2024 WATER QUALITY MANAGEMENT PLAN UPDATE

Houston-Galveston Area Council

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

EPA

Funding for this project was provided by the Environmental Protection Agency through a Clean Water Act Section 604(b) grant to the Houston-Galveston Area Council, administered by the Texas Commission on Environmental Quality

DRAFT REPORT FOR CONTRACTS NO. 582-23-40182 and 582-24-50311

WATER QUALITY MANAGEMENT PLAN UPDATE

Fiscal Year 2024

PREPARED IN COOPERATION WITH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY AND UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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Prepared by the Houston-Galveston Area Council (H-GAC), in coordination with the TCEQ. This project was funded under a Clean Water Act (CWA) Section 604(b) grant; TCEQ contract numbers 582-23-40182 and 582-24-50311.

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ACRONYMS AND ABBREVIATIONS

BIG	Bacteria Implementation Group
CCN	Certificate of Convenience and Necessity
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
DMR	Discharge Monitoring Report
ECHO	Enforcement and Compliance History Online
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GBEP	Galveston Bay Estuary Program
GIS	Geographic Information System
GPS	Global Positioning System
H-GAC	Houston-Galveston Area Council
I-Plan	Implementation Plan
MGD	Million Gallons Per Day
MPN	Most Probable Number
MUD	Municipal Utility District
NCTCOG	North Central Texas Council of Governments
NRAC	Natural Resources Advisory Committee
OSSF	On-Site Sewage Facility
PUC	Public Utility Commission of Texas
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCI	Regional Conservation Initiative
SAB	Service Area Boundary
SEP	Supplemental Environmental Project
SSO	Sanitary Sewer Overflow
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TWC	Texas Water Code
TWDB	Texas Water Development Board
WPP	Watershed Protection Plan
WQMP	Water Quality Management Plan
WWTF	Wastewater Treatment Facility

INTRODUCTION

Within the Houston metropolitan region and surrounding counties there are a variety of water quality issues, with elevated levels of bacteria being the most prevalent. Contaminants from both point and nonpoint sources continue to impair the region's streams, rivers, lakes, and bays. To address water quality impairments and concerns and develop and implement watershed-based plans, it is important to have current and accessible data, including geospatial data of regional wastewater infrastructure. Evaluating effluent discharge quality and quantity, as well as the frequency, amounts, and potential causes of unauthorized discharges, is also an important component of planning efforts to address water quality in the region.

H-GAC's Regional Water Quality Management Plan (WQMP) Update helps to address the water quality issues affecting the region by acquiring, compiling, and analyzing water and wastewater data and subsequently making this data accessible to various programs, projects, and stakeholder groups who use the data for planning purposes. The WQMP is updated annually, and these updates are used to guide planning and implementation measures to support current and future efforts and inform decision-makers in their evaluations.

This WQMP Update is a report from H-GAC on the Fiscal Year (FY) 2024 activities conducted under Contract 582-23-40182 and 582-24-50311, with funding through an EPA CWA § 604(b) grant administered by the TCEQ. This report will focus on the progress achieved in the primary task objectives set forth in the Project Scope of Work. These tasks are:

1. Project Administration
2. Quality Assurance
3. Wastewater Infrastructure, Data and Permit Update
4. Conformance Review for Clean Water State Revolving Fund (CWSRF) Projects
5. Support Watershed Planning
6. On-Site Sewage Facility (OSSF) Planning, Coordination, and Outreach Activities
7. OSSF Mapping Tool Expansion Feasibility Study
8. WQMP Coordination
9. Final Report

The H-GAC's WQMP Update Report will become part of the State's WQMP after completion of its public participation process, acceptance by the H-GAC's Board of Directors, and certification by the TCEQ.

PROJECT BACKGROUND

H-GAC is a voluntary association of local governments in the Houston-Galveston region, an area that covers approximately 12,500 square miles and is home to more than 7 million people. H-GAC's service area encompasses 13 counties: Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, and Wharton (**Map 1**). H-GAC is the designated water quality planning agency for the region and is responsible for the development of the regional WQMP.

The annual WQMP Updates are used to guide planning for implementation measures that control and/or prevent water quality problems. The purpose of this WQMP Update is to support current and future planning decisions concerning water quality efforts, wastewater infrastructure development, watershed management, and related issues on both a regional and state level.

Development of the WQMP Update involves acquiring, compiling, and evaluating water and wastewater data, as well as a series of special studies and coordination activities, as requested by the State. The data and information compiled by H-GAC are combined with data from the TCEQ to form a series of integrated data sets to allow for meaningful evaluation of infrastructure and water quality decisions. The CWA § 604(b) grant requires the WQMP to be updated as needed to fill information gaps and to revise earlier approved and certified plans. Any updates to the plan need include only the elements of the plan that are new or require modification. This update revises only the information specifically addressed in the included sections. Previously certified and approved WQMPs remain in effect.

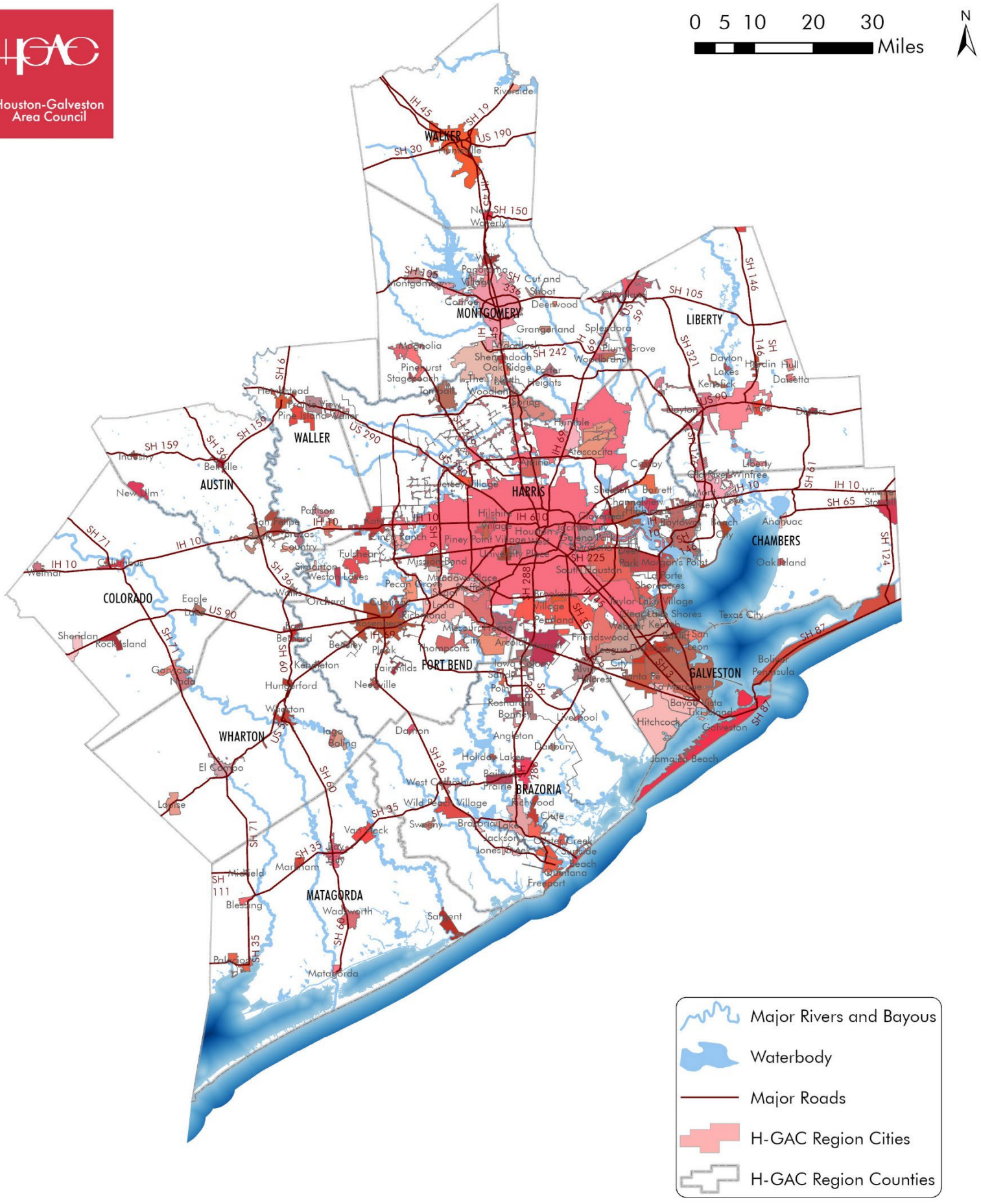
The annual WQMP Update is reviewed by the Natural Resources Advisory Committee (NRAC), a policy and technical advisory committee that advises H-GAC's Board of Directors on issues related to natural resources. Its membership includes diverse representatives from local governments, natural resource management agencies, environmental organizations, and the private sector. An opportunity is provided to both the NRAC and the public to review and submit comments on the WQMP Update before the report is finalized. After review, comments are incorporated into the report to produce the final plan, which is submitted to H-GAC's Board of Directors. Once accepted by the Board, the report is submitted to the TCEQ for review and approval. H-GAC's WQMP Update will become part of the State WQMP after it is certified by the TCEQ.

HISTORICAL WQMP UPDATES

Under previous WQMP projects, H-GAC sought to address aspects of the information and data needs related to water quality issues facing the region. These projects typically have been a mix of both ongoing efforts and short-term special studies. Some of the project efforts have been continuous, such as wastewater data collection and maintenance and development of an online OSSF mapping tool. Other efforts have been stand-alone research relating to specific data needs or questions, such as Geographic Information System (GIS) analyses for infrastructure consolidation, Phase II stormwater permit implementation, and support for the Coastal Communities project. This balance of continuous and stand-alone efforts allows for the long-term accumulation of data while retaining flexibility to address specific issues.

The ongoing efforts in the FY 2024 WQMP project focused on:

- Updating and improving existing regional wastewater infrastructure databases (wastewater treatment facility (WWTF) outfalls and service area boundaries (SABs)),
- Improving spatial datasets of potential unpermitted OSSF locations using 9-1-1 addressing,
- Support of local watershed-based plans,
- Coordination and public outreach in support of a Supplemental Environmental Project (SEP) to repair or replace failing OSSFs within the region, and
- Outreach and education related to H-GAC's OSSF Mapping Tool.



Map 1. H-GAC Regional Map

PROJECT SIGNIFICANCE

Already one of the largest metropolitan statistical areas in the United States, the Houston-Galveston region continues to grow at a rapid pace, resulting in a proportional increase in population growth and land development. Development, and its accompanying utility infrastructure, continues into counties beyond the urban core. Existing water and wastewater infrastructure systems continue to age and face challenges related to drought and flooding events. With the region expected to gain several million additional residents by 2040, these challenges will only be exacerbated in the future.

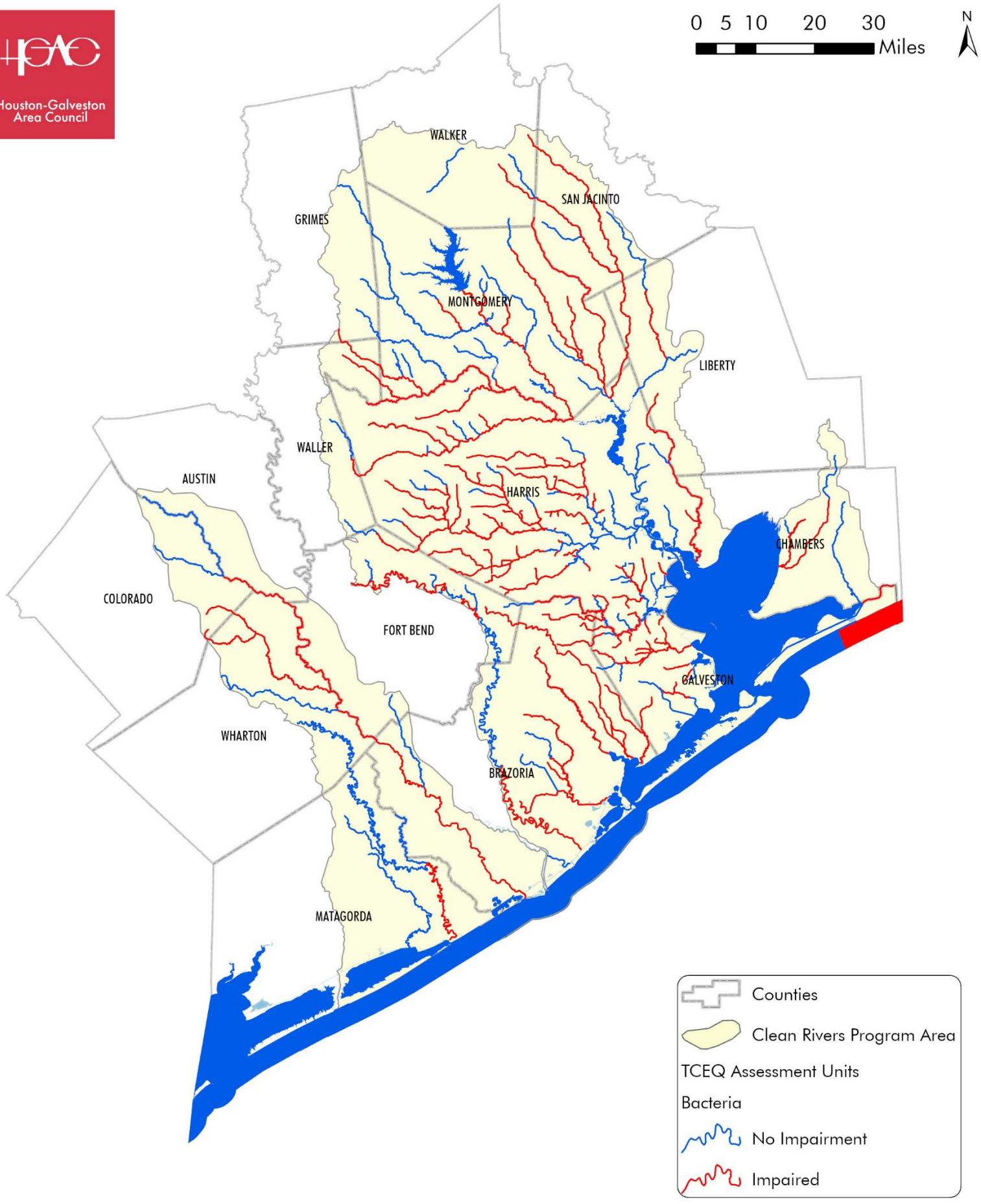
Within the region, there are a variety of water quality impairments and concerns. The majority of stream segments in the region fail to meet the criteria as defined in the *Texas Surface Water Quality Standards*. Many of those water bodies are listed with impairments or concerns in the 2022 *Texas Integrated Report of Surface Water Quality*. Approximately 80 percent of the region's streams are unable to meet one or more state water quality standards, with the most pervasive issue being elevated bacteria levels in exceedance of the primary contact recreation standard (Map 2). The bacteria in the region's lakes, creeks, streams, and bayous come from a variety of sources, including human waste, domestic animal waste, pet waste, and wildlife. These wastes may enter the water through point sources (discrete "end-of-pipe" discharges, such as wastewater effluent) or diffusely through nonpoint sources, carried by precipitation runoff flowing over the land. While some bacteria are naturally occurring, development brings additional bacterial sources and a greater potential impact to water bodies. Careful planning is necessary to address these additional sources.

In addition to the identified water quality issues, numerous developmental challenges exist in the region as well. The wastewater infrastructure that serves the region's increasing population has expanded and developed much like the region itself. As the population has expanded and spread into less urban areas, there has been a proliferation of smaller sized WWTFs and the creation of a diffuse network of infrastructure to provide utility service to this population. This is partially due to the area's flat topography, as larger centralized WWTFs would require a significant number of costly lift stations to consolidate flow. Due to the availability to fund infrastructure through political subdivisions like Municipal Utility Districts (MUDs) and other special districts, many areas of the region have a wastewater treatment network that is relatively widespread rather than limited by the bounds of a traditional, centralized model. Development through this model has created a patchwork of wastewater infrastructure, which offers both future challenges and opportunities for local decision-makers.

One of the primary objectives of this WQMP is to collect and analyze data related to wastewater infrastructure in the region. Wastewater infrastructure is a potential contributor of bacteria into area waterways through improperly treated effluent discharges, or through sanitary sewer overflows (SSOs) from the treatment facilities or throughout the collection

systems. Self-reported data from WWTF Discharge Monitoring Reports (DMRs) and SSO violation reports can be analyzed to better evaluate the potential impacts these sources have on bacteria impairments throughout the region. As the population continues to increase at a rapid pace and the infrastructure continues to age, the integrity of these treatment and collection systems may be harmed. It is important to continuously monitor these systems over time to ensure decision-makers and water resource managers have the necessary information to implement best management practices, repairs, or system replacements in areas with the most need.

The population is expected to continue to rapidly grow in the coming decades, and the ability to make informed decisions regarding water quality and wastewater infrastructure development will be crucial in planning for the region's future. The accumulation, maintenance, and analysis of regional wastewater and effluent quality data can help inform regional solutions to water quality issues.



Map 2. Bacteria Impairments in the CRP Area (from the 2022 Texas Integrated Report of Surface Water Quality)

In areas that are not served by a sanitary sewer collection system, which includes a sizable portion of the region, wastewater is treated through use of decentralized OSSFs, such as aerobic treatment units or conventional septic systems. These OSSFs collect, treat, and disperse wastewater generated by a home or business at the site where it was generated (hence the name "on-site"). The use of an OSSF is allowable to treat up to 5,000 gallons of wastewater per day. For volumes above that threshold, a wastewater discharge permit from TCEQ is required.

When properly designed, sited, and maintained, these systems are an effective form of wastewater treatment. However, if an OSSF fails, which can occur for numerous reasons (improper design, system overload, improper operation, mechanical failure, lack of proper maintenance, etc.), it can contribute to groundwater or surface water contamination through the release of untreated or partially- treated wastewater.

One of the primary objectives of the WQMP is to maintain a geospatial database of permitted OSSFs and an estimation of the number and locations of unpermitted OSSFs. Typically, these unpermitted OSSFs are those "grandfathered" systems that were installed prior to 1989, when the State began requiring that these systems be permitted. For the FY 2024 WQMP Update, H-GAC employed methodology developed in earlier WQMP updates which uses 9-1-1 addressing for estimating the potential locations of these unpermitted systems.

From a regional perspective, the water quality and wastewater infrastructure decisions facing the region are more effectively considered on a watershed basis, as contaminants do not adhere to political boundaries along waterways. This is particularly important for watersheds that serve as significant sources of drinking water, such as Lake Houston. H-GAC maintains a large store of relevant and accessible data to provide useful information, analysis, and viable recommendations. The data collection and analysis tasks completed under this WQMP Update project have significant value for a variety of efforts in the region, such as the development of watershed protection plans (WPPs) and Total Maximum Daily Loads (TMDLs) to address known water quality issues in local waterways.

HOW DOES H-GAC UTILIZE THE DATA ACQUIRED THROUGH THE WQMP PROJECT?

Internal Data Collection and Regional Data Sharing

The wastewater permit data, SABs, and OSSF location data acquired under this WQMP Update project serve to augment existing data sets, inform project decisions on related efforts, and expand internal capabilities of both the H-GAC and TCEQ to incorporate and produce future data and analyses. For example, WQMP acquired data were used by the Houston-area Bacteria Implementation Group (BIG), Basins 11 and 13 TMDL efforts, the Galveston Bay Estuary Program (GBEP), the Clean Rivers Program, and others.

Regional Project Coordination

Maintaining and expanding data resources allows the H-GAC and TCEQ to better understand and facilitate regional coordination between parties involved in wastewater infrastructure decisions and general water quality/watershed protection efforts. Participation in regional groups and coordination efforts helps ensure decisions benefit from the resources compiled under the WQMP. More examples of the uses for data acquired through the WQMP are listed in **Table 1**.

Table 1. Uses for Data Acquired through the WQMP

Source Water Protection	CWSRF Project Review	Education and Outreach
A large portion of the region's population is served by treated surface water originating in local rivers and lakes. The infrastructure planning and watershed coordination activities of this WQMP Update project help foster a greater understanding of the relationship between water quality issues and steps to help protect drinking water sources.	Data and analyses allow H-GAC staff to assist state and federal granting agencies in the review of regional grant applications. These reviews ensure potential projects concur with regional priorities and regional data projections.	Data gathered under this WQMP Update project have been used as a focal point or basis for several education efforts, including the OSSF location database and various facilitated meetings, such as the ongoing NRAC.

PROJECT TASK OBJECTIVES

The WQMP Update is a report from H-GAC on the FY 2024 activities conducted under Contract 582-23-40182 and 582-24-50311, with funding through a CWA § 604(b) grant by the U.S. EPA and administered through the TCEQ.

This WQMP Update report focuses on the progress achieved in the Task Objectives set forth in the Project Scope of Work. The Task Objectives for this project are:

1. Project Administration
2. Quality Assurance
3. Wastewater Infrastructure, Data and Permit Update
4. Conformance Review for CWSRF Projects
5. Support Watershed Planning
6. OSSF Planning, Coordination, and Outreach Activities
7. OSSF Mapping Tool Expansion Feasibility Study
8. WQMP Coordination
9. Final Report

This WQMP Update Report, the contract deliverable for Task 8, will focus on the data acquisition and analysis performed under Tasks 3 to 7. Project-related tasks (Tasks 1 and 2) will be discussed in a separate Project Final Report (Task 9). A description of each project task is provided in **Table 2**.

Each of the primary data acquisition and analysis Task Objectives serves to maintain, expand, or implement H-GAC's store of water quality and wastewater infrastructure data. Each Task Objective is described in a separate section of the WQMP Update report, and includes methodologies, results and observations, and discussion (as appropriate). Some of the deliverables generated for this project are large electronic data sets unsuitable for full inclusion in a printed version of this Final Report. However, copies of the full electronic data are available, with representative portions of the data included in this report.

For some analyses presented in this report, such as the WWTF outfalls, a 15-county area (to include Grimes and San Jacinto counties) is considered due to the location of watersheds of interest. These counties are included in the area monitored by H-GAC as part of its ambient surface water quality monitoring program (known as the Clean Rivers Program).

Table 2. WQMP Project Task Objective Descriptions, FY 2024 Workplan

Task #	Task	Objective
1	Project Administration	To administer, coordinate, and monitor all work performed under this project including technical and financial supervision and preparation of status reports.
2	Quality Assurance	To refine, document, and implement data quality objectives and quality assurance/quality control (QA/QC) activities that ensure data of known and acceptable quality are generated by this project. This task includes reviews, revisions, and updates to the Quality Assurance Project Plan (QAPP).
3	Wastewater Infrastructure, Data and Permit Update	To collect and integrate wastewater infrastructure and permit data to support planning for WWTFs and water quality projects in H-GAC's region, and to support TCEQ in their WQMP Update process.
4	Conformance Review for CWSRF Projects	To review and provide input on CWSRF loan applications in H-GAC's region and ensure conformance with the latest WQMP.
5	Support Watershed Planning	To support watershed planning and sharing of regional information on water quality and related topics in H-GAC's region.
6	OSSF Planning, Coordination, and Outreach Activities	To administer and coordinate H-GAC's OSSF program activities. These activities include maintaining and continuing to develop H-GAC's existing spatial database of permitted OSSFs and projected unpermitted OSSF locations. These activities will support an existing SEP to repair or replace failing OSSFs within the watershed, coordinate regional water quality and wastewater infrastructure projects, and provide outreach and educational activities.
7	OSSF Mapping Tool Expansion Feasibility Study	To determine the feasibility of aligning the North Central Texas Council of Governments (NCTCOG) OSSF inventory and spatial dataset with the existing approach already in use in the Houston-Galveston region. This task will also focus on conducting planning activities to evaluate the possible expansion of the Performing Party's current OSSF Mapping Tool in future project years. Efforts will include determining the feasibility of acquiring and incorporating permit records from other potential collaborating entities (ex: Councils of Government, River Authorities, Authorized Agents, TCEQ Regional Offices, Watershed Coordinators, etc.) to expand the geographical reach of the tool and provide a repository for OSSF permit data for use in watershed-based planning activities. The Performing Party will also begin evaluating OSSF permit data alongside regional equity data to better target additional programs and tasks towards disadvantaged communities and vulnerable populations.
8	WQMP Coordination	To provide TCEQ with a comprehensive report on water quality management planning activities for the Gulf Coast region as well as documentation that H-GAC's Board of Directors has accepted the FY 2024 Final WQMP Update Report.
9	Final Report	To produce a Final Report that summarizes all completed activities and conclusions reached during the project. The Final Report will discuss the extent to which project goals and purposes have been achieved. The Final Report should emphasize successes, failures, and lessons learned. The Final Report will summarize all the Task Reports either in the text or as appendices.

WASTEWATER INFRASTRUCTURE, DATA, AND PERMIT UPDATE

The goal of this Task is to collect and integrate wastewater infrastructure and permit data to support planning for WWTFs and water quality projects in the Houston-Galveston region and to support TCEQ in their WQMP Update process. Primary components of this task are:

- Wastewater Infrastructure Data Update
- Wastewater DMR Data Analysis

The acquisition and analysis of data collected under this task adhered to approved QAPPs and QA/QC methods.

WASTEWATER INFRASTRUCTURE DATA UPDATE

For the Wastewater Infrastructure Data Update task, H-GAC acquires data and updates the SABs and related permitted domestic wastewater outfalls for the region's wastewater collection and treatment facilities. The annual updated GIS map layers include the boundaries of the wastewater collection systems within the region and the geographic location of WWTF outfalls.

To update the WQMP, H-GAC utilizes a series of data sets related to the Texas Pollutant Discharge Elimination System (TPDES)-permitted wastewater facilities in the region. These are the SAB data set and the Wastewater Outfalls data set. A primary task under this Project is to update and continue to integrate these data sources.

To approach this task, H-GAC set out to address the following questions:

- Is there a corresponding SAB for every domestic outfall?
- What are the differences between the current and previous outfall locations for current domestic permits?
- Are there any data errors that need to be reported to TCEQ?

Wastewater Outfall GIS Layer Update

The wastewater outfall layer is maintained by TCEQ. This GIS layer identifies the location of TPDES-permitted WWTF outfalls for the state. Each year, as part of the WQMP Update process, H-GAC acquires an updated wastewater outfalls GIS data set from TCEQ. The Wastewater Outfalls data were acquired from TCEQ's using their GIS website[1].

The data for this year's report were acquired on 3/25/24.

[1] https://gis-tceq.opendata.arcgis.com/datasets/wastewater-outfalls/explore

For this Project, H-GAC examined the domestic wastewater outfalls in the 15-county region for the period of 1/1/23 to 12/31/23. In the metadata for the GIS layer provided by TCEQ, the outfalls are classified with descriptors. The outfalls examined for this project include those categorized as "D" or "W" in the data dictionary. The "D" category represents domestic outfalls at <1 millions of gallons per day (MGD) domestic sewage. The "W" category includes wastewater outfalls ≥1 MGD domestic sewage or process water, including WWTF discharge.

As the focus of this analysis is on domestic discharges, the "D" category was automatically included in H-GAC's evaluation. To determine which facilities in the "W" category were domestic and which were industrial, the permit numbers were queried using TCEQ's water quality permit registry[2].

Permits in the "W" category identified as Public Domestic Wastewater or Private Domestic Wastewater were included in the domestic wastewater outfall layer. Industrial discharges were excluded from analysis, as these are tied to a single location and not a traditional SAB.

SAB GIS Layer Update

The SAB data set is a GIS layer maintained by H-GAC. This file contains a spatial representation of the SABs of the permitted domestic wastewater dischargers in the region. Typically, these boundaries include municipalities, MUDs, Water Control and Improvement Districts, other public districts, and private utilities that serve an area greater than a single facility. Industrial permittees are not included in the SAB data set as these dischargers typically only serve a single facility.

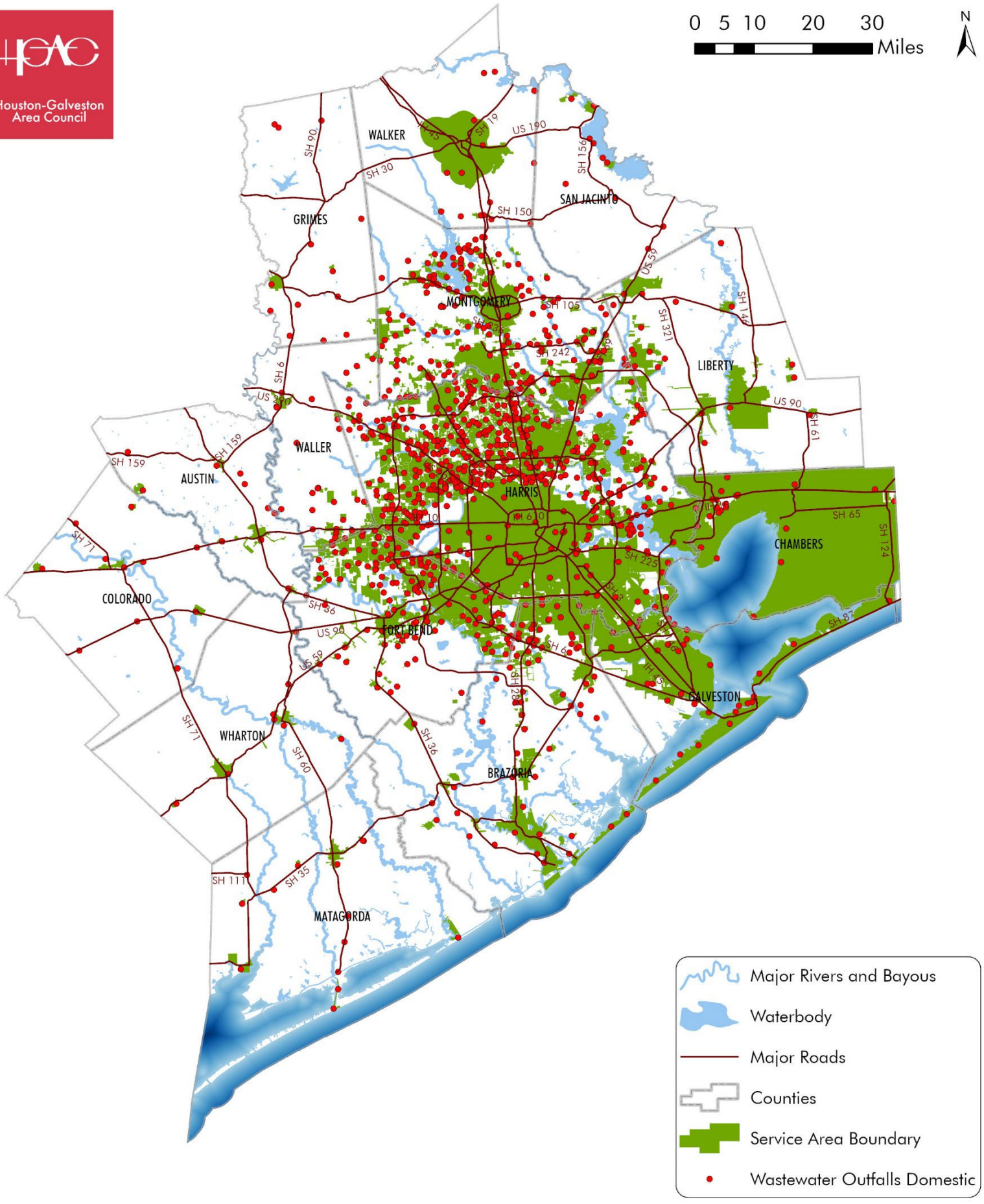
H-GAC utilizes data from multiple sources (MUD records, EPA and TCEQ permit databases, etc.) to update the SAB and outfall layer data sets. In addition, H-GAC also utilized the Public Utility Commission of Texas' (PUC) Certificates of Convenience and Necessity (CCN) data set to match outfalls to SABs. A CCN grants the holder the exclusive right to provide retail water and/or sewer utility service to a defined geographic area. If a CCN is issued, it may serve as a proxy for the SAB, as the CCN holder is required to provide continuous and adequate service within its CCN boundary.

A manual review of the GIS outfall layer and SABs was performed to identify outfalls without an associated SAB. To address small private systems without an associated SAB, and to help develop boundaries for these systems, the SAB data set was compared to other sources of boundary data, such as city boundaries and the CCNs available through the PUC. These city boundaries and CCNs can serve as proxies for the SAB until H-GAC staff can receive verification from these individual entities. These proxy boundaries were added to the SAB GIS layer.

[2] https://www6.tceq.texas.gov/wqpaq/index.cfm

Updated data sets were submitted to TCEQ in digital format with this report. These data sets created under this project are listed in Appendix A. These data are too large to include in the report but are available upon request.

The SABs alongside domestic outfall locations are shown in **Map 3**. The new outfalls and SAB GIS layers will be used to inform other programs and projects, such as the Clean Rivers Program, the BIG, and various TMDL and WPP projects.



Map 3. Domestic Wastewater Outfalls and SABs, 2023

WASTEWATER DMR DATA ANALYSIS

The Wastewater DMR Data Analysis for this project involves the acquisition and analysis of self-reported discharge monitoring data for regional permitted facilities. The WQMP Update specifically evaluates bacteria discharges, but other constituents may be evaluated if a water body-specific or facility-specific need is identified, or if requested by stakeholders.

As part of the analysis for the WQMP Update, H-GAC acquired self-reported DMR data for permitted facilities through TCEQ and EPA to evaluate bacteria permit limit exceedances for the period of 2019 to 2023.

As defined in the *Texas Surface Water Quality Standards*, the *Escherichia coli* (*E. coli*) geometric mean criterion for primary contact recreation for ambient surface water is 126 most probable number (MPN) per 100 milliliters (mL), and 399 MPN/100 mL for single grab samples. For enterococci, which is the designated indicator organism for tidal segments, the criterion for the geometric mean is 35 MPN/100 mL, with a single sample criterion of 89 MPN/100 mL. TCEQ does not apply the single sample criterion for their assessment. In most cases, these standards are generally applied as an effluent permit limit for WWTFs. In the region, the majority of TPDES permits have effluent limitations set for *E. coli*. However, some permits have enterococci as the indicator organism where the effluent is discharged into tidal waters. Select WWTFs may have more stringent bacteria permit limits depending on site-specific conditions or participation in TMDL projects such as the BIG.

Effluent discharges from WWTFs are regulated by TCEQ, with water quality limits specified in each discharger's permit. Both TCEQ and Harris County Pollution Control Services perform effluent monitoring for compliance with water quality permits through their inspection and enforcement programs. These effluent discharge limits are also monitored by WWTF personnel on a frequency dependent on facility size, location, wastewater type (domestic or industrial), and other factors. Results from field measurements (pH, dissolved oxygen, instantaneous flow, etc.) and laboratory analyses (biochemical oxygen demand, total suspended solids, ammonia, etc.) from these required monitoring events are submitted to the TCEQ monthly as a DMR.

Evaluating trends in permit exceedances for indicator bacteria is important in understanding the impact WWTFs may have on overall surface water quality. DMRs are the most comprehensive data available for the broad regional evaluations conducted under the WQMP Update, even though there are some inherent uncertainties. As with any self-reported data, there is an expectation that some degree of uncertainty or variation from normal conditions may occur. Additionally, samples are collected at the weir and not at the end of the outfall pipe, so results generated do not take into account potential bacterial regrowth in the outfall pipe.

The data acquired under this task continues to be widely used by local projects and entities. Water quality protection efforts, including the various WPPs, TMDLs, and the Clean Rivers

Program, use the data to guide and inform planning decisions.

For this project, H-GAC staff evaluated the occurrence of self-reported bacteria violations through domestic WWTF DMRs in the region for the period of 2019 to 2023. Evaluations were based on the regulatory permit limits specific to each facility and consider the number of exceedances and bacteria loadings by year and by WWTF size. The data analyzed for this project are self-reported by WWTFs.

DMR data for this analysis were acquired from EPA's Enforcement and Compliance History Online (ECHO) ICIS- NPDES Permit Limit and Discharge Monitoring Datasets webpage[3] on 3/25/24.

Additional wastewater permit limit data was acquired from TCEQ's Permit Application and Registration Information Systems (PARIS) database[4] on 4/29/24.

The acquisition and analysis of wastewater DMR data and effluent permit limit data adhered to updated QAPPs and QA/QC methods.

Permitted Outfalls in the Region

The number of permittees can change from year to year, and multi-year comparisons are based on the current wastewater outfall GIS layer. Therefore, slight variations may be present from the data presented in this report and previous or subsequent reports. Differences between the TCEQ and EPA data sets are likely due to new permits approved by TCEQ but not yet entered into the EPA Registry. The data presented in this report are accurate as of the date the data were acquired, but previous or subsequent data could be slightly different based upon the number of outfalls present at the time of that data acquisition.

Based on the GIS data acquired from TCEQ, there are 1,398 permittees in the TCEQ Outfall Layer for 2023, with the EPA Registry showing 1,405 permittees (**Table 3**). For 2022, there were 1,363 permittees in the TCEQ Outfall Layer and 1,299 in the EPA Registry. Compared to the 2022 data set, there was an increase of 35 permittees in the TCEQ Outfall Layer and 176 permittees in the EPA Registry for 2023. Of the permittees in the EPA Registry, self-reported DMR data (of any type) were submitted in 2023 for 1,054 outfalls, with bacteria data being submitted for 924 of the outfalls.

[3] https://echo.epa.gov/tools/data-downloads/icis-npdes-dmr-and-limit-data-set
[4] https://www6.tceq.texas.gov/wqpaq/index.cfm?fuseaction=home.AdvanceSearch

Table 3. Wastewater Permittees in the Houston-Galveston Region, 2022 and 2023

WWTF Type	Number of Permittees 2022	Number of Permittees 2023	Difference
Permittees in the TCEQ Outfall Layer	1,363	1,398	35
Permittees in the EPA Registry	1,299	1,405	176
Permittees submitting DMR data (any type)	1,026	1,054	28
Permittees submitting DMR bacteria data	899	924	25

A summary of the WWTFs submitting DMR data in 2022 and 2023 is provided in **Table 4**. Of the permittees submitting bacteria DMR data in 2023, 844 are domestic WWTFs, and 210 are industrial facilities.

The number of permittees (all WWTF types) submitting DMR data increased from 1,026 in 2022 to 1,054 in 2023 (**Table 4**). The number of permittees submitting bacteria data increased from 899 to 924. For the domestic WWTFs in 2023, 842 submitted DMR bacteria data, and 82 industrial facilities submitted bacteria data.

Table 4. Permittees Submitting DMR Data, 2022 and 2023

WWTF Type	Permittees Submitting DMR Data (any type) in 2022	Permittees Submitting DMR Bacteria Data in 2022	Permittees Submitting DMR Data (any type) in 2023	Permittees Submitting DMR Bacteria Data in 2023
Domestic	819	815	844	842
Industrial	207	84	210	82
TOTAL	**1,026**	**899**	**1,054**	**924**

The subsequent analyses presented in this report pertain to the domestic WWTFs, as these provide wastewater treatment for a defined service area, unlike an industrial facility that provides treatment for a single location. In order to determine permit exceedance rates, analyses only consider those results from WWTFs with a permit limit. If a facility reports results but has no established effluent permit limit, those results are not included in the analyses.

For many of the analyses in this report, WWTFs are evaluated on relative facility size, as categorized by daily flow in MGD. Those facility size categories and the number of facilities per category are shown in **Table 5**.

The total number of dischargers submitting bacteria DMR data shown in **Table 4** (924 WWTFs) differs from that in **Table 5** (936 WWTFs) due to a difference in the time frame the data represent. The data in **Table 4** show that total of 924 permittees submitted bacteria DMR data in 2023. The total number of facilities reporting bacteria DMR data shown in

Table 5 (936) are calculated using data from 2019 to 2023 so permit exceedance rates by year and facility size can be determined.

Table 5. Number of WWTFs Reporting Bacteria DMR Data by WWTF Relative Facility Size

WWTF Facility Size by MGD	Number of Facilities, 2019 to 2023	Percentage of Facilities
Variable/Intermittent	90	9.62%
<0.1 MGD	270	28.85%
0.1 to 0.5 MGD	226	24.14%
0.5 to 1 MGD	143	15.28%
1 to 5 MGD	149	15.92%
5 to 10 MGD	37	3.95%
>10 MGD	21	2.24%
TOTAL	**936**	**100.00%**

Within the region, the largest number of WWTFs are in the <0.1 MGD category (28.85% of facilities) followed by those in the 0.1 to 0.5 MGD category (24.14% of facilities). Combined, these two categories represent over half of the permitted domestic facilities submitting bacteria data in the region. Considering regional growth patterns and the proliferation of MUDs and other special districts, it is expected that the number of these smaller facilities would be very high in the region. WWTFs in the >10 MGD category represent the smallest group, at 2.24% of all facilities.

Bacteria DMR Data Analysis and Permit Exceedances

In 2023, WWTFs within the region self-reported a combined 8,827 bacteria geometric mean results and 9,031 bacteria daily maximum/single grab sample results. These records include only those outfalls with permit limits. Facilities that test and report data but do not have a permit limit are not included in these numbers. The number of reported results by year (2019 to 2023) are shown in Table 6 and Table 7.

Table 6. Bacteria DMR Data Permit Geometric Mean Samples by Year

Bacteria Parameter	2019	2020	2021	2022	2023
E. coli	7,027	7,130	7,257	7,430	7,588
Enterococci	1,128	1,200	1,239	1,235	1,239
TOTAL	**8,155**	**8,330**	**8,496**	**8,665**	**8,827**

Table 7. Bacteria DMR Data Permit Daily Maximum/Grab Samples by Year

Bacteria Parameter	2019	2020	2021	2022	2023
E. coli	7,151	7,273	7,414	7,588	7,782
Enterococci	1,146	1,212	1,253	1,256	1,249
TOTAL	**8,297**	**8,485**	**8,667**	**8,844**	**9,031**

Of these reported results for 2023, 125 of the geometric mean results (1.42%) and 450 of the daily maximum/single grab sample results (4.98%) exceeded permit limits (**Table 8**). Overall, there is a 98.58% compliance with geometric mean permit limit results, and a 95.02% compliance for daily maximum/single grab sample results for effluent monitoring samples reported in 2023.

Table 8. **Bacteria DMR Data Reported and Permit Exceedance Rates, 2023**

Bacteria Data Reported	Geometric Mean Results	Daily Maximum / Single Grab Sample Results
Total Results Reported	8,827	9,031
Total Exceeding Limit	125	450
Percent Exceedance	1.42%	4.98%
Percent Compliance	98.58%	95.02%

Geometric mean and single grab bacteria effluent reporting and compliance data for 2023 were also evaluated by relative facility size. The data in **Table 9** and **Table 10** show the number of geometric mean and daily maximum/single grab sample results reported, the number exceeding permit limits, and the percent exceedance for each of the WWTF relative facility size categories. For geometric mean results in 2023, percent exceedances ranged from 0.53% (5 to 10 MGD and >10 MGD) to 1.97% Variable/Intermittent). For daily maximum/single grab sample results, percent exceedances ranged from 2.66% (0.1 to 0.5 MGD) to 13.62% (5 to 10 MGD).

Table 9. **Bacteria DMR Data Permit Geometric Mean Sample Exceedance Rates by Relative Facility Size, 2023**

Relative Facility Size	Results Reported	Results Exceeding Permit Limit	Percent Exceedance
Variable/Intermittent	761	15	1.97%
< 0.1 MGD	1,429	25	1.75%
0.1 to 0.5 MGD	2,446	35	1.43%
0.5 to 1 MGD	1,713	9	0.53%
1 to 5 MGD	1,783	29	1.63%
5 to 10 MGD	442	8	1.81%
> 10 MGD	253	4	1.58%
TOTAL	**8,827**	**125**	**--**

Table 10. Bacteria DMR Data Permit Daily Maximum/Grab Sample Exceedance Rates by Relative Facility Size, 2023

Relative Facility Size	Results Reported	Results Exceeding Permit Limit	Percent Exceedance
Variable/Intermittent	784	33	4.21%
< 0.1 MGD	1,456	42	2.88%
0.1 to 0.5 MGD	2,595	69	2.66%
0.5 to 1 MGD	1,713	64	3.74%
1 to 5 MGD	1,782	154	8.64%
5 to 10 MGD	448	61	13.62%
> 10 MGD	253	27	10.67%
TOTAL	**9,031**	**450**	**--**

As presented in **Table 9** and **Table 10**, WWTFs in the 0.1 to 0.5 MGD category have the largest number of samples reported (both geometric mean and single grab samples), with the smallest number being for facilities in the > 10 MGD category. WWTFs in the Variable/Intermittent category have the highest percent exceedance for geometric mean samples at 1.97%, while the 5 to 10 MGD category has the highest percent exceedance rate for the daily maximum/single grab samples at 13.62%. Although the daily maximum/single grab percent exceedance is highest for WWTFs in the 5 to 10 MGD category, these facilities have a low geometric mean exceedance rate (1.81%). These facilities also collect samples at a greater frequency than most facilities due to their flow volume.

Geometric mean and single grab bacteria sampling and compliance data were also evaluated by year. The data in **Table 11** and **Table 12** show the number of geometric mean and daily maximum/single grab sample results reported, the number exceeding permit limits, and the percent of samples exceeding permit limits for each year (2019 to 2023). In general, results indicate a small number of bacteria permit exceedances are reported annually. For 2023, 125 of 8,827 geometric mean results, or 1.42%, were reported as exceedances. Of the 9,031 daily maximum/single grab samples reported, 450 results, or 4.98%, were reported as permit exceedances in the self-reported DMR data.

Table 11. Bacteria DMR Data Permit Geometric Mean Sample Exceedance Rates by Year

Year	Results Reported	Results Exceeding Permit Limit	Percent Results Exceeding Permit Limit	Percent Compliance
2019	8,155	81	0.99%	99.01%
2020	8,330	71	0.85%	99.15%
2021	8,496	77	0.91%	99.09%
2022	8,665	70	0.81%	99.19%
2023	8,827	125	1.42%	98.58%

Table 12. **Bacteria DMR Data Permit Daily Maximum/Grab Sample Exceedance Rates by Year**

Year	Results Reported	Results Exceeding Permit Limit	Percent Results Exceeding Permit Limit	Percent Compliance
2019	8,297	292	3.52%	96.48%
2020	8,485	220	2.59%	97.41%
2021	8,667	253	2.92%	97.08%
2022	8,844	242	2.74%	97.26%
2023	9,031	450	4.98%	95.02%

Year-to-year bacteria DMR permit exceedance data were also analyzed by relative facility size. The bacteria permit limit exceedance rates for each facility size category for geometric mean and daily maximum/single grab samples for the period of 2019 to 2023 are presented in **Table 13** and **Table 14**.

In 2023, rates of compliance were high across all relative facility size categories, with at least 98.58% of geometric mean results and 95.02% of daily maximum/single grab samples meeting effluent permit limits. Compared to previous years, however, percent exceedance was greater for both geometric mean and daily maximum/grab samples in 2023. Assessments will continue in following annual updates to observe whether an increasing trend develops for exceedances.

Table 13. **Bacteria DMR Data Geometric Mean Sample Permit Exceedance Rates by Relative Facility Size and Year**

Relative Facility Size	2019	2020	2021	2022	2023
Variable/Intermittent	1.80%	4.10%	2.70%	1.50%	2.00%
<0.1 MGD	1.50%	1.20%	1.40%	1.00%	1.70%
0.1 to 0.5 MGD	1.30%	1.00%	0.90%	1.20%	1.40%
0.5 to 1 MGD	0.20%	0.00%	0.30%	0.20%	0.50%
1 to 5 MGD	0.90%	0.40%	0.70%	0.80%	1.60%
5 to 10 MGD	1.50%	0.70%	0.00%	0.00%	1.80%
>10 MGD	0.00%	0.00%	0.80%	0.00%	1.60%

Table 14. **Bacteria DMR Data Geometric Mean and Daily Maximum/Single Grab Sample Permit Exceedance Rates by Relative Facility Size and Year**

Relative Facility Size	2019	2020	2021	2022	2023
Variable/Intermittent	3.90%	7.30%	4.50%	1.70%	4.20%
<0.1 MGD	2.90%	2.00%	1.80%	1.90%	2.90%
0.1 to 0.5 MGD	2.40%	1.50%	1.50%	2.10%	2.70%
0.5 to 1 MGD	2.00%	1.50%	1.90%	2.10%	3.70%
1 to 5 MGD	5.60%	3.80%	4.70%	4.00%	8.60%
5 to 10 MGD	6.70%	3.20%	5.00%	5.60%	13.60%
>10 MGD	7.10%	4.80%	10.30%	6.70%	10.70%

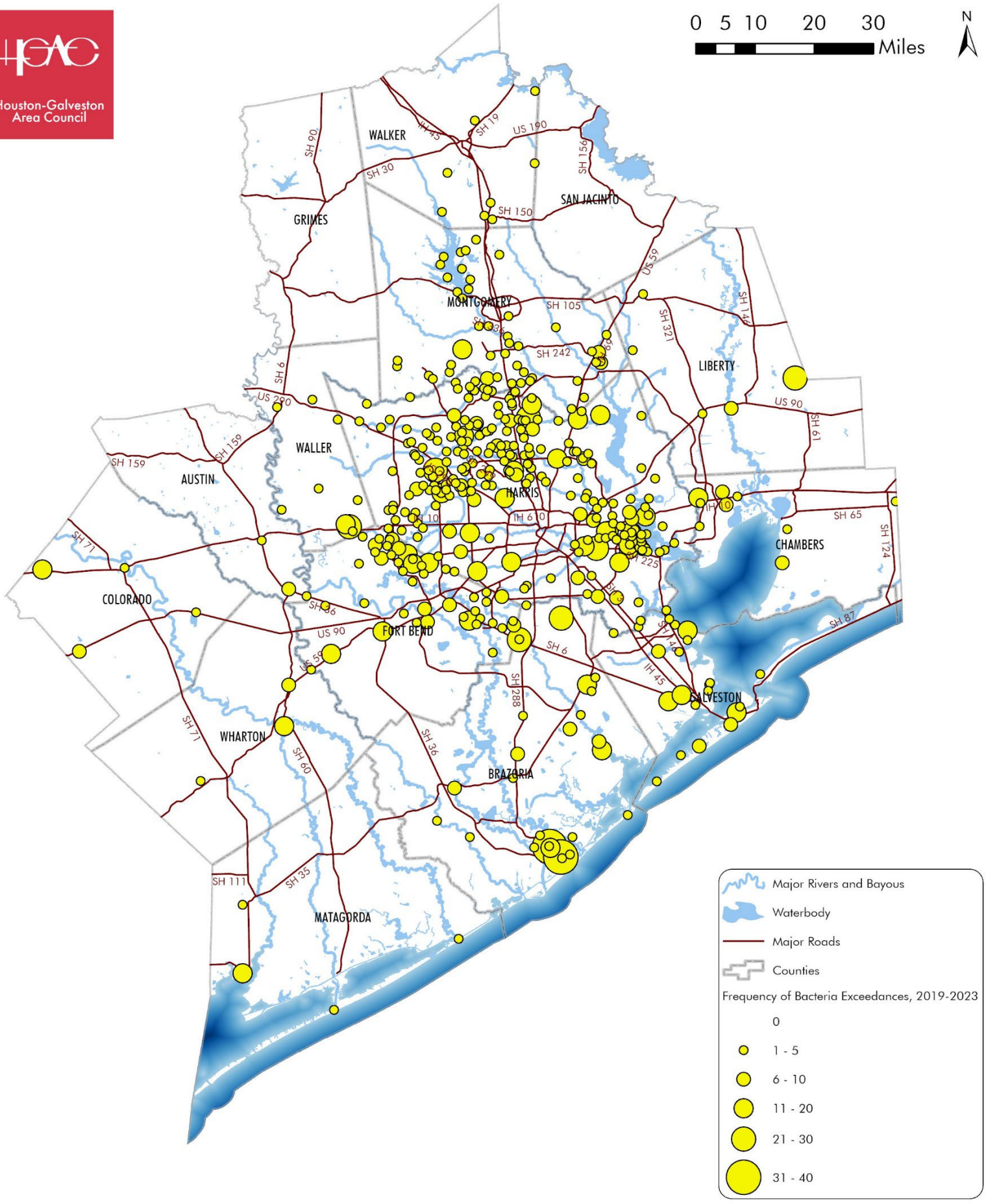
Permit exceedances for geometric mean permit limits are generally low. Higher permit exceedance rates are observed with the daily maximum/single grab samples as compared to the geometric mean results, especially for facilities in the 5 to 10 MGD range. To an extent, this is to be expected. For smaller facilities, dischargers may only have to sample once per quarter or once per month. For larger facilities with higher flow volumes, sampling frequency may increase to weekly or daily, with multiple single grab results for each facility each month, but only one geometric mean result reported.

Overall, bacteria permit limit exceedance rates are low and WWTFs in the region are typically within permit compliance. However, it is important to remember that these DMR data are self-reported and therefore have some inherent uncertainty. In many cases, these samples are collected at the same time each day, which may bias the results if sample collection is postponed until conditions are ideal.

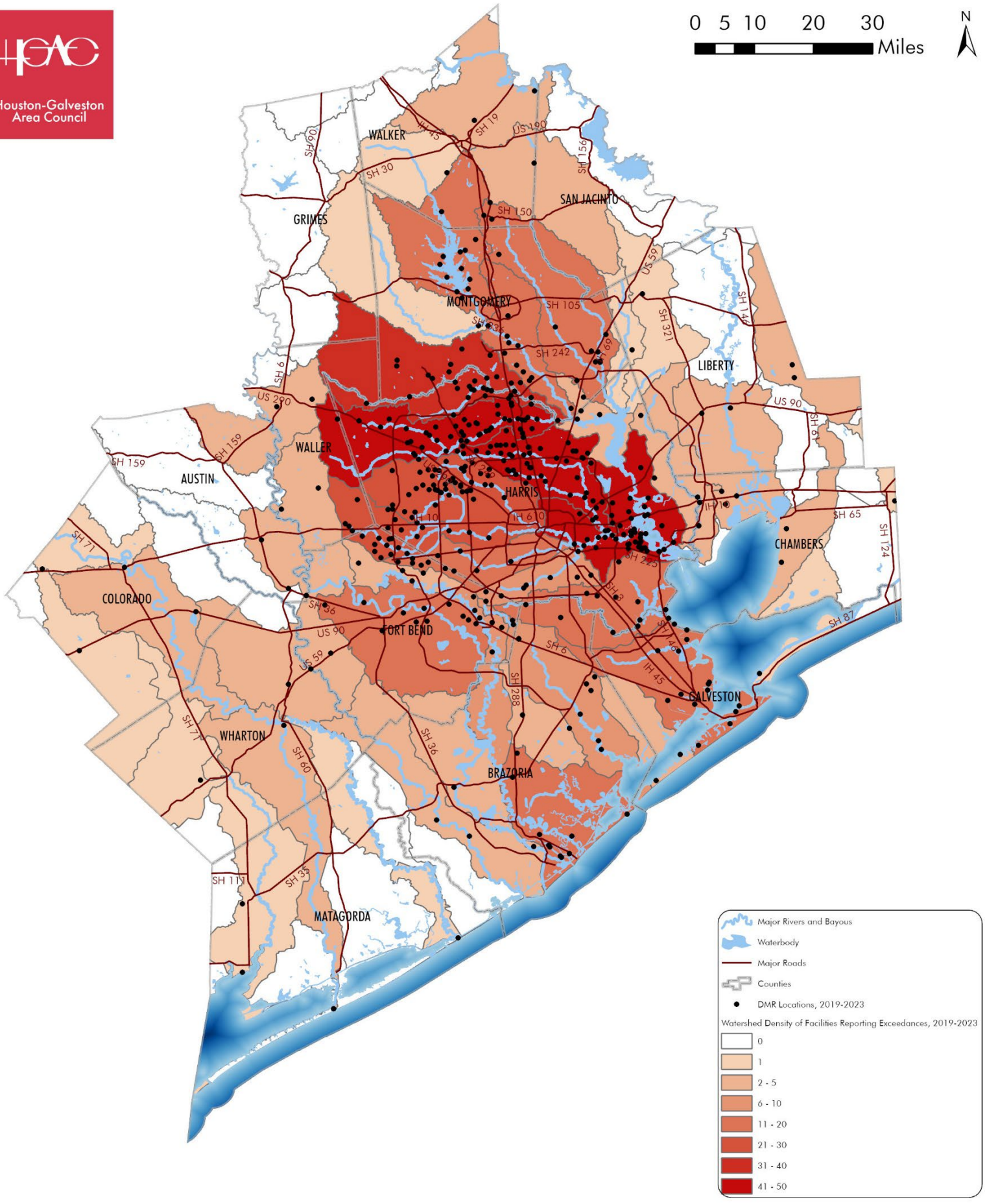
Frequency and Density of Permit Exceedances

Violations are mapped based on WWTF addresses and SAB data. **Map 4** and **Map 5** show the frequency of bacteria exceedances and density of reporting facilities for the period of 2019 to 2023, respectively. **Map 6** and **Map 7** show the frequency of bacteria exceedances and density of reporting facilities for 2023, respectively. On **Map 5** and **Map 7**, watersheds that have no outfalls located within their boundary are shown in white to indicate that there are no data. On **Map 4** and **Map 6**, no symbols appear in areas with no reported exceedances.

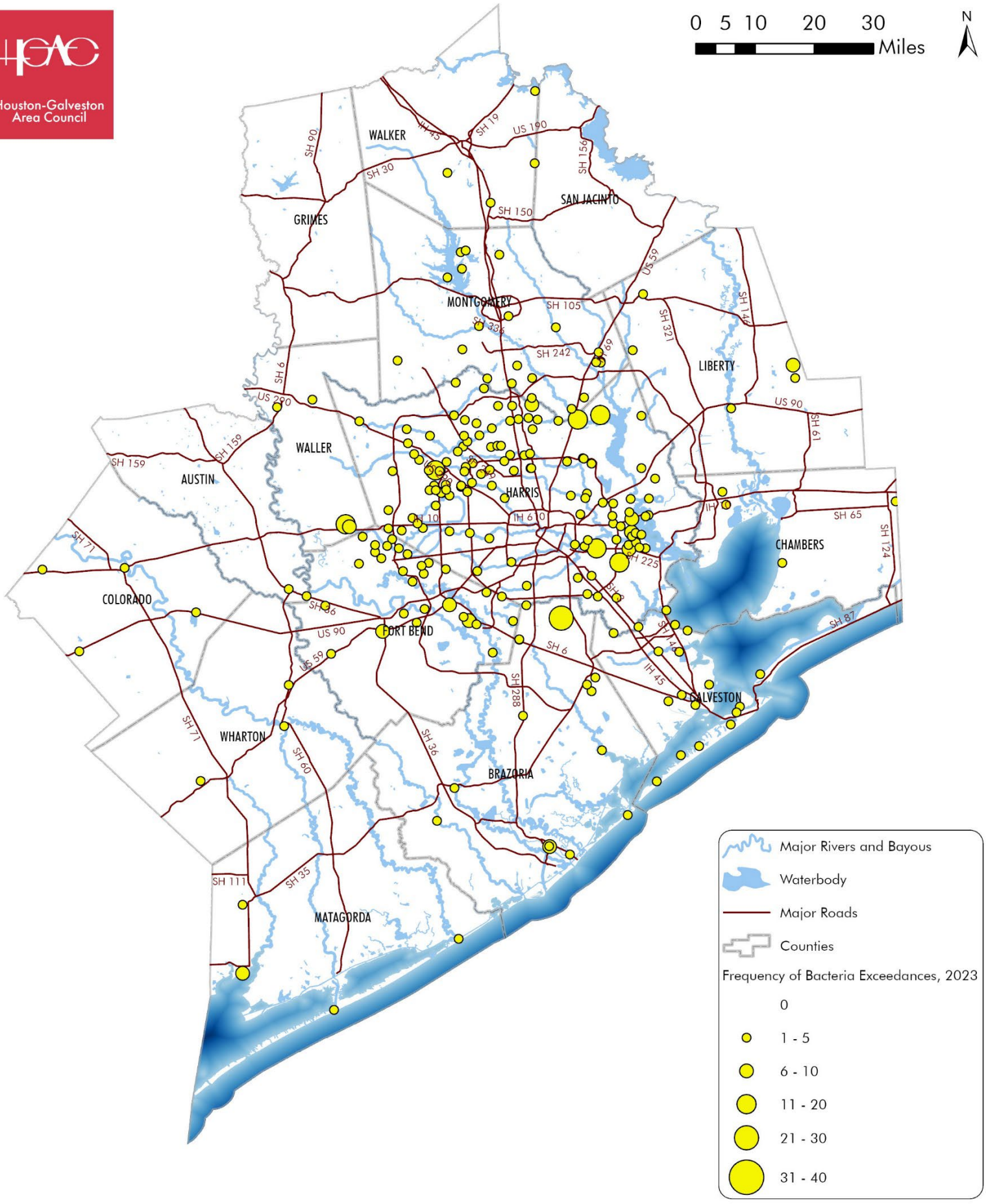
These maps illustrate areas in the region that have the highest rate of permit exceedances based on the reported DMR data acquired from TCEQ and EPA. It is evident that the more populated urban and suburban areas present in the region experience the greatest number of bacteria violations compared to more rural watersheds along the region's perimeter. It should be noted that spatial analysis of DMR exceedances are based on the location of WWTF outfalls. The density of WWTF outfalls in urban and suburban centers is much greater than the less populated watersheds in the region, therefore it would be expected that the number of DMR bacteria exceedances would also be higher.



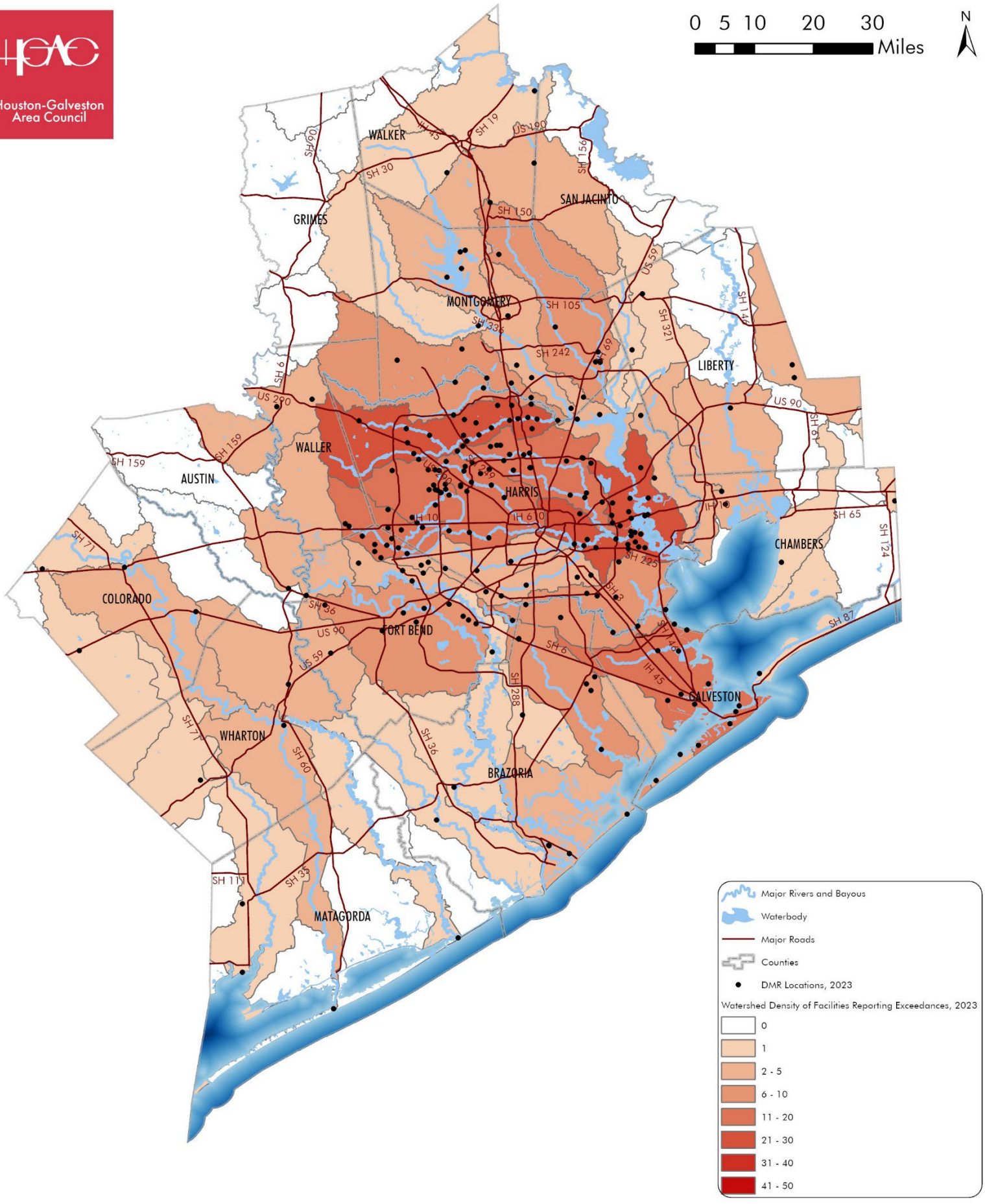
Map 4. DMR Bacteria Violation Occurrences, 2019 to 2023



Map 5. DMR Bacteria Violation Density by Watershed, 2019 to 2023



Map 6. DMR Bacteria Violation Occurrences, 2023



Map 7. DMR Bacteria Violation Density by Watershed, 2023

Total WWTF Annual Discharge

The total discharge from domestic WWTFs for each year was calculated based upon the reported average daily discharges as reported in the DMRs. These results, reported in MGD, are shown in **Table 15**. For 2023, there was a total reported discharge of 570 MGD.

Table 15. Total Reported Discharge (in MGD) from Domestic WWTFs by Year

Discharge	2019	2020	2021	2022	2023
Total Reported Discharge, MGD	581	559	595	550	570

Estimated WWTF Daily *E. coli* Load

The estimated *E. coli* daily loads (in Millions MPN per day) from domestic WWTFs are shown in **Table 16**. Results are shown by year and relative facility size, and are based on WWTF effluent discharge rates and average *E. coli* geometric mean concentrations reported by facility size.

For the period of 2019 to 2023, WWTFs in the 1 to 5 MGD size category contributed the most bacteria loading. In 2023, the estimated bacteria loading for this facility size category was 115,305.60 million MPN/Day (or 1.15×10^{11} MPN/Day). WWTFs in the <0.1 MGD size category contributed the least amount of bacteria loading. Although this category represents the largest number of facilities—270 WWTFs, or 28.85% of the total number of facilities (as shown in **Table 5**)—the relatively low flow rates for this category helps minimize the amount of bacteria loading entering local waterways. Load calculations were not performed for Intermittent/Variable facilities due to the infrequent nature of their discharges and variability of their flow rates.

Table 16. Estimated Daily *E. coli* Load (in Million MPN/Day) from Domestic WWTFs by Relative Facility Size and Year

Relative Facility Size	2019	2020	2021	2022	2023
<0.1 MGD	509.80	304.60	334.50	290.40	484.50
0.1 to 0.5 MGD	3,267.50	2,314.20	2,492.20	2,536.00	2,670.00
0.5 to 1 MGD	3,956.20	3,619.30	4,098.00	3,851.60	5,231.00
1 to 5 MGD	16,524.90	17,571.20	20,212.20	17,257.80	115,305.60
5 to 10 MGD	4,595.30	5,167.30	5,123.30	5,441.40	9,634.10
>10 MGD	10,049.00	12,131.90	14,527.10	10,475.90	19,800.20

SSO DATA ANALYSIS

What is an SSO?

SSOs are defined as any type of unauthorized discharge of untreated or partially treated wastewater from a collection system or its components (e.g., manholes, lift stations, clean-outs, etc.) before reaching a treatment facility. Issues such as blockages, significant inflow and infiltration of excess water flowing into sewer pipes from stormwater (inflow) or groundwater (infiltration), poor operation and maintenance, or inadequate capacity to collect, store, or treat the wastewater can result in SSOs.

Unlike treated WWTF effluent, SSOs represent a high, if episodic, risk because they can have bacterial concentrations several orders of magnitude higher than treated sewage. Untreated sewage can contain large volumes of raw fecal matter, making areas with sizable and/or chronic SSO issues a significant human health risk under certain conditions.

SSOs are self-reported to the TCEQ, with each event linked to the water quality permit number for the facility or subscriber reporting the violation. A permitted facility may be a municipality, municipal water district, private individual, or company. A subscriber system is a sewer system that conveys flow to a WWTF that is owned by a separate entity. The term is not intended to indicate individual private laterals, such as a homeowner's connection to a sewer system.

As specified in 30 TAC § 327.32(c), permitted facilities are required to report SSOs to TCEQ within 24-hours of becoming aware of the event, and provide a written notification within 5 days. A monthly summary is also required. Exceptions are made for accidental discharges of less than 1,000 gallons, which only have to be reported monthly provided they are controlled or removed before entering a water way or adversely affecting a source of public or private drinking water. Information reported must include (at a minimum) the location, volume, and content of the discharge, a description of the discharge and its cause, dates and times of the discharge, and steps taken to reduce, eliminate, and prevent recurrence of the discharge.

SSO Data Analysis Methods

H-GAC incorporated SSO exceedance data for the period of 1/1/23 to 12/31/23 into their ongoing analysis. Statewide SSO data were acquired from TCEQ on 4/15/24 and filtered to examine data from TCEQ Region 12 (Houston). Analysis included an overview of the total number of permittees reporting SSOs, the causes of SSOs, and the estimated overflow volume by cause.

SSO volumes are self-reported estimates based on visual observations or estimated calculations. Therefore, the values reported can be subjective based on the best professional judgment of the individual reporting the event. Additionally, it is possible that SSOs may go undetected in certain conditions and are therefore not documented or

reported to the TCEQ. However, self-reported SSO violation reports are the most comprehensive source of data that can be used to evaluate SSO events and their potential impact to regional water quality.

The frequency of SSO violations by watershed was also evaluated and mapped for this project. Violations were mapped based on the SAB linked to each WWTF reporting the event. SAB data was acquired through municipality, private utility, and public MUD records. SABs are updated on an annual basis to reflect things like collection system expansions and other changes or updates. However, spatial analysis of SSOs is limited due to unavailable or unusable SAB information. Private utilities in smaller communities, for example, may not maintain usable records of their SABs while SABs do not exist for most package facilities, industrial WWTFs, and other subscribers.

Additionally, due to inconsistent reporting of SSO event addresses and location data, frequency maps were generated using the address of the WWTF's permitted outfall itself rather than the actual location of the SSO event. Therefore, watersheds with insufficient SAB data or no WWTF located within its boundaries may be mapped as having no data (as is done in **Map 9**) even if SSO events were common in those areas.

Domestic Wastewater Permittees Reporting SSOs

H-GAC evaluated the number of domestic wastewater permittees submitting SSO violation reports by year compared to the number of permittees in the region submitting DMR data. The number of domestic WWTFs submitting DMRs and reporting SSOs for the period of 2019 to 2023 are presented in **Table 17**.

Table 17. **Domestic WWTFs Submitting DMRs and Reporting SSOs Each Year**

Year	Domestic Permittees Submitting DMRs	Domestic Permittees Reporting SSOs	Percentage Permittees Reporting SSOs
2019	775	227	29.29%
2020	784	235	29.97%
2021	796	230	28.89%
2022	817	222	27.17%
2023	844	239	28.32%

In 2023, SSO violations are being reported for 28.32% percent of the domestic WWTFs that submit DMR data within the region.

Number and Volume of SSOs

The total number of SSO violations and the estimated flow volume for the region was calculated based upon the self-reported data. This information is presented in **Table 18**. In 2023 there were 1,447 events reported in the data provided by TCEQ. The total volume for these events was 17,381,071 gallons.

Table 18. Reported SSOs and Estimated Discharge Volume, 2023

Year	Number of SSOs Reported	Estimated Volume (x1000 Gallons)
2023	1,447	17,381.1

Causes of SSOs

In order to determine the primary causes of SSO events, the number of SSO events by reported SSO cause (as reported to TCEQ by the permittees) was calculated. It should be noted, however, that categorization depends on the accuracy of the data reported by the permittees and that while a single cause is listed on the SSO report, many SSOs are caused by a combination of factors. For example, fats/oils/grease collecting in lift station pumps can cause overflows in high rain events when excess water is in the system. The event may be listed as lift station failure, but fats/oils/grease and inflow and infiltration of stormwater are additional causative elements in this example.

In reviewing the data, H-GAC evaluated not only the listed cause, but also the comments associated with the event to determine if a different cause was more appropriate. For example, if the cause was listed as equipment failure but the equipment failed due to a power failure, then the cause was changed to power outage for this analysis. If the cause was listed as inflow and infiltration but a blockage by grease was mentioned in the comments field, the cause of the SSO was changed to line blockage – fats/oils/grease, as the blockage would have caused the excess water to backup and overflow. The number of SSOs for 2023 by cause and the volume of discharge (in thousands of gallons) for each reported cause is shown in **Table 19**.

Table 19. Number and Volume of Reported SSOs, 2023

Reported Cause	Number of SSO Events	Percentage of SSO Events	Volume (x1,000 gallons)	Percentage of SSO Discharge Volume	(Percentage of SSO Discharge Volume)
Collection System Structural Failure	74	5.11%	335.0	1.93%	74
WWTF Operation or Equipment Malfunction	82	5.67%	240.0	1.38%	82
Lift Station Failure	106	7.32%	10,266.8	59.07%	106
Power Failure	4	0.28%	6.7	0.04%	4
Rain/Inflow/Infiltration	584	40.36%	1,823.1	10.49%	584
Severe Weather/ Natural Disaster	0	0.00%	0.0	0.00%	0
Line Blockage – Fats/Oils/Grease	467	32.27%	313.6	1.80%	467
Line Blockage – Rags/Wipes	15	1.04%	4,035.8	23.22%	15
Line Blockage – Other Causes	97	6.70%	262.8	1.51%	97
Human Error	3	0.21%	60.8	0.35%	3
Unknown Cause	15	1.04%	36.5	0.21%	15
TOTAL	**1,447**	**100.00%**	**17,381.1**	**100.00%**	**1,447**

The most common cause listed for reported SSOs in 2023 is rain/inflow/infiltration with 584 events reported. This value is nearly matched by the addition of all reported events in the line blockage categories (fats/oils/grease, rags/wipes, and other causes) which equal 579 reports combined. The reported source with the largest volume of discharge was lift station failure with a 2023 total volume of 10,266,760 gallons. One line break event reported 9,556,400 gallons of discharge released over the course of nine days between the initial failure, discovery, and repair. This represents over half of the annual total volume of discharge from all causes and was the highest reported discharge of any category in 2023. Therefore, this one event heavily weighted the results of the volume analysis.

As mentioned previously, many of these SSO events are due to multiple causes and are reported as a single cause based upon the best professional judgment of the person reporting the SSO. Because of the uncertainty and variability of estimating discharge from these events, volumes reported should only be considered to be estimates.

Figure 1 shows the reported cause categories as a percentage of the total number of SSO events. **Figure 2** shows the percentage of total volume discharged for each cause category with the one-time high-volume event reported for line blockage – other causes exempted.

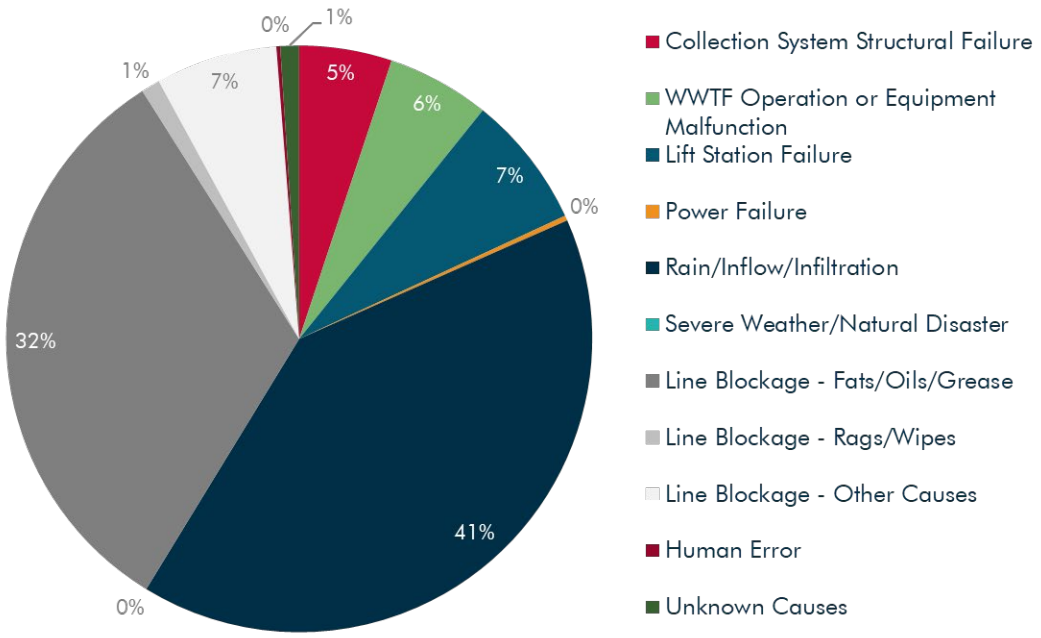


Figure 1. Number of Reported SSO Events, 2023

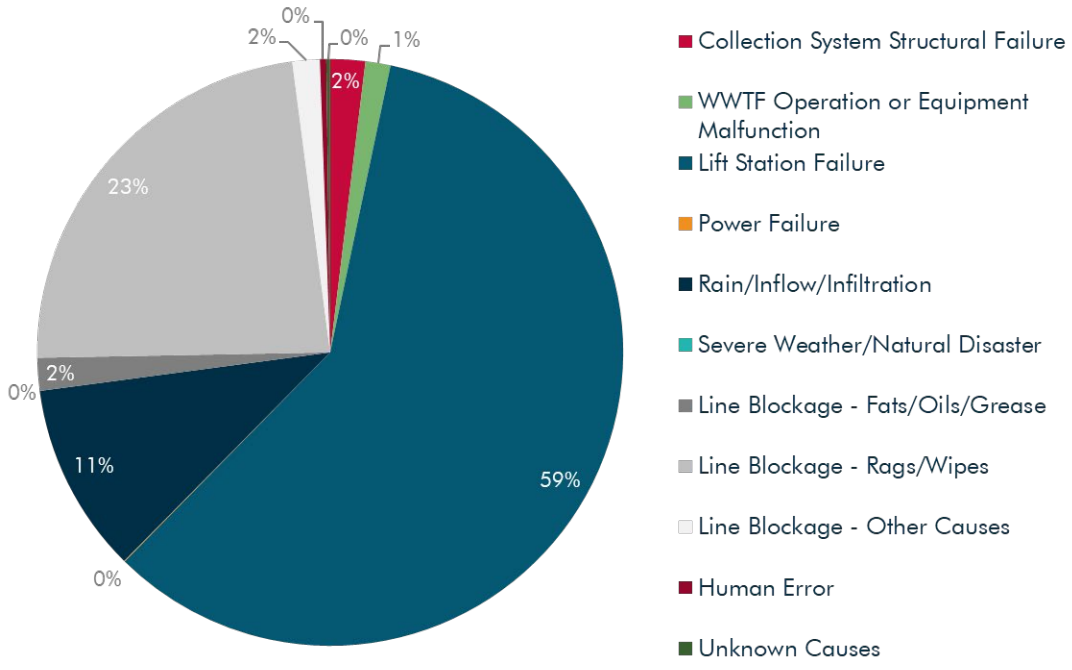


Figure 2. Volume of Reported SSO Events, 2023

Year- To- Year Comparison of SSO Causes

The number of SSO events by cause category were determined for each year from 2019 to 2023. These data are shown as reported values in **Table 20** and as percent of total annual reports in **Table 21** and in **Figure 3**.

Table 20. Number of Reported SSOs by Cause

Reported Cause	2019	2020	2021	2022	2023
Collection System Structural Failure	71	245	172	75	74
WWTF Operation or Equipment Malfunction	101	284	268	164	82
Lift Station Failure	82	103	126	56	106
Power Failure	4	1	6	4	4
Rain/Inflow/Infiltration	226	163	273	188	584
Severe Weather/Natural Disaster	1	1	20	0	0
Line Blockage – Fats/Oils/Grease	453	469	455	695	467
Line Blockage – Rags/Wipes	39	75	72	6	15
Line Blockage – Other Causes	192	222	158	190	97
Human Error	5	1	1	8	3
Unknown Cause	8	2	17	17	15
TOTAL	**1,182**	**1,566**	**1,568**	**1,403**	**1,447**

Table 21. Percentage of Reported SSOs by Cause

Reported Cause	2019	2020	2021	2022	2023
Collection System Structural Failure	6.01%	15.64%	10.97%	5.35%	5.11%
WWTF Operation or Equipment Malfunction	8.54%	18.14%	17.09%	11.69%	5.67%
Lift Station Failure	6.94%	6.58%	8.04%	3.99%	7.32%
Power Failure	0.34%	0.06%	0.38%	0.28%	0.28%
Rain/Inflow/Infiltration	19.12%	10.41%	17.41%	13.40%	40.36%
Severe Weather/Natural Disaster	0.08%	0.06%	1.28%	0.00%	0.00%
Line Blockage – Fats/Oils/Grease	38.33%	29.95%	29.02%	49.54%	32.27%
Line Blockage – Rags/Wipes	3.30%	4.79%	4.59%	0.43%	1.04%
Line Blockage – Other Causes	16.24%	14.18%	10.08%	13.54%	6.70%
Human Error	0.42%	0.06%	0.06%	0.57%	0.21%
Unknown Cause	0.68%	0.13%	1.08%	1.21%	1.04%
TOTAL	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Total numbers of annual events reported are fairly consistent throughout the five-year period and have been most commonly caused by blockages—specifically those related to fats/oils/grease. Data from 2023 differs from previous years in that reports related to rain/inflow/infiltration outnumbered SSOs caused by blockages. Clogged pipes can also be an underlying cause for rain/inflow/infiltration events and may contribute to the high occurrence of rain/inflow/infiltration reports in 2023.

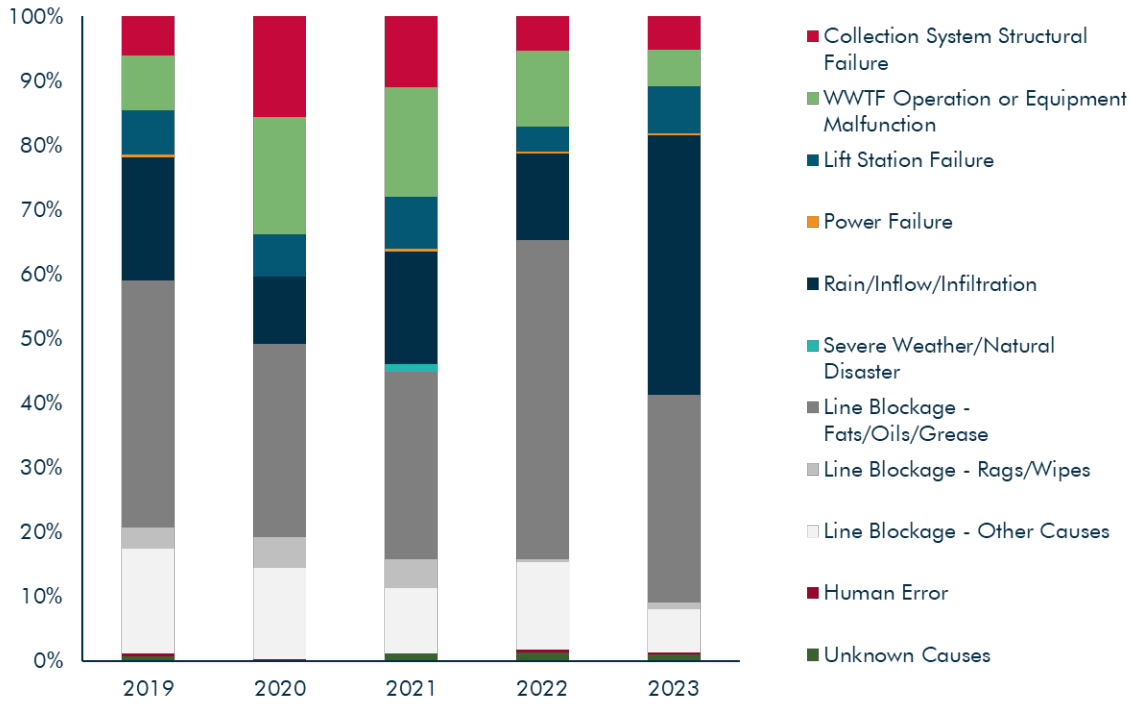
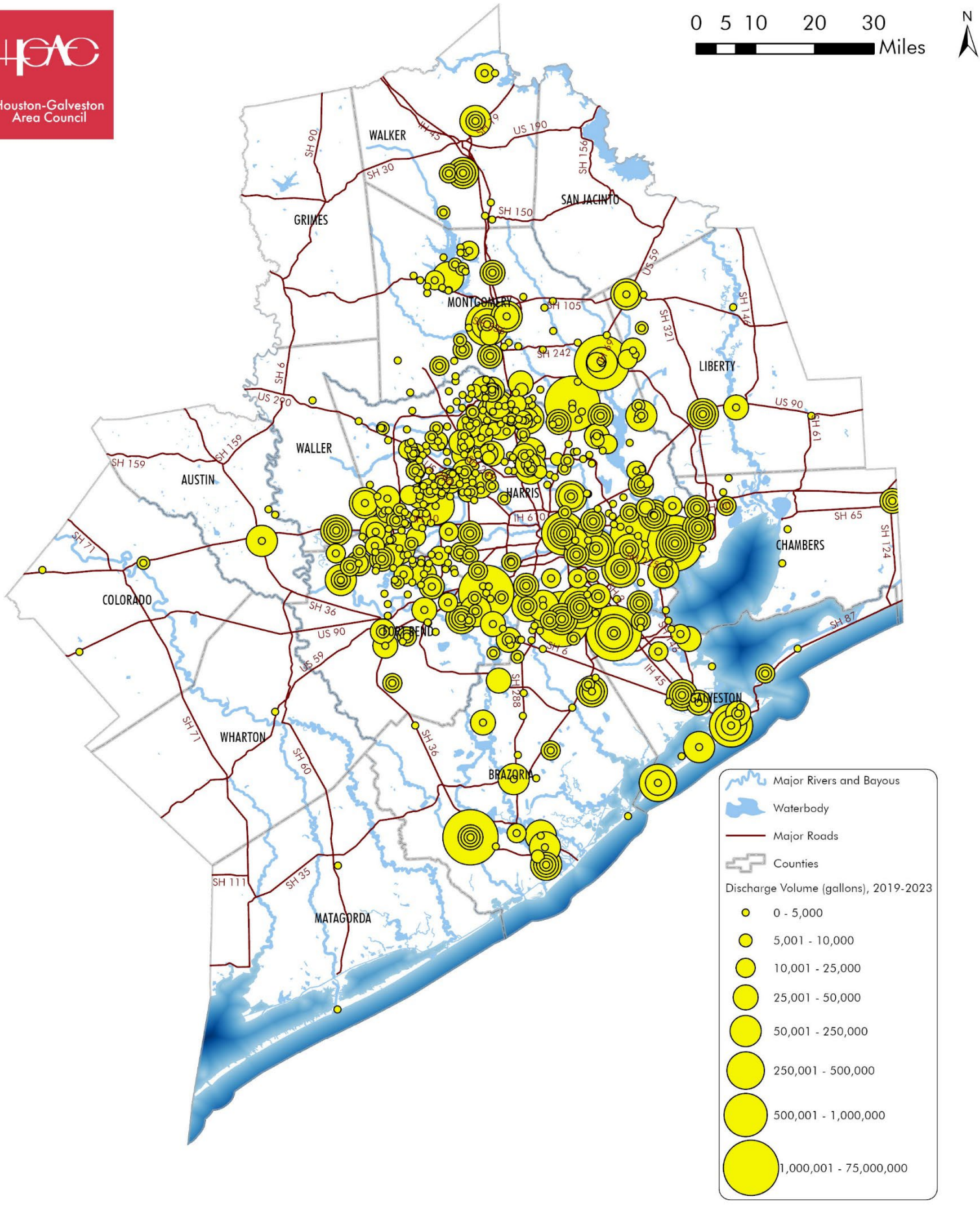


Figure 3. Percent Reported SSO Events by Cause, 2019 to 2023

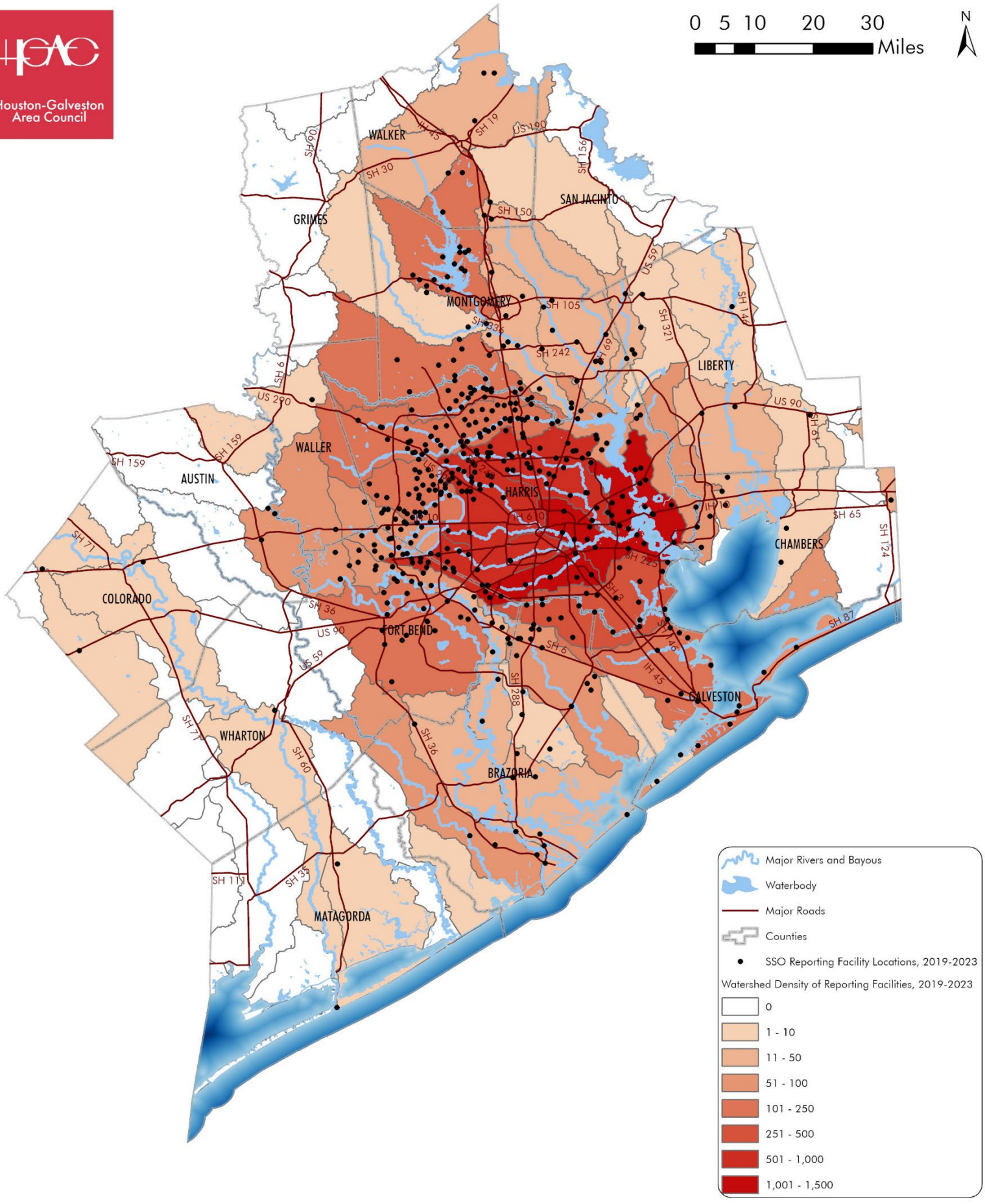
Frequency and Density of SSO Occurrences

SSO events are mapped based on WWTF addresses and SAB data. **Map 8** and **Map 9** show the volume and density of SSOs for the period of 2019 to 2023, respectively. **Map 10** and **Map 11** show the volume and density for 2023, respectively. On **Map 9** and **Map 11**, watersheds with no SSOs reported within their boundary are shown in white to indicate that there are no reported data (all potential reporting entity locations are indicated in **Map 3**). On **Map 8** and **Map 10**, no symbols appear on areas where SSOs were not reported.

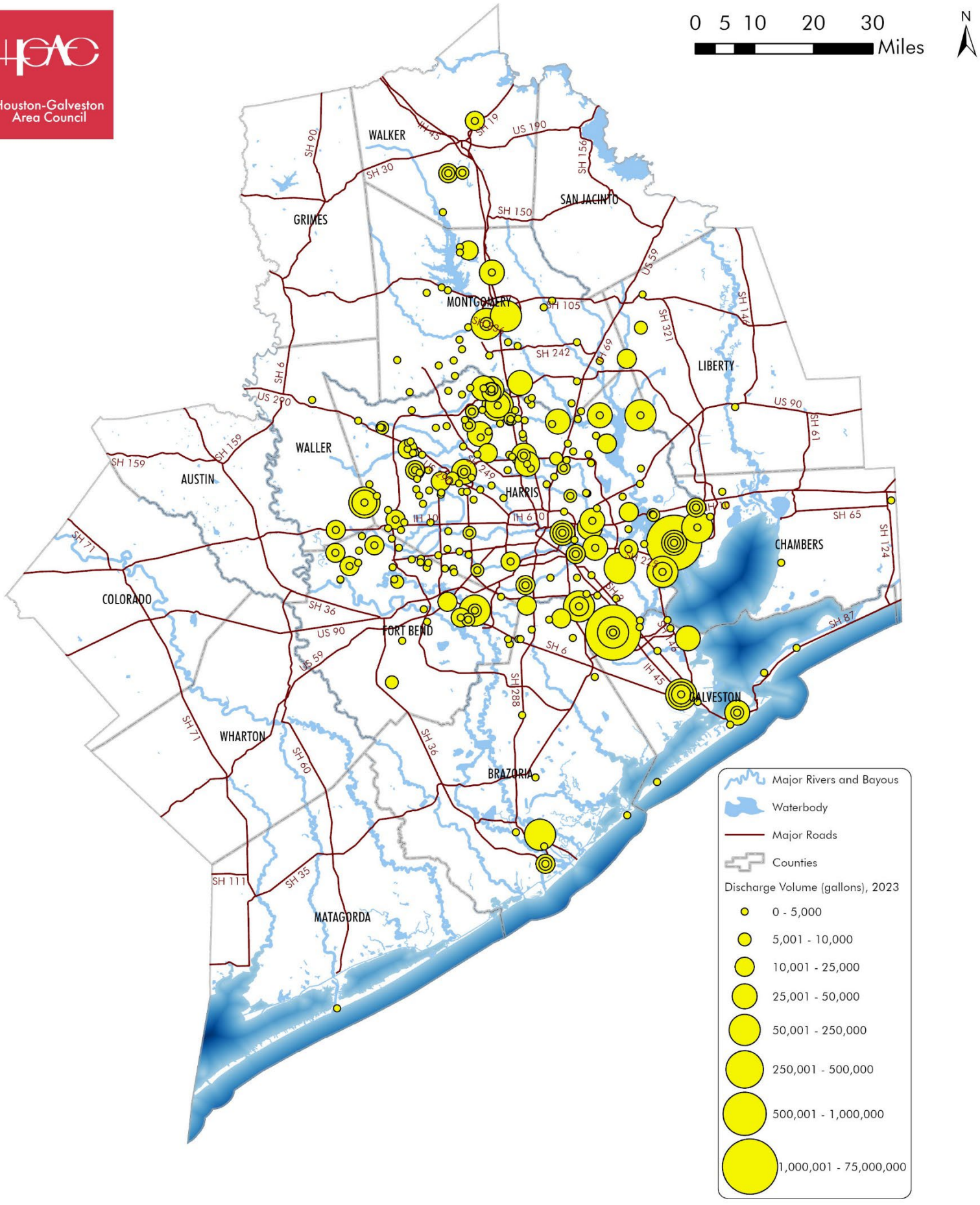
With the exception of central Harris County which has a low density of outfalls, more populated urban and suburban watersheds throughout the region are experiencing higher rates of SSO events compared to the more rural, smaller communities. This is likely due to larger populations putting added strain on the collection systems overall, including contributing fats/oils/grease to the collection system, resulting in a greater frequency of blockages. However, it should be noted that some rural communities with small WWTFs and package facilities may be underrepresented due to staff and resource limitations resulting in a greater likelihood of SSOs going undetected. Also, the amount of impervious cover in urban areas may make SSOs more visibly identifiable, whereas rural systems may have long runs of pipe between connections or running though undeveloped areas where they may go unseen. Further, the age of the infrastructure should be considered, as older systems will be more likely to experience structural failures such as line breaks.



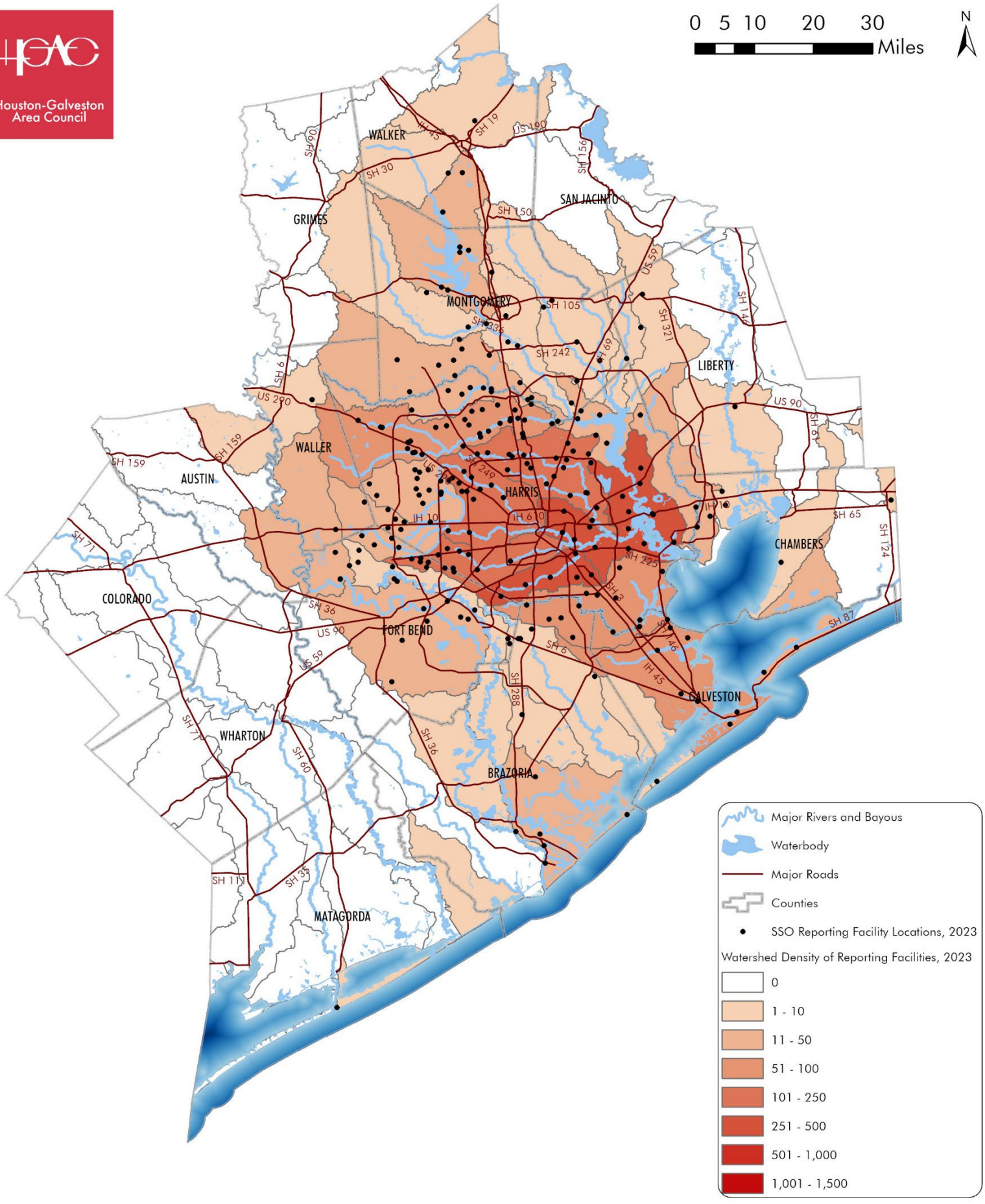
Map 8. SSO Occurrences and Volumes, 2019 to 2023



Map 9. SSO Density by Watershed, 2019 to 2023



Map 10. SSO Occurrences and Volumes, 2023



Map 11. SSO Density by Watershed, 2023

WASTEWATER INDUSTRY EMPLOYMENT OUTREACH

Through years of collaboration with wastewater professionals on various tasks for the WQMP Update, H-GAC became aware of a growing concern among wastewater permittees regarding a shortage of operators. Large numbers of operators are approaching retirement age or beginning to retire, and there is not a large enough group of young people interested in replenishing the workforce. Many young people are not aware that such a career exists or that becoming licensed as a Class D wastewater operator does not require a college degree of any kind. Licensing requirements include:

- A High School Diploma or General Equivalency Diploma,
- Completion of a basic wastewater operation training course, and
- Passing the licensing exam.

To get an understanding what was happening within the H-GAC region, H-GAC put together a stakeholder meeting on 3/16/23 to bring together wastewater permittees, training providers, educational institutions, and workforce development (**Figure 4**). Organizations represented at the meeting included:

- City of Houston
- City of Lake Jackson
- Gulf Coast Authority
- H-GAC
- Houston Community College
- Inframark
- San Jacinto College District
- San Jacinto River Authority
- Tarrant Regional Water District
- TCEQ
- Texas Rural Water Association
- Trinity River Authority
- U.S. Department of Labor
- Water Environment Association of Texas
- Workforce Solutions

Discussions at this initial meeting centered on the large number of operators reaching retirement age and not having enough young talent to replace them. This group committed to work on finding new and novel approaches to attract new talent to the industry. There is a need to work with School Districts to let students know that jobs in water and wastewater operations are great careers offering stability, good benefits, and an opportunity to protect the environment (which speaks to many young people). Several groups are providing training for operators including the Water Environment Association of Texas, Texas Rural Water Association, and Texas Engineering Extension Service-Houston Community College.

Another focus of this meeting included discussions on how Workforce Development funds can be used to help support the costs for training and apprenticeships to help ease the cost of hiring while providing on the job training for new operators.

Since the first meeting in March of 2023, H-GAC and the Association of Water Board Directors have co-hosted three additional meetings. These meetings have resulted in discussing the creation of a centralized website that can be used to house information

about all the various training programs that are available, the availability of funding to help employers pay for training for new operators, and a place to post jobs, pay and benefit information. The group is also working on branding and marketing to advertise not only through the website but through social media, streaming services, and possibly television. Identifying sources of funding for these efforts including pooling funds from member groups is also a priority topic for this group.

Figure 4. Ensuring the Future of Texas' Water Workforce – Roundtable, March 16, 2023

CONFORMANCE REVIEW FOR CWSRF PROJECTS

The goal of this Task is to review and provide input on CWSRF loan applications in the Houston-Galveston region and assure compliance with the latest WQMP. H-GAC responds to requests from TCEQ to review CWSRF applications and assists applicants and TCEQ in the resolution of conflicts between proposed project information and H-GAC's most recently approved WQMP.

In conjunction with H-GAC's role as a regional planning group and the local council of governments for the Houston- Galveston area of the Upper Gulf Coast, staff regularly provides comments on grant proposals of varying types. For the WQMP Update, H-GAC reviews proposals for projects under the Texas Water Development Board (TWDB) CWSRF program. These reviews help ensure regional goals are represented in project funding decisions at various governmental levels.

Entities with WWTF and transport infrastructure make loan applications to TWDB to help with improvements. These applications are reviewed by TCEQ. If requested by TCEQ, H-GAC also completes a review to determine if the applicant has conformed to the regional WQMP. H-GAC reviews the grant application and associated engineering documentation (such as the Preliminary Engineering Report, Environmental Review, population projections, etc.) for concurrence with broad regional planning priorities and goals (such as improving water quality, protecting waterways, reducing bacteria or nutrient loading, etc.).

During this review process, H-GAC staff looks for:

- Population projections that match TWDB, H-GAC, or other relevant forecasts;
- Alternatives that may impact water quality considerations; and
- Concurrence with regional priorities and goals (water quality impacts, etc.)

As part of this Project, H-GAC staff used data gathered under this and previous projects to review and provide comments on two CWSRF project applications during the FY 24 WQMP Update period. The outcomes of those reviews are shown in **Table 22**. The CWSRF projects reviewed during this year were consistent with regional goals of the WQMP.

Table 22. CWSRF Application Review, FY 2024

Project ID	Requesting Entity	Project Summary	Findings
73949	City of Hitchcock	The project would rehabilitate the sanitary sewer collection system through trenchless technology using Pipe Busting, Sliplining, Cured-in-Place Pipe (CIPP) construction methods, service line replacement and reconnection, and manhole rehabilitation or replacement.	Based upon our review, H-GAC staff finds this project is consistent with regional goals as defined in the FY 2022 Houston-Galveston Area Regional Water Quality Management Plan.
73952	City of New Ulm Water Supply Corporation	Build a new in-ground wastewater treatment plant to replace the existing package plant in the present location. The new plan would consist of a concrete aeration basis, concrete clarifier, concrete chlorination basis and concrete digester. The size of the plant would remain the same.	Based upon our review, H-GAC staff finds this project is consistent with regional goals as defined in the FY 2022 Houston-Galveston Area Regional Water Quality Management Plan.

SUPPORT WATERSHED PLANNING

The goal of this Task is to support watershed planning in the Houston-Galveston Region and to support regional information sharing on water quality and related topics. Work performed under this task includes:

- Coordination of water quality planning efforts with flood mitigation, resilience, and habitat conservation processes in areas with existing WPPs
- Support for watershed-based plans that are not covered under other contracts.
- Facilitation of the NRAC
- Urban Forestry support and coordination

COORDINATION OF WATER QUALITY PLANNING EFFORTS

WQMP project staff work closely with other H-GAC staff in the development of watershed-based plans, including TMDLs and WPPs. Data acquired and analyzed under this project are used to inform decisions for these other watershed projects. More information on watershed-based plans in the region is available on the H-GAC website[5].

SUPPORT FOR WATERSHED-BASED PLANS

Facilitation of regional communication, coordination, and cooperation on water quality efforts through staff presence and participation is an essential component of the WQMP. H-GAC staff routinely attend meetings of, or otherwise support, numerous other organizations involved in water quality efforts throughout the region. Due to the density of work in the Houston-Galveston Region, coordination and communication are essential.

During the current project term, staff helped coordinate activities and provide data for several projects, including both internal programs and outside organizations. Examples of the groups and projects staff worked with this year include:

- GBEP subcommittee memberships;
- Coordination with the Clean Rivers Program on the development of the Basin Highlights Report;
- Participation in the BIG OSSF and Illicit Discharge Regional Workgroup;
- Promotion of OSSF projects, including the SEP for the Homeowner Wastewater Assistance Program;
- Preparation of OSSF education and outreach programs and materials for the Coastal Communities project;
- Participation in the Watershed Coordinator's Roundtable;
- Coordination with ongoing TMDL, WPP, and other efforts, such as:

[5] https://www.h-gac.com/watershed-based-plans

- Houston-Area BIG TMDL
- San Jacinto-Brazos Coastal Basin TMDL
- Brazos-Colorado Coastal Basin TMDL
- Upper Oyster Creek TMDL
- Chocolate Bayou TMDL
- East Fork San Jacinto River TMDL
- Big Creek TMDL
- Cotton Bayou TMDL
- West Fork San Jacinto River and Lake Creek WPP
- Cypress Creek WPP
- Spring Creek WPP
- Clear Creek WPP
- East Fork San Jacinto River WPP
- Greens Bayou WPP
- Implementation of the combined WPPs for the West Fork San Jacinto River, Lake Creek, Spring Creek, and Cypress Creek watersheds

TMDL Projects in the Houston- Galveston Region

TMDL is a regulatory process triggered when a waterway is listed as impaired for one or more water body standard criterion as defined in the *Texas Surface Water Quality Standards*. The TMDL calculates the maximum amount of a pollutant that a water body can receive and still meet water quality criteria. An Implementation Plan (I-Plan) is then completed with the assistance of watershed stakeholders to reduce pollutant loads to meet the pollutant criterion. The I-Plan contains a series of recommended regulatory and/or non-regulatory best practices, identifies funding sources and implementing partners, and determines a project timeline.

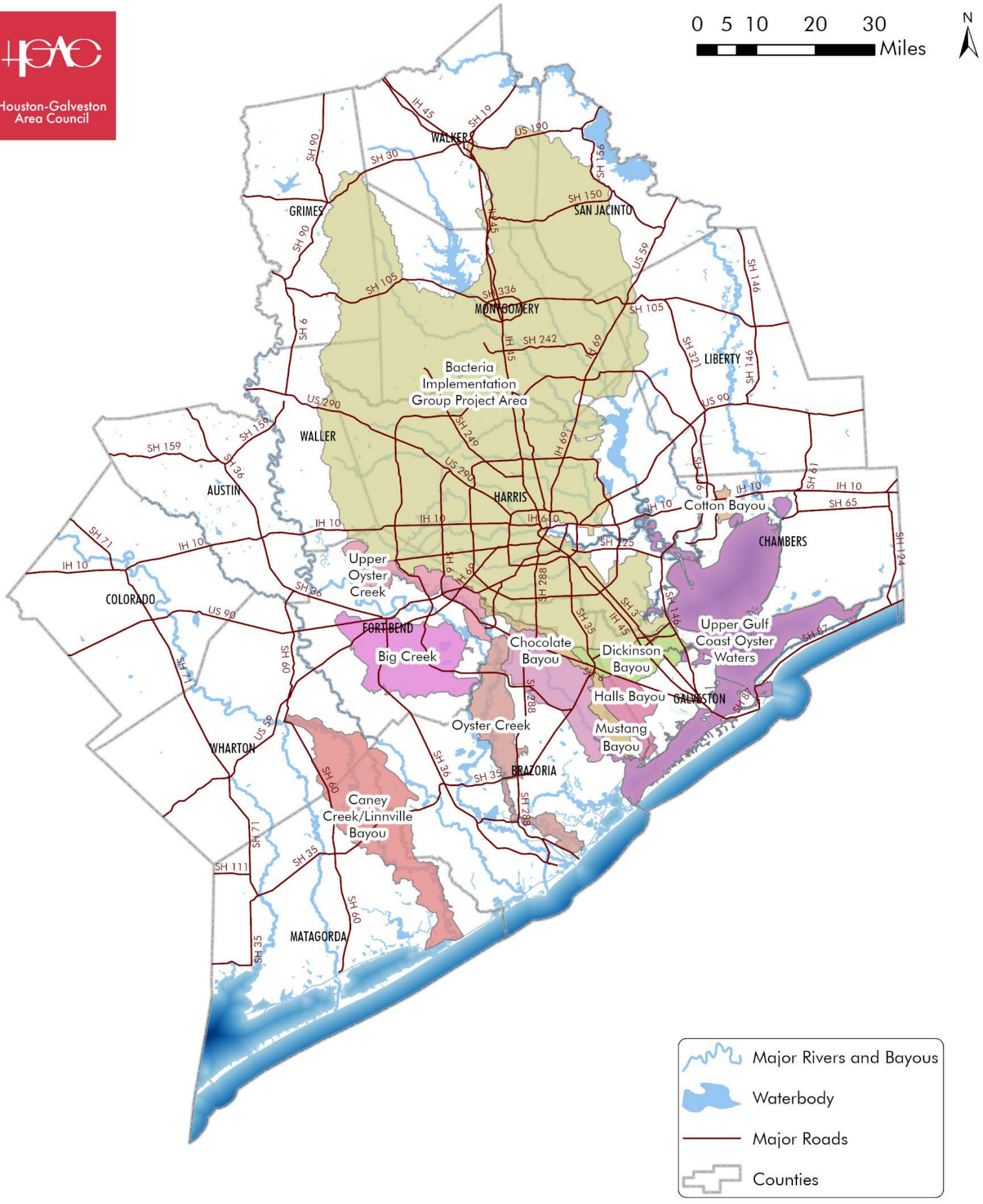
One of the ways the region is addressing bacteria issues is through projects such as the BIG—a partnership between H-GAC, local governments, businesses, and community leaders who developed and implement a shared plan to reduce bacteria. The BIG Project area (**Map 12**) is a combination of more than 100 TMDLs in adjacent watersheds. The BIG heavily relies on the information acquired and analyzed under this project.

As part of the WQMP project, H-GAC provided support for public outreach activities for completed TMDL projects and other TMDL projects being developed in the region, including activities necessary to plan and conduct meetings. H-GAC with support from the TCEQ facilitates seven TMDL projects within the H-GAC planning area and partners on two others. Links to the websites for the TMDL projects are included in the Additional Resources section of this report. These projects are shown in **Table 23** and **Map 12**. Please note that the BIG TMDL project area overlaps with several of the WPP and other TMDL projects.

Table 23. FY 24 Regional TMDL and I-Plan Project Summary

Project Name	TMDL Project Areas	Impairment(s)	I-Plan Status
Basin 11*	Chocolate Bayou, Oyster Creek, Halls Bayou, Willow Bayou, Mustang Bayou, Persimmon Bayou, New Bayou	Bacteria	Chocolate Bay I-Plan in development (Chocolate, Mustang, Halls, Willow, Persimmon, and New Bayous). Oyster Creek I-Plan complete and under review by TCEQ.
Basin 13*	Caney Creek and Linnville Bayou	Bacteria	I-Plan complete and approved by TCEQ. Watershed in implementation
Big Creek*	Big Creek	Bacteria	I-Plan complete and under review by TCEQ
Cotton Bayou*	Cotton Bayou	Bacteria	I-Plan in review by TCEQ
Dickinson Bayou	Dickinson Bayou	Bacteria, Dissolved Oxygen	Bacteria I-Plan is complete
Houston-Area BIG*	Buffalo and Whiteoak Bayou, Clear Creek, Houston Metropolitan, East and West Fork of San Jacinto River and Upper Lake Houston, Jarbo Bayou, and Armand Bayou	Bacteria	I-Plan complete and in implementation
Houston Ship Channel	San Jacinto River Tidal, Houston Ship Channel, Buffalo Bayou Tidal, Upper Galveston Bay, and tidal tributaries	Dioxin, PCBs in Fish Tissue	Legacy pollutant sites under Superfund; no TMDL I-Plan is planned
Upper Oyster Creek*	Upper Oyster Creek	Bacteria, Dissolved Oxygen	I-Plan complete and in implementation
Upper Texas Gulf Coast Oyster Waters	Chocolate Bay, Bastrop Bay, Christmas Bay, Drum Bay and Galveston Bay: Upper, Trinity, East, West, and Lower Bays	Bacteria	I-Plan complete and in implementation

* H-GAC facilitated projects



Map 12. TMDL and I-Plan Projects in the Houston-Galveston Region, FY 2024

WPPs in the Houston- Galveston Region

WPPs empower local stakeholders to improve water quality issues using voluntary, community-driven approach. Plans are based on a template developed by the EPA that seeks to identify causes and sources of pollution, establish improvement goals, identify feasible and effective voluntary measures to address them, and establish metrics of success. WPPs are usually developed in response to an exceedance of one or more state water quality standards in a specific waterway, but they can also be implemented as a preventative measure. Unlike TMDL projects which focus on specific impairments, WPPs can consider a wide range of stakeholder concerns related to water quality and coordinate with related efforts. Implementation activities outlined by WPPs are entirely voluntary, contain no regulatory requirements, and generally focus on nonpoint source pollution.

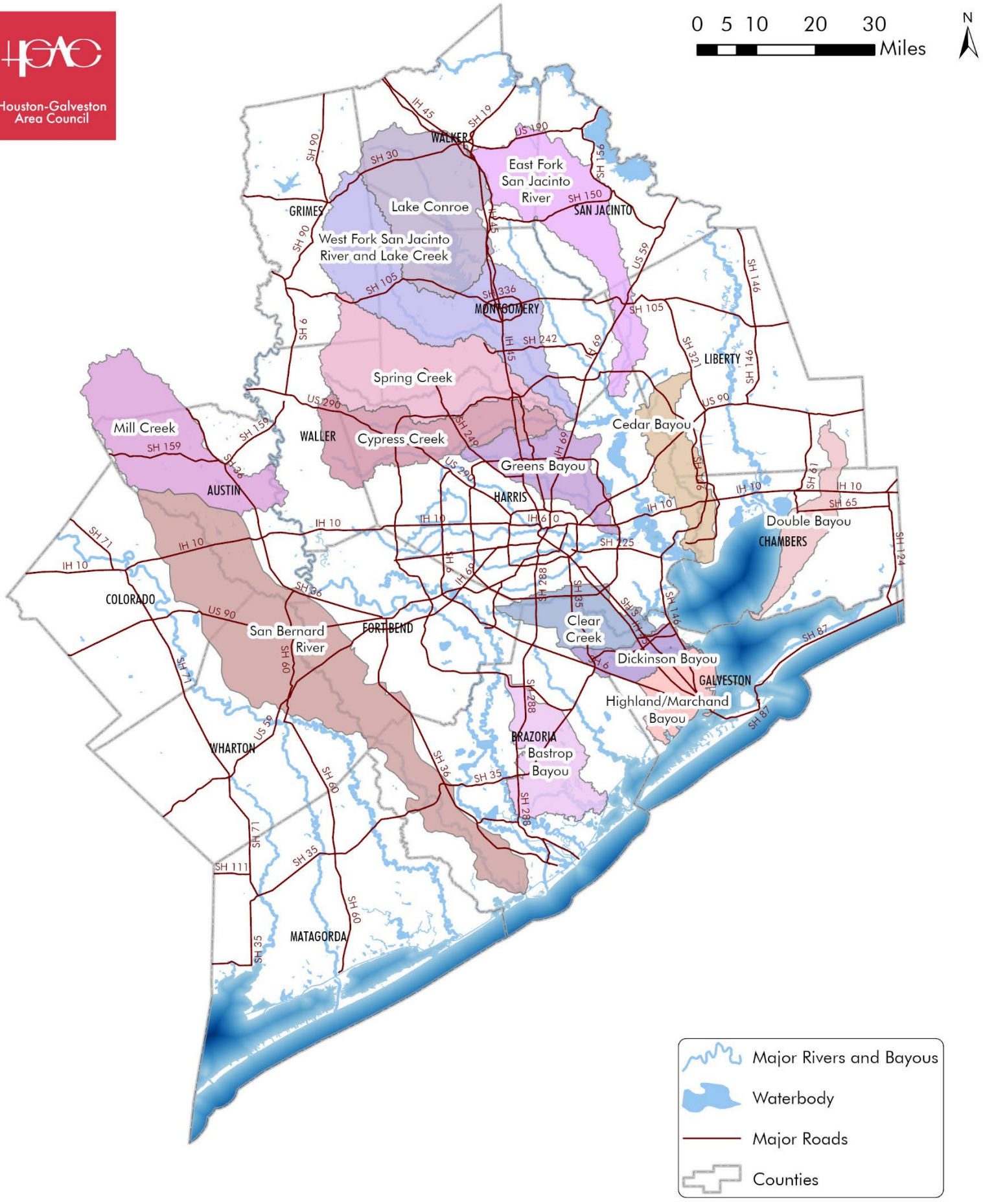
WPPs are developed by voluntary partnerships of local stakeholders, including governments, residents, businesses, community organizations, and agricultural producers. WPPs currently being implemented or developed throughout the region are described in Table 24 and Map 13. Links to the websites for the WPP projects are included in the Additional Resources section of this report.

Table 24. FY 24 Regional WPP Project Summary

Project Name	Water Bodies Included	Impairment(s)	Concern(s)	WPP Status
Bastrop Bayou WPP*	Bastrop Bayou, Flores Bayou, Austin Bayou, Brushy Bayou	Bacteria, Dissolved Oxygen	Dissolved Oxygen	WPP accepted by the EPA in 2016; Implementation ongoing
Cedar Bayou WPP*	Cedar Bayou, Cary Bayou, Adlong Ditch	Bacteria, Dissolved Oxygen, PCBs, Dioxins	Dissolved Oxygen, Macrobenthic Community, Ammonia	WPP accepted by the EPA in 2016; Implementation ongoing
Clear Creek WPP*	Clear Creek, Magnolia Creek, Chigger Creek, Cowart Creek, Cow Bayou, Robinson Bayou, Mary's Creek, Hickory Slough, Turkey Creek, Mud Gully	Bacteria, Dissolved Oxygen, PCBs, Dioxins	Dissolved Oxygen, Ammonia, Nitrate, Total Phosphorus, Chlorophyll-a	WPP sent to EPA for review in 2023
Cypress Creek WPP*	Cypress Creek, Faulkey Gully, Spring Gully, Little Cypress Creek, Senger Gully, Lemm Gully	Bacteria	Dissolved Oxygen, Habitat, Nitrate, Total Phosphorus	WPP accepted by the EPA in 2021; Implementation ongoing
Dickinson Bayou WPP	Dickinson Bayou, Bensons Bayou, Bordens Gully, Geisler Bayou, Gum Bayou, Cedar Creek	Bacteria, Dissolved Oxygen, PCBs, Dioxins	Dissolved Oxygen	WPP accepted by the EPA in 2009; Implementation ongoing
Double Bayou WPP	East Fork Double Bayou, West Fork Double Bayou	Bacteria, Dissolved Oxygen, PCBs, Dioxins	Chlorophyll-a	WPP accepted by the EPA in 2016; Implementation ongoing
East Fork San Jacinto River WPP*	East Fork San Jacinto River, Winters Bayou, Nebletts Creek, Boswell Creek	Bacteria	Bacteria	WPP in review with TCEQ and TSSWCB in 2023
Greens Bayou WPP*	Greens Bayou, Houston Ship Channel, Halls Bayou, Big Gulch, Spring Gully, Garners Bayou	Bacteria, PCBs, Dioxins	Bacteria, Dissolved Oxygen, Ammonia, Nitrate, Total Phosphorus, Toxics in Fish Tissue (PCBs)	In Development
Highland and Marchand Bayous WPP	Highland Bayou, Marchand Bayou	Bacteria, Dissolved Oxygen, PCBs, Dioxins	Dissolved Oxygen, Chlorophyll-a	WPP accepted by the EPA in 2021; Implementation ongoing
Lake Conroe WPP	Lake Conroe	None	None	WPP completed in 2015
Mill Creek WPP	Mill Creek	Bacteria	Habitat	WPP accepted by the EPA in 2016; Implementation ongoing
San Bernard River WPP*	San Bernard River, Gum Tree Branch, West Bernard Creek, Peach Creek, Mound Creek, Turkey Creek, Snake Creek	Bacteria, Dissolved Oxygen	Dissolved Oxygen, Habitat, Ammonia	WPP accepted by the EPA in 2017; Implementation ongoing

Project Name	Water Bodies Included	Impairment(s)	Concern(s)	WPP Status
Spring Creek WPP*	Spring Creek, Mill Creek, Panther Branch, Bear Branch, Lake Woodlands, Willow Creek, Walnut Creek, Brushy Creek	Bacteria	Bacteria, Dissolved Oxygen, Fish Community, Nitrate, Total Phosphorus, Cadmium	WPP accepted by the EPA in 2023; Implementation ongoing
West Fork San Jacinto River and Lake Creek WPP*	West Fork San Jacinto River, Whiteoak Creek, Stewarts Creek, Crystal Creek, Lake Creek, Mound Creek	Bacteria	Dissolved Oxygen, Macrobenthic Community, Nitrate	WPP accepted by the EPA in 2019; Implementation ongoing

* H-GAC facilitated projects



Map 13. WPP Projects in the Houston-Galveston Region, FY 2024

Facilitation of the NRAC

As an extension of H-GAC's role as a coordinator of regional planning efforts, H-GAC staff members develop and maintain relationships with other local and state governments, community groups, and other organizations involved in efforts related to the aims of this Project. Through this task, H-GAC provides staff for the quarterly NRAC meeting to address regional watershed management and related natural resource issues. The NRAC provides policy recommendations for H-GAC's Board of Directors and serves as a regional roundtable for coordinating environmental efforts. This committee provides an efficient communication network and point of contact for H-GAC staff with other local and regional water quality decision makers.

Four NRAC meetings were held during the Project term. Topics discussed at these meetings are presented in **Table 25**.

Table 25. NRAC Meetings, FY 2024

Date	Topics Discussed
11/2/2023	• Membership Updates • Environmental Committee Highlights • Environmental Program Highlights • Subcommittee Reports • Presentation on H-GAC's Regional Equity Application tool
2/1/2024	• Membership Updates • Environmental Committee Highlights • Environmental Program Highlights • Subcommittee Reports • Presentation on H-GAC's Coastal Communities project
5/2/2024	• Membership Updates • Environmental Committee Highlights • Environmental Program Highlights • Subcommittee Reports • Presentation on invasive species management
8/1/2024	• Membership Updates • Environmental Committee Highlights • Environmental Program Highlights • Subcommittee Reports • Presentation on the FY 24 WQMP Update

Urban Forestry Support and Coordination

Through the Urban Forestry Support and Coordination subtask, H-GAC supports regional efforts to coordinate water quality and forestry efforts, with a focus on riparian and urban areas. These efforts have been closely coordinated with H-GAC's Regional Conservation Initiative (RCI), an ongoing effort to promote conservation projects by local governments and partners. Time and effort on some forestry projects was augmented by staff capacity from the RCI. Staff from H-GAC continue to serve on and/or coordinate with the following forestry projects:

- Cities in Forests national association of municipal forestry programs, in support of local municipalities
- Texas Forests and Drinking Water Partnership (leadership role)
- Houston Area Urban Forestry Council (leadership role)
- H-GAC RCI
- Bayou Preservation Association Stream Corridor Restoration Committee

H-GAC staff also actively participated in continuing to develop and implement the Green Futures corporate sustainability program with Texas A&M Forest Service to promote and fund riparian reforestation plantings in the Houston region, with one planting held during this year. For this planting, hundreds of trees were planted in the Kashmere Gardens neighborhood of Houston, transforming miles of a denuded major streetscape and providing stormwater benefits to the community.

H-GAC has supported our local governments and organizations with direct support through:

- Assisting the City of Houston with coordination support
- Assisting the City of Bellaire with a comprehensive canopy assessment of all city parks and public facilities
- Assisting the Houston Area Urban Forestry Council in the planning for its annual tree planting competition planting event and urban forestry education events
- Assisting various entities with letters of support, funding research, program coordination, or other minor data projects to support forestry efforts.

H-GAC has also continued to represent forestry practices and goals as part of broader projects, including TCEQ TMDL and WPP grant projects in the region. H-GAC has focused on increasing forestry presence and activity in these and other water quality efforts, and has built forestry-based recommendations into these plans and guidances.

OSSF PLANNING, COORDINATION, AND OUTREACH

The goal of this Task is to administer and coordinate H-GAC's OSSF program activities. These activities include maintaining and continuing to develop the existing spatial database of permitted and projected unpermitted OSSF locations. These activities also provide coordination in support of an existing SEP to repair or replace failing OSSFs within the region, coordinate regional water quality and wastewater infrastructure projects, and provide outreach and education activities.

Work performed under this task includes:

- Permitted OSSF Update
- Unpermitted OSSF Update
- Authorized Agent Coordination
- SEP Coordination and Outreach
- OSSF Outreach and Education

OSSFS IN THE HOUSTON GALVESTON REGION

Decentralized OSSFs are a widespread wastewater treatment technology in the region. OSSFs are relied on for the treatment and disposal of wastewater in areas not conducive to centralized sanitary sewer service. Although they produce treated effluent of a high grade when functioning properly, OSSFs can be appreciable sources of bacterial contamination if they are not properly maintained and functioning. Annually, thousands of OSSFs are designed, sited, permitted, and installed within the region, especially in the rapidly developing unincorporated areas of northern Harris and Montgomery counties, as well as the rural counties along the region's outer boundary. While new systems are subject to permit requirements as specified in Title 30 Texas Administrative Code Chapter 285 (30 TAC §285), many systems installed prior to 1989 did not require a permit. Specific locations of these unpermitted systems may be unknown. Information about these unpermitted systems is particularly significant because they represent most of all OSSFs in the H-GAC service area.

TCEQ has authority over the regulation and permitting of OSSFs in Texas. In many cases, that authority is delegated by TCEQ to Authorized Agents (counties, municipalities, river authorities, and other responsible entities). As there is no centralized repository for OSSF permitting data, the Agents have traditionally maintained these data in many formats. To ensure a regional, uniform set of data for use by Authorized Agents and water quality planning efforts, H-GAC developed a comprehensive inventory of permitted system locations and likely unpermitted system locations under previous grant contracts.

During this Project year, new data provided by the Authorized Agents were added to H-GAC's regional OSSF permit database. In previous project years, H-GAC utilized parcel and census block data for its estimations. Beginning in FY 2022, this process switched to using 9-1-1 address data to perform the location analysis. This allows H-GAC to estimate the location of these systems with a much higher level of specificity. For more details on the 9-1-1 methodology, please reference previous WQMP[6].

PERMITTED OSSF UPDATE

For the Permitted OSSF Update, H-GAC staff continued to update the OSSF location database with data from Authorized Agents, including permitted OSSF locations and related permit data as appropriate.

The OSSF database's intent is to provide a comprehensive, spatially explicit inventory for all permitted OSSF locations throughout the region. No such inventory existed before H-GAC's initial database development began. The initial work had collected location data for permitted OSSFs and developed a program under which participating Authorized Agents would submit new system data on a regular basis, including spatial locations using Global Positioning System (GPS) units provided by H-GAC.

This information is updated annually and is available to the public through H-GAC's online interactive OSSF Information System[7]. This ArcGIS mapping tool (**Figure 5**) allows the user to view the locations of permitted OSSFs by age, Authorized Agent or permitting authority, and the number of permits per square mile.

[6] https://www.h-gac.com/getmedia/e0e2581a-2513-48e4-ba43-594f539d88c8/FY-2023-WQMP-Update-FINAL-08-31-2023
[7] https://datalab.h-gac.com/OSSF/

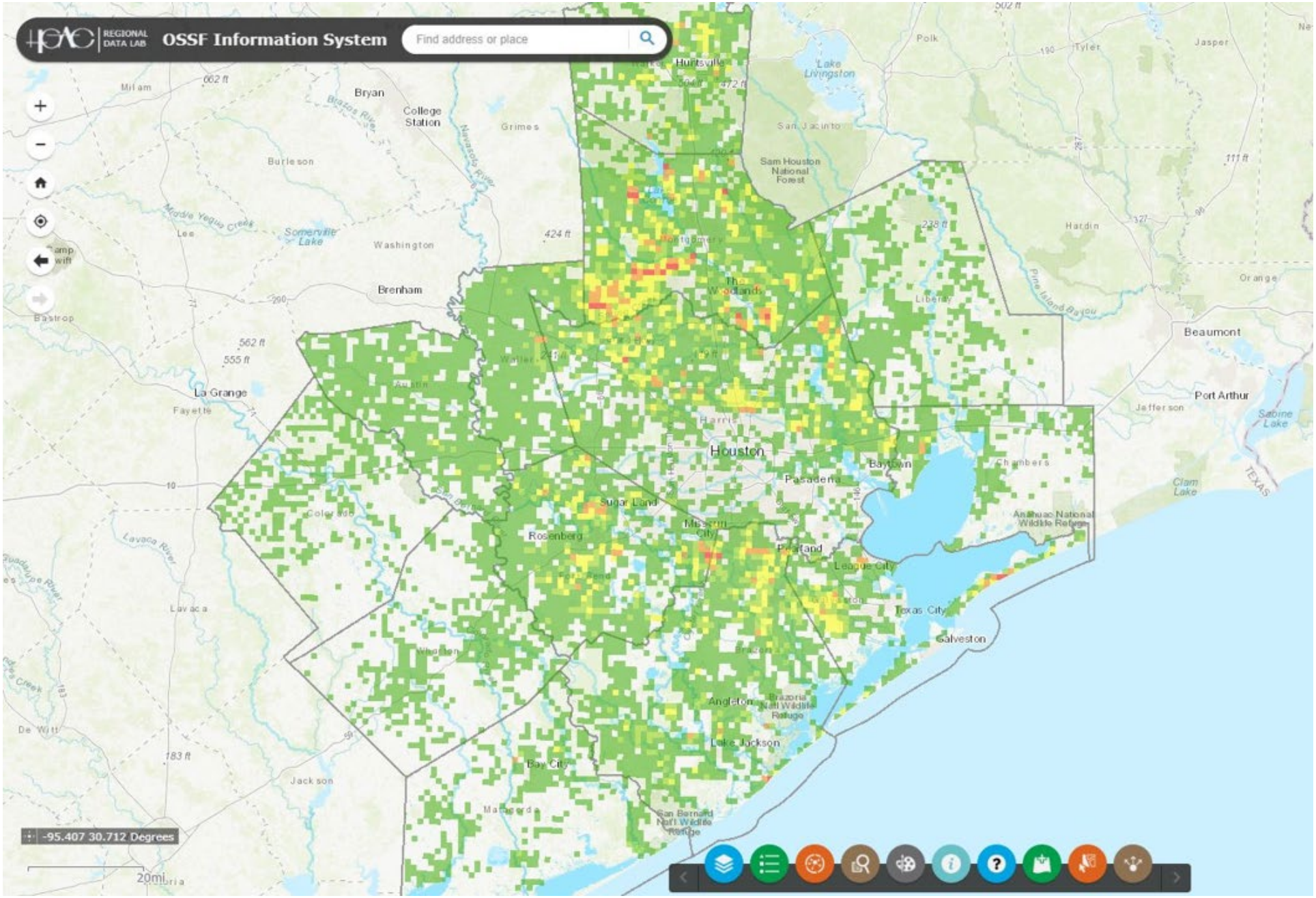


Figure 5. H-GAC's Interactive OSSF Information Systems Mapping Tool

Acquisition of OSSF Permit Data

Authorized Agents typically submit data to H-GAC in electronic format. Data received from Authorized Agents are reviewed by H-GAC staff and reformatted as necessary for inclusion into the geospatial database. The methods used in the OSSF database update are described in more detail in the H-GAC WQMP Data Acquisition and Geospatial Data QAPP. Any data errors (incorrect GPS coordinates, typographical errors, etc.) were corrected, while duplicate records were removed.

The FY 2024 update brings the database current through the end of calendar year 2023. There were 18,684 permitted systems added to the database for 2023. The total permitted systems include first time data submittal from Austin County, Surfside Beach, and TCEQ Region 12. Also included is the addition of 321 permitted OSSFs in Grimes County. Grimes County is not a part of H-GAC's 13-county region, but it, along with San Jacinto County, are a part of H-GAC's Clean Rivers Program area. Watersheds that H-GAC monitors extend into a part of these counties, so H-GAC has been seeking this OSSF permit data for a long time to use in watershed-based planning efforts in these areas. Unfortunately, attempts to acquire data from San Jacinto County continue to be unsuccessful.

H-GAC acquired a scanned copy of Harris County's Early Permitting System (EPS) database which contained roughly 14,816 records. About 69% of the scans were legible enough to match to H-GAC's STAR*Map data. In total, 9,710 records of the EPS database were added to the 2024 permitted database. Of the scanned pages that were ineligible, H-GAC plans to identify the records in the 2025 update. Many of these records may never be added to the database simply because the address/parcel no longer exists in Harris County.

As of 12/31/23, there are 144,515 permitted OSSFs in the database. Colorado, Matagorda, Walker, and San Jacinto counties did not report any data to H-GAC for 2023. Attempts have been made to resume acquisition of this data.

Table 26 shows a breakdown of the number of total permitted systems by county in 2023 and the new permitted systems for 2024.

Table 26. Permitted OSSFs by County, 2023 and 2024

Authorized Agent	Permitted Systems 2023	New Permitted Systems 2024
Austin	3,175	2,512
Brazoria	16,584	646
Chambers	1,619	152
Colorado	595	Not Reported
Fort Bend	14,576	417
Galveston	7,103	434
Grimes*	4,684	264
Harris	25,106	10,487
Liberty	2,007	584
Matagorda	1,669	Not Reported
Montgomery	35,544	983
San Jacinto*	No Data Available	No Data Available
San Jacinto River Authority	Not Reported	177
City of Surfside Village	Not Reported	80
TCEQ Region 12	Not Reported	1,527
Walker	6,043	Not Reported
Waller	5,026	304
Wharton	1,691	116
TOTAL	**125,422**	**18,684**

* These counties are outside H-GAC's 13-County Region but are within H-GAC's Clean Rivers Program area.

Processing Notes for OSSF Permit Data

It is often necessary to further process the data received from Authorized Agents. This includes such tasks as making sure that data is in a consistent format, removing duplicates, verifying, or removing permits that are located outside an Authorized Agent's County boundaries, geocoding street addresses to determine latitude and longitude, correcting GPS coordinates that may have been entered incorrectly, and verifying locations using STAR*Map or Google Earth.

Table 27 documents data processing notes related to the most recent update, including data corrections.

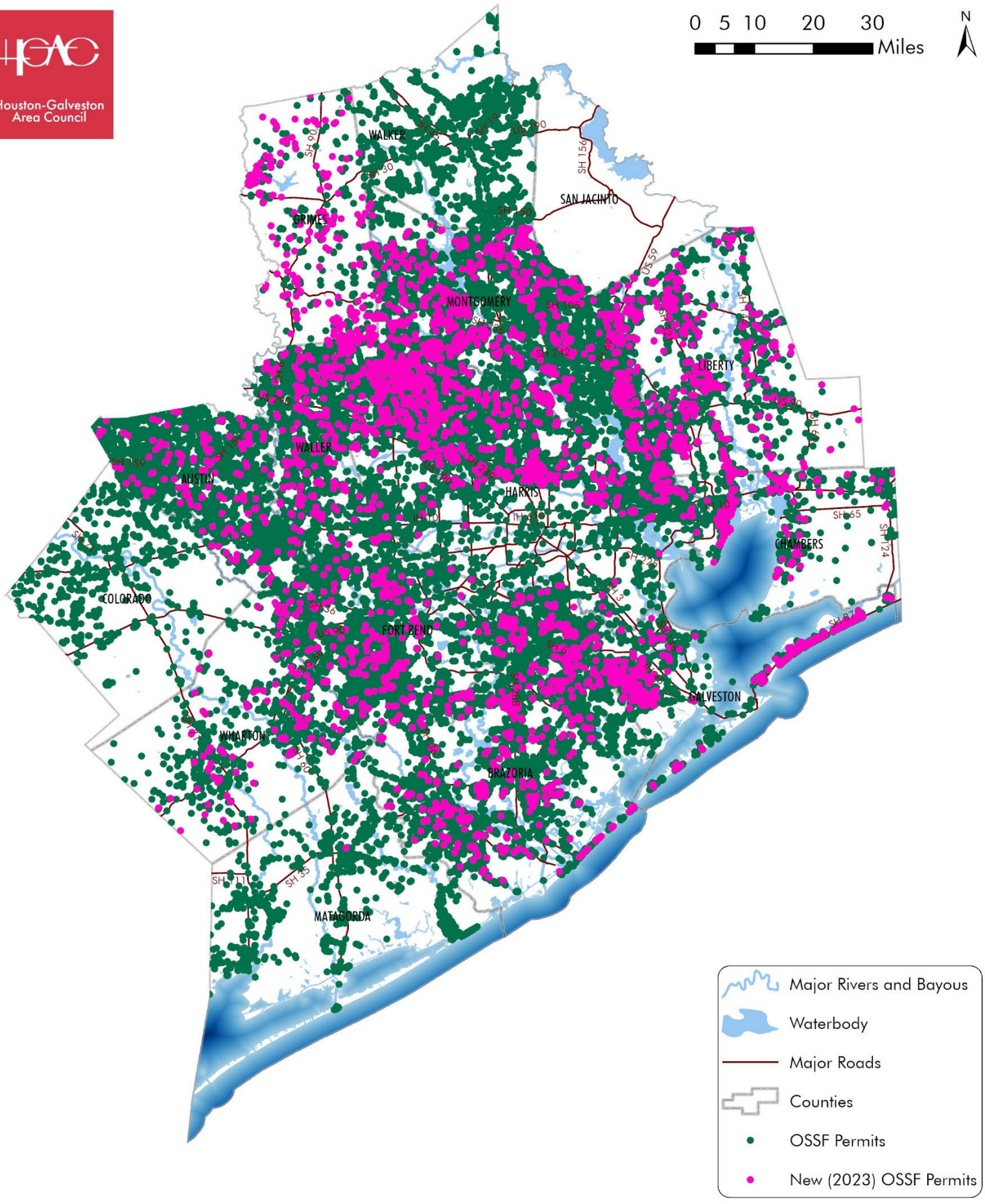
Table 27. OSSF Data Processing and Database Update Notes

County or Authorized Agent	Update Notes
Austin	Submitted data for the first time in 6+ years
Brazoria	Submitted monthly data, records updated and processed
Chambers	Submitted monthly data, records updated and processed
Colorado	Did not submit data
Fort Bend	Submitted annual data, records updated and processed
Galveston	Submitted monthly data, records updated and processed
Grimes*	Submitted annual data, records updated and processed
Harris	Submitted annual data, records updated and processed. Submitted historical database records.
Liberty	Submitted annual data, records updated and processed
Matagorda	Did not submit data
Montgomery	Submitted annual data, records updated and processed
San Jacinto*	Did not submit data
San Jacinto River Authority	Submitted data from 2020-2023
City of Surfside Beach	Submitted data for the first time in 6+ years. Submitted 2017-2023 data.
TCEQ Region 12	Submitted data for the first time in 6+ years. Submitted 2002-2023 data.
Walker	Did not submit data
Waller	Submitted monthly data, records updated and processed
Wharton	Submitted annual data, records updated and processed

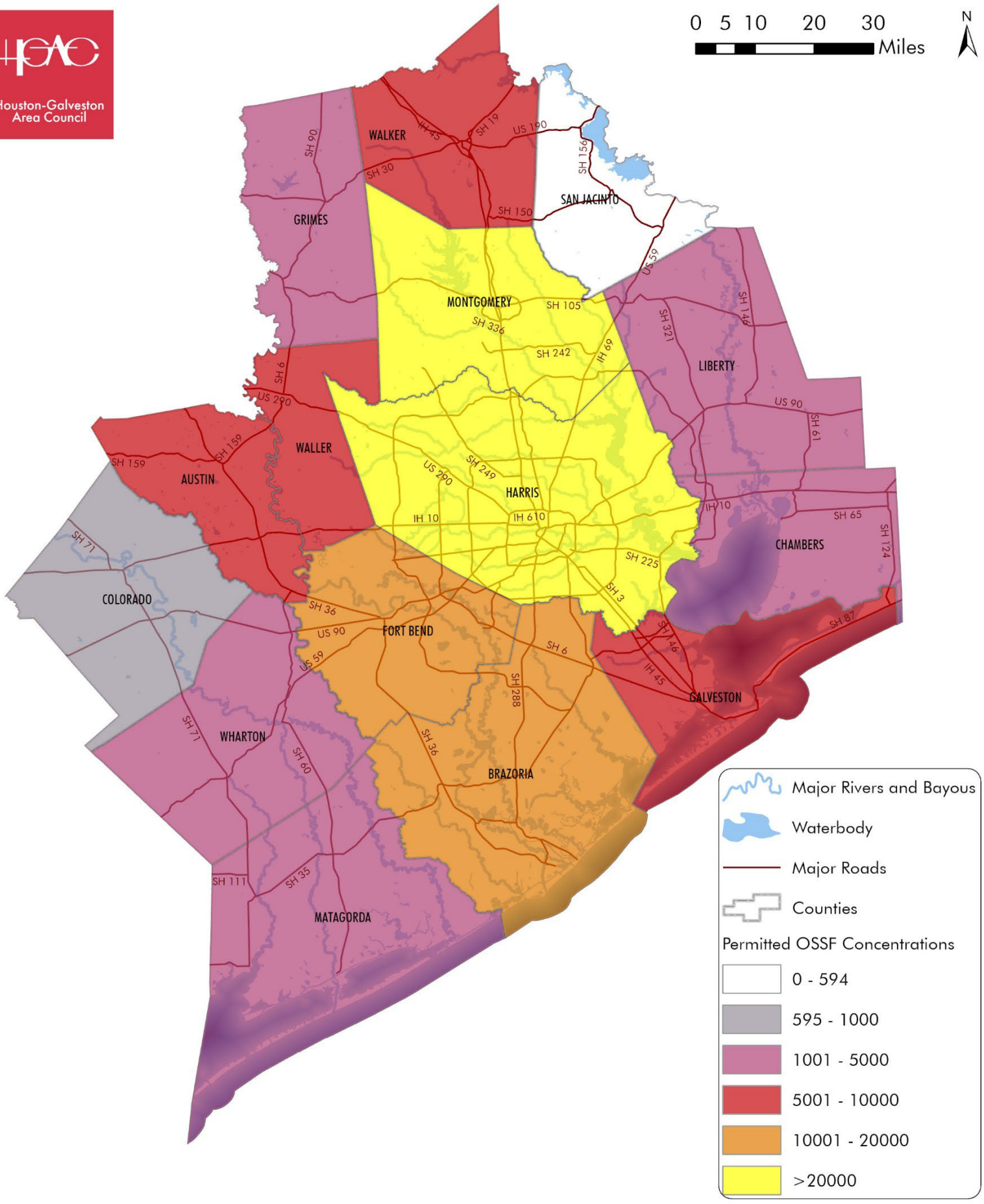
* These counties are outside H-GAC's 13-County Region but are within H-GAC's Clean Rivers Program area.

Locations and Concentrations of Permitted OSSFs in the Houston-Galveston Region

The locations and concentrations of permitted OSSFs in the Houston-Galveston region are shown in **Map 14** and **Map 15**. For the OSSF permits, existing permits are shown in green and new permits (those added in calendar year 2023) are shown in pink.



Map 14. Permitted OSSFs in the Houston-Galveston Region, 2023



Map 15. Concentration of Permitted OSSFs in the Houston-Galveston Region by County, 2023

UNPERMITTED OSSF UPDATE

The OSSF inventory data developed by H-GAC deals specifically with permitted OSSFs. For most Authorized Agents, systems began to be permitted after 1989. OSSFs installed prior to this date were not necessarily required to have a permit (depending on county). These systems are "grandfathered" and, in most cases, are not actively tracked unless violation data exist for that site. While many of these systems are well-maintained, aging systems in general pose a greater threat of failure and contamination of groundwater and surface water sources. Many of these older systems may be of a type not suited for the soil type. These unpermitted systems represent an appreciable portion of the systems in service.

The OSSF data has already been used for a variety of watershed protection efforts and other local planning projects. With the projected population expansion and aging infrastructure, additional information about unpermitted system locations will be vital to utility planning and developing watershed-based plans to address water quality impairments and concerns throughout the region.

For the Unpermitted OSSF Update, H-GAC staff estimated the number and probable locations of unpermitted systems, which were typically installed prior to the requirement that OSSFs be permitted. In previous project years, this analysis was performed using polygons representing parcel and census block data. Moving forward, H-GAC will use 9-1-1 addressing to estimate the projected locations of potentially unpermitted OSSFs on a county level. This method uses an automated script to interpolate the addresses of these unpermitted systems.

The Unpermitted OSSF Update was performed in compliance with the H-GAC WQMP Data Acquisition and Geospatial Data QAPP.

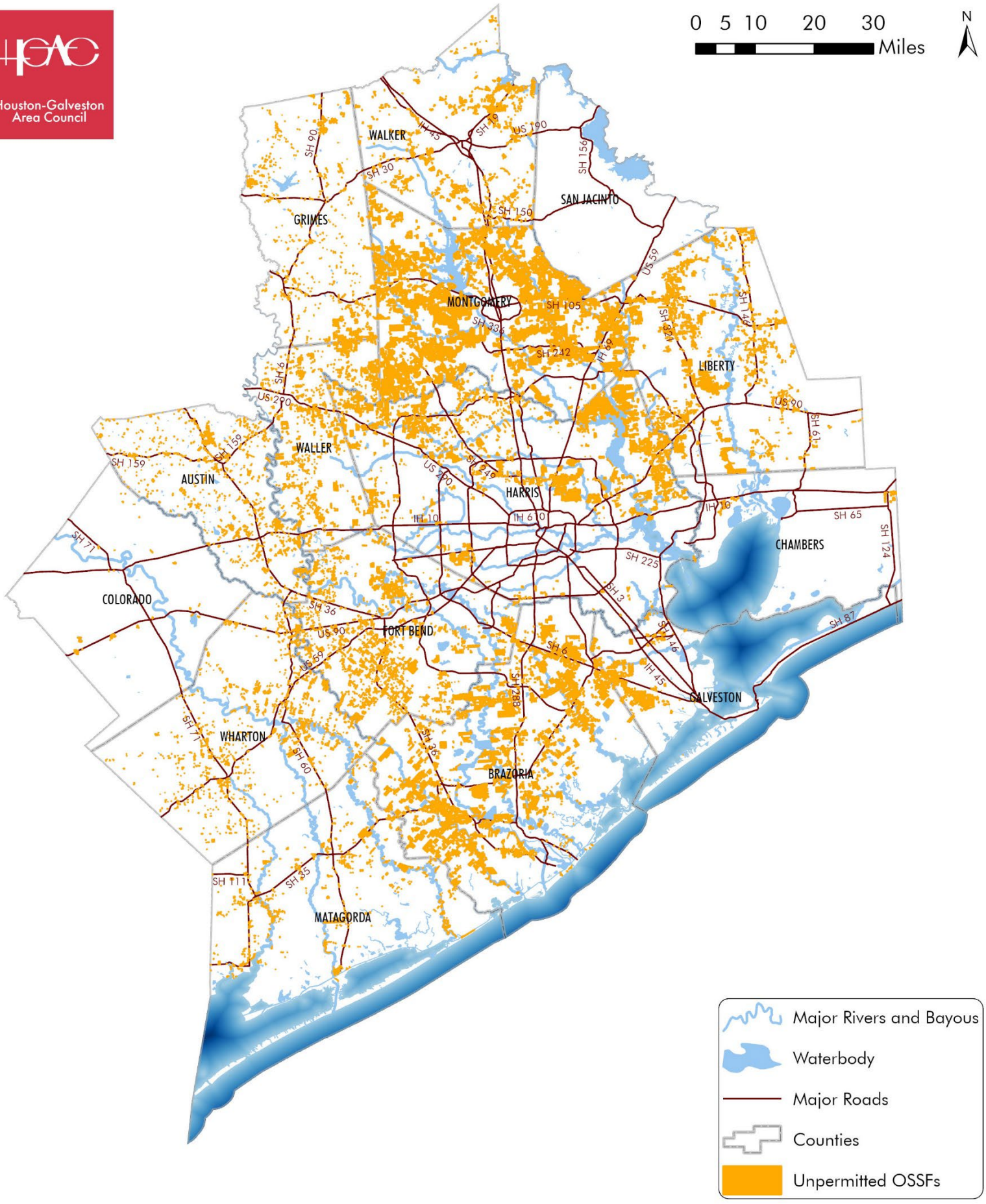
Results of Unpermitted OSSF Analysis Using 9- 1- 1 Addresses

Based upon H-GAC's Unpermitted OSSF analysis using 9-1-1 address data, it is projected that there are a total of 220,287 potentially unpermitted OSSFs within the region for calendar year 2024. This number includes an estimated 2,729 unpermitted OSSFs in Grimes County.

Table 28. Summary of Permitted and Unpermitted OSSFs by County, 2024

County	Permitted Systems 2024	Unpermitted Systems 2024	Total OSSFs 2024
Austin	5,745	2,389	8,134
Brazoria	18,074	24,987	43,061
Chambers	1,778	1,328	3,106
Colorado	595	316	911
Fort Bend	15,382	9,846	25,228
Galveston	7,530	6,163	13,693
Grimes	4,938	2,729	7,667
Harris	36,097	80,075	116,172
Liberty	2,833	16,037	18,870
Matagorda	1,663	4,437	6,100
Montgomery	36,689	52,041	88,730
San Jacinto	No Data Available	No Data Available	No Data Available
Walker	6,052	5,610	11,662
Waller	5,318	8,797	14,115
Wharton	1,812	5,532	7,344
TOTAL	**144,506**	**220,287**	**364,793**

For the most recent analysis of 2024 data, there were 144,506 permitted OSSFs and 220,287 potential unpermitted OSSFs, for an estimated total of 364,793 OSSFs within the Houston-Galveston region.



Map 16. Unpermitted OSSFs in the Houston-Galveston Region, 2023

AUTHORIZED AGENT COORDINATION

H-GAC staff works in coordination with Authorized Agents and their Designated Representatives to receive OSSF permit data submissions for inclusion into the regional OSSF database. For counties in the Coastal Zone (Brazoria, Chambers, Galveston, Harris, and Matagorda), H-GAC facilitates data gathering and sharing with Texas A&M AgriLife Extension, who are currently developing a Coastal Zone OSSF database for TCEQ.

Several counties did not submit data for inclusion in this year's OSSF database update, with some not having submitted data in several years. Staff changes among Authorized Agents have led to the need to meet with those entities' Designated Representatives and reestablish working relationships. While staff have had discussions with several of the Designated Representatives, further meetings are necessary to resume receiving data from the other permitting authorities.

H-GAC staff reached out to the Designated Representatives for both San Jacinto County and Grimes County. Although both counties are outside H-GAC's 13- County area, H-GAC does conduct water quality monitoring there. Additionally, H-GAC is the lead agency on watershed-based plans being developed for water bodies in those counties. Information on OSSF location and density is particularly important for TMDL implementation or making recommendations in WPPs.

SEP COORDINATION AND OUTREACH

H-GAC is the Third-Party Administrator for a SEP through the TCEQ (Agreement No. 2012-15). H-GAC's Homeowner Wastewater Assistance Program funds the repair or replacement of malfunctioning or failing OSSFs for homeowners who meet certain income requirements. Funding from this project may also be used to provide extension of first-time sewer service, pump-out service, and water conservation equipment. Homeowners are not charged for any portion of the cost of the work performed.

Funding for the SEP program is provided through voluntary contributions by respondents in a TCEQ enforcement action. These respondents negotiate an agreement to perform a TCEQ-approved SEP to offset a portion of the assessed administrative penalty. In addition to the funding through TCEQ, the Harris County District Attorney's Office also provides funding through their enforcement actions.

Homeowners under enforcement for violation of TCEQ rules set forth in 30 TAC § 285 are not eligible for assistance under the TCEQ SEP. However, additional funding from other sources may not have the same requirements. Some of these sources can be used to address OSSF issues throughout the region.

Coordination of H-GAC's Homeowner Wastewater Assistance Program occurs through the WQMP project. The WQMP contract does not fund any OSSF repair and replacement projects, as that funding strictly comes from one or more of the SEP funding sources. However, the WQMP supports the SEP program as a component of the water quality planning process, particularly the outreach and education component of the SEP. Through the SEP, H-GAC can identify failing OSSFs, either through homeowner self- disclosure or reported through referrals from Authorized Agents or OSSF professionals. This is an important planning tool used by H-GAC in addressing failing or malfunctioning OSSFs as a major contributor to bacterial impairments in the region. By identifying these systems and then targeting them for repair, replacement, or decommissioning through the SEP, H-GAC can actively contribute to the remediation of these systems.

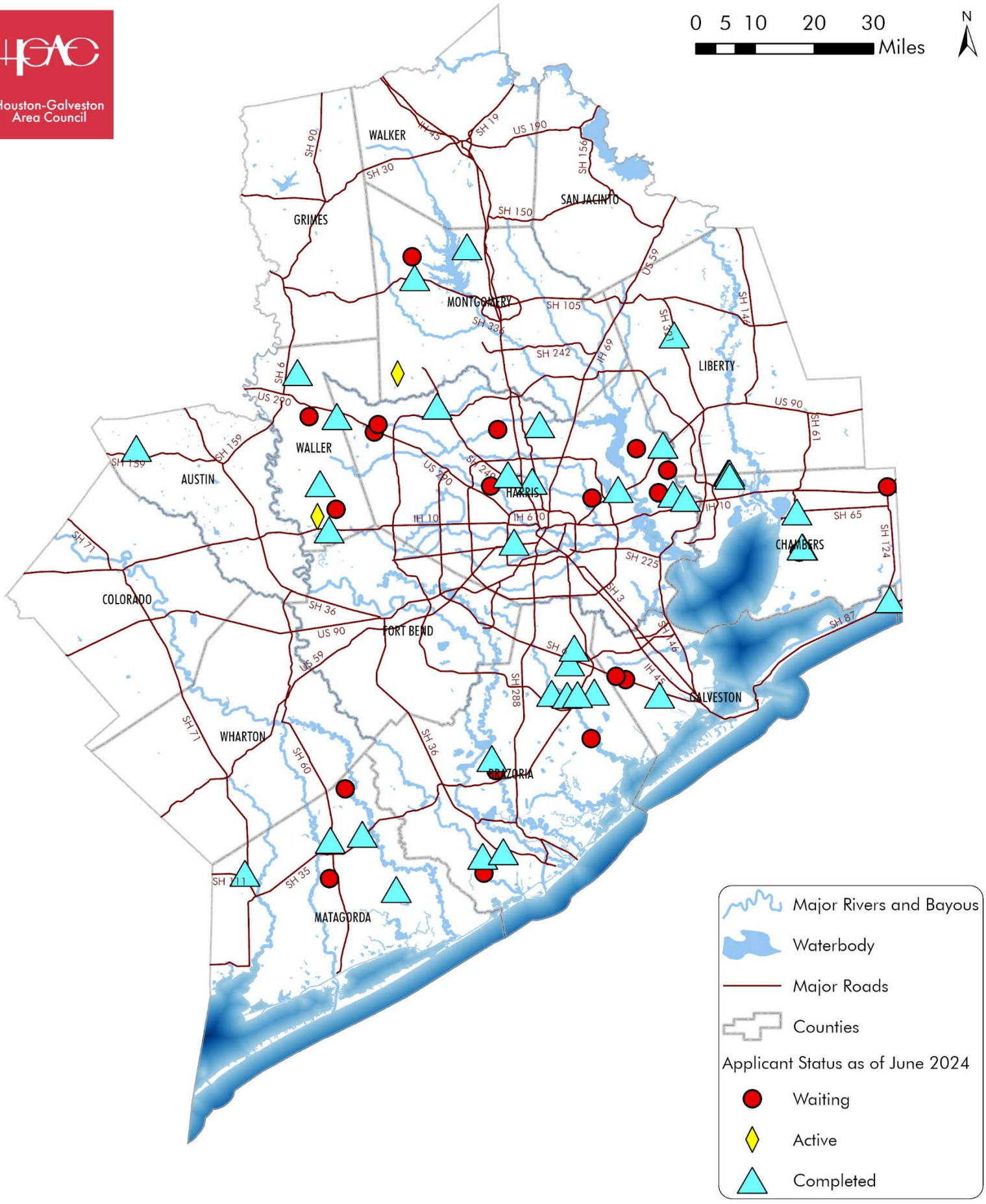
H-GAC's efforts largely target priority watersheds (such as those monitored by the Clean Rivers Program or subject to a WPP or TMDL) to identify areas with failing OSSFs and evaluate best management practices to address the issue. Efforts are coordinated with the appropriate H-GAC staff for each watershed project and the local permitting and enforcement agencies.

SEP activities supported by the WQMP include coordinating with elected government officials and enforcement agencies to promote the program and presenting at numerous meetings to inform homeowners and OSSF professionals about the program and the qualifications that applicants must meet to qualify.

As of 7/1/24, the SEP program has funded the replacement of 30 failed OSSFs and the repair of 14 malfunctioning OSSFs (**Table 29**). Over the last twelve months, H-GAC has not been able to replace or repair any systems, primarily due to the loss of critical resources for the program. With the hiring and onboarding of a new H-GAC staff member to oversee the program and additional funding for the SEP, H-GAC is planning to address more failing OSSFs over the next twelve months and is actively working to address two of the qualified entries on the waiting list. H-GAC staff continues to review and update the homeowner waiting list with failing systems. The current waiting list has 23 homeowners on the list. Staff will be working diligently to validate these homeowners and address their needs (**Map 17**).

Table 29. SEP OSSF Replacements and Repairs by County, 2018 to 2024

County	Replacement	Repair	Waiting
Austin	1	-	-
Brazoria	6	3	3
Chambers	6	-	3
Colorado	-	-	-
Fort Bend	-	-	-
Galveston	2	-	2
Grimes	-	-	-
Harris	5	3	7
Liberty	-	4	-
Matagorda	3	1	2
Montgomery	2	2	3
San Jacinto	-	-	-
Walker	-	1	-
Waller	5	-	3
Wharton	-	-	-
TOTAL	**30**	**14**	**23**



Map 17. OSSF Repair and Replacement Projects as of 2024

OSSF OUTREACH AND EDUCATION

Homeowner Education Courses

Through H-GAC's OSSF Outreach and Education programs, staff traditionally conduct or facilitate educational training courses on basic OSSF maintenance and fundamentals of operation. These training courses are offered to homeowners, real estate inspectors and other interested parties as requested.

Homeowner outreach conducted through the SEP is a vital component of numerous watershed-based projects. H-GAC uses this program as a vehicle by which homeowners can be educated about the proper operation and maintenance of their systems. This project year H-GAC staff have rewritten the homeowner education course and hosted four (4) courses. With the support of H-GAC's Costal Communities Program and a generous grant from Wells Fargo, staff has worked closely with local community partners to provide OSSF pumpouts to vulnerable communities at no cost to the homeowner. H-GAC is also working to allow the OSSF Homeowner Education Course available online, either through interactive presentations via Teams or Zoom, or through hosted web videos, such as YouTube.

Coastal Communities Outreach Tools

H-GAC's Coastal Communities Outreach and Education program provides free downloadable physical and digital media content for distribution to residents of the Coastal Communities project area. Content is available on OSSFs, as well as topics such as fats/oils/grease, pet waste, household hazardous waste, litter, and illegal dumping.

In addition, between 2023-2024 the Coastal Communities program partnered more closely with OSSF workshop efforts. Staff completed an analysis of the program area to identify where vulnerable communities overlapped with large numbers of OSSFs. Targeted outreach and promotion of OSSF workshops were provided to those communities with help from city staff and local partners, and supplemental workshop materials were developed. The promotional flyer and workshop checklist are shown in **Figure 6**.

These resources were created through the project "Water Quality Outreach Implementation for Vulnerable Rural Populations" funded by a FY 2023 grant from GBEP. This project is a continuation H-GAC's Coastal Communities Outreach and Education program which developed an outreach roadmap and resources to assist small, non-MS4, communities in the region's coastal counties with the creation and implementation of water quality outreach and education for their residents. The initial Coastal Communities project was funded in part by the TCEQ through a grant from the EPA.

Join H-GAC at a free On-Site Sewage Facility (Septic System) Homeowner Education Workshop in your community!

Friday, March 8, 2024
1:00pm to 3:00pm or 5:00pm to 7:00pm

Liverpool City Hall
8901 CR 171
Liverpool, TX 77577

Contact: ossf@h-gac.com

This project is funded in part by the TCEQ through a grant from the United States Environmental Protection Agency

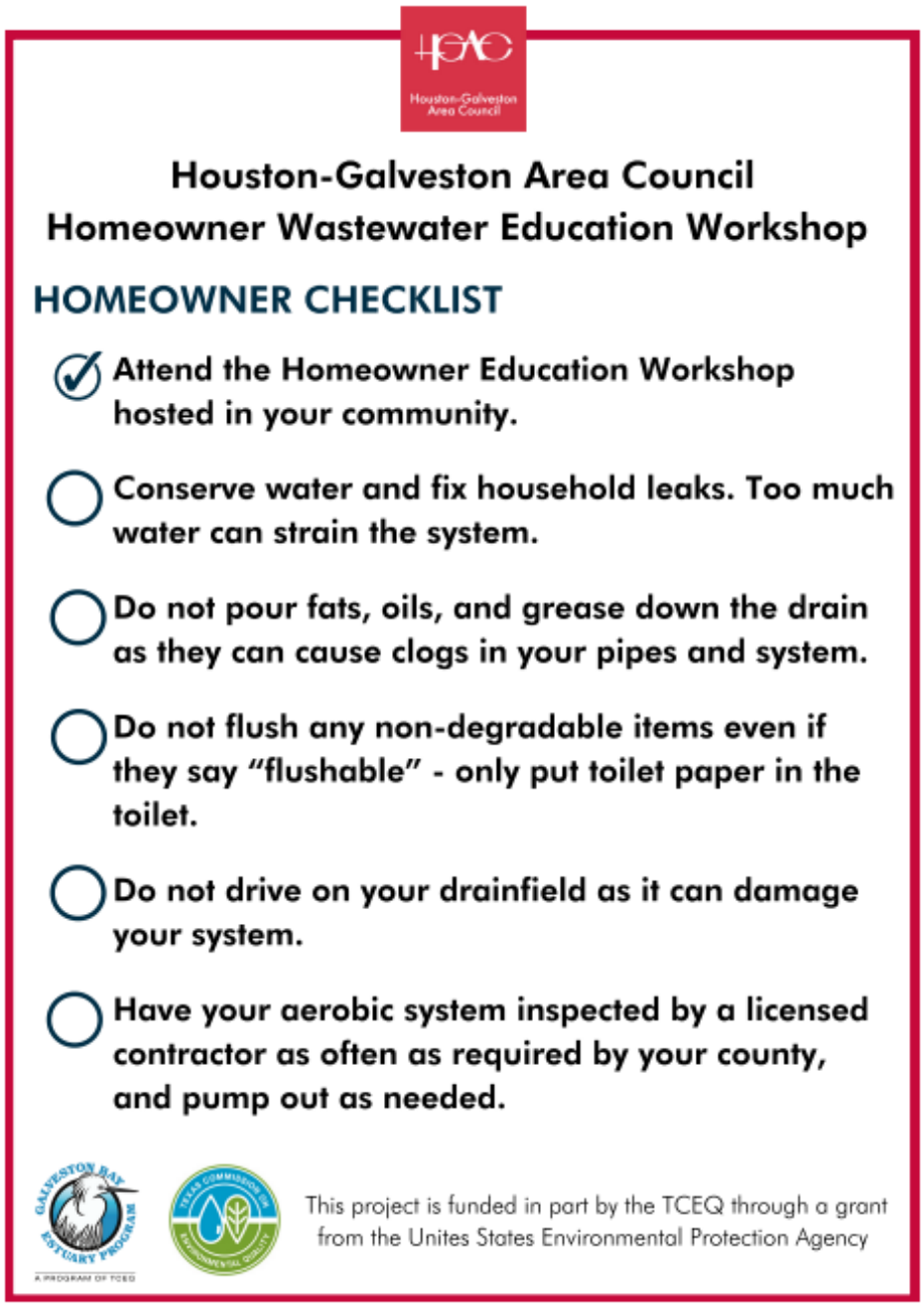


Figure 6. Outreach and Education Materials

OSSF MAPPING TOOL EXPANSION FEASIBILITY STUDY

The purpose of this Task is to determine the feasibility and interest of using the H-GAC's current OSSF Mapping Tool to host OSSF data from an interested partner, specifically NCTCOG, with the purpose to provide a repository for OSSF permit data for use in watershed-based planning activities by the partner. As part of the NCTCOG Scope of Work Subtask 3.4 in this Work Plan, NCTCOG plans to determine the feasibility of aligning NCTCOG's OSSF inventory and spatial dataset with the existing approach already in use in the Houston-Galveston region.

COLLABORATIVE PLANNING ACTIVITIES

H-GAC is coordinating and facilitating planning activities with currently identified collaborators (and future potential collaborators), specifically NCTCOG, to determine the feasibility of incorporating their OSSF permit data into H-GAC's OSSF Mapping Tool. This task includes planning meetings and presentations (virtual, hybrid, or in-person) with collaborators and TCEQ to facilitate discussion of technical issues, data quality objectives, contractual and budgetary considerations, and other pertinent issues for developing an expanded OSSF Mapping Tool in future project years. An initial planning meeting was held with NCTCOG in 7/27/23 to discuss NCTCOG's current dataset and assess possible methods for making it compatible with the data format H-GAC uses in their OSSF mapping tool. An additional meeting was held on 1/18/24 to discuss NCTCOG's progress with adapting their data and discussing alternate methods of geolocation for increased spatial accuracy. H-GAC and NCTCOG will continue to meet regularly in FY 25 as deliverables for this task are developed further under contract 582-24-50311.

H-GAC is also conducting regular internal planning and coordination meetings with staff from their Data Analytics and Research department to discuss technical considerations for expansion of the OSSF Mapping Tool. These discussions include development of budgets for personnel and equipment costs associated with the possible expansion.

SUMMARY

The FY 2024 WQMP Update Report summarizes the activities conducted under TCEQ Contract 582-23-40182 and 582-24-50311.

For this year's Project, H-GAC acquired and analyzed WWTF infrastructure data for the Houston-Galveston area region. Both the wastewater permitted discharger GIS layer and the SAB GIS layer were updated as part of this work, expanding the data repository that H-GAC maintains. These data are used throughout multiple H-GAC programs, such as the Clean Rivers Program, as well as in the development of watershed-based plans such as WPPs and TMDLs.

A primary component of the WQMP Update involves the acquisition and analysis of self-reported DMR data. These data are important for evaluating potential sources of bacteria in area waterways. Analysis of WWTF effluent monitoring data provides a means by which decision makers and water resource managers can evaluate the role wastewater infrastructure plays in regional water quality issues. The analysis provided in this report shows WWTFs are typically operating within compliance of their effluent discharge permit limits for bacteria. However, considering the volume of discharge and the potential for high bacteria loading in the case of a system malfunction, it is prudent to continue to monitor the DMR data closely. The DMR data acquired through this project are important for other watershed-based projects within the region, most notably the BIG TMDL project. Through addressing issues such as WWTF discharge permit limits, the BIG has been very successful in reducing bacteria loading in the region's water bodies.

As part of the WQMP Update, H-GAC also analyzed self- reported SSO data for the region. SSO data are of great interest due to the potential for acute loading of extremely elevated levels of human fecal bacteria. H-GAC analyzed the frequency, volume, and root causes of SSOs.

H-GAC continues to develop and foster relationships with interested parties in the region's watersheds and coordinate regional water quality activities. H-GAC has been a leader in TMDL and WPP efforts, and the coordination activities of the WQMP Update Project mesh well with the overall approach of outreach, targeted studies, and implementation activities. By having multiple water quality projects concurrently within the same organization, H-GAC can achieve vertical integration between base data sources, internal analysis, watershed planning efforts, and external coordination.

The OSSF Database development which started in previous projects continued during this year and will be an ongoing effort that will be continuously updated. This project deliverable remains useful in H-GAC's various watershed planning efforts. H-GAC acquires OSSF permit data from Authorized Agents throughout the region and consolidates that data into a regional database. An estimation of unpermitted OSSFs is also performed

through this project. The number, location, and density of these OSSFs are important considerations in the development of watershed-based plans. This information is also useful in targeting OSSF homeowner education and outreach programs or OSSF repair and replacement initiatives.

H-GAC is the Third-Party Administrator for the SEP to repair or replace malfunctioning or failed OSSFs for qualifying homeowners within the region. Through this SEP, H-GAC addresses failing systems within the region. Although the WQMP Contract does not fund any OSSF repair or replacement, many of the coordination, outreach, and education activities are conducted through this Project.

The accumulated data sets, the GIS analyses, and other deliverables generated through this Project have been submitted electronically to TCEQ. Where allowable and appropriate, data from this Project will be used to support other related efforts.

This *WQMP Update Report*, once accepted by the H-GAC Board of Directors and certified by TCEQ, will be incorporated into the State's WQMP.

ADDITIONAL RESOURCES

The following resources are provided for additional information on topics discussed in this report:

HOUSTON- GALVESTON AREA COUNCIL

H-GAC Main Page
https://www.h-gac.com/Home

Water Quality Management Planning
https://www.h-gac.com/water-quality-management- planning

OSSFs
https://www.h-gac.com/on-site-sewage-facilities

OSSF Information System
https://datalab.h-gac.com/ossf

Clean Rivers Program
https://www.h-gac.com/clean-rivers-program

Clean Rivers Program 2021 Basin Summary Report
https://datalab.h-gac.com/BSR2021/

Clean Rivers Program 2024 Basin Highlights Report
https://storymaps.arcgis.com/stories/cb07286ad40b4f11afff963f37f38692

Water Resources Information Map (WRIM)
https://h-gac.com/go/wrim

NRAC
https://www.h-gac.com/board-of-directors/advisory-committees/natural-resources-advisory-committee

Clean Waters Initiative Workshops
https://www.h-gac.com/clean-water-initiative-workshops

BIG Project TMDL
https://www.h-gac.com/bacteria-implementation-group

Watershed-Based Plans
https://www.h-gac.com/watershed-based-plans

Coastal Communities
https://www.h-gac.com/coastal-communities

Coastal Communities Tools & Resources
https://www.coastalcommunitiestx.com/get-tools.html

TEXAS WATER DEVELOPMENT BOARD

CWSRF Loan Program
http://www.twdb.texas.gov/financial/programs/CWSRF/index.asp

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Permit Application and Registration Information Systems (PARIS)
https://www6.tceq.texas.gov/wqpaq/index. cfm?fuseaction=home.AdvanceSearch

TCEQ GIS Data
https://gis-tceq.opendata.arcgis.com/

Texas Surface Water Quality Standards
https://www.tceq.texas.gov/waterquality/standards

Texas Integrated Report of Surface Water Quality
https://www.tceq.texas.gov/waterquality/assessment

Texas Clean Rivers Program
https://www.tceq.texas.gov/waterquality/clean-rivers/ index.html

Surface Water Quality Segments Viewer
https://www.tceq.texas.gov/gis/segments-viewer

Surface Water Quality Web Reporting Tool
https://www80.tceq.texas.gov/SwqmisPublic/index.htm

State WQMP
https://www.tceq.texas.gov/permitting/wqmp

TMDL Program
https://www.tceq.texas.gov/waterquality/tmdl/index.html

Nonpoint Source Program
https://www.tceq.texas.gov/waterquality/nonpoint-source/ index

Wastewater and Stormwater Permitting
https://www.tceq.texas.gov/permitting/wastewater

SEP
https://www.tceq.texas.gov/compliance/enforcement/sep

OSSF Rules and Regulations
https://www.tceq.texas.gov/permitting/ossf/ossfregulators. html

GBEP
https://gbep.texas.gov/

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ECHO
https://echo.epa.gov/

ECHO Facility Search - Enforcement and Compliance Data
https://echo.epa.gov/facilities/facility- search?mediaSelected=cwa

ECHO ICIS-NPDES Permit Limit and Discharge Monitoring Datasets
https://echo.epa.gov/tools/data-downloads/icis-npdes- dmr-and-limit-data-set

ECHO Water Pollution Search
https://echo.epa.gov/trends/loading-tool/water-pollution- search/

Municipal Wastewater
https://www.epa.gov/npdes/municipal-wastewater

Septic Systems (Onsite/Decentralized Systems)
https://www.epa.gov/septic

Septic Systems Outreach Toolkit
https://www.epa.gov/septic/septic-systems-outreach-toolkit

REGIONAL TMDL PROJECTS

BIG Project TMDL
https://www.h-gac.com/bacteria-implementation-group

Upper Oyster Creek TMDL
https://www.h-gac.com/watershed-based-plans/upper-oyster-creek-tmdl-and-implementation-plan

Basin 11 TMDL
https://www.h-gac.com/watershed-based-plans/san-jacinto-brazos-coastal-basin-tmdl-and-implementation-plan

Basin 13 TMDL
https://www.h-gac.com/watershed-based-plans/brazos-colorado-coastal-basin-tmdl-and-implementation-plan

Cotton Bayou TMDL
https://www.h-gac.com/watershed-based-plans/cotton-bayou-tmdl

Big Creek TMDL
https://www.h-gac.com/watershed-based-plans/big-creek-tmdl

Dickinson Bayou TMDL
https://agrilife.org/dickinsonbayou/watershed-information/

Upper Texas Gulf Coast Oyster Waters TMDL
https://www.tceq.texas.gov/waterquality/tmdl/74-uppercoastoyster.html

Houston Ship Channel TMDL
https://www.h-gac.com/watershed-based-plans/houston-ship-channel-and-galveston-bay-tmdl-and-implementation-plan

REGIONAL WPP PROJECTS

Bastrop Bayou WPP
http://www.houstontx.gov/planhouston/sites/default/files/plans/bb_watershed_protection_plan.pdf

Cedar Bayou WPP
https://www.h-gac.com/getmedia/b3ea3b36-a3c5-4ddf-bab9-e0ccdba6657b/WPP-Cedar-Bayou

Clear Creek WPP
www.clearcreekpartnership.com

Cypress Creek WPP
https://www.h-gac.com/watershed-based-plans/cypress-creek

Dickinson Bayou WPP
https://agrilife.org/dickinsonbayou/watershed-information/

Double Bayou WPP
https://www.doublebayou.org/

East Fork San Jacinto River WPP
https://eastforkpartnership.weebly.com/

Greens Bayou WPP
https://greensbayoupartnership.weebly.com/

Highland and Marchand Bayous WPP
https://agrilife.org/highlandbayou/files/2021/05/Highland-Bayou-Coastal-Basin-5.12.2021-FINAL.pdf

Lake Conroe WPP
http://www.sjra.net/wp-content/uploads/2014/12/Lake-Conroe-Watershed-Protection-Plan.pdf

Mill Creek WPP
https://millcreek.tamu.edu/watershed-protection-plan/

San Bernard River WPP
https://www.h-gac.com/watershed-based-plans/san-bernard-river-watershed-protection-plan

Spring Creek WPP
https://www.h-gac.com/watershed-based-plans/spring-creek

West Fork San Jacinto River and Lake Creek WPP
https://www.h-gac.com/watershed-based-plans/west-fork-san-jacinto-river-lake-creek

West Lake Houston Basin Implementation Project
https://www.h-gac.com/watershed-based-plans/west-lake-houston-implementation

APPENDICES

APPENDIX A: WASTEWATER DATA UPDATE AND COORDINATION DATA DELIVERABLES

The following Contract Deliverables were submitted electronically with this report:

GIS LAYERS

- Wastewater Outfalls GIS Layer
- SAB GIS Layer

MAPS

- SAB_2024_Outfalls_Map
- DMR_frequency_2019-2023
- DMR_frequency_2023
- DMR_wtshd_density_2019-2023
- DMR_wtshd_density_2023
- SSO_discharge_volume_2019-2023
- SSO_ discharge_volume _2023
- SSO_wtshd_density _2019-2023
- SSO_wtshd_density _2023

DATA ANALYSIS

- Region 12 DMR Analysis SAS Output File

APPENDIX B: OSSF DATABASE UPDATE DATA DELIVERABLES

The following Contract Deliverables were submitted electronically with this report:

GIS LAYERS

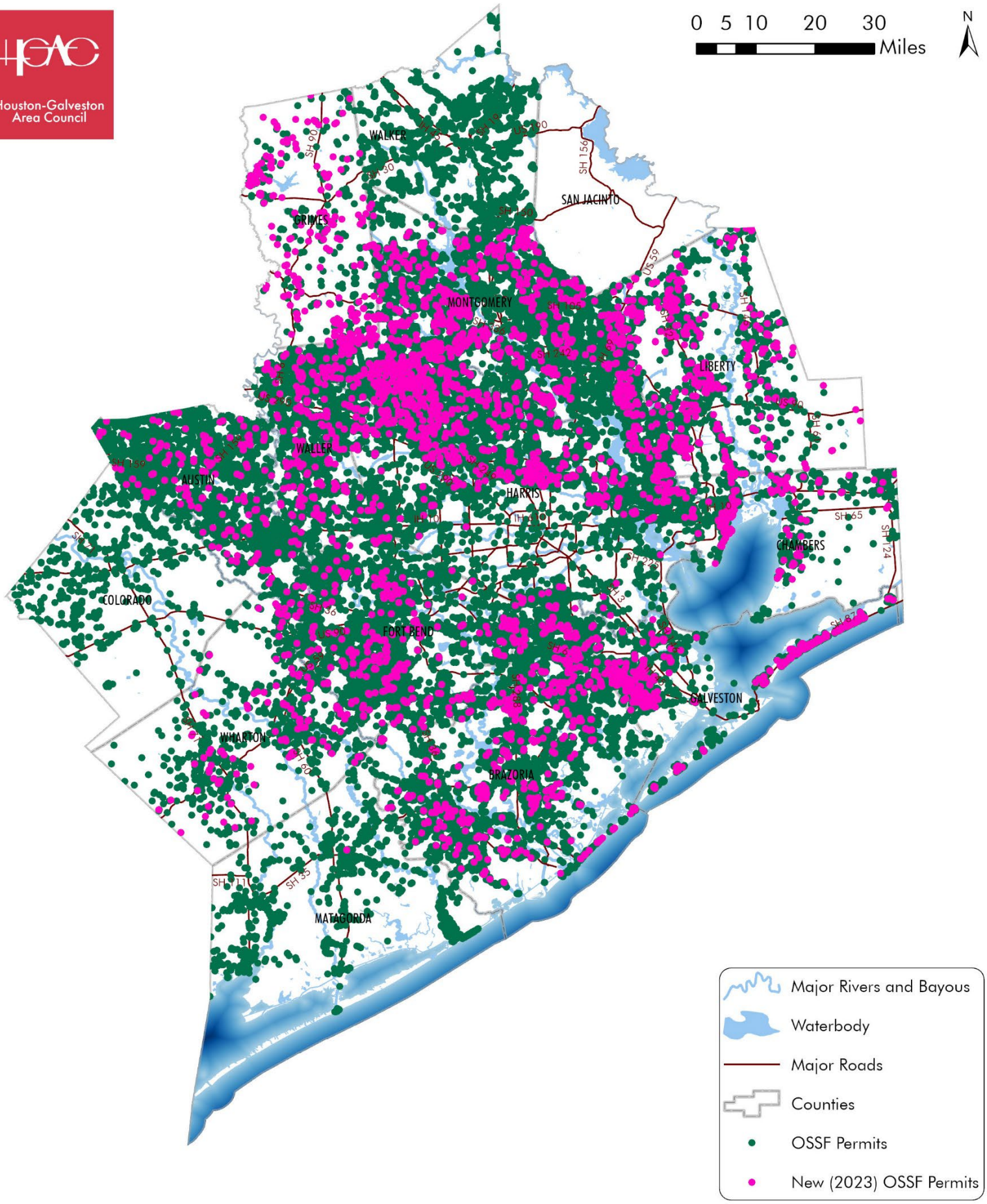
- Permitted OSSF Database
- Unpermitted OSSF Analysis

MAPS

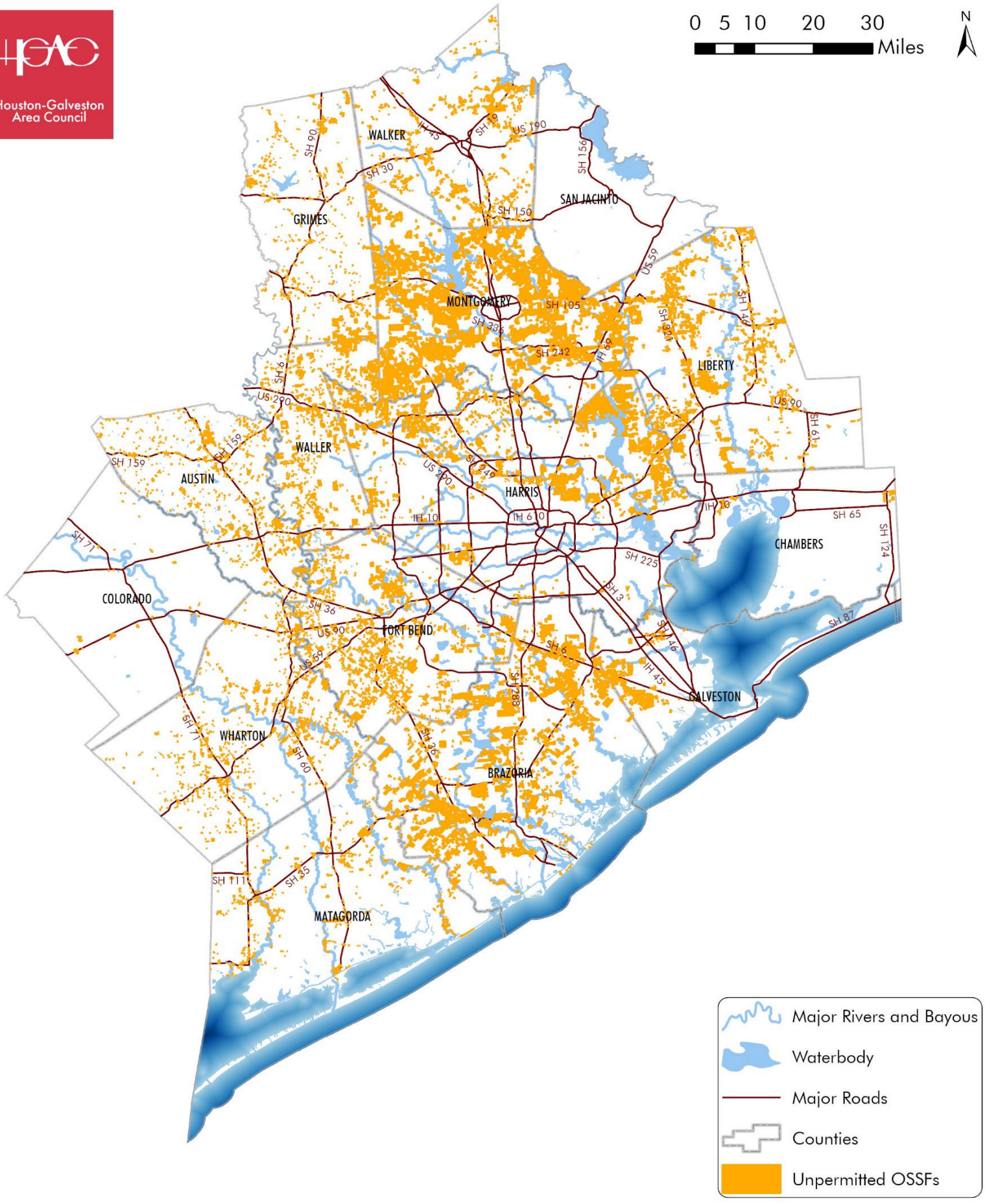
- 2023_Permitted_OSSFs
- 2023_Permitted_OSSF_Concentrations
- 2023_Unpermitted_OSSFs
- SEP_Applicants_25Jun24

APPENDIX C: MAPS OF PERMITTED AND UNPERMITTED OSSFS

MAP C-01A. Regional Permitted OSSFs, 2023
MAP C-01B. Regional Potential Unpermitted OSSFs, 2023



Map C-01A. Regional Permitted OSSFs, 2023



Map C-01B. Regional Potential Unpermitted OSSFs, 2023

APPENDIX D: WQMP UPDATE TIMELINE

The *WQMP Update Report* summarizes all contract activities and findings relevant to the water quality goals of the Houston-Galveston region. A draft of this Update Report has been made available for public comment in accordance with Texas Water Code (TWC) Section 26.037 to allow interested parties the opportunity to comment and provide input into the WQMP Update. The report has also been submitted to H-GAC's NRAC for review and comment.

Comments received will be addressed in the Final Report. A table documenting comments received and H-GAC's written response to those comments will be incorporated into the Final WQMP Report as an Appendix (see Appendix F).The Final *WQMP Update Report* will be submitted to H-GAC's Board of Directors for acceptance. Once accepted by the Board, the Update will be certified by TCEQ for inclusion in the State's WQMP.

The timeline presented in **Table E-1** was established to meet the requirements of TWC Section 26.037 related to the public comment period for the report.

Table E-1. WQMP Report Review, Acceptance, and Submittal Timeline

Task	Due Date
WQMP Update Draft Report and Project Data Deliverables due to TCEQ	7/1/2024
Thirty-Day Public Comment Period Opens	7/1/2024
Send Draft WQMP Update Report electronically to NRAC members for review	7/1/2024
Upload Draft WQMP Update Report to H-GAC's website	7/1/2024
Public Comment Period closes	7/31/2024
Revise Draft WQMP Update Report to address public comments	7/1/24 – 7/31/24
Present Final WQMP Update Report to NRAC for recommendation to Board of Directors	8/1/2024
H-GAC Board of Directors Meeting	8/20/2024
Upload Final WQMP Report to H-GAC's website	8/31/2024
Submit Final WQMP Update Report and documentation of public comment period to TCEQ	8/31/2024

APPENDIX E: WQMP UPDATE FINAL REPORT DOCUMENTATION

The following Contract Deliverables will be submitted electronically with the Final version of this report:

- Documentation of Public Participation
- Comments received on the FY 2024 WQMP Update Report
- Response to comments on the FY 2024 WQMP Update Report

Documentation of Participation in the WQMP Update

- To ensure the public has an opportunity to participate in the WQMP Update and provide comments on the report, a 30- day public comment period will open on 7/1/24.
- The Draft WQMP Update Report will be sent electronically to members of the NRAC for review and comment on 7/1/24.
- The Draft WQMP Update Report document will be posted on H-GAC's website for public review and comment on 7/1/24.
- The Public Comment period will close on 7/31/24.
- The Draft WQMP Update Report will be updated to address public comments and comments from the NRAC.
- The Final WQMP Update Report, incorporating comments submitted by the public and NRAC, will be presented to the NRAC on 8/1/24 as part of a public meeting.
- The Final WQMP Update Report will be submitted to the H-GAC Board of Directors for acceptance on 8/20/24.
- The Final WQMP Update Report will be submitted to TCEQ for certification on 8/31/24.

APPENDIX F: PUBLIC COMMENT

Public Comments on WQMP Update

From	Page #	Comment	Response