BACTERIA IMPLEMENTATION GROUP

On-Site Sewage Facilities and Illicit Discharges Work Group
Meeting Summary
Thursday, March 23, 2017
1:00 PM to 3:00 PM
H-GAC Conference Room A, Second Floor

Call to Order/Welcome/Introductions
Sandra Arismendez (TCEQ), Camila Biaggi (Harris Co.), Linda Broach (TCEQ), Richard Chapin (COH), Danielle Cioce (Harris Co.), Sarah Gossett (GBF), Frank Green (Montgomery Co.), Denise Hall (Harris Co.), Stephen Lewis (COH), David Parkhill (SJRA), Rajendra Shrestha (City of Pearland), Robert Snoza (HCFCD), Jennifer Wheeler (Harris Co.)

Review Summary from 12/15/15 Meeting
The work group reviewed the draft summary and did not provide any changes to the document.

Presentation: Update on ongoing H-GAC OSSF Implementation
H-GAC provided an update of ongoing OSSF implementation in the region. The update included information on the permitted OSSF database, grandfathered OSSF modeling, inspection course and supplementary environmental project (SEP) for OSSFs. The permitted OSSF database houses 92,008 permitted OSSF records for the thirteen county H-GAC region. In the BIG there are 34,328 permitted in the original footprint and 44,914 in the expanded BIG project area (32 in Armand and 10,544 in East and West Fork project areas). H-GAC is working on acquiring data from San Jacinto and Grimes counties, which are not part of the thirteen county H-GAC region. The home inspection course targets realtors and home inspectors covering conventional, low pressure dosing and aerobic systems. The SEP OSSF project has a cap of $492,000 and is expected to repair or replace 50 – 100 systems should it become fully funded.

Discussion: Preparing for the BIG 2016 Annual Report
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Discussion: Review I-Plan Strategy 3.0 OSSF and 6.0 Illicit Discharges and Dumping Language
Workgroup reviewed the approved I-Plan wording and anticipated potential I-Plan revisions during 5th year of implementation (2018). H-GAC provided copies of the Upper Gulf Coast Oyster Waters I-Plan concerning Boater Wastes. The work group discussed the best means for revising the I-Plan to address boater wastes. The work group determined that the BIG I-Plan should reference the Oyster Waters I-Plan Boater Waste section and the work being carried out by the Galveston Bay Foundation to implement the Ouster Waters plan. The BIG would coordinate and support those initiatives. H-GAC staff stated that they would create draft language based on this discussion and provide the draft language for the next meeting.

Adjourn
Upcoming Meeting Schedule

5/23/2017	BIG Spring Meeting (1:00 PM)
3/28/2017	Animals, Agriculture and Outreach Work Group (1:00 PM-Location offsite)
4/3/2017	Monitoring and Outreach Work Group (1:00 PM)

BACTERIA IMPLEMENTATION GROUP

On-Site Sewage Facilities and Illicit Discharges Work Group
Meeting Agenda
Wednesday, May 2, 2018
1:00 PM to 3:00 PM
H-GAC Conference Room A, Second Floor

Call to Order/Welcome/Introductions

Review Summary from 3/23/17 Meeting

Presentation: Update on ongoing H-GAC OSSF Implementation

Discussion: Preparing for the BIG 2018 Annual Report
Work group will:

- review the 2017 Annual Report,
- review the timeline for preparing the 2018 report,
- report on implementation activities accomplished in the 2017 calendar year,
- open discussion on expectations for the 2018 Annual Report, and
- discuss focus and priorities for 2018 calendar year.

Discussion: Review I-Plan Strategy 3.0 OSSF and 6.0 Illicit Discharges and Dumping Language
Workgroup will:

- review approved I-Plan wording and anticipate potential I-Plan revisions during 5th year of implementation (2018),
- discuss potential editorial changes,
- agree on any updates, and
- develop recommendations, if necessary, that will be presented at the annual BIG meeting for approval.

Adjourn

Upcoming Meeting Schedule
6/5/2018 BIG Spring Meeting (1:00 PM)
5/7/2018 Monitoring and Research Work Group (1:00 PM)

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On-Site Sewage Facilities

3

Summary

Properly functioning and maintained On-Site Sewage Facilities (OSSF) contribute negligible amounts of bacteria to waterways. Therefore, BIG stakeholders have primarily focused on unpermitted, failing, or poorly maintained OSSFs.

H-GAC staff partners with local governments to continually update the OSSF Information System, a GIS-based online mapping tool displaying OSSF data. The OSSF Information System helped identify probable locations of older, unpermitted systems at higher risk of failing. Staff identified 44,914 permitted systems in the BIG project area (Appendix D). There is an estimated 172,537 "grandfathered" systems within the project area.

The On-Site Sewage Facilities Workgroup met with the Illicit Discharges Workgroup on March 23, 2017. Thirteen stakeholders reported continued focus over the past year on education and regulatory action to prevent and remediate failing systems. Efforts are already underway to provide education programs to a variety of audiences. Harris County continues to work with the East Aldine Management District. H-GAC's supplemental environmental project (SEP) received funding to begin to address low-income residences with failing OSSFs.

2017 Focus

- H-GAC and BIG stakeholders aim to
  - Continue to update maps with OSSF location data and establish priority areas;
  - Continue to allow only higher performing systems that are electronically monitored to be installed in unincorporated Harris County within bacteria impaired watersheds; and
  - Continue to seek SEP funds to maintain, repair, and replace failing systems in priority areas.

Implementation Strategies

3.1 Identify and Address Failing Systems

Interim Measures:

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

Project Status

Not Started	Behind Schedule	– This activity is Ahead of Schedule to meet the five-year target, to repair and replace 500 failing systems. Harris County reports that with East Aldine management District, 1,149 OSSFs have been abandoned since 2014 in Harris County (H-GAC's OSSF Database).
Initiated	On Schedule	
In Progress	**Ahead of Schedule**	
Completed		

Implementation Effort

- **Mapping**. H-GAC staff, with the input from BIG stakeholders, continued to refine and update the OSSF permit database. The mapping system allows the public to view OSSF permit data and access basic analyses. (www.h-gac. com/go/ossf) Highlights of the system include
- Layers showing permitted OSSFs by age, authorized agent, and residential properties with a high chance of having an old or otherwise unpermitted system; and
- Tools, such as maps (Appendix D), to assist in future system repair and replacement prioritization.
- **Data.** Authorized agents continue to provide data to H-GAC. OSSF data is used to refine the mapping system and prioritize areas for education and potential repair and replacement as funding becomes available.
- **Address Failing Systems**.
  - Harris County and East Aldine Management District continue to install sewer service in the Aldine region using grant funding. Harris County and East Aldine Management District had made 207 connections to new sanitary sewer systems in 2016 for a total of 646 connections since 2014. 297 OSSFs were abandoned in 2016 for a total of 1,149 abandoned since 2014. Many of the abandoned OSSFs were failing as evidenced by violations (source: Harris County).
  - H-GAC maintains a Supplemental Environmental Project (SEP) with the TCEQ to address failing OSSF systems. H-GAC received SEP funds in 2016 and began to identifying focus areas.

3.2 Address Inadequate Maintenance of OSSFs

Interim Measures:

- *Each community will examine its regulations and policies.*
- *Existing regulations will be compiled and shared among BIG stakeholders.*
- *Flyers or collateral material will be distributed among BIG stakeholders.*

Project Status

Not Started	Behind Schedule	– This activity is On Schedule. Regulations and educational information have been compiled and are available through the H-GAC website.
Initiated	**On Schedule**	
In Progress	Ahead of Schedule	
Completed		

Implementation Effort

- **Wastewater Professional Education.** Harris County hosted its 6th Annual Harris County On-Site Wastewater Seminar on May 3, 2016, which was attended by 134 regional on-site wastewater professionals
- **Real Estate Industry Coordination**. H-GAC developed and maintains a curriculum for real estate inspection professionals to learn how to properly inspect an OSSF during a point-of-sale home inspection. H-GAC is planning to hold workshops in 2017. Three workshops have been offered since 2015 and H-GAC has trained over 100 area home inspectors focusing on conventional, LPD, and aerobic systems. Workshops offer a Texas Real Estate Commission-approved course (6 Continuing Education Credits) on the benefits of visually inspecting OSSFs.
- **Homeowner Education.**
  - H-GAC maintains a website to share educational materials. (www.h-gac.com/go/septic) In addition to providing general information, the site offers content specific to homeowners/homebuyers, local governments, and real estate professionals.

3.3 Legislation and Other Regulatory Actions

Interim Measures:

- *The TCEQ should host biennial meetings to review OSSF regulations.*
- *Local authorized agents will meet annually.*
- *Every five years, one community shall revise or adopt new regulations.*

Project Status

Not Started
Initiated
In Progress
Completed

Behind Schedule
On Schedule
Ahead of Schedule

– This activity is On Schedule.

Implementation Effort

- **Meetings.** The TCEQ reported Authorized Agent meetings are anticipated to resume in 2016.
- **Education.**
  - May 3, 2016 Harris County hosted the 6th Annual On-Site Wastewater Seminar for water professionals with topics including regulatory requirements.

Implementation Activity 3.1: Identify and Address Failing Systems

H-GAC will work with the TCEQ, authorized agents,[68] and other interested parties to create an inventory and map of OSSFs with particular focus on areas with known or suspected failing systems. The inventory is a crucial component in the development of priorities, budgets, and timelines for repairing or replacing failing OSSFs.

3.1.1: Map permitted and unpermitted OSSFs in the H-GAC and BIG Regions

H-GAC began mapping OSSFs in the region in 2009 and continues to work with the TCEQ and the region's authorized agents to inventory and map permitted OSSFs and reported OSSF violations. As part of the study, H-GAC will identify unpermitted OSSFs by analyzing data from appraisal districts, wastewater treatment plant service areas, census data, and other sources of information. Initial efforts, including data collection and standardization and mapping, were completed in November of 2010.

Ongoing data collection should be continued by H-GAC as resources are available. Authorized agents or the TCEQ shall submit information about OSSF locations as frequently as reporting requirements are specified in 30 Tex. Admin. Code § 285.11(e)(2). Currently, reporting requirements are monthly.

3.1.2: Identify target areas, timelines, and costs

H-GAC, working with stakeholders, will analyze the initial mapping data and prepare a report of recommended target areas, timelines, and budgets. H-GAC will solicit input from authorized agents and other interested parties. When possible, target areas will be identified using the geographical prioritization framework described in Implementation Strategy 11.0. Additional criteria to select target areas will include proximity to an impaired waterway and density of failing systems. The report will be used to facilitate grant applications and identify appropriate resources.

3.1.3: Address target areas and pursue funding

Local governments or other agencies will seek to address failing systems in target areas with appropriate actions which may include enforcement, owner education, repair, replacement, connection to municipal treatment works, and public education. Local governments and H-GAC shall seek to secure funding to address failing OSSFs, particularly in target areas. In addition to local funding, a variety of funding sources may be available.

[68] An authorized agent is defined in the Tex. Health & Safety Code Ann. § 366.002(1) (Definitions) as "a local governmental entity authorized by the commission to implement and enforce rules [related to OSSF regulations in Chapter 366 of the Health and Safety Code]" (TCEQ 2009b)

3.1.4: Reevaluate plan

Annually, as resources allow, H-GAC or other appropriate entity shall convene representatives of the TCEQ, authorized agents, and other stakeholders to review progress, priority areas, funding opportunities, and other elements of the regional plan.

Implementation Activity 3.2: Address Inadequate Maintenance of OSSFs

Authorized agents and other stakeholders are concerned that homeowners do not know enough about maintaining an OSSF to identify problems and solutions in order to prevent failures.

3.2.1: Homeowner education

As resources are available, H-GAC will create or adapt a website to provide homeowner education. An interactive function of this website will encourage OSSF owners to sign up for automatic reminders of required maintenance activities. This interaction not only benefits the homeowner, but it also serves as an information gathering tool for H-GAC regarding ownership, permitting and maintenance of OSSFs. Other possible elements of the website could include an online pumpout and maintenance log for homeowners and a list of licensed maintenance providers. Municipalities, counties, communities, homeowner associations and other interested parties can post a link to the website from their websites, creating a familiar portal for residents.

H-GAC will create or adapt collateral material, such as flyers, advertisements, mailers, and other marketing pieces for distribution at schools, in newspapers and publications, and to real estate agents and property inspectors.

3.2.2: Encourage repair and pumpout logs be kept by homeowners and/or maintenance providers

Authorized agents are encouraged to persuade homeowners and/or maintenance providers to maintain repair and pumpout logs, which may consist of proof of a valid maintenance contract, for their facilities. The logs should describe repair and pumpout data for the previous five years. Authorized agents may choose to require such logs by way of updates to their permit regulations. Homeowners and/or maintenance providers are encouraged to allow potential homebuyers to review the logs upon request. Homeowners and/or maintenance providers are encouraged to provide the logs or a copy of the logs to new homeowners upon transfer of property. Homebuyers will be given flyers or information sheets, possibly by real estate agents or property inspectors, that provide information about what a homebuyer or new owner should look for in the logs.

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3.2.3: Coordinate with real estate industry

H-GAC, authorized agents, and other entities shall, as resources are available, provide education opportunities to real estate agents, property inspectors, and consumers about identification and consequences of inadequate maintenance and the failure of OSSFs. The Texas Real Estate Commission requires property inspections at the time of sale, specifies education and certification requirements for licensed real estate salespersons and inspectors, and develops forms for use during sales and inspections. Each of these items can be modified to provide additional resources for homeowners related to their septic systems.

3.2.4: Additional actions

The TCEQ, authorized agents, and other parties are encouraged to develop actions to increase maintenance of OSSFs, including more inspections, incentives for proper maintenance, and requirements that systems must be maintained by a maintenance company or a trained homeowner. The TCEQ is encouraged to suspend or revoke licenses and registrations of poorly performing installers and maintenance providers.[69] As resources are available, H-GAC and other stakeholders shall work to develop continuing education opportunities regarding OSSF regulations and enforcement for district attorneys and justices of the peace to increase prosecution of OSSF violations.

Implementation Activity 3.3: Legislation and Other Regulatory Actions

The BIG recommends consideration of the following changes to Texas legislation, rules, and agency policy.

3.3.1: Model Order, Ordinance, or Resolution

The TCEQ is required to provide a model order, ordinance, and resolution that can be used by authorized agents to meet the minimum requirements of OSSF laws and rules.[70] The TCEQ should maintain a list of more stringent local rules that have been adopted. Authorized agents are encouraged to adopt more stringent local rules as appropriate.

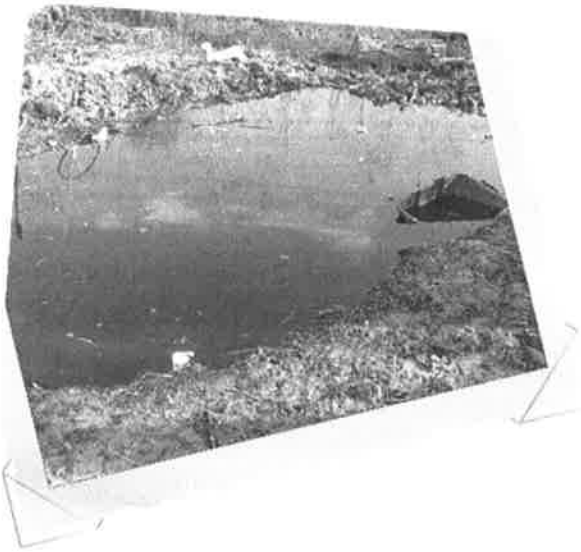
3.3.2: Biennial Review

The TCEQ shall consider providing a biennial forum to consider changes to legislation, rules, policies, and guidance relating to management of OSSFs. As part of this forum, the TCEQ shall discuss and consider appropriate mechanisms for funding OSSF programs.

[69] See 30 Tex. Admin. Code § 285.65 (2011) (Suspension or Revocation of License or Registration)

[70] See 30 Tex. Admin. Code § 285.10

Note: Appendix E provides information about more stringent regulations enacted by authorized agents in the Houston-Galveston region.



Illicit Discharges and Dumping

6

Summary

Illicit discharge detection efforts have found illegal connections, discharges, and dumping activities resulting in illegal bacterial loads entering in the project area's storm sewer and watershed. BIG stakeholders have widely cited septic waste haulers as a source of contamination when transport waste from OSSFs and grease and grit traps are not properly disposed. While regulations dictate proper methods for disposing of waste at treatment facilities and recording information on manifests, evidence indicates illicit discharges and illegal dumping occurs. Because these discharges can happen in so many locations, there are no flow-adjusted estimates for waste hauler contributions to bacteria levels in area waterways.

In response to these concerns, the BIG recommends that stakeholders focus on three activities: 1) detect and eliminate illicit discharges specific to bacteria; 2) improve local government mechanisms to regulate and enforce illicit discharges; and, 3) monitor and control waste hauler activities through regulations and fleet tracking programs.

The Illicit Discharges and Dumping Workgroup met jointly with the OSSF Workgroup on March 23, 2017. Thirteen stakeholders discussed the challenges facing waste hauler tracking and ensuring waste makes it to a proper disposal site. Attendees suggested continuing efforts to document illegal dumping, identifying locations to install motion sensing cameras, developing a CWI workshop on illegal dumping and use of cameras, and revising the MS4 survey to include questions regarding tracking of honey trucks

2017 Focus

- H-GAC and BIG stakeholders aim to
  - Identify a local government to implement a pilot tracking program;
  - Host a CWI workshop on illegal dumping and use of tracking cameras; and
  - Conduct a survey of MS4 Phase II operators, including questions covering illicit discharge detection activities and tracking of honey trucks.

Implementation Strategies

6.1 Detect and Eliminate Illicit Discharges

Interim Measures:

- *Within 10 years, MS4 operators will complete initial surveys and maps.*
- *Each year, MS4 operators will identify the number of illicit discharges found and resolved each year.*

Project Status

Not Started	Behind Schedule	– This activity is On Schedule to meet the 10-year target. Current TPDES MS4 permits require permittees complete surveys and develop maps. Additional effort is needed to routinely capture the number of illicit discharges identified and resolved by MS4 Phase II operators each year.
Initiated	**On Schedule**	
In Progress	Ahead of Schedule	
Completed		

Implementation Effort

- **Compliance and Enforcement.**
  - The Joint Task Force (Harris County, City of Houston, and HCFCD) continue illicit discharge detection and elimination (IDDE) programs to identify and track illicit discharges. Maintaining strong IDDE programs is likely one reason for the declining bacteria seen in the BIG project region (Appendix B).
  - H-GAC supports the Environmental Enforcement Assistance and Education website that maintains resources to assist enforcement officials to better enforce existing environmental laws, including illegal dumping - http://www.h-gac.com/community/environmental-enforcement/default.aspx.
- **IDDE Investigations.**
  - Bayou Preservation Association continued, with the assistance of the City of Houston, to conduct a source identification and elimination project. BPA presented to BIG stakeholders on August 1, 2017. For more details, see Section 11. Geographic Priority Framework.
  - In 2016, H-GAC with a grant from the Galveston Bay Estuary Program, continued an IDDE project in the BIG Project Area using the Top Ten Most Wanted/Top Ten Least Wanted Lists.
- **IDDE Reporting.**
  - CleanBayous.org maintains an illegal dumping notification system used to notify participating small MS4s for correction.
  - HCFCD maintains a Citizen's Service Hotline and verifies reports of illicit discharges to HCFCD facilities and coordinates elimination with enforcement agencies in appropriate jurisdictions.
  - Galveston Bay Action Network is an online resource for reporting fish kills, spills, SSOs, and other incidents (www.galvbay.org/gban).

Figure 76. BPA interns conducting a water quality investigation of P138 in Halls Bayou.

6.2 Improve Regulation and Enforcement of Illicit Discharges

Interim Measures:

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

Project Status

Not Started	Behind Schedule	*– This activity is On Schedule to meet the five-year target.*
Initiated	**On Schedule**	
In Progress	Ahead of Schedule	
Completed		

Implementation Effort

- **Compile MS4 Regulations.**
  - H-GAC, along with the BIG, will continue to compile a list of ordinances and add them to ordinances currently available on the BIG website. (www.h-gac.com/community/water/tmdl/big/workgroups/illicit-discharges-and-dumping-workgroup.aspx)
  - Harris County and the City of Houston reported that their regulations are publicly available on their respective websites and at Clean Water Clear Choice. (www.cleanwaterways.org/downloads/)

6.3 Monitor and Control Waste Hauler Activities

*Interim Measure: **Within five years, one waste hauler fleet tracking pilot program shall be started by local stakeholders.***

Project Status

Not Started	**Behind Schedule**	*– This activity is Behind Schedule to meet the five-year target. BIG partners have yet to identify a local program interested in starting a pilot program.*
Initiated	On Schedule	
In Progress	Ahead of Schedule	
Completed		

Implementation Effort

- **Education.**
  - H-GAC host the Environmental Enforcement Roundtable which meets regularly to discuss ways to enhance enforcement activities.
  - Workshop – H-GAC hosted "Strategies to Stop Illegal Disposal," on 12/1/2016.
- **Tracking**.
  - The City of Houston reported that it maintains a successful waste hauler tracking program and reviews waste hauler receipts during inspections at WWTFs.
  - Illegal Dumping Surveillance Camera Sharing Program. H-GAC, with administering agencies, Fort Bend, Galveston, and Walker counties, maintains a camera resource sharing program for local governments. Cameras are only used for illegal dumping enforcement. (www.h-gac.com/community/environmental-enforcement/ illegal-dumping-surveillance-camera-sharing-program.aspx)

Implementation Strategy 6.0: Illicit Discharges and Dumping

Illicit discharges and dumping illegally introduce contaminants into waterways. Sources include illicit discharges and connections to storm sewers, as well as direct discharges and dumping to the water body itself. While a wide variety of sources may introduce contaminants to a water body, the following implementation activities specifically address bacterial contamination, both mobile and stationary.

Many of the TMDLs in the BIG region indicate that illicit discharges and dumping account for significant dry-weather bacteria loadings. Outfalls in Buffalo and Whiteoak bayous TMDL have bacterial *E. coli* loads ranging from 7.43 X 10^5 to 2.21 X 10^{11} MPN/day.[87] In Whiteoak Bayou, these discharges represented the largest source of indicator bacteria loading.[88] Similarly, in Clear Creek, estimates indicate that between a quarter and a third of all outfalls have illicit dry-weather discharges, and that more than 20 percent of these had *E. coli* concentrations of over 1000 cfu/mL, more than eight times the in-stream standard.[89]

Stakeholders have expressed concern that mobile waste haulers may contribute bacteria directly to area bayous. Waste from septic systems, grease traps, and grit traps is hauled from its originating point. While regulations dictate this waste be properly transported and recorded on a manifest, anecdotal evidence raises suspicion that this waste may not always be properly disposed in a treatment facility.

Given the transitory nature of these discharges, there are no flow-adjusted estimates for their contributions. They have been a widely cited potential source among the project stakeholders. Sampling data, such as unexplained spikes in bacteria levels with no corresponding permitted outfalls or sources nearby, may help identify illicit discharge sources.

Programs to detect and eliminate these illegal discharges are an integral part of TPDES Phase I and II stormwater permits. As such, the activities discussed in this section may also be considered as part of Implementation Strategy 4.0. While all communities and jurisdictions will participate in implementation efforts, the extent to which these activities are applied may vary by individual need and ability.

Implementation Activity 6.1: Detect and Eliminate Illicit Discharges

Jurisdictions shall devise and implement a program, as they deem practicable, to detect and eliminate illicit discharges that assist them in identifying sources for further enforcement action. This implementation activity is similar to the programs required under stormwater permits, but with a

[87] (TCEQ 2009a)

[88] (TCEQ 2009a)

[89] (TCEQ 2008b)

specific focus on direct, bacteria-laden discharges. Existing illicit discharge programs can be modified to focus on bacteria.

Elements of the detection portion of the program may consist of:

- Conducting field surveys of waterways and associated drainage channels,
- Reviewing existing spatial data (geographic information system, engineering drawings, etc.) with on-site visual inspections of water body channels,
- Producing or revising a storm sewer map of all outfalls and the names and locations of all waters of the state that receive discharges from the outfalls,
- Producing or revising, to the level of detail that meets the specific need of the government entity, an initial record of located discharges for comparison against permitted discharges (stormwater outfalls, permitted industrial outfalls, etc.), and
- Reviewing, verifying, and updating the program and data on a regular basis.

Sampling data, where available, may help predict where unidentified illicit point sources may be located (such as unexplained spikes in bacteria levels with no corresponding permitted outfalls or sources nearby). Publicity and outreach efforts regarding these actions, indicating enforcement is imminent, will help promote self-enforcement by current or potential point source dischargers.

Next, the program will seek to eliminate illicit discharges to the extent allowable under state and local law and as resources allow. Entities will pursue elimination through their established methods. If the existing abilities to eliminate these discharges are deemed insufficient, the local entity shall expand their program as detailed in Implementation Activity 6.2, as appropriate. Several illicit discharge detection programs already exist and may be used as guides by stakeholders for developing or altering their approach.[90]

At least annually, local governments shall provide reports of how many illicit discharges have been found and how many have been eliminated. Provision of this information in a copy of an existing report is sufficient.

Implementation Activity 6.2: Improve Regulation and Enforcement of Illicit Discharges

To the extent allowable under state and local laws, an ordinance or other regulatory mechanism must be utilized to prohibit and eliminate illicit discharges. Each jurisdiction must also establish guidelines for enforcement for removing the source of an illicit discharge.

[90] An example, *A Guidance Manual for Identifying and Eliminating Illicit Connections Municipal Separate Storm Sewer Systems (MS4)*, is available online. (Galveston County Health District 2002)

Stakeholders are concerned current regulations and penalties often fail to act as deterrents, especially given a perceived low level of standardization and enforcement. Jurisdictions shall review and enforce existing regulations, or, as appropriate, develop or improve regulations relating to illicit discharges.

As resources are available, H-GAC shall compile local regulations and make the information available for other communities to emulate as appropriate. H-GAC will also facilitate coordination of standardization, as resources are available, possibly as part of the circuit rider program described in Implementation Strategy 4.0.

Implementation Activity 6.3: Monitor and Control Waste Hauler Activities

Waste haulers routinely transport bacteria-laden materials, including septic, grease trap, and grit trap wastes. When this highly concentrated, untreated waste is discharged into waterways instead of being properly disposed of or treated, it may represent a significant local increase in bacterial loading. Under this implementation activity, bacteria control will occur through the development of monitoring and control programs by individual communities and by a pilot program to monitor waste hauler fleets.

6.3.1: Develop regulations pertaining to waste hauler activities

While many jurisdictions have some degree of regulation regarding waste hauler activities, some programs have had greater success than others. Jurisdictions will, according to their needs and as practicable, create or update a program designed to monitor and control waste hauler activities. This program should integrate inspection and enforcement capacities in order to ensure the ability to provide a strong disincentive for non-compliance. State law[91] allows counties and municipalities to permit and regulate the activities of septic, grease trap, and grit trap waste haulers, up to and including criminal penalties for non-compliance. As resources are available, H-GAC shall compile and make available information about the most effective waste hauler programs.

The City of Pasadena's program, for example, requires all waste haulers have a license or permit, know the nature of their cargo, and maintain a manifest. The program sets forth penalties for violations of these and other requirements, including revocation of permits and monetary fines for each day of non-compliance.[92] Stakeholders may choose to pursue a regional approach to better track haulers who may operate in numerous jurisdictions. A previous regional project, the Environmental Enforcement Database Application (maintained from 2003-2008 as a pilot project by the H-GAC) shared secure

[91] See Tex. Health & Safety Code Ann. § 368 (2011) (Subchapter A - Transporters of Grease Trap, Sand Trap, and Septic Waste)

[92] See City of Pasadena, Tex., Code of Ordinances, ch. 37 (Water, Sewers and Sewage Disposal, Article VIII - Liquid Waste Generators and Transporters)

information for local enforcement agencies regarding waste hauler violations. A similar project may help individual entities identify and curtail violators.

6.3.2: Waste Hauler Fleet Tracking Pilot Program

To promote accountability and compliance among waste haulers, the BIG will consider pursuing a grant to develop a pilot program to install global positioning transponders and/or other apparatus or technology on the vehicles of waste haulers who have violated regulations relating to waste transport and disposal. H-GAC, the TCEQ, local jurisdictions, and waste companies would have access to the transponder feed to determine whether individual haulers are making unscheduled stops that may correlate to illicit discharges. Potential funding sources include EPA Section 319(h) nonpoint source program funding (via the TCEQ or the Texas State Soil and Water Conservation Board), State Revolving Fund monies through the Texas Water Development Board, and private foundations.

Management Measure 3.0: Boater Waste

Management Measure 3.1: Increase Access to Pump-Out Facilities, Enforce Existing Regulations, Enhance Outreach and Marketing, Designate Galveston Bay as Federal NDZ, Conduct Water Quality Monitoring in Marinas

The goal of this management measure is to reduce the amount of treated and untreated boater sewage discharged into Galveston Bay and its tributaries. While the focus of this I-Plan is on impaired oyster water segments, the Boater Waste Workgroup recommends broadening the efforts of this management measure to include Clear Lake and other tributaries heavily used by boaters. This source of pollution is transient in nature, so the Workgroup believes that targeting a broader audience through cohesive efforts will result in increased success. This includes collaboration among outreach groups (i.e. U.S. Coast Guard Auxiliary, Sail and Power Squadrons, TPWD Boater Education, etc.), environmental groups (H-GAC, GBEP, GBF, etc.), and government/enforcement agencies (U.S. Coast Guard, TPWD Game Wardens, city managers, etc.).

There are currently 32 marinas in the Galveston Bay/Clear Lake area (Table 14). Most marinas are located in the Clear Lake area, which has the third highest concentration of privately owned marinas in the United States (GBEP, 2004). This includes recreational boats and live-aboard boats. At this time, the Workgroup's best estimate is that marinas in the project area have a total capacity of 7,903 boats, including 6,695 wet slips and 1,208 dry boat storage slips (Clean Texas Marina Program, 2013). This number does not include the many canal communities that would add many more boats to that total. Specifically related to boats with the potential of having a marine sanitation device (MSD), 2013 Texas Parks and Wildlife boater registration data captures a total of 8,771 boats greater than 25 feet long in the counties surrounding Galveston Bay. Improper handling of human waste at any of the marinas can result in unauthorized discharges. This can cause elevated bacteria concentrations both within the marina area and in oyster water areas through the transport of bacteria by currents or boating activity. In addition, elevated bacteria concentrations could result from a large number of boaters discharging sewage into the bay itself, which directly affects the oyster waters. The Workgroup found that the extent to which boat sewage contributes to bacteria levels in the UGCOW is difficult to calculate due to the lack of data available regarding this source. In order to better understand this issue, the Workgroup will develop methods to collect data in order to determine boater waste impact on bacteria inputs to the project area.

The following is a summary of regulations and penalties that are applicable to the boater waste issue in Clear Lake and Galveston Bay. The full code references and language can be found in Appendix C.

- It is illegal to discharge untreated waste into any surface water in the state.
- It is illegal to discharge untreated or treated waste into Clear Lake or any other state or federally recognized no discharge zone.

- Treated and untreated sewage may be discharged into coastal waters from a point three nautical miles or further into the Gulf of Mexico.
- Boats equipped with a Type I or II MSD (those with some level of treatment and no holding tank) must secure their y-valve and/or main discharge valve to prevent discharge of sewage while in a no discharge zone.
- Boats equipped with a Type III MSD (those with no treatment and a holding tank) must secure their y-valve and/or main discharge valve unless located three or more nautical miles in the Gulf of Mexico, and dispose of sewage at an approved pump-out facility.
- All MSDs and pump-out facilities must be certified every two years through the TCEQ's Clean Water Certification Program: (https://www.tceq.texas.gov/field/cleanwatercert/boatsdisposalrule.html)
- Violating or failing to comply with these rules is a Class C Parks and Wildlife Code misdemeanor and a separate offense is committed each day a violation continues. Violators may be assessed a fine of up to $500 per day.
- A game warden or any peace officer certified as a marine safety enforcement officer may enforce these rules.
- If a marine safety officer reasonably suspects that a boat is illegally discharging sewage, they may (if the owner or operator is aboard) board the boat to inspect the MSD and test the system for compliance by flushing a dye tablet.

Increase Access to Pump-Out Facilities

The Workgroup and local boating community widely agree that Galveston Bay and Clear Lake need more pump-out facilities. Local government entities will be encouraged to pass an ordinance requiring marinas to provide a pump-out if certain conditions are met. Those conditions will be determined as more research is done and information becomes available. One example would be to require a pump-out station for every 200 boats in a marina that are 26 feet or larger (U.S. EPA, 1985). Another example is an ordinance that the City of Seabrook passed in 2010. Section 80-269 states, "every marina with more than ten slips, or with more than 200 linear feet of mooring at bulkheads or piers, shall provide an approved dump station for sanitary sewage. Approved dump stations include mobile facilities." A mobile facility refers to a piece of on-site equipment (i.e. limited capacity pump-out cart) at the marina, not to mobile pump-out companies. Seabrook has expressed their support of improving water quality and their intent to collaborate with GBF and the Workgroup to ensure that this ordinance is being followed. Moving into the future, the city anticipates researching and working toward formulating ordinances that will help protect water quality, such as requiring that new marina developments install stationary pump-out facilities (not allowing mobile facilities to be the only pump-out on-site), and requiring visible signage throughout marinas to educate boaters of discharge regulations, enforcement contact information, and available pump-out facilities. The Workgroup will collaborate with the City of Seabrook by providing supporting information as they work to enforce their existing

ordinance, as well as make recommendations as they develop new ordinances. The Workgroup will use the City of Seabrook as a positive local example of how municipalities can assist in reducing bacteria in Galveston Bay and encourage other local governments to follow suit.

To date, there are thirteen public and three private pump-out facilities, only six of which are located in Galveston Bay. Additionally, there are three mobile pump-out companies (Figure 10). With the potential of having over 8,000 vessels traveling throughout the Clear Lake/Galveston Bay area, the Workgroup and local boating community overwhelmingly believe that more pump-out facilities are needed. The asterisks in the "Pump-Out" column of Table 14 indicate the marinas and other waterfront locations at which the Workgroup recommends installing pump-out stations based on the number and size of boats in the marina, and/or its navigability. If accomplished, this would result in ten new pump-out stations across the Galveston Bay system. The Boater Waste Workgroup will open discussions with the local jurisdictions and marinas to solicit their support to add pump-out facilities where they are most needed. An effort will be made to seek funding to increase the number of pump-out facilities in the area. For example, the Workgroup will assist these entities in applying for Clean Vessel Act (CVA) grants that are available through TPWD, which can fund up to 75% of installation of the public pump-out facilities. This grant funding comes directly from taxes on fishing and boating supplies to the Sport Fish Restoration and Boating Trust Fund. The taxes go back into improving the environments that support these recreational activities. Additionally, the Workgroup recommends that marinas build the cost of installing and maintaining pump-out facilities into their slip fees, which many already do in order to provide this "free" service to their tenants.

Enforce Existing Regulations

The Workgroup believes that enforcement of existing laws and regulations needs to become a local priority, particularly in Clear Lake, where a federal NDZ designation already exists (Figure 10). An increase in enforcement will help decrease the amount of sewage discharged from boats. One recommended effort is to capture data from the U.S. Coast Guard, as well as Galveston and Harris County TPWD Game Wardens regarding their current inspection activities and coordinate with them for increased inspection efforts in marinas. Additionally, the Workgroup recommends facilitating training for Galveston and Harris County TPWD Game Wardens on marine sanitation devices and how to easily incorporate this knowledge into their existing vessel inspection checklist based on successful enforcement efforts by Game Wardens on Lake Texoma. Finally, improved communication between enforcement agencies and those engaged in education and outreach is needed in order to better understand each other's roles and how their uniquely focused efforts contribute to reducing sewage discharges and improving water quality. GBF is leading this communication effort through a Clean Vessel Committee, which will meet on at least a semi-annual basis.

One issue regarding enforcement that has been identified is that many of these agencies receive very few, if any reported complaints of boat sewage dumping,

whereas GBF, marina management, mobile pump-out companies and those on the water see evidence and reports of non-compliant MSD equipment and dumping on a regular basis. The lack of reporting is likely due to citizens not being sure of where to report or how to submit useful reports, resulting in limited success in the follow-up response to their reports. GBF launched a beta Web tool in August 2012 called Galveston Bay Action Network (www.galvbay.org/gban) in order to help facilitate reporting and, based on lessons learned, is in the process of creating an improved application that will directly link reports via Web, Android, or iPhone applications to the appropriate authorities. The Workgroup believes that simplifying the reporting process through this app and educating citizens on how to report through available materials such as TCEQ's publication "Do You Want to Make an Environmental Complaint?" (GI-278), will lead to increased reporting and successful enforcement.

Enhance Outreach and Marketing

For each of these tasks, a strong education and outreach program is necessary for success. GBF has led a region-wide Boater Waste Education Campaign (Pump Don't Dump) since 2008, which began as a social marketing campaign and now consists of many on-the-ground components including hands-on volunteer and outreach programs for boaters of all ages. GBF will continue to collaborate with the Boater Waste and Policy and Outreach Workgroups on this outreach campaign and increase collaboration with GBEP's Back the Bay campaign on social marketing efforts. The Workgroup will also increase their communication with commercial boating operations to determine their concerns and needs in preparation for the NDZ. Partnerships will continue to be formed with marinas, in the project area as well as the U.S. Coast Guard Auxiliary, Houston Sail and Power Squadron, Galveston Bay Sail and Power Squadron, TPWD Boater Education, and Houston Safe Boating Council in order to build relationships and implement the Pump Don't Dump campaign through enhanced education efforts. More widespread and collaborative participation is needed in order to educate boaters about where public pump-out stations are located, to increase awareness of applicable marine sanitation codes and fines, and to capture more extensive data of outreach activities carried out by campaign partners. Finally, GBF staff will attend city council meetings, Rotary Club meetings, as well as other government entities, environmental organizations, and civic associations to present information about this management measure and will develop new educational materials for the campaign when necessary.

Designate Galveston Bay as Federal No Discharge Zone (NDZ)

The Boater Waste Workgroup will explore the possibility of submitting an application to the U.S. EPA to designate Galveston Bay as a federal NDZ (both treated and untreated sewage) (Figure 10). Under Section 312 of the CWA, U.S. EPA or States may establish no discharge zones in which the discharge of both treated and untreated sewage from all vessels into specified waters is prohibited. It is still legal to discharge treated boat sewage into Galveston Bay so it is not yet a NDZ, by definition.

The Workgroup believes that the most appropriate NDZ application for Galveston Bay is for waters that have environmental importance (CWA Section 312 (f)(4)(A)). Historically,

Galveston Bay accounted for about 90 percent of oysters produced in the state of Texas. This production has decreased over the years due to increasing salinities caused by droughts, making the oysters more prone to predation and parasites. Additionally, bacteria impairments in several segments and negative impacts from Hurricane Ike in 2008 have put pressure on Galveston Bay oyster fisheries. Currently, Galveston Bay supplies only about one-third of Texas' oysters, but they are still a key economic asset for the region (TPWD, 2013). In addition, oysters serve an important ecological role as filter feeders in the estuary influencing conditions such as water clarity and phytoplankton abundance. Oysters create reef habitats utilized by many other species and serve as an important indicator of the overall health of a bay ecosystem. However, only a few federal NDZ designations have been made under CWA Section 312 (f)(4)(A), so the Workgroup will also consider applying under Section 312 (f)(3), which is based on the water body having an adequate number of pump-out facilities.

Conduct Water Quality Monitoring in Marinas

The Boater Waste Workgroup recommends that baseline and long-term trend data be collected, and that focused sampling be carried out in marinas in order to determine the effectiveness of implementation efforts over time. The Environmental Institute of Houston (EIH) carried out a baseline study for TCEQ in 1993 in several marinas throughout Clear Lake and Galveston Bay, but no other data was collected in marinas until recently when GBF launched their volunteer Water Monitoring Team (a partner with Texas Stream Team) in 2012 and a volunteer sampling program for Enterococci in 2013. GBF will continue to run these programs in order to collect monthly ambient data, as well as conduct focused bacteria studies in several marinas. These studies will look at a variety of bacteria sources and variables (i.e. stormwater, birds, boat activity, marina design, etc.) in order to better understand the complex water quality challenges that can exist in marinas. Additionally, the Workgroup will seek funding in collaboration with EIH in order to repeat their 1993 study, if further data are needed.

Responsible Parties and Funding

The following parties are responsible for carrying out various components of this management measure:

- Boater Waste Workgroup
- Clean Texas Marina Program
- Clean Vessel Committee
- Clear Lake Marina Association
- Environmental Institute of Houston
- Galveston Bay Foundation
- Galveston Bay Sail and Power Squadron
- Galveston County Health District
- Harris County Pollution Control Services
- Houston Safe Boating Council
- Houston Sail and Power Squadron
- Individual boaters in the project area

- Individual marinas in the Clear Lake/Galveston Bay area
- Marina Association of Texas
- Marine Safety Officers
- Maritime Sanitation
- Maximum Marine Services
- Policy and Outreach Workgroup
- Redfish Island Marine
- Texas Commission on Environmental Quality
- Texas Department of State Health Services
- Texas Parks and Wildlife (Boater Education and Enforcement Division)
- U.S. Coast Guard Auxiliary
- U.S. Coast Guard Marine Safety Units

The Boater Waste Workgroup will seek financial assistance to support the proposed outreach activities and to assist with installing additional pump-out stations throughout the project area. Potential funding sources include the Texas General Land Office Coastal Management Program, Galveston Bay Estuary Program, Clean Vessel Act pump-out funds, Clean Water Act Section 319 Nonpoint Source Grant Program, Five Star and Urban Waters Restoration Grant Program, U.S. EPA - Gulf of Mexico Program, Supplemental Environmental Project funds, and foundation grants or corporate sponsorships.

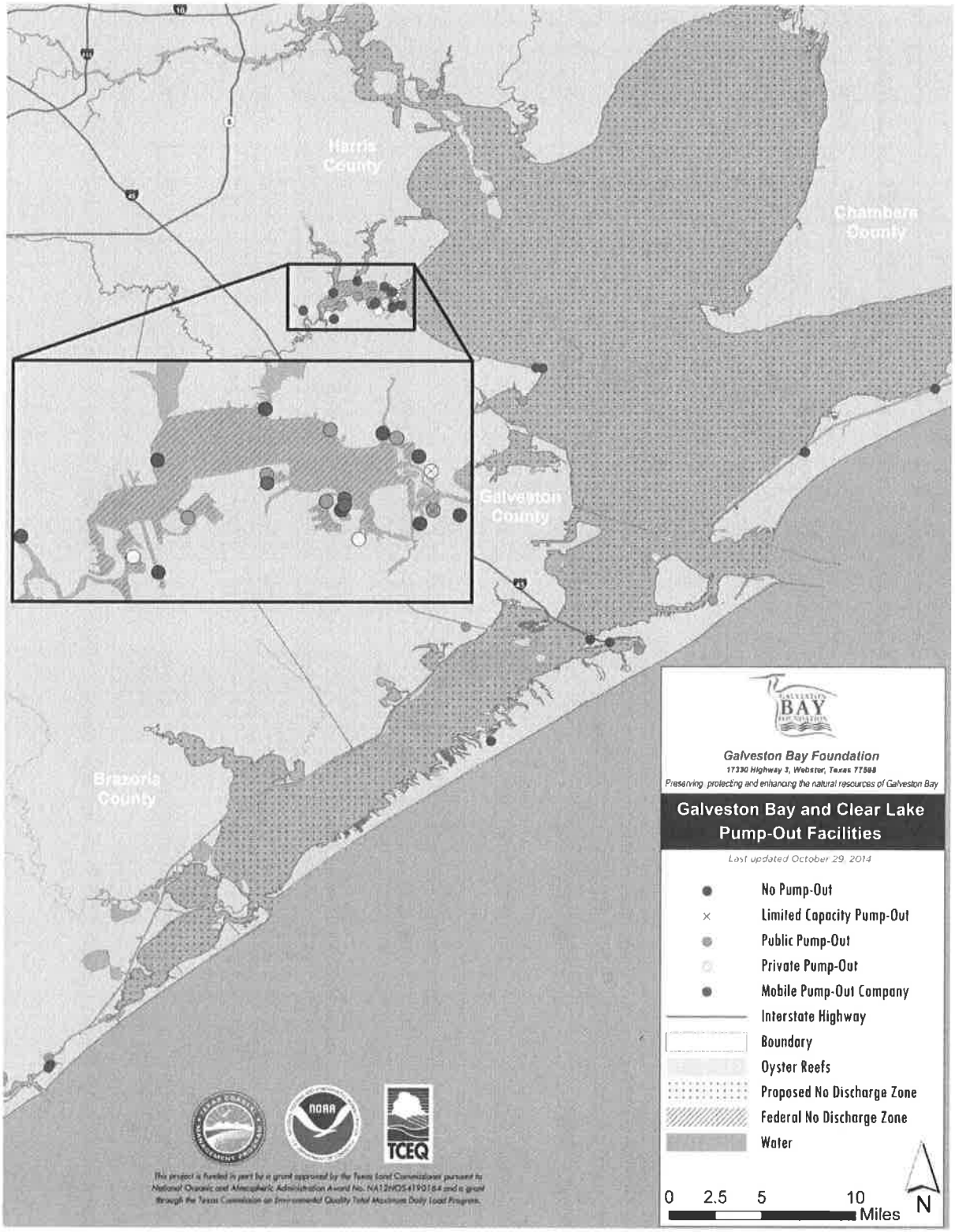


Figure 10. Galveston Bay and Clear Lake boat pump-out facilities (13 public, 3 private, 3 mobile)

Table 14. Marinas and Other Waterfront Locations in the Galveston Bay Area (Clean Texas Marina Program, 2013)

Marina Name and Location						Slips and Ramps			
Clear Lake						**Wet Slips**	**Dry Slips**	**Ramp**	**Pump Out**
Bal Harbor Marina	123 Lakeside Lane	Nassau Bay	TX	77058	(281) 333-5168	133	0	No	No*
Blue Dolphin Yachting Center, Inc.	P.O. Box 123	Seabrook	TX	77586	(281) 474-4450	237	0	No	No*
Clear Lake Marine Center, Inc.	P.O. Box 716	Seabrook	TX	77586	(281) 326-4426	161	0	No	No*
Constellation Point and Marina	451 Constellation	League City	TX	77573	(281) 334-2527	48	0	No	No
Endeavour Marina	3101 NASA Parkway	Seabrook	TX	77586	(832) 864-4000	0	380	No	Yes
Kemah Boardwalk Marina	555 Bradford Street	Kemah	TX	77565	(281) 334-2284	424	0	No	No*
Lakeside Yachting Center, Inc.	2511- B Nasa Rd. 1, Ste. 101	Seabrook	TX	77586	(281) 326-5547	75	0	No	No
Lakewood Yacht Club	2425 Nasa Parkway	Seabrook	TX	77586	(281) 474-2511	300	0	Yes	Yes
Legend Point (private)	1300 Marina Bay Drive	Clear Lake Shores	TX	77565	(281) 334-3811	254	0	No	Yes
Marina Bay Harbor Yacht Club	P.O. Box 478	Kemah	TX	77565	(281) 535-2222	0	280	No	No
Marina Del Sol	1203 Twin Oaks Boulevard	Kemah	TX	77565	(281) 334-3909	265	195	No	Yes
Nassau Bay Yacht Club	1120 Nasa Pkwy, Ste. 109	Nassau Bay	TX	77058	(281) 333-2570	40	55	Yes	No
Portofino Harbour	One Portofino Plaza	Clear Lake Shores	TX	77565	(281) 334-6007	212	0	No	Yes
Seabrook Marina Inc.(private)	1900 Shipyard Drive	Seabrook	TX	77586	(281) 474-2586	500	135	No	Yes
South Shore Harbour	2551 South Shore Blvd., Ste B	League City	TX	77573	(281) 334-0515	858	0	No	Yes
Waterford Harbor Marina	800 Mariners Drive	Kemah	TX	77565	(281) 334-4400	640	0	No	Yes
Watergate Yachting Center	1500 Marina Bay Drive	Clear Lake Shores	TX	77565	(281) 334-1511	1000	0	No	No*
Wharf at Clear Lake (WSMA) (private)	P.O. Box 1208	League City	TX	77574	(281) 334-5976	205	0	Yes	Yes

*Workgroup recommends pump-out facility be installed based on the number and size of boats in the marina, and/or its convenient access

Marina Name and Location						Slips and Ramps			
Galveston Bay						**Wet Slips**	**Dry Slips**	**Ramp**	**Pump Out**
Bayland Marina	2651 S. Highway 146	Baytown	TX	77520	(281) 422-8900	150	0	Yes	Yes
Eagle Point Fishing Camp, Inc.	Route 1 Box 1718	San Leon	TX	77539	(281) 339-1131	37	46	Yes	No
Galveston Yacht Basin	715 North Holiday Dr.	Galveston	TX	77550	(409) 762-9689	500	300	Yes	Yes
Harborwalk Marina	P.O. Box 2328	League City	TX	77574	(409) 935-3737	156	0	Yes	Yes
Houston Yacht Club	3260 Miramar Drive	Shoreacres	TX	77571	(281) 471-1255	187	100	Yes	Yes
Payco, Inc.	501 Blume Drive	Galveston	TX	77554	(409) 744-7428	150	0	No	No*
Pelican Rest Marina	7819 Broadway	Galveston	TX	77554	(409) 744-2618	33	0	No	No*
Pirates Beach Bait & Tackle	14302 Steward Road	Galveston	TX	77554	(409) 737-3635	25	0	Yes	No
Ray's Marina	6310 Herds Lane	Galveston	TX	77551	(409) 744-2111	26	0	No	Yes
Gulf Intracoastal Waterway						**Wet Slips**	**Dry Slips**	**Ramp**	**Pump Out**
Bolivar Yacht Basin	1283 West Boyt Road	Port Bolivar	TX	77650	(409) 684-7777	35	0	Yes	No
Bridge Harbor Yacht Club	411 Sailfish Avenue	Freeport	TX	77541	(979) 233-2101	300	0	No	Yes
Gulf Coast Marina	135 Shark Lane	Surfside Beach	TX	77541	(979) 239-1502	0	100	No	No
Stingaree Marina	1297 N. Stingaree Drive	Crystal Beach	TX	77650	(409) 684-9530	8	0	Yes	No
Surfside Marina	827 Gulf Road	Surfside Beach	TX	77541	(979) 230-9400	34	245	No	No*

*Workgroup recommends pump-out facility be installed based on the number and size of boats in the marina, and/or its convenient access

Other Waterfront Locations						Slips and Ramps			
Clear Lake						**Wet Slips**	**Dry Slips**	**Ramp**	**Pump Out**
Blue Marlin Fuel Dock	1900 Shipyard Drive	Seabrook	TX	77586	(281) 291-7497	6	0	No	No*
Star Fleet Yachts	280 Grove Road	Kemah	TX	77565	(281) 334-4692	0	0	No	No*
Galveston Bay						**Wet Slips**	**Dry Slips**	**Ramp**	**Pump Out**
Topwater Grill	815 Avenue O	San Leon	TX	77539	(281) 339-1232	20	0	Yes	Yes

*Workgroup recommends pump-out facility be installed based on the number and size of boats in the marina, and/or its convenient access

Measurable Milestones

In Year One, the Workgroup will continue to survey and collect data in order to determine boater waste impact on bacteria inputs to the project area. This information will be compiled and submitted in a request to the TCEQ to apply to the U.S. EPA to make Galveston Bay a federal NDZ. Discussions will continue with local municipalities, enforcement agencies, marinas, and boaters in order to get support for the effort to make Galveston Bay a federal NDZ, to encourage installing more pump-out stations, and to pass an ordinance requiring pump-out stations in at least one municipality. The Boater Waste Workgroup will continue collaborating with the Clean Vessel Committee, and seek funding for additional pump-out stations, additional training workshops for marine officers, and additional educational and outreach materials. Partners will update the larger stakeholder group at an annual stakeholder meeting.

In Years Two, Three, and Four, the Workgroup will continue to garner support for the federal NDZ designation and get it approved, gain support to pass another ordinance in a different local government entity, and add one new pump-out at another key location. The Boater Waste Workgroup will continue collaborating with the Clean Vessel Committee, and seek funding for additional pump-out stations, additional training workshops for marine officers, and additional educational and outreach materials. Partners will update the larger stakeholder group at an annual stakeholder meeting.

In Year Five, partners will evaluate the effectiveness of implementing this management measure and make appropriate adjustments.

Table 13 provides additional details for Management Measure 3.1. Appendix A provides the schedule of implementation.

Table 15. Boater Waste Management Measure 3.1

(1) **Management Measure**	(2) **Potential Load Reduction**	(3) **Technical and Financial Assistance Needed**	(4) **Education Component**	(5) **Schedule of Implementation**	(6) **Interim, Measurable Milestones**	(7) **Progress Indicators**	(8) **Monitoring Component**	(9) **Responsible Organization**
Nonpoint Sources from Boater Waste								
Management Measure 3.1: Increase Access to Pump-Out Facilities, Enforce Existing Regulations, Enhance Outreach and Marketing, Designate Galveston Bay as Federal NDZ, and Conduct Water Quality Monitoring in Marinas	This TMDL calls for a concentration-based target of 0 CFU per 100 mL	**Technical:** Assistance from the Coast Guard Auxiliary/Game Wardens to train marine officers Work with the TCEQ to develop an application for federal NDZ designation **Financial :** Grant funding, loans, and existing local funding as available	Education and outreach to marinas to install pump-outs, adopt BMPs and participate in volunteer water quality monitoring Education and outreach to jurisdictions to require pump-out stations at marinas with certain conditions Workshop to train marine officers	**Year 1:** Survey/collect data to determine impacts Continue promoting NDZ and adding pump-out stations through education and outreach Discussions with marina owners and various jurisdictions Marine officers increase enforcement efforts Begin federal NDZ application process **Years 2, 3 and 4:** Final approval of application for federal NDZ Pass one ordinance and add one pump-out per year Marine officers increase enforcement efforts **Year 5:** Evaluate the effectiveness of the MM	Plan of action created to facilitate establishment of federal NDZ Discussions being held with local governments to establish new ordinance Discussions being held with marinas to install pump-outs Volunteer monitoring carried out in marinas Continued tracking and improvement of outreach campaign	Reduction in fecal coliform concentrations Establishment of federal NDZ Number of new pump-out stations and ordinances Increased enforcement efforts Quantity of educational materials distributed Volunteer monitoring sampling plan or QAPP Number of marinas monitored for water quality	Routine water quality monitoring by TDSHS and TCEQ Volunteer monitoring in marinas via GBF Water Monitoring Team (through Texas Stream Team program)	Recommend that TCEQ assist in applying for federal NDZ Recommend that local jurisdictions develop new ordinances and marinas increase pump-out stations GBF will meet with stakeholders and public officials to get support for federal NDZ Workgroup will continue outreach campaign Recommend that TPWD provides increased training to local Game Wardens and that all enforcement agencies increase enforcement efforts