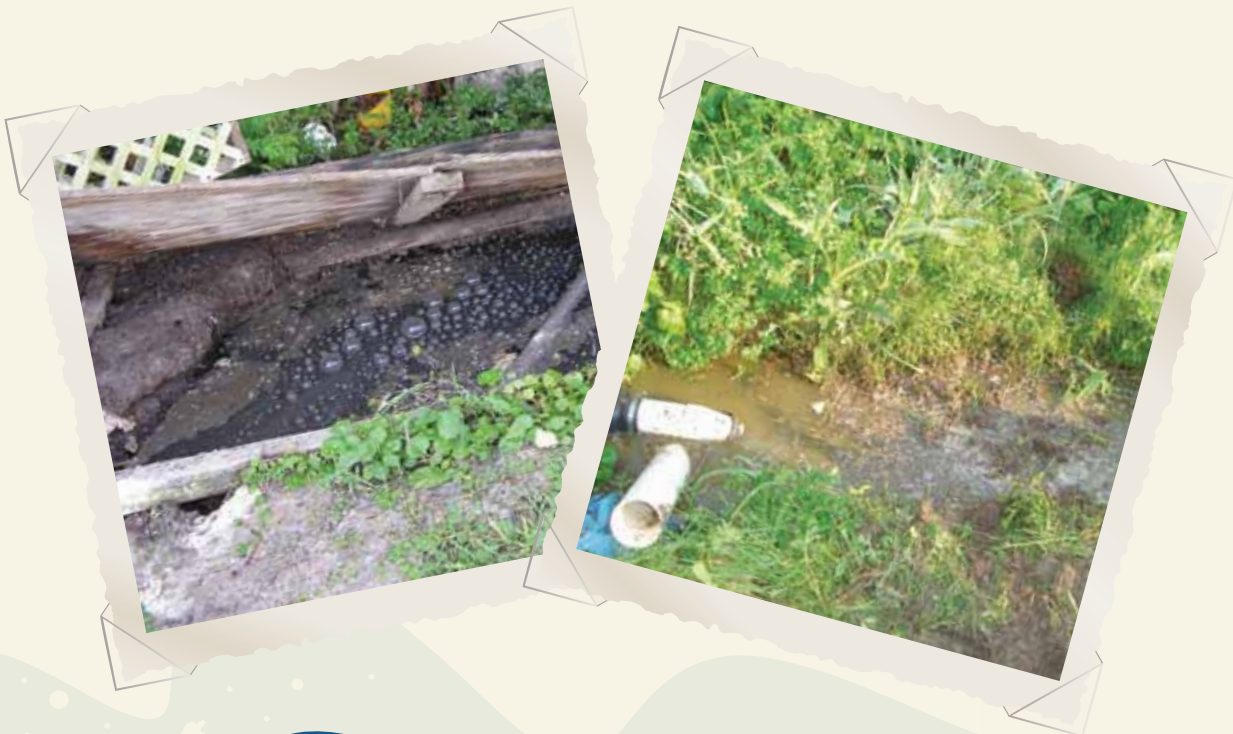
- The TCEQ should host biennial meetings to review OSSF regulations.
- Local authorized agents will meet annually.
- Every five years, one community shall revise or adopt new regulations.
- Every five years, the Texas On-Site Wastewater Treatment Research Council (TOWTRC) should consider updates to its rules.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Annual Seminar.** Harris County hosted its Second Annual Wastewater Seminar in April 2012. The day-long event was designed to present new innovations, best practices, and rules and enforcement updates.
- **OSSF Overflow Regulations.** H-GAC and BIG stakeholders primarily tracked Texas House Bill (HB) 1932 of the 83rd legislative session.* If passed, HB 1932 would impose a criminal penalty for violations and revise the current definition of a public nuisance to include surface discharges from OSSFs. These amendments would increase counties' authority to bring faulty OSSFs into compliance if owners are unwilling or unable to do so themselves.

*Note: HB 1932 can be accessed online at: www.legis.state.tx.us/BillLookup/History.aspx?LegSess=83R&Bill=HB1932.



STORMWATER AND LAND DEVELOPMENT



4

Main Summary

Regional growth and development have increased the importance of stormwater management. Bacteria sources, such as waste from pets, wildlife, and even humans, can be washed into storm drains and then discharged into local waterways. Stormwater systems are designed to remove stormwater from developments quickly and efficiently. As a result, stormwater in urbanized areas often bypasses natural vegetative barriers. Without these filters, “sheet flow” (i.e., stormwater flowing across the landscape) tends to result in more concentrated bacteria loading to waterways.

In general, this strategy focuses on building upon existing programs by sharing knowledge and developing incentives to increase voluntary implementation. Individual stakeholders have continued existing programs and adapted their activities to better address bacteria. At the same time, H-GAC has compiled and shared information about activities undertaken by operators of municipal separate storm sewer systems (MS4s). These efforts will serve as a baseline for assessing future progress. Renewal of the Texas MS4 general permit in 2012 and expansion of the permitted area provided opportunities to evaluate, expand, and improve activities related to stormwater management.

Work Group Activities

Meeting February 21, 2013. 16 attendees, including three BIG members and four alternates.

Progress

Progress has been adequate. MS4 Phase II permit renewal is in progress. Annual reports are on the H-GAC website. Additional MS4 operators are expected based on 2010 Census data. An educational and networking meeting series has been established.

Achievements

- H-GAC and BIG stakeholders:
 - Began collecting and analyzing MS4 annual reports, which are available on H-GAC’s website at: <http://www.h-gac.com/community/water/MS4reports.aspx>.
 - Used MS4 annual reports to identify speakers for the Clean Waters Initiative (CWI) stormwater workshop series.
 - Continued implementation of workshops that received positive feedback.
 - Continued working with the Texas Commission on Environmental Quality (TCEQ) to develop guidelines for facilitating reimbursement of water quality features.
- Low impact development (LID) roadway projects were constructed this year.

Focus

- H-GAC and BIG stakeholders aim to:
 - Track implementation by stakeholders and new MS4 permittees, especially with the goal of expanding stormwater management programs.
 - Work with stakeholders to develop a more uniform MS4 annual report format that will facilitate tracking.
 - Examine local regulations and how they might inhibit LID projects.
 - Make progress on a recognition or awards program.
 - Highlight five local programs on H-GAC's website.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

4.1 Continue Existing Programs

- 80 MS4 programs will be continued.

- Not Started
- Initiated
- **In Progress**
- Completed

- Behind Schedule
- **On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Continued Program Administration.** Eighty MS4 permit areas are located partially or fully within the BIG project area. These programs have been used to identify best practices and supported by educational opportunities.

4.2 Model Best Practices

- Each year, BIG stakeholders will hold four to six networking meetings and will highlight five local programs.

- Not Started
- Initiated
- **In Progress**
- Completed

- Behind Schedule
- **On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **Analysis and Online Resources.** H-GAC continued to acquire copies of annual reports for MS4 operators in the H-GAC region, post these reports online, and cross-compare and analyze them. The reports helped to identify innovative practices, opportunities for collaboration, and suggestions for future workshop and educational content. Moreover, they included specific contact information for each MS4 operator that can be used to collect future data and coordinate regional opportunities.
- **H-GAC Workshops.** H-GAC continued to host its annual series of workshops focusing on the six minimum control measures: illicit discharge detection and elimination, construction site runoff control, post-construction runoff control, pollution prevention/good housekeeping, public education and outreach, and public participation/involvement. The series also included a "Welcome to the MS4 Program" workshop in November 2012. Workshop content is being refined by reviewing annual reports. MS4 representatives are being asked to share information at the CWI workshops.

4.3 Encourage Expansion of Stormwater Management Programs

- *Within the next five years:*
 - *All permit holders shall expand or focus their existing programs; and*
 - *30 previously unpermitted entities shall develop new programs.*

- Not Started
- Initiated**
- In Progress
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- New General Permit Eligibility.** In May 2012, the U.S. Census Bureau released new maps of urban areas based on the 2010 Census. A preliminary review indicated that 13 cities and 124 special purpose districts will be subjected to the MS4 Phase II General Permit for the first time. However, many of these jurisdictions may qualify for waivers and/or may not be located inside the BIG project area. H-GAC hosted a “Welcome to the MS4 Program” workshop in November 2012.

4.4 Promote Recognition Programs for Developments that Voluntarily Incorporate Bacteria Reduction Measures

- *Within five years, BIG stakeholders should develop a recognition program and subsequently recognize communities and participants.*
- *Each year, two communities will analyze regulations and programs to accommodate participation in existing programs.*

- Not Started
- Initiated**
- In Progress
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- Program Funding.** H-GAC received funding from the TCEQ to develop an awards program. Representatives from Harris County and the City of Houston volunteered to lead program development. BIG stakeholders recommended that the Bayou Preservation Association (BPA), Association of Water Board Directors (AWBD), and Greater Houston Builders Association (GHBA) be encouraged to participate.
- Green Built Gulf Coast Program.** The GHBA developed a green building certification program based on the National Green Building Standard ICC 700-2008. The program specifications have been tailored for the Gulf Coast’s unique climate.

4.5 Provide a Circuit Rider Program

- *Each year, H-GAC will contact 50 stakeholders and provide five in-depth community consultations.*

- Not Started
- Initiated**
- In Progress
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- Low Impact Development.** H-GAC received TCEQ funding to compile and examine local codes that may present an impediment to implementing LID. This information will help to identify local agencies that could utilize the services of a circuit rider to develop better codes that will allow for LID. The National Wildflower Center’s LID project was identified as a model.

4.6 Petition the TCEQ to Facilitate Reimbursement of Bacteria Reduction Measures

– Within three years, BIG stakeholders should receive letters of commitment or similar support from the TCEQ.

- Not Started
- Initiated
- In Progress**
- Completed
- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

■ **Developer Reimbursements.** Various stakeholders continued conversations with the TCEQ regarding financing for water quality infrastructure. The purpose of this coordination is to facilitate municipal utility district (MUD) reimbursement to developers for stormwater quality features (which may otherwise be considered part of a developer's amenity package and not subject to MUD reimbursement) in their plans for development.





CONSTRUCTION

5

Main Summary

Rapid population growth and increasing densification of the BIG project area have led to more widespread and intense development activity that contributes to bacterial loading. Although construction sites for typical building and transportation projects are not significant sources of bacteria, urbanization inevitably results in more stormwater runoff. This runoff conveys sediments, nutrients, fertilizers, on-site sanitary wastes, and other contaminants downstream.

BIG stakeholders recommend that regulations and educational outreach be used to facilitate a reduction in pollutant runoff levels. Permitting, site inspection, training, and literature are useful tools in enforcing regulations and informing construction professionals of best management practices. H-GAC continues to gather data and information regarding construction site standards, regulations, and educational programming that can be used as stakeholder resources.

Work Group Activities

Meeting February 21, 2013. 16 attendees, including three BIG members and four alternates.

Progress

Progress has been adequate. An educational and networking meeting series has been established. The Texas Commission on Environmental Quality (TCEQ) reissued the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit in February 2013.

Achievements

- H-GAC and BIG stakeholders:
 - Collected and shared municipal separate storm sewer system (MS4) annual reports.
 - Reviewed MS4 annual reports to track the number of qualifying construction sites and reported construction inspections.
 - Identified existing education material and best practices relating to bacteria.
 - Established a workshop series focused on minimal control measures for MS4 Phase II permits.

Focus

- H-GAC and BIG stakeholders aim to:
 - Implement stakeholder tracking.
 - Solicit information and participation from new MS4 permittees.
 - Quantify and document inspections and enforcements in annual reports.
 - Provide education material and opportunities for contractors.
 - Work with professional organizations.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

5.1 Increase Compliance with and Enforcement of Stormwater Management Permits

- In year one, MS4 operators should evaluate needs or requirements for staffing an appropriate construction inspection program.
- In year two, BIG stakeholders should develop and begin offering educational material and training.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

- **MS4 Reports.** The BIG recommends local governments and MS4 operators evaluate their construction inspection programs to determine whether staff resources are sufficient to enforce existing guidelines. MS4 operators report that they have begun evaluating and making changes to their construction inspection programs. H-GAC staff reviewed the MS4 Phase II annual reports to track construction activities by MS4 operators. Useful information was not obtained, but H-GAC staff plans to evaluate the U.S. Environmental Protection Agency's Small MS4 Annual Report form as an alternative information resource in the coming years.
- **Training and Education.** H-GAC continued to gather examples of existing educational material. The TCEQ, Harris County, City of Houston, and Construction EcoServices reported offering and distributing educational material. On a continual basis, H-GAC's Clean Waters Initiative, the Associated General Contractors (Houston Chapter), and other community organizations offer training workshops pertaining to stormwater construction activities. BIG stakeholders identified other potential venues or audiences to host future events. These potential sponsors include the Houston Contractors Association, the American Subcontractors Association (Houston Chapter), and Associated Builders and Contractors (Greater Houston Chapter).





ILLCIT DISCHARGES AND DUMPING

6

Main Summary

Illegal connections, discharges, and dumping activities have resulted in increased bacterial loads in the project area's storm sewer and watershed systems, as documented by total daily maximum load (TDML) monitoring. BIG stakeholders have widely cited mobile septic waste haulers as a potential source of contamination as they transport waste from on-site sewage facilities (OSSFs) and grease and grit traps. While regulations dictate proper methods for disposing of waste at treatment facilities and recording information on manifests, anecdotal evidence indicates that violations may occur. Because these discharges can happen in so many locations, there are no flow-adjusted estimates for waste hauler contributions to bacteria levels in area waterways.

In response to these concerns, the BIG recommends that stakeholders focus on three activities: (1) detect and eliminate illicit discharges specific to bacteria; (2) improve local government mechanisms to regulate and enforce illicit discharges; and, (3) monitor and control waste hauler activities through regulations and fleet tracking programs. Changes to the Texas Commission on Environmental Quality's (TCEQ) general permit for municipal separate storm sewer system (MS4) Phase II communities (which took effect in late 2012) will facilitate more robust reporting and tracking of illicit discharges. As such, the activities discussed in this section may also be considered as part of *Implementation Strategy 4.0, Stormwater and Land Development*.

Work Group Activities

Meeting January 8, 2013. 8 attendees, including no BIG members and four alternates.

Progress

Activities have begun, although little information has been gathered about activities.

Achievements

- Many communities in the BIG project area adopted (or will adopt) regulations as a result of new MS4 permitting requirements.

Focus

- H-GAC and BIG stakeholders aim to:
 - Gather information about implementation.
 - Identify regulatory resources related to liquid waste hauling, liquid waste generators, and trip tickets.
 - Encourage MS4 operators to use the U.S. Environmental Protection Agency's (EPA) Small MS4 Annual Report form.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

6.1 Detect and Eliminate Illicit Discharges

- Within ten years, MS4 operators will complete initial surveys and maps.
- Each year, MS4 operators will identify the number of illicit discharges found and resolved each year.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

MS4 Reporting. MS4 operators are required to map their storm sewer system, develop techniques for detecting illicit discharges, and establish enforcement procedures for removing sources of illicit discharges. Based on a review of approximately 60 annual reports from 2010, most MS4 operators have regulatory mechanisms in place and procedures for detecting illicit discharges. H-GAC staff identified the following statistics: five MS4s reported no illicit discharges; three reported a combined total of 12 illicit discharges; and one illicit discharge had been resolved or eliminated. However, the report format is not structured to easily compare one report to another.

6.2 Improve Regulation and Enforcement of Illicit Discharges

- Within five years, BIG stakeholders will compile and share all existing regulations in the project area.
- Within five years, all communities shall examine their regulations, and one shall adopt new or revised regulations.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

MS4 Regulations. Many MS4 Phase II operators have implemented new regulations as a permit requirement. These regulations require more robust tracking and reporting of illicit discharges. However, H-GAC has not finished compiling existing regulations or tracking whether those regulations have been revised.

6.3 Monitor and Control Waste Hauler Activities

- Within five years, one waste hauler fleet tracking pilot program shall be started by local stakeholders.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

No Progress Reported.



ANIMALS AND AGRICULTURE

7

Main Summary

Animals and agricultural practices contribute to increased bacteria levels in sediment runoff and water bodies. Cattle and poultry operations are the most common animals of concern in the BIG project area. However, clusters of other animals – such as horses, swine, sheep, and goats – also contribute to lower water quality levels throughout the watershed. Of particular interest to BIG stakeholders are feral hogs, a state and national menace estimated to cause \$500 million in statewide economic damages each year. Feral hogs not only damage property due to their rooting, wallowing, and predatory tendencies. They also discharge large amounts of bacteria and nutrients into the environment through excrement.

Most agricultural management programs are either voluntary or only apply to confined animal feeding operations (CAFOs) designated by the U.S. Environmental Protection Agency (EPA). These operations are not present in the BIG project area. The I-Plan recommends that local initiatives focus on promoting increased participation in existing voluntary- and incentive-based programs that target erosion control, nutrient reduction, and livestock management. The expansion of these programs will help lower bacteria levels in waterways, particularly in subwatersheds where substantial areas of land are devoted to crop, pasture, and range use.

Work Group Activities

Meeting December 18, 2012. Three attendees, including no BIG members and one alternate.

Progress

Progress has been adequate. Activity has been initiated for all of the implementation activities.

Achievements

- H-GAC presented BIG concerns at the Natural Resources Conservation Service's (NRCS) local work group meetings.
- H-GAC collected information about the NRCS' Environmental Quality Incentives Program (EQIP), a potential funding stream for financial and technical assistance.
- The Texas State Soil and Water Conservation Board (TSSWCB) funded Texas AgriLife Extension to provide statewide technical assistance for managing feral hogs in the project area's priority watersheds.
- Harris County Precinct 3 received a \$300,000 Coastal Impact Assistance Program grant to help build feral hog pens in the Addicks and Barker Reservoirs and to pay for processing.

Focus

- H-GAC and BIG stakeholders aim to encourage stakeholder involvement in existing programs.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

7.1 Promote Increased Participation in Existing Programs for Erosion Control Nutrient Reduction and Livestock Management

- Each year, participation by farmers and ranchers in financial and technical assistance programs should increase by five percent.

- Not Started
- Initiated**
- In Progress
- Completed

- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **EQIP Funding.** H-GAC staff attended NRCS local work group meetings to: share information about the BIG; encourage bacteria as a funding priority; and, gather information on NRCS' EQIP. This voluntary program provides financial and technical assistance to help manage natural resources in a sustainable manner. Meeting participants raised drought recovery as a common issue. However, many of the proposed solutions were already among BIG's recommended best management practices (BMPs).
- **Economic Incentives for Voluntary Programs.** H-GAC continued to provide data for a study by The Conservation Fund. The study uses behavioral economics to better understand if and how incentives increase participation in voluntary water quality programs.
- **Lone Star Healthy Streams Program.** As part of the Lone Star Healthy Streams Program, the Texas Water Resources Institute (TWRI) created a series of publications pertaining to bacterial contamination of waterways and related management of beef cattle, feral hogs, horses, grazing lands, and more. The program aims to educate Texas farmers, ranchers, and landowners about proper grazing, feral hog management, and riparian area protection to reduce the levels of bacterial contamination in streams and rivers.
 - **Agricultural BMPs.** The TWRI developed hands-on resources such as an Agricultural BMP Effectiveness Table for the Carter's Creek total daily maximum load (TMDL) and fact sheets on watering facilities, heavy use protection areas, and other livestock-related practices.
- **Farm Subsidy Database.** As a resource to understanding more about existing programs, the Environmental Working Group organization offers an online, 2012 Farm Subsidy Database (www.farm.ewg.org/) that tracks \$240 billion in farm subsidies from commodity, crop insurance, and disaster programs, and \$37 billion in conservation payments paid between 1995 and 2011. The database's level of detail is more granular than the NRCS reports.

7.2 Promote the Management of Feral Hog Populations

- During the next five years, Texas AgriLife Extension will host two feral hog management workshops per year for landowners, local governments, and other interested people.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

- **AgriLife Extension Workshops and Technical Assistance.** In 2012, Texas AgriLife Extension received a TSSWCB grant to administer a statewide feral hog program. An extension agent will be assigned to an area slightly larger than the 13-county H-GAC region to provide workshops and technical assistance. While the program is statewide, the BIG project area will receive special attention since the I-Plan and other local Watershed Protection Plans identify feral hog control as a priority.
- **Feral Hog Management Grant.** In 2013, Harris County Precinct 3 received a \$300,000 Coastal Impact Assistance Program grant to help build feral hog pens in the Addicks and Barker reservoirs and to pay for processing. For the last eight years, off-duty county workers, Army Corps of Engineers staff, and contractors continuously trapped approximately 250 to 300 hogs in the reservoirs on an annual basis.
- **AgriLife Extension Online Resources.** Texas AgriLife Extension developed a "Feral Hog Community of Practice." This educational resource includes a website (www.extension.org/feral_hogs), webinars, and publications.
- **Education Outreach Contest.** The Texas Department of Agriculture continued to sponsor the "Hog Out Month County Challenge," which awards monetary prizes to counties that provide the most education opportunities and capture the most hogs. The number of participating BIG jurisdictions increased in 2012, including first-time participation from Austin, Chambers, Fort Bend, and Montgomery counties.





RESIDENTIAL

8

Main Summary

Communities can improve water quality by changing overall citizen attitudes and individual behavior – one homeowner at a time. Enforcement, or the threat of enforcement, may be effective against large stakeholders regulated by permits. Yet it has less impact on individuals. For this strategy, the focus is on how to empower residents and neighborhoods through volunteer activities and educational outreach.

BIG stakeholders recommend expanding homeowner education efforts in the project area. With guidance, residents can improve water quality through simple changes in their daily routines, such as using appropriate lawn care practices, not putting cooking grease down sink drains, and picking up and properly disposing of pet waste. The identification of existing educational resources, particularly those related to bacteria, remained a focus this year. In particular, stakeholders identified pet waste education and FOG (fats, oils, and grease) programs as prime opportunities for development and coordination.

Work Group Activities

Meeting February 13, 2013. Seven attendees, including two BIG members and two alternates.

Progress

Progress has been adequate. Activity has begun and is ongoing for the implementation activity.

Achievements

- H-GAC and BIG stakeholders:
 - Identified regional educational and regulatory opportunities to address pet waste and FOG.
 - Evaluated municipal separate storm sewer system (MS4) Phase II annual reports for bacteria-specific outreach efforts.

Focus

- H-GAC and BIG stakeholders aim to:
 - Develop education objectives that address what to report and to whom.
 - Continue identifying regional opportunities for education on and/or focused regulation of pet waste and FOG.
 - Encourage MS4 operators to focus on bacteria.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

8.1 Expand Homeowner Education Efforts throughout the BIG Project Area

8.1.1 Continue or Begin a Homeowner Education Program Based on Existing Models

- Local governments and appropriate agencies should begin or continue homeowner education programs.
- Each year, participation should increase by two percent.

- Not Started
- Initiated
- In Progress
- Completed

- Behind Schedule
- On Schedule
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **"Don't Mess with Texas Water" Sign Program.** In 2012, the Texas Commission on Environmental Quality (TCEQ) enlisted Harlingen as the first local government to implement its new program, "Don't Mess with Texas Water." The program helps to safeguard lakes, rivers, ponds, and streams by placing watershed signs along state highway rights-of-way. Interested municipalities should contact the TCEQ for program details.
- **Educational Kiosks.** H-GAC has developed content for educational kiosks that address how to improve water quality. The kiosks will be available for loan to city and county permit offices, schools, nature centers, libraries, and other public places throughout the project area.
- **Annual "Trash Bash" Event.** Last year, 2,557 people helped collect 41,185 pounds of garbage in the BIG project area. A Clean Water Act Section 319 Grant application has been preliminarily approved to support water quality education at Trash Bash events for the next three years. These proposed displays and/or activities will be available at other times throughout the year. Possible themes include pet waste, FOG programs, and data reporting.
- **"Pet Waste Disposal."** H-GAC's ongoing "Pet Waste Pollutes" campaign aims to reduce pet waste that ultimately drains into waterways and causes bacterial pollution. Similar to last year's Trash Bash event, pet waste dispensers will be distributed at the 2013 gathering. This type of programming is supplemented by educational outreach efforts such as new online resources pertaining to other programs and model ordinances (www.petwastepollutes.org). The campaign is also useful for reporting data. For instance, the City of Houston demonstrated a progressive increase in the number of pet waste-related citations and convictions over the past six years.
- **Stream Team Monitoring.** Established in 1991, the Texas Stream Team continued to collect water quality data on lakes, rivers, and streams. In 2012, 84 new volunteers were trained through H-GAC and the Texas Stream Team's cooperative partnership between Texas State University, the TCEQ, and the U.S. Environmental Protection Agency.

■ **Formal and Informal Education Providers.** Local organizations and communities continued to offer many ongoing homeowner education programs that help reduce bacteria loading in the BIG project area. In addition to the listed programs, events, and website repositories, a number of other formal and informal resources are available to increase awareness and understanding. These examples include, but are not limited to:

- **Clean Waters Initiative MS4 Series.** H-GAC's Clean Waters Initiative hosts at least one workshop each year focused on public engagement, education, participation, and awareness.
- **Environmental Awareness Roundtable.** H-GAC hosts quarterly Environmental Awareness Roundtable discussions which are designed to facilitate idea-sharing on how to create effective environmental awareness campaigns.

8.1.2 Conduct Pilot Studies to Evaluate Results of Education Efforts

– *Every five years, H-GAC and BIG stakeholders will conduct at least one pilot study to evaluate the results of education efforts.*

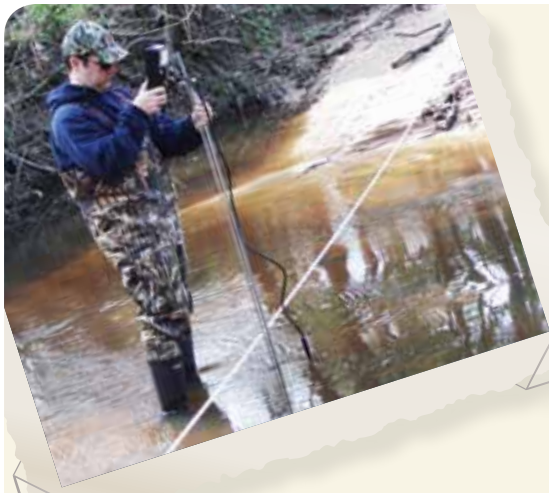
- Not Started
- Initiated
- In Progress**
- Completed

- Behind Schedule
- On Schedule**
- Ahead of Schedule

Annual Progress and Applicable Programming:

■ **Pilot Program.** In 2012, H-GAC conducted a series of community outreach impact assessments to measure pre- and post-implementation metrics. This effort was part of the Westfield Estates Watershed Protection Plan. The results of the assessment indicated that outreach efforts were fairly effective, and that implementation activities were positively received. In the previous year, the Galveston Bay Estuary Program conducted a pilot study to assess the effectiveness of the "Back the Bay" campaign. This program continues to educate residents on how to protect Galveston Bay.





MONITORING AND I-PLAN REVISION

9

Main Summary

To assess I-Plan progress, the BIG is required to monitor ambient water quality data and develop an annual report (i.e., as encompassed in this document). This information will help determine if the I-Plan or any of its individual elements require revisions to their implementation strategies or schedules. The monitoring data, in particular, will be an important indicator of whether I-Plan guidance results in the desired reduction of bacteria loading. A more in-depth evaluation will occur every five years, as resources are available and with stakeholder participation.

The review will address answers to the following questions:

- Do ambient water quality monitoring data indicate that bacteria levels are changing?
- If so, are the bacteria levels rising or falling?
- Do non-ambient water quality monitoring data indicate that implementation activities are reducing the load of bacteria?
- Are implementation activities and controls being undertaken as described in the I-Plan? Which activities have been implemented, and which have not?

Work Group Activities

Meeting March 7, 2013. Nine attendees, including two BIG members and two alternates.

Progress

Progress has been adequate. Activity has begun and is ongoing for each of the implementation activities.

Achievements

- H-GAC and BIG stakeholders:
 - Continued ambient water quality monitoring.
 - Increased analysis capabilities.
 - Drafted a non-ambient quality assurance project plan (QAPP).
 - Developed and tested a regional implementation activity database.
- Harris County Flood Control District (HCFCD) continued to develop its non-ambient best management practice (BMP) database.
- Overall, bacteria levels continued to decline.

Focus

- H-GAC and BIG stakeholders aim to:
 - Continue ambient water quality monitoring and analysis.
 - Strengthen implementation tracking and coordination of non-ambient efforts.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

9.1 Continue to Utilize Ambient Water Quality Monitoring and Data Analysis

- Each year, H-GAC and BIG stakeholders will monitor ambient water quality to help determine if water bodies are meeting state standards for bacteria.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

- **H-GAC's CRP.** H-GAC's Clean Rivers Program (CRP) continued to be the primary vehicle for water quality monitoring and data analysis in the project area. The CRP Basin Steering Committee serves as the primary forum for discussion of various water quality issues raised through the assessment process. The Committee establishes area-wide water quality priorities and advises staff on all administrative matters related to the CRP, including: work plan and budget development; monitoring of progress toward project milestones; and, review of the draft and final basin reports.
 - **Basin Highlights Report.** The 2013 Basin Highlights Report *How's the Water* documents water quality impairments and trends.
 - **Regional Monitoring Work Group.** The regional monitoring work group continued to meet quarterly. At the spring meeting, individual CRP monitoring partners met one-on-one with H-GAC and Texas Commission on Environmental Quality (TCEQ) staff to review monitoring plans for the coming year.
 - **Enterococci Monitoring.** In September 2011, CRP monitors began recording evidence of *Enterococci* as requested by the BIG. In non-tidal areas, about one-third of *Enterococci* results exceed *E. coli* results. According to more detailed analyses, these discordant results did not appear to be random.
 - **Contact Recreation Monitoring.** In September 2012, the CRP monitors began recording evidence of contact recreation as requested by the BIG. While there is not sufficient information to analyze this year, more information will be available in the following year.

9.2 Conduct and Coordinate Non-Ambient Water Quality Monitoring

- H-GAC and BIG stakeholders will conduct non-ambient water quality monitoring activities including:
 - Developing a regional QAPP; and
 - Developing a regional non-ambient monitoring database.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

- **Non-Ambient Water Quality Monitoring QAPP.** In 2011, H-GAC submitted a draft non-ambient water quality monitoring QAPP to the TCEQ. While still awaiting a response, H-GAC continued to identify monitoring alternatives that would adequately validate the data.
- **Regional BMP Database.** The HCFCD developed a regional BMP database, which is modeled on the International Stormwater BMP Database. Currently, the database includes monitoring information for stormwater BMP projects developed by the HCFCD, as well as other BMP projects in the region. More information is available at: www.bmpbase.org/LandingPage.aspx/.

9.3 Create and Maintain a Regional Implementation Activity Database

– Each year, BIG stakeholders will provide a report on the activities they implemented during the year. H-GAC will compile and share this information in a database.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Regional Implementation Activity Database. In 2012, H-GAC staff developed a preliminary regional implementation activity database for the purpose of tracking total maximum daily load (TMDL) progress. Preliminary data entry using MS4 annual reports identified a need to improve the database in order to expedite the data entry process.

9.4 Assess Monitoring Results and Modify I-Plan

– Each year, H-GAC will assess monitoring in annual reports to identify whether progress is being made and communicate the results to the BIG. The BIG will determine if changes or updates to the I-Plan are needed.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

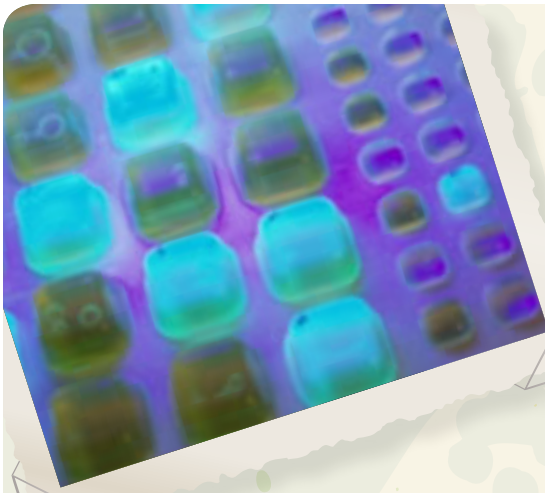
“Most Wanted” Streams. As noted on page 46 and listed on page 48, the Top 10 “Most Wanted” Streams (i.e., with the highest bacteria levels) generally showed improvement. Some of them, such as Little White Oak Bayou and Schramm Gully, showed marked drops in bacteria levels. In these two instances, BIG stakeholders have engaged in activities that could easily be construed to have caused the decline. However, there is no evidence documenting a direct correlation.

“Most Likely to Succeed” Streams. As noted on page 46 and listed on page 50, the Top 10 “Most Likely to Succeed” Streams (i.e., with the lowest bacteria levels that still exceed the standard) generally showed degradation, although it was relatively minor degradation. Removing these streams from the list of impaired waterways would be a major accomplishment for the TMDL program. BIG stakeholders will focus programming and research efforts on these streams in the coming years.

BIG “Bacteria Trend Line.” In general, the BIG bacteria trend line continues to show improvements (as illustrated on page 12). However, it seems that progress has slowed in the past year. BIG members hypothesized that the lack of clear improvement might be more readily apparent after the area recovers from the drought. H-GAC will continue to review available data to determine trends in bacteria levels.

Non-Ambient Water Quality Monitoring. At this time, H-GAC has received no reports of non-ambient water quality monitoring data that indicate implementation activities are reducing bacteria loading. As a result, few conclusions can be drawn from the work that has been accomplished. Related activities include:

- The Joint Task Force and Bayou Preservation Association have conducted limited non-ambient sampling;
- The HCFCFCD will soon launch its BMP database; and
- H-GAC has submitted a QAPP to the TCEQ.



RESEARCH

10

Main Summary

BIG stakeholders support new research initiatives that result in useful findings and recommendations. Total daily maximum load (TDML) studies provide a general overview of the extent and character of the presence of bacteria. However, these studies are not sufficient to determine the most cost-effective courses of action to achieve water quality standards for contact recreation. The BIG has identified three top research priorities: (1) effectiveness of stormwater management activities, (2) bacteria persistence and regrowth, and (3) appropriate indicators to identify health risks presented by contact recreation in impaired waters.

These topics are pertinent to the entire project area. However, research is often driven by the availability of resources. While some research is being conducted within the region, BIG's active participation and advocacy at the state and national levels will help to ensure regional priorities are addressed. Local participation will also help to ensure findings and recommendations produced elsewhere are transferrable to the project area. Efforts to date have focused on compiling informational resources.

Work Group Activities

Meeting March 7, 2013. Nine attendees, including two BIG members and two alternates.

Progress

Progress has been adequate. Activity has begun or is ongoing for each of the research priorities.

Achievements

- H-GAC and BIG stakeholders:
 - Began analyzing local water quality data to determine the relationship between *E. coli* and *Enterococcus*.
 - Began the grant application process for funding research on bacteria persistence and regrowth in local streams.
- The Harris County Flood Control District's (HCFCD) best management practice (BMP) database showed promise as a tool for evaluating stormwater BMP effectiveness.

Focus

- H-GAC and BIG stakeholders aim to:
 - Continue researching existing programs and projects.
 - Secure funding for additional projects.
 - Research the relationship between bacteria and the supernatant and colloidal sediment that passes through a 0.45 micron filter.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

10.1 Evaluate the Effectiveness of Stormwater Implementation Activities

– BIG stakeholders will monitor current and future stormwater projects and analyze their effectiveness.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

No Progress Reported. Eventual monitoring of current and future stormwater projects in the planning area will help provide an area-specific set of data on the relative effectiveness of different management practices. These studies should include both structural measures and behavioral measures.

10.2 Further Evaluate Bacteria Persistence and Regrowth

– BIG stakeholders will conduct special studies to better understand the extent of human contributions to bacterial loading. Data from these studies should be included in monitoring databases.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Research Funding. H-GAC sought grant funding to investigate naturalized populations of *E. coli* in local waterways. If funded, H-GAC would work with a team at the Georgia Institute of Technology headed by Dr. Konstantin Konstantinidis. Along with other researchers, he has sequenced the genomes of many naturalized strains of *E. coli* and is developing a molecular assay to quantify the relative contributions of environmental and fecal sources.

10.3 Determine Appropriate Indicators

– H-GAC and BIG stakeholders should help determine the need for alternative, supplemental, or multiple bacteria indicators to refine the I-Plan.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Initial Research. Ongoing and future research by the following agencies and organizations indicates promising indicators in the coming years:

- The U.S. Environmental Protection Agency continued developing recreational water quality standards based on new analytical techniques involving quantitative polymerase chain reactions, new statistical terminology, predictive modeling, sanitary surveys, epidemiological studies, and the development of quantitative microbial risk assessment.
- Harris County and the HCFCD continued to analyze the Clean Rivers Program's (CRP) water quality data to identify possible correlations between bacteria levels and other water quality parameters such as total suspended solids or nutrients.
- The CRP continued collecting *Enterococci* samples to supplement *E. coli* samples in freshwater.
- The HCFCD, in cooperation with H-GAC and the City of Houston Public Works Department, continued to conduct sampling to better describe diurnal patterns in bacteria levels.

10.4 Additional Research Topics

- H-GAC and BIG stakeholders should conduct additional research on WWTFs, health risks, recreational use, land use modeling, unimpaired waterways, nutrients, and other constituents as funds are available.

Not Started

Initiated

In Progress

Completed

Behind Schedule

On Schedule

Ahead of Schedule

Annual Progress and Applicable Programming:

Research Abstracts. H-GAC staff prepared 29 article abstracts relating to BIG issues. The collection included articles about:

- Predicting bacteria levels from other water quality parameters;
- Bacteria in stormwater;
- Microbial source tracking and alternative indicators; and
- Naturalized fecal indicator bacteria.

New Research Topics. BIG members recommended new research initiatives that study the relationship between bacteria and biofilms, colloidal particles, total suspended solids, and turbidity. The group discussed:

- Wet sieve analysis;
- Sample dilution;
- Use of filters smaller than 0.45; and
- Testing sludge blankets from wastewater treatment facilities.





GEOGRAPHIC PRIORITY FRAMEWORK

11

Main Summary

For the BIG project area to achieve state standards for contact recreation, a wide range of community stakeholders must be responsible for implementing the I-Plan. While some initiatives span the entire project area, others focus on targeted watersheds. During the planning stage, public input via outreach meetings and/or surveys is essential to help set priorities and timing.

As regional organizations and local jurisdictions work to establish their priorities, they should consider five main categories of concern: (1) bacteria level, (2) accessibility of water body, (3) use level, (4) implementation opportunities, and (5) future land use changes. To facilitate such priority-setting, H-GAC staff has tracked bacteria levels to determine the “Most Wanted” impairment locations (i.e., those streams with the highest geometric means relative to state standards for bacteria) and those “Most Likely to Succeed” (i.e., stream locations with the lowest geometric means relative to state standards for bacteria).

Work Group Activities

Meeting March 7, 2013. Nine attendees, including two BIG members and two alternates.

Progress

Progress has been adequate. Activity has begun and is ongoing for several implementation activities.

Achievements

- The seven-year geometric mean decreased for each of the assessment units identified in the 2012 “Most Wanted” Streams list of stations with the highest bacteria levels.
- H-GAC and BIG stakeholders received positive and action-oriented stakeholder responses to the Top 10 “Most Wanted” Streams list.

Focus

- H-GAC and BIG stakeholders aim to:
 - Continue to address the Top 10 “Most Wanted” Streams by building on the momentum of stakeholders to address specific problem areas.
 - Evaluate new potential additions to the Top 10 “Most Wanted” Streams list, including Berry Bayou (station 16661 on 1007F_01) and Plum Creek (station 16658 on 1007L_01).
 - Begin to address the Top 10 “Most Likely to Succeed” Streams list. Most saw increased bacteria levels (i.e., negative results).
- Harris County should continue developing analytical capabilities to geographically prioritize waterways in coordination with BIG recommendations.

Revisions

The work group does not recommend changes to the I-Plan.

Implementation Strategies

11.1

Consider Recommended Criteria When Selecting Geographic Locations for Projects

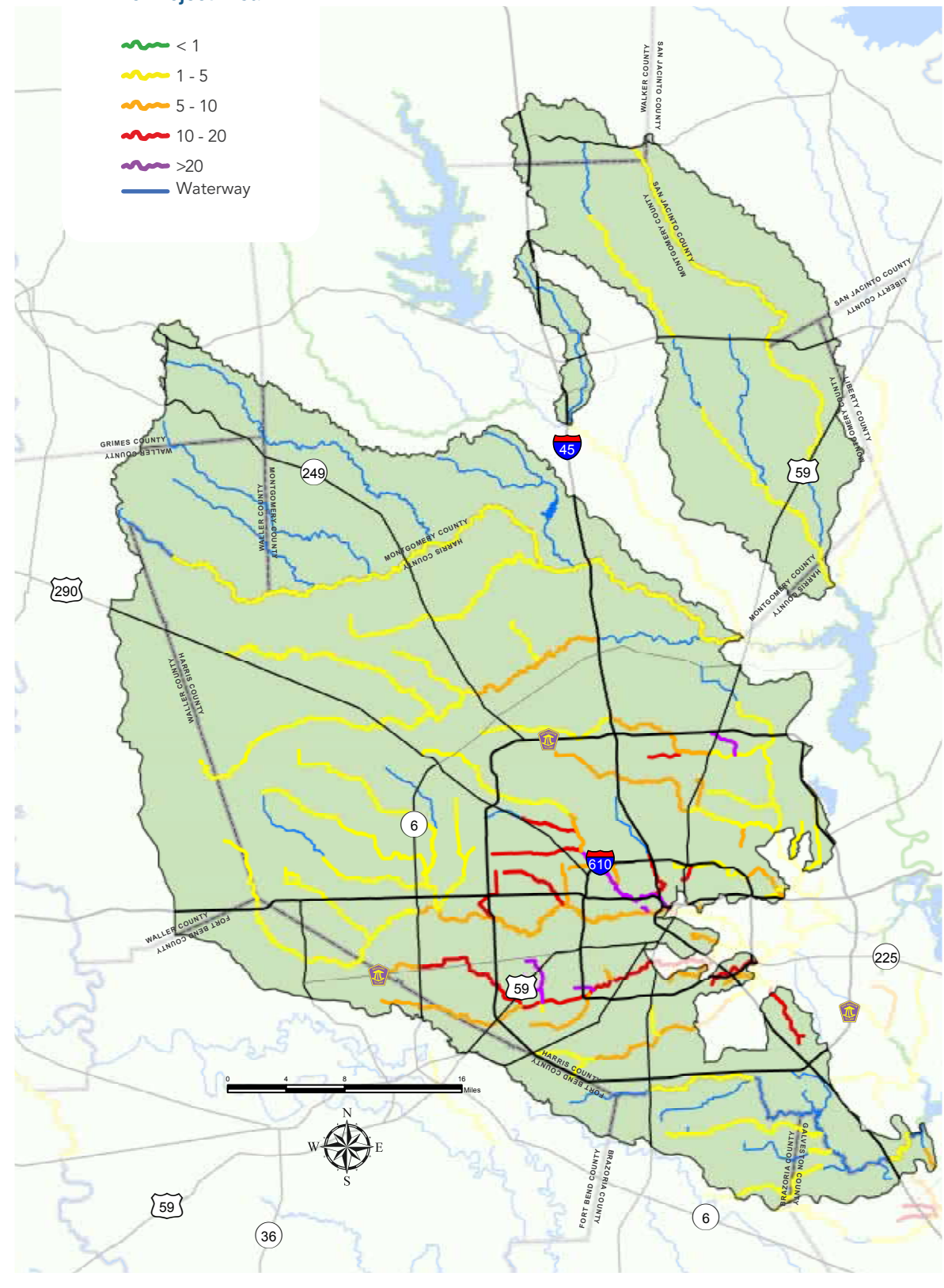
- Communities should consider bacteria, accessibility, opportunities, use, and future use when selecting locations for projects.

- Not Started
- Initiated
- In Progress
- Completed
- Behind Schedule
- On Schedule
- Ahead of Schedule

Annual Progress and Applicable Programming:

- **BIG's Geographic Prioritization.** H-GAC staff developed and cross-compared 2012 and 2011 lists of the Top 10 "Most Wanted" Streams and Top 10 "Most Likely to Succeed" Streams assessment units. These lists are based on the seven-year geometric mean for the monitoring stations with the 10 highest bacteria levels ("Most Wanted") and the lowest bacteria levels that are still considered impaired ("Most Likely to Succeed"), respectively.
 - **"Most Wanted" Streams.** Of the assessment units on the "Most Wanted" Streams list, all but one on last year's Top 10 list showed decreased bacteria levels. Examples yielding significant results included:
 - » Schramm Gully (1007R_01) at station 15869 went from a geomean of 35 times the standard to 20 times the standard. This led the assessment unit to drop off the Top 10 list from fourth place. It once had the highest bacteria level.
 - » Little White Oak Bayou (1013A_01) at station 11148 went from a geomean of 28 times the standard to 19 times the standard. As a result, it dropped off the Top 10 list from seventh place. These changes cannot be directly attributed to stakeholder efforts. However, anecdotal information suggests the identification of problems and action strategies helped to improve results.
 - **"Most Likely to Succeed" Streams.** The data evaluation of the Top 10 "Most Likely to Succeed" Streams list did not yield as many positive results as the Top 10 "Most Wanted" Streams list. Four of the assessment units on last year's Top 10 list showed almost no change. Six saw relatively minimal increases ranging from 0.1 to 0.8 times the standard (up to 2.2 times the standard).
- **Harris County's Geographic Prioritization.** Harris County applied the I-Plan's prioritization criteria to begin analyzing priority waterways in the unincorporated portion of the county. At this time, county staff indicated that they had not figured out a way to include recreational use, which is being recorded by the Clean Rivers Program's monitoring partners, in their analyses.

Bacteria Relative Geomeans within the BIG Project Area



The information on this map represents the most current information available to H-GAC and is for general informational purposes only. H-GAC does not implicitly or expressly warrant its accuracy or completeness and neither assumes nor will accept liability for its use.

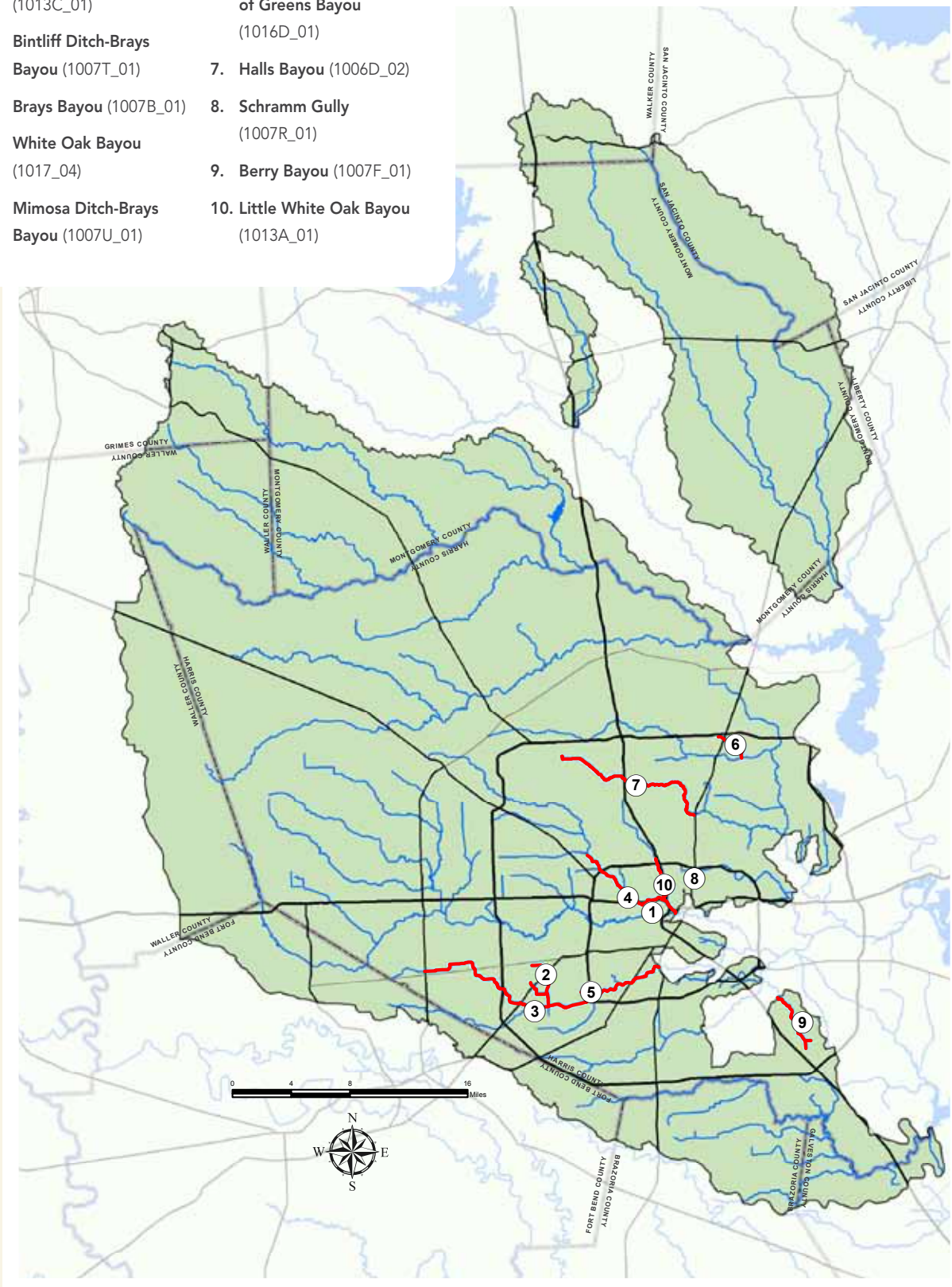
TOP 10 “MOST WANTED” STREAMS

Rank	Station	Parameter	Relative Geomean	Assessment Unit	Station Description	Watershed
1	16675	<i>E. coli</i>	42.0	1013C_01	Unnamed tributary of Buffalo Bayou at Glenwood Cemetery Road 160 miles west of intersection of Lubbock Street and Sawyer Street in central Houston	Buffalo Bayou Tidal
2	18690	<i>E. coli</i>	35.7	1007T_01	Bintliff Ditch Tributary of Brays Bayou under center of Bissonnet Street Bridge 317 miles northeast of Bissonnet Street at Fondren Road in southwest Houston	Houston Ship Channel/Buffalo Bayou Tidal
3	15854	<i>E. coli</i>	31.3	1007B_01	Brays Bayou immediately downstream of South Rice Avenue in west Houston	Houston Ship Channel/Buffalo Bayou Tidal
4	11387	<i>E. coli</i>	29.9	1017_04	Whiteoak Bayou immediately downstream of Heights Boulevard in Houston	Whiteoak Bayou Above Tidal
5	18691	<i>E. coli</i>	23.0	1007U_01	Mimosa Ditch Tributary of Brays Bayou at Newcastle Drive in southwest Houston	Houston Ship Channel/Buffalo Bayou Tidal
6	16676	<i>E. coli</i>	22.4	1016D_01	Unnamed tributary of Greens Bayou at Smith Road in northeast Houston	Greens Bayou Above Tidal
7	17490	<i>E. coli</i>	20.9	1006D_02	Halls Bayou at Airline Road in north Houston	Houston Ship Channel
8	15869	<i>E. coli</i>	19.6	1007R_01	Hunting Bayou at Cavalcade Street in northeast Houston	Houston Ship Channel/Buffalo Bayou Tidal
9	16661	<i>E. coli</i>	18.8	1007F_01	Berry Bayou immediately upstream of South Richey Street in southeast Houston	Houston Ship Channel/Buffalo Bayou Tidal
10	11148	<i>E. coli</i>	18.8	1013A_01	Little White Oak Bayou at Trimble Street/north edge of Hollywood Cemetery in Houston	Buffalo Bayou Tidal

Top 10 “Most Wanted” Streams

- | | |
|--|---|
| 1. Buffalo Bayou Tidal (1013C_01) | 6. Unnamed tributary of Greens Bayou (1016D_01) |
| 2. Bintliff Ditch-Brays Bayou (1007T_01) | 7. Halls Bayou (1006D_02) |
| 3. Brays Bayou (1007B_01) | 8. Schramm Gully (1007R_01) |
| 4. White Oak Bayou (1017_04) | 9. Berry Bayou (1007F_01) |
| 5. Mimosa Ditch-Brays Bayou (1007U_01) | 10. Little White Oak Bayou (1013A_01) |

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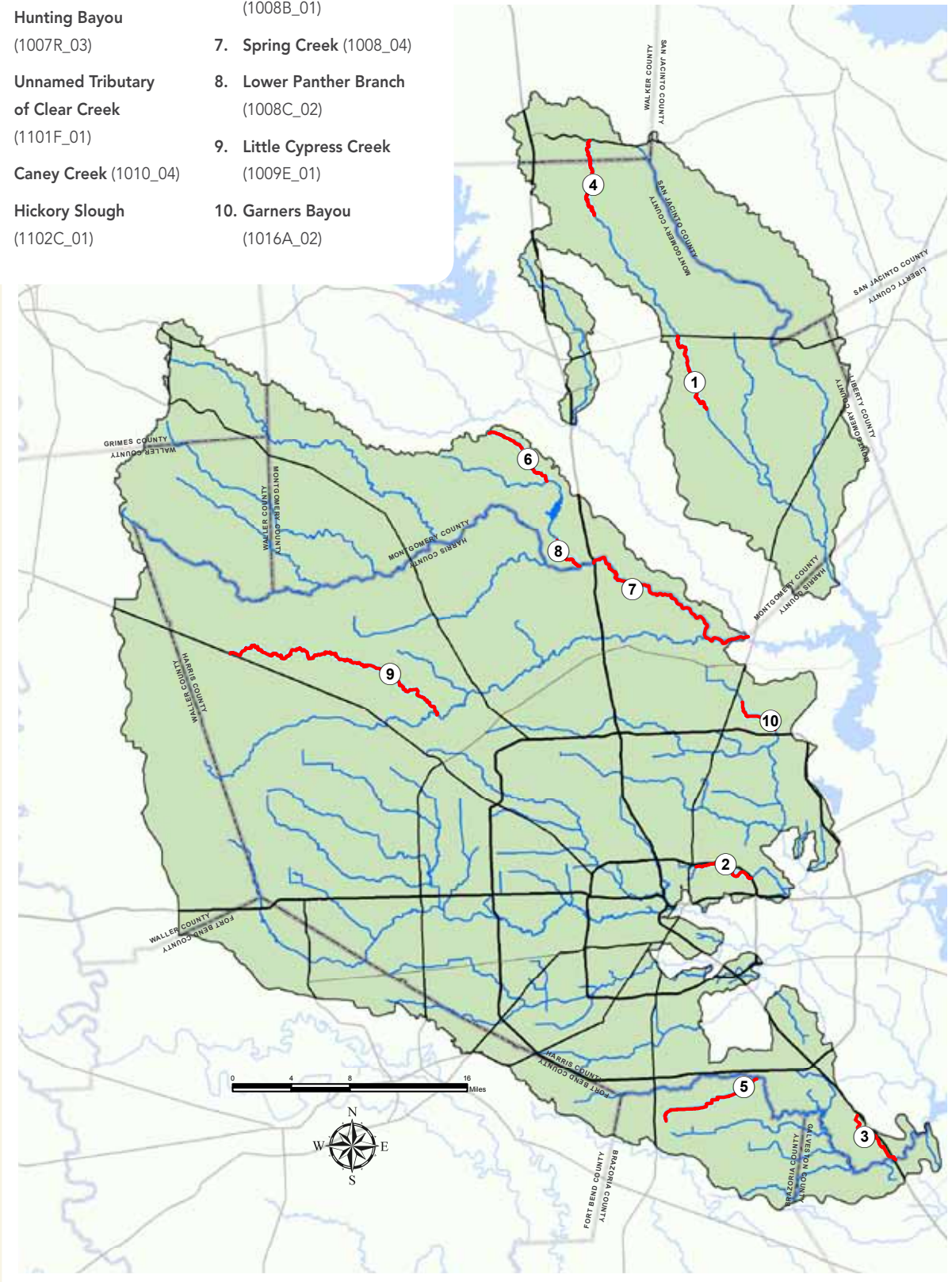
TOP 10 “MOST LIKELY TO SUCCEED” STREAMS

Rank	Station	Parameter	Relative Geomean	Assessment Unit	Station Description	Watershed
1	20453	<i>E. coli</i>	1.4	1010_02	Caney Creek at County Line Road in Montgomery County east to the City of Willis	Caney Creek
2	11129	<i>E. coli</i>	1.4	1007R_03	Hunting Bayou at North Loop East/I-610 in Houston	Houston Ship Channel/Buffalo Bayou Tidal
3	18591	<i>Enterococci</i>	1.4	1101F_01	Unnamed tributary of Clear Creek Tidal in Forest Park Cemetery immediately upstream of South Feeder Road of I-45/ Gulf Freeway south of Nasa Road 1 in Webster	Clear Creek Tidal
4	20452	<i>E. coli</i>	1.3	1010_04	Caney Creek at Firetower Road West to the City of Woodbranch	Caney Creek
5	17068	<i>E. coli</i>	1.2	1102C_01	Hickory Slough at Robinson Drive in Pearland	Clear Creek Above Tidal
6	16629	<i>E. coli</i>	1.2	1008B_01	Upper Panther Branch approximately 80 miles upstream of Permit Wq0012597-001 located at 5402 Research Forest Drive	Spring Creek
7	18868	<i>E. coli</i>	1.2	1008_04	Spring Creek at Roberts Cemetery Road west-northwest of Tomball	Spring Creek
8	16627	<i>E. coli</i>	1.2	1008C_02	Lower Panther Branch 180 miles upstream of Sawdust Road approximately 50 miles upstream of Permit Wq0011401-001 located at 2436 Sawdust Road	Spring Creek
9	20456	<i>E. coli</i>	1.2	1009E_01	Little Cypress Creek at Mueschke Road 4.4 kilometers north of SH 290 northwest of Cypress	Cypress Creek
10	16589	<i>E. coli</i>	1.2	1016A_02	Garners Bayou immediately upstream of Old Humble Road at the confluence with Rienhardt Bayou in northeast Houston	Greens Bayou Above Tidal

Top 10 “Most Likely to Succeed” Streams

- | | |
|--|------------------------------------|
| 1. Caney Creek (1010_02) | 6. Upper Panther Branch (1008B_01) |
| 2. Hunting Bayou (1007R_03) | 7. Spring Creek (1008_04) |
| 3. Unnamed Tributary of Clear Creek (1101F_01) | 8. Lower Panther Branch (1008C_02) |
| 4. Caney Creek (1010_04) | 9. Little Cypress Creek (1009E_01) |
| 5. Hickory Slough (1102C_01) | 10. Garners Bayou (1016A_02) |

The information on this map represents the most current information available to H-GAC and is for general informational purposes only. H-GAC does not implicitly or expressly warrant its accuracy or completeness and neither assumes nor will accept liability for its use.



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WALL OF FAME

Authorized agents for on-site sewage facilities (OSSFs) and operators of municipal separate storm sewer systems (MS4s) were asked via e-mail and/or phone to provide data and information for this annual report. The "Wall of Fame" acknowledges participating stakeholders for their contributions. Additional stakeholders, including wastewater treatment facility permit holders, will be asked to provide data and information in the coming year.

On-Site Sewage Facilities

RELIABLY SUBMITTED DATA, SUBMITTED A COMPLETE PERMIT DATA SET, AND REGULARLY SUBMITTED COMPLAINT DATA

- Fort Bend County
- Galveston County

RELIABLY SUBMITTED DATA AND SUBMITTED A COMPLETE PERMIT DATA SET

- Brazoria County*
- Harris County
- Liberty County
- San Jacinto River Authority (SJRA)
- Waller County
- Walker County
- Texas Commission on Environmental Quality (TCEQ)

SUBMITTED DATA DURING THE REPORTING PERIOD

- City of Manvel

* Also submitted some violation data

Note: Austin, Chambers, Colorado, Matagorda and Wharton counties, while outside of the BIG project area, have provided information in support of the OSSF mapping program initiated by the BIG.

Municipal Separate Storm Sewer Systems

SHARED ANNUAL REPORTS

- Chelford City MUD
- City of Bunker Hill Village
- City of Houston
- City of Humble
- City of Jacinto City
- City of League City
- City of Oak Ridge North
- City of Pasadena
- City of Stafford
- Fort Bend County
- Fort Bend County MUD #119
- Fort Bend County Drainage District
- Grand Lakes MUD 1
- Grand Lakes MUD 2
- Grand Lakes MUD 4
- Grand Lakes WCID
- Harris County and MUDs covered by Harris County's permit
- Harris County Flood Control District
- Harris Fort Bend Counties MUD 5
- Montgomery County
- Montgomery County MUD 6
- NASA Johnson Space Center
- North Mission Glen MUD
- Rayford Road MUD
- Renn Road MUD
- Southern Montgomery County MUD
- Southwest Harris County MUD #1
- Spring Creek Utility District
- The Woodlands Joint Powers Authority
- Texas Department of Transportation (with the Joint Task Force, but not in other areas)
- West Keegans Bayou Improvement District

Note: Additional MS4s outside of the BIG project area have also submitted MS4 annual reports. A complete list can be found at: www.h-gac.com/go/MS4reports.



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