

FINAL REPORT

Project Name: Boater Waste Education Campaign

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Project Description

Boat sewage, one of the primary sources of fecal bacteria found in Galveston Bay, can be a public health risk for oyster consumption and contact recreation in areas where localized bacteria levels are heightened from the illegal discharge of boater waste. Despite the Galveston Bay and Clear Lake areas having 16 pump-out facilities, two of which are mobile pump-out boats, some boaters continue to discharge raw sewage from marine heads directly into bay waters. In large part, illegal boater waste discharge is the result of a lack of enforcement and understanding of potential environmental and public health impacts.

The intent of Boater Waste Education Campaign (BWEC) was to directly improve water quality in Galveston Bay by collecting and communicating environmental data to the boating community, working with marinas and cities to install pump-out facilities throughout the Bay, encouraging a decrease in illegal dumping of sewage by boaters, and collaborating with authorities to increase enforcement of illegal boater waste discharges. Galveston Bay Foundation (GBF) has received CMP funding to support the BWEC for over ten years. During this time, GBF has made huge strides in raising awareness of environmental and public health concerns resulting from illegal dumping through their numerous public education programs.

GBF used CMP Cycle 23 funds to expand the number and distribution of available pump-out facilities for recreational vessels in Galveston Bay, incorporate community-based social marketing strategies into outreach efforts, increase boater waste reports and enforcement via the Galveston Bay Action Network (GBAN), analyze and publicize volunteer collected water quality data and boater survey results, and collaborate with commercial boaters and government agencies to encourage support for a Galveston Bay No Discharge Zone designation. Additionally, GBF maintained the licensing of the GBAN app and website, and expanded outreach and education efforts for this pollution reporting tool.

Task 1: Maintain Active Stakeholder Groups and Marketing/Outreach Materials

GBF engaged stakeholders through workgroup meetings, individual engagement, and through the creation and distribution of marketing and outreach materials. COVID-19 and subsequent Stay-At-Home advisories led to the cancellation or postponement of many meetings and events starting on March 15, 2020; however, GBF worked with project partners to come up with digital solutions that could be implemented within the bounds of Center for Disease Control (CDC) distancing recommendations.

1.1 Boater Waste Workgroup

During this project, GBF continued to facilitate quarterly stakeholder workgroup meetings, in which local representatives and stakeholders provided recommendations and guidance on key project messages and performance indicators, as well as on water quality survey data collection and analytical strategies. The workgroup members consisted of representatives from the Galveston Bay Estuary Program (GBEP), local marinas and yacht clubs, local municipalities, County Officials, Houston-Galveston Area Council, local recreational boaters, Maritime Sanitation, and other local organizations and groups. The insight provided by the various workgroup members have been instrumental in effective programming, messaging, and implementation. An updated workgroup roster, meeting schedule, and workgroup recommendations are outlined in Appendix 1. The complete schedule of workgroup meetings during this project period is shown below.

- GBF hosted a Boater Waste Workgroup meeting on November 14, 2018
- GBF hosted a Boater Waste Workgroup meeting on February 28, 2019.
- GBF hosted a Boater Waste Workgroup meeting on August 29, 2019.
- GBF hosted a Boater Waste Workgroup meeting on February 26, 2020
- GBF held a digital Boater Waste Workgroup Meeting on May 21, 2020.

1.2 Development of Initiatives and Stakeholder Engagement

GBF continued to engage with new marina partners and stakeholders, and established partnerships with a variety of local groups and organizations to ensure boater waste topics were addressed. Among the regular groups of stakeholders, GBF was an active participant in the workgroups and subcommittees listed below. Through these workgroups, GBF was able to share progress made towards a reduction of boater waste, hear about other ongoing projects with similar goals, and continue to build relationships with potential project partners and stakeholders:

- GBEP Public Participation and Education (PPE) Subcommittee
- GBEP Monitoring and Research (M&R) Subcommittee
- GBEP Water and Sediment Quality (WSQ) Subcommittee
- Central Texas Coastal Area Committee (CTCAC)
- Harris-Galveston Area Council (H-GAC) Bacteria Implementation Group (BIG) Coordination and Policy Workgroup
- H-GAC BIG Wastewater Workgroup
- H-GAC BIG Stormwater Workgroup
- H-GAC BIG OSSF and Illicit Discharge Workgroup

- H-GAC Coastal Communities Toolkit Workgroup
- Houston Advanced Research Center (HARC) Partners in Litter Prevention (PLP) Removal Workgroup
- HARC PLP Communication Workgroup
- Plastic Pollution Prevention Partnership
- Galveston Island Nature Tourism Council

GBF additionally met individually with a range of local stakeholders, listed below, to discuss possible partnerships and share water quality data, boater waste educational materials, and invitations to participate in GBF BWEC programming. GBF staff communicated with various community members not included in the below list, as we were contacted to answer questions about various water quality related issues.

- Texas Corinthian Yacht Club
- Clear Lake Marina Managers Association
- Interim Director of Harris County Pollution
- Highland Bayou Watershed Protection Plan
- Bayou Vista Water Quality Committee
- Interested stakeholders in San Leon
- GBF membership
- Houston Conchology Society
- One Water Summit
- Lower Trinity Master Naturalist chapter
- GBF rain barrel workshop audiences
- Port of Galveston
- Marina del Sol
- Kemah Elks Lodge
- Gulf Coast Ocean Observing System Board
- Marina Association of Texas Annual Symposium
- City of Galveston
- Dolphin Research and Conservation Program
- Clear Lake Water Authority
- City of League City
- 2020 Virtual River Rally and River Network
- Lakewood Yacht Club
- Clear Lake Marina Association (CLMA)
- Texas Commission on Environmental Quality (TCEQ) Stormwater Division.
- “The Recreational Boater Information Guy”
- White Oak Bayou Association
- Moody Gardens and the Colonel Paddlewheel
- Bolivar Beach Patrol
- Salt-Water Recon
- Sea Star Base Galveston Community Sailing Center

1.3 Marketing and Outreach Materials

During this period marketing materials were maintained, distributed, and updated as needed for all various programs in the BWEC, including GBAN, the GBF Water Monitoring Team (WMT), the Dockwalkers Program, and the Pump Don’t Dump campaign. The digital and printed materials described below are available in Appendix 1. Distribution of the materials is discussed in depth under Task 2.

- In late 2018, GBF ordered GBAN magnets and stickers to promote pollution reporting in the region.

- In June 2019, GBF printed WMT “business cards” for the WMT volunteers to distribute to passersby interested in their work and findings.
- GBF contracted the services of a graphic designer to develop new graphics and information products from the water quality data collected by GBF’s water monitoring team. This work was completed in October 2019.
- In the spring of 2020, GBF created a new GBAN Infographic to share on social media and with partner organizations’ online resources
- In the summer of 2020, GBF created new GBAN and BWEC stickers and infographics to ensure that the project goal of sharing these resources and tools are continued past the project period.
- GBF created multiple pieces of digital content throughout the project period, regarding GBAN, boater waste, water quality in Galveston Bay, bacteria, Pump Don’t Dump, and non-point source pollution, including social media posts, educational videos, and infographics.

Deliverables for this task are attached in Appendix 1, and include the following:

- List of recruited stakeholder workgroup members, submitted September 10, 2019 and reattached for reference.
- Meeting schedule and locations, submitted September 10, 2019 and reattached for reference.
- Performance indicator recommendations from workgroup, submitted September 10, 2019 and reattached for reference.
- Copies of new marketing/outreach materials both locally and statewide, attached.
- Summary of campaign expansion efforts with other boater groups, attached.

Task 2: Develop Social Marketing and Behavior Change Plan

2.1 Social Marketing and Behavior Change Plan

GBF prepared a Social Marketing and Behavior Change Plan to better understand why commercial and recreational boaters either do or do not comply with discharge regulations. This plan was submitted on December 10, 2018 and is included in the report in Appendix 2. Results of the research findings identified channels for outreach events, presentations, workshops, and marketing materials in order to have the most effective and efficient impacts to boater waste issues. GBF staff additionally started an internal Inclusive Community Engagement working group to work towards outreach being more inclusive of a diverse audience.

2.2 Community Engagement and Outreach

During this project period, community engagement and outreach was implemented as identified and described in the Social Marketing Plan, including the creation of print and digital media, outreach events and presentations, volunteer programs, public events, and through leveraging campaign partners. Workgroup members and campaign partners assisted with this promotion through inviting GBF to outreach events, presentations, and through distributing campaign materials at their own booths and events. COVID-19 and subsequent Stay-At-Home advisories led to the cancellation or postponement of many planned outreach events starting on March 15, 2020; however, GBF came up with creative digital solutions that could be implemented within the bounds of CDC distancing recommendations. During this cycle, GBF staff promoted the BWEC programs at 159 different events and directly reached over 8,000 individuals. A table of all events can be found in Appendix 2. The community engagement and outreach efforts completed during this project period are outlined below.

Digital and Print Materials

GBF promoted the BWEC materials through print and digital advertising throughout the life of the project. This includes the distribution of the BWEC printed materials described in Task 1, engagement of community members at public outreach and boating events, and through the creation and sharing of digital content:

- GBF staff regularly distributed BWEC materials to the following libraries for increased community outreach and visibility:
 - LaMarque Public Library
 - Friendswood Public Library
 - Tom Reid Library
 - Evelyn Meador Library
 - Parker Williams Public Library
 - Bracewell Neighborhood Library
 - Park Place Regional Public Library
 - South Houston Branch Library
 - Rosenberg Library
 - Hitchcock Public Library
 - Mae S Bruce Public Library
 - Dickinson Public Library
 - Moore Memorial Public Library
- Additional materials were distributed to the following business:
 - Redfish Marine
 - Kemah's Elks Lodge
 - Several REI locations
 - Keep Dickinson Beautiful

- Galveston Island Visitor Center
 - Clear Lake City Water Authority
 - Bolivar Peninsula Beach Patrol
 - Texas A&M Galveston
 - Moody Gardens
- GBF distributed BWEC campaign materials and engaged community members in conversation at the following public outreach or boothing events:
- Houston Museum of Natural Science's World Oceans Day
 - Houston Zoo's World Oceans Day
 - Artist Boat's World Oceans Day
 - World Oceans Day at Java Lava Brew
 - the Helen Hall Library Volunteer Bazaar
 - the SEACAP August meeting
 - GBF's Rain Barrel Workshops
 - GBF's education administrator workshop
 - UHCL's teacher workshop
 - the Creation Care Festival
 - Galveston Bay Report Card launch event
 - St. Arnold's Brewery Happy Hour
 - Waterford Marina Anniversary Dinner
 - League City Health Fair
 - Gatorfest
 - GBF's Adopt a Beach Event
 - Kemah Blessing of the Fleet
 - The Proletariat Public House
 - Exploration Green's Wetland Walkabout
 - Dickinson Public Library
 - The Wild About Houston Film Festival
 - Rotary Regatta on Clear Creek
 - San Jacinto College
 - Guardian of the Bay Awards Ceremony
 - State of the Bay Symposium
 - Dickenson Bayou Cleanup Event
 - Bike Around the Bay
 - Nassau Bay Street Eats Festival
 - Johnson Space Center' Health Fair
 - Houston Parks and Recreation Department Community Action Day
 - Galveston's Own Farmers Market
 - The Gulf Estuarine Research Symposium
 - Winter Texans Tradeshow in Galveston
 - On the Bay with Jeff Corwin on Moody Garden's Colonel Paddlewheel boat
 - Native Plant Society of Texas Fall Symposium
 - Mountain Ocean Project's Sounds for Ocean event and cleanup
 - North Pasadena Neighborhood Association monthly meeting
- Digital content created during this project period included:
- GBF staff contributed an interactive video tutorial for younger audiences to learn proper trash, recycling, and composting skills to the Bay Day Festival in May 2019. This can be found at <https://www.youtube.com/watch?v=hgSnfs2ENHI>
 - A cover story on the Galveston Bay Report Card website offered suggestions for individual and family behavior changes at home that reduce non-point source pollution during this time. This can be found at <https://www.galvbaygrade.org/cover-stories/2020/05/what-you-can-do-to-keep-the-bay-safe-while-youre-staying-safe/>

- GBF shared a post about trash reduction in the Bay impacting the Gulf of Mexico for World Oceans Day in June 2019.
- GBF joined the global Plastic Free July campaign in 2020 and created seven social media posts in July focused on trash & litter reduction initiatives and resources. These included a video of staff sharing their efforts for the month, which included reporting pollution on the GBAN app. This video can be seen here: https://www.youtube.com/watch?v=Au1X9MqgfC4&feature=youtu.be&fbclid=IwAR2cvMg-RB52rVRz011e5BAVI7rsbBQRaTRFpBE3liKav5VGeaKIJZG_nK8. The campaign also included a cover story about prevention and clean-up efforts people can join, and more. The GBAN tool was featured as a resource throughout this campaign's different engagement formats.

Outreach Events and Presentations

GBF promoted the BWEC through presentations to facilitate interactions and direct dissemination of BWEC information. An extensive list of these presentations is available in Appendix 2.

Of particular note, GBF staff was featured on the CW39 Morning talk show on July 10, 2019. GBF featured the GBAN app on the program. The segment can be viewed at: <https://cw39.com/2019/07/12/galveston-bay-is-beautiful-but-is-it-safe-meet-the-group-working-yearlong-to-ensure-that-it-is/>. Additionally, GBF participated in a press release hosted by Environment Texas on July 23, 2019 to discuss current bacteria trends in Galveston Bay and actions residents can take to improve water quality, including citing many resources available through the BWEC.

2.3 Marina, Boating Groups, and Agency Partnerships

Partnerships with boaters is a crucial part of the BWEC programming. They are the main audience to reduce waste in the Bay and function as GBF's eyes and ears on where potential sources of pollution may be. In addition to the individual meetings discussed under Task 1, GBF engaged recreational and commercial fishing and boating groups throughout the project period to discuss increasing participation in GBF programs and initiatives. This included attending Texas Mariners Cruising Association meetings to build new relationships with new businesses and communities and obtain pledges to Pump Don't Dump, leading water quality programming for Water Activity Day Events (WADE) hosted by the Houston Safe Boating Council, and promoting the reduction of boater waste at Clear Lake Marina Association Meetings.

2.4 No Discharge Zone

Based on feedback from stakeholders, boaters, and experiences during the BWEC campaign, GBF decided in June 2019 to pause efforts to update the No Discharge Zone (NDZ) draft and designate Galveston Bay as a federal No Discharge Zone. As outlined in the draft petition submitted with the Cycle 22 deliverables, the general sentiment in the area is that a federal NDZ would be supported by recreational boaters but ineffective in changing the behaviors of those who need it. The postponement of these efforts was due to concerns about effective enforcement, difficulty generating interest from state and federal agencies, and concerns about the efficiency of this measure as a means to reduce the amount of bacteria entering Galveston Bay. GBF's efforts for this measure will instead be directed at changing the local culture of enforcement and implementing the other measures to reduce discharge in Galveston Bay. Additional notes and justifications can be found in the draft petition submitted in Cycle 22's deliverables and summary of the NDZ meetings and stakeholders can be found in Appendix 2.

Deliverables for this task are attached in Appendix 2, and include the following:

- Outline of social marketing and behavior change plan, submitted December 10, 2018 and reattached for reference.
- Schedule of outreach and partnership activities, attached.
- Summary of NDZ meetings and stakeholder list, attached.

Task 3: Facilitate Boat Sewage Discharge Reporting and Response

In order to increase reporting and enforcement of boater waste discharge, GBF created GBAN. GBAN aims to educate citizens on how and where to report boat sewage discharges and other common water pollution incidents. The BWEC workgroup’s theory is that an increase in citizens reporting illegal discharges will further open the eyes of marina owners, boaters, and enforcement agencies to the reality of the boater waste issue compared to GBF and workgroup members receiving the reports via word of mouth and sending them informally to the enforcement agencies. Having a central location for citizens to submit reports also makes it easier on the citizens and provides regulatory agencies with quicker reporting of pollution events. The tool was initially launched as a mobile-optimized webpage in Cycle 18, and as a downloadable mobile app in Cycle 21. Cycles 22 and 23 focused on increasing awareness of the tool, increasing app downloads and pollution reports, and continuing maintenance activities. COVID-19 and subsequent Stay-At-Home advisories led to the cancellation or postponement of many meetings, training sessions, and events starting on March 15, 2020. GBF worked with project partners to come up with digital solutions that could be implemented within the bounds of CDC distancing recommendations; however, the number and types of opportunities to share the GBAN app changed due to this new challenge.

Throughout the project period, GBAN received a total of 87 reports. A graph showing the dates, location, and nature of these reports is available below.

Date of Incident	Pollution Type	Municipality
2018-09-03	Storm Drains	Galveston
2018-09-10	Storm Drains	Webster
2018-09-10	Sanitary Sewers	Webster
2018-09-14	Sanitary Sewers	Galveston
2018-10-28	Trash and Debris	Seabrook
2018-12-19	Discolored Water	Seabrook
2019-01-15	Oil Sheen	Aldine
2019-02-04	Trash and Debris	Houston
2019-02-10	Storm Drains	Houston
2019-02-19	Discolored Water	Unknown
2019-02-20	Sanitary Sewers	Houston
2019-02-21	Trash and Debris	Houston
2019-03-17	Unknown	La Porte
2019-03-30	Trash and Debris	Pasadena
2019-03-30	Trash and Debris	Brazoria
2019-03-30	Unknown	Jamaica Beach
2019-04-12	Sanitary Sewers	Galveston
2019-04-13	Oil Sheen	Kemah
2019-04-21	Chemicals	Houston
2019-04-25	Pet Waste	Bayou Vista
2019-05-07	Storm Drains	Beaumont Place
2019-05-29	Trash and Debris	La Porte
2019-05-29	Trash and Debris	La Porte
2019-06-07	Septic Systems	Brazoria
2019-06-11	Trash and Debris	Morgan’s Point

2019-06-23	Chemicals	Galveston
2019-06-27	Chemicals	Galveston
2019-06-27	Sanitary Sewers	Galveston
2019-07-14	Trash and Debris	Kingwood
2019-07-16	Unknown	Galveston
2019-07-30	Chemicals	Clear Lake Shores
2019-07-30	Storm Drains	Galveston
2019-08-02	Trash and Debris	League City / Galveston
2019-08-08	Unknown	Morgan's Point
2019-08-11	Storm Drains	League City / Galveston
2019-08-20	Trash and Debris	La Porte
2019-08-21	Trash and Debris	Cloverleaf
2019-10-09	Boat Sewage	Galveston
2019-10-29	Unknown	Houston
2019-11-10	Abandoned Vessel	League City / Galveston
2019-11-20	Abandoned Vessel	Brazoria
2019-11-22	Storm Drains	Texas City
2019-12-05	Unknown	Sheldon
2019-12-23	Storm Drains	Nassau Bay
2019-12-28	Pet Waste	Bayou Vista
2020-01-02	Trash and Debris	Unknown
2020-01-14	Storm Drains	Galveston
2020-01-17	Unknown	Hitchcock
2020-02-02	Unknown	Houston
2020-02-03	Pet Waste	Galveston
2020-02-06	Trash and Debris	La Porte
2020-03-01	Trash and Debris	League City / Galveston
2020-03-01	Unknown	League City / Galveston
2020-03-01	Chemicals	Galveston
2020-03-05	Trash and Debris	Galveston
2020-03-10	Trash and Debris	Santa Fe
2020-03-14	Fish Kill	Galveston
2020-04-30	Trash and Debris	La Porte
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-03	Trash and Debris	Unknown
2020-05-05	Trash and Debris	Galveston
2020-05-14	Chemicals	Nassau Bay

2020-05-26	Unknown	Baytown
2020-05-27	Sanitary Sewers	El Lago
2020-05-28	Sanitary Sewers	Seabrook
2020-06-01	Trash and Debris	San Leon
2020-06-05	Storm Drains	La Porte
2020-06-05	Unknown	Morgan's Point
2020-06-07	Sanitary Sewers	Bayou Vista
2020-06-08	Unknown	Baytown
2020-06-08	Sanitary Sewers	Bayou Vista
2020-06-16	Abandoned Vessel	Bacliff
2020-06-19	Oil Sheen	Crystal Beach
2020-06-29	Storm Drains	Baytown
2020-07-07	Trash and Debris	La Porte
2020-07-17	Trash and Debris	Freeport
2020-07-20	Sanitary Sewers	Bolivar Peninsula
2020-07-24	Storm Drains	Baytown
2020-08-29	Trash and Debris	Galveston
2020-08-29	Trash and Debris	Galveston
2020-09-03	Storm Drains	La Porte

3.1 Outreach and Education of GBAN Tool

GBAN was shared and promoted in the community through several methods including online social media campaigns, presentations, boothing events, and more. The presentations and boothing events which included GBAN outreach and education are included in Task 2, Appendix 2. Some of the popular social media campaigns are shown below.

- GBF promoted a fall social media campaign in December 2019 encouraging people to “make a resolution to report pollution” on the GBAN app for New Years.
- In July 2019, GBF started a #WaterWednesday social media campaign to feature various water programs. The month of July’s posts focused on the GBAN app. Each week in the month of July, a different short video about the app was posted on Facebook. The four reports in July collectively received 3,603 impressions and 171 “engagements.”

3.2 Agency Partnerships

During this project, GBF continued regular communication with enforcement agencies: Texas Parks and Wildlife Department (TPWD), Coast Guard, local marine safety officers, TCEQ and Galveston County Health District. GBF updated partner contact information as needed and ensured ongoing functionality of the app as it pertained to agency communications.

3.3 App Functionality

- GBF met with the GBAN developer in April 2020 to update app and thereby increase reporting. Updates were completed in May 2020.
- GBF attended a webinar on an app called Clean Swell where users report trash collected during pickup events to compare functionality to GBAN.

Deliverables for this task are attached in Appendix 3, and include the following:

- List of enforcement agencies tied into GBAN app, submitted November 10, 2019 and reattached for reference.
- Summary of GBAN usage and reports, above and attached.

Task 4: Facilitate Volunteer Programs

The GBF volunteers have been instrumental in the implementation of the BWEC. From the WMT, to the Dockwalkers, to the interns, this program has relied on volunteers to collect, enter, and manage data. Engagement of volunteers is also an effective outreach method, ensuring that the general public feels an ownership for the work being done to preserve and protect the Bay.

4.1 Water Monitoring Team

The GBF Water Monitoring Team (a group within the Texas Stream Team) was launched in February 2012, with the Bacteria Sampling Program launching shortly thereafter in January 2013. There are four main goals for collecting water quality data through these programs for the BWEC:

1. To engage citizens in a hands-on program that empowers them to be stewards of Galveston Bay;
2. To create a line of communication between GBF, boaters, and marinas on a regular basis;
3. To establish baseline data trends at marinas and other near-shore recreational sites in Clear Lake and Galveston Bay; and
4. To detect potential bacteria impairments in marinas and other near-shore recreational sites in Clear Lake and Galveston Bay.

GBF Water Monitoring Team volunteers are certified to sample at sites around the Bay for core water quality parameters (temperature, pH, dissolved oxygen, salinity, transparency, and field observations), and have the option of being trained to collect samples for enterococci bacteria. Core certification consists of a full day, two-phase group training session and a one-on-one Phase III training at the volunteer's site with a GBF staff member. This training process is based on the Texas Stream Team training protocol. Volunteers commit to sampling their site(s) on at least a monthly basis. The entire monitoring program is conducted under an EPA-approved Quality Assurance Project Plan and Quality Management Plan. GBF's team is part of the Texas Stream Team because of its partnership with the Houston Galveston Area Council's region.

At the start of the project period, GBF had 55 active, fully certified monitors at 52 monitoring sites, with 25 sites sampling for Enterococcus bacteria. At the end of this project period, the monitoring team has 57 volunteers sampling from 55 locations, 26 of whom have advanced certification to collect bacteria samples. During this cycle, volunteers contributed over 3,400 volunteer hours, analyzed 1,110 water samples, and 459 collected bacteria samples. COVID-19 and subsequent Stay-At-Home advisories led to the closure of the GBF bacteria lab and asking volunteers to not collect bacteria samples beginning on March 17, 2020. A phased reopen of the bacteria lab began in July 2020. A full map of monitoring locations, data summaries, and trends can be accessed at www.galvbay.org/watermonitors.

Implementation of the WMT has allowed GBF to better connect with many marina and waterfront restaurant owners around Galveston Bay to provide sampling sites and promote clean water. GBF continues to make improvements to the management and processes within the WMT. Consistent, long-term monitoring is valuable because it identifies trends and hotspots, fosters community-based environmental stewardship, and aids in watershed planning activities. Due to budget constraints, professional monitoring is conducted at a limited number of sites and generally on a quarterly basis, so GBF's WMT is a cost-effective way to augment this professional data. Additionally, most professional monitoring occurs in the middle of the Bay, while GBF monitoring focuses on the nearshore, where most humans are interacting with the water. Current water monitoring sites, volunteers, and a training schedule for this project period are all outlined in Appendix 4.

Within this cycle GBF focused a lot of our efforts on maintaining regular data sampling at existing sites and improving data management and analysis.

1. Maintaining regular data sampling: By sampling continually at the same existing sites, GBF can better track and interpret long-term trends at each location and across the Bay. Prior CMP cycles facilitated the expansion of the WMT to a representative sampling of Galveston Bay and in this cycle, GBF staff focused on the following items:
 - **Volunteer Management and Site Continuity**: GBF worked to maintain regular volunteer correspondence on an individual basis and through volunteer bulletins throughout the life of the project. As sites opened, GBF attempted to fill them with other volunteers to ensure continued sampling. In October 2019, GBF completed collecting more detailed site information about each WMT location. This includes information on access, land use, photos, etc. to better document any changes and to ensure consistency among different volunteers.
 - **Improvement of the volunteer bulletin**: A section was added to the volunteer bulletins called “Quality Control Check” to address common issues that volunteers come across during their sampling. Each bulletin addresses a separate issue as a reminder and encouragement for volunteers. This was added to ensure that high quality data continued to be collected between training sessions.
 - **QAPP**: GBF created an internal Quality Assurance Project Plan (QAPP) to ensure high quality data and to hold the team accountable in the future for maintaining high training and record keeping standards.
 - **Maintaining training and recruitment efforts**:
 - In June 2019, GBF hosted a Phase 1 & 2 training for new monitors. Nine potential volunteers were trained at this event.
 - GBF completed a bacteria training session for 4 new bacteria samplers on August 27, 2019.
 - GBF conducted quality control recertification trainings on September 5, 2019 and September 7, 2019.
 - GBF hosted a water monitoring team quality control training on December 14, 2019.
 - GBF conducted a WMT quality control training on January 14, 2020.
 - GBF recognized water quality monitors at Bravos for the Bay on January 16, 2020.
 - GBF gave a presentation on Volunteering to Protect the Bay Ecosystem to 42 Johnson Space Center staff on May 27, 2020 that offered ways to volunteer with GBF, including recruitment to the water monitoring team.
2. Improving Data Management and Analysis: In order to truly have long-term success monitoring water quality throughout Galveston Bay, GBF is continually improving its capacity for data management and analysis. In the fall of 2018, GBF completed its migration of data from Excel to a Microsoft Access database and in this project cycle, the database has continued to be refined for continued usability and efficiency. These actions are described below:

- GBF launched its new Water Quality data visualization portal with a social media campaign and email blast in early June 2019. The data portal can be viewed at: waterdata.galvbay.org.
- GBF's Water Quality Program Coordinator attended a National Academy of Sciences Data Carpentry Workshop in New Orleans, LA (sponsored by separate funding) in May 2019. This included an introduction to R, OpenRefine, and SQL, which covered basic data analysis and visualization.
- In August 6 through 8, 2019 GBF's Water Quality Program Coordinator attended a United States Geological Survey Introduction to R course in Middleton, WI. This opportunity provided a hands-on lesson on R, covering typical data analysis workflow and visualization. This will help with internal data visualization and analysis capacity with WMT data.
- GBF's Water Quality Program Coordinator attended a Microsoft Access training course in September 2019 to better manage GBF's Microsoft Access water quality database and understand its capabilities.
- From April 2020 through the end of the project period, GBF's Water Quality Program Coordinator attended an online Data Scientist with R course (Intro and Intermediate R) course to continually improve GBF's data management and analysis capacity.
- The tool to retrieve data by site was redesigned to make it more user friendly.
- The data export was streamlined with a single button for use with R analytical script.
- Two buttons were added for easier determination of which volunteers are due for quality control training and the dates of their last Quality Check training session
- A new table was created which added the capability to record, search for, and retrieve volunteer time for volunteer tracking and accounting.
- An R data analysis script was developed with a PhD student at Texas A&M University Galveston to lay the groundwork for future data visualization using the tool.

4.2 Dockwalkers

Historically, the Dockwalkers Program has been a volunteer program for select volunteers to conduct surveys of boaters in exchange for clean boating kits and outreach materials. These surveys helped inform GBF on current boater practices, perceptions and priorities while also promoting the BWEC message.

Beginning in the Fall of 2018, GBF transitioned the Dockwalkers Program away from a volunteer-based system to being monthly surveys conducted by the GBF community engagement coordinator. This was due to challenges with volunteer recruitment and data consistency. Many GBF volunteers are older and were unable or unwilling to endure the intense Texas heat on the docks for long periods of time. Volunteers additionally expressed being discouraged by the infrequency of willing survey participants visiting the docks. Volunteers were asked to conduct the surveys at their leisure, which led to a high level of artificial selection bias and inconsistencies in the data collection. Lastly, previous versions of the survey contained subjective questions that were open to interpretation and influence by the volunteer conducting the survey. As described in the December 2019 deliverables, the Dockwalkers Program was planned to continue through May 2020 with monthly surveys conducted by the GBF community engagement coordinator. However, COVID-19 and subsequent Stay-At-Home advisories led to cancellation of in-person surveys starting in March 2020. In lieu of these in-person surveys, GBF created a virtual

“Dockwalker” survey to determine the perceived improvements of services related to waste disposal, pollution, and wildlife over the entire BWEC. This survey was shared with marina around Galveston Bay, the Boater Waste Workgroup, GBF volunteers, and various other partners in the area with ties to marinas and recreational boating.

4.3 Water Quality Internships

GBF’s water quality internships provide university students with the opportunity to develop and execute short-term water quality research projects from start to finish including planning, design, sampling, data analysis and creating a final research product. GBF hosted two Water Quality Research Interns (WQRIs) from the University of Houston during the summer of 2019. These interns teamed up to continue the targeted water quality monitoring and analysis at Pier 19 marina on Galveston Island that the 2018 intern had begun. This location has historically returned very high bacteria concentrations, both during wet and dry weather events. The WQRIs collected samples from 5 different locations around the pier, targeting different potential sources of fecal contamination – birds and stormwater outfalls. Their findings were consistent with the 2018 intern’s findings, and GBF continued to work with the City of Galveston and TCEQ to attempt to locate the source of the bacteria pollution. Results were showcased at UH’s Undergraduate Research Symposium. These efforts are further described in Section 5.

In the beginning of 2020, GBF hosted an additional intern from Clear Horizons High School. They assisted with data entry and data management and gained experience processing bacteria samples and learning general laboratory management. Although the internship was originally planned to take place throughout the spring semester, the social distancing requirements ended in it in March.

Deliverables for this task are attached in Appendix 4, and include the following:

- List of Water Monitoring Team and Dockwalkers, submitted December 10, 2019 and reattached for reference.
- Volunteer training/meeting schedule, submitted December 10, 2019 and reattached for reference.
- WQ monitoring plan, logic model, action plan, and schedule, submitted December 10, 2019 and reattached for reference.
- Dockwalker plan and survey schedule, submitted December 10, 2019 and reattached for reference.

Task 5: Track Behavior/Knowledge/Environmental Change

One of the major challenges with behavior change campaigns such as the BWEC is effectively monitoring campaign success. Unobtrusively and accurately gauging behavior change on a granular level in a community as large as Galveston Bay's boating community is next to impossible. Additionally, due to the nonpoint source, transient nature of boater waste pollution and the many factors that impact fecal bacteria levels in the Bay, it can be difficult to attribute changes in water quality specifically to this one source. However, over the years GBF has constantly looked for ways to improve measuring program success. Programs such as the Dockwalkers Program, the WMT, and GBAN can help measure potential successes and changes over time.

5.1 Water Monitoring Team Data Results

GBF and its WMT continued to collect ambient surface water quality data at marina and near-shore sites around Clear Lake and Galveston Bay throughout Cycle 23. A summary of the results from this project period can be found in Appendix 5.

The percentage of samples with enterococci bacteria samples measuring greater than 105 most probable number (mpn) varies greatly between the WMT site locations from approximately 43% to zero. The locations with the two highest frequencies (Galveston Bay at Pier 19 and Lake Anahuac), the lowest frequency with an exceedance (Galveston Bay at Texas City Dike), and one location in the middle (Jones Bay at Bayou Vista) are discussed below.

All of the example sites, with the exception of the Galveston Bay at Texas City Dike, the trend line shows a decrease in mpn over time. This indicates that there is generally less bacteria present in the waters of Galveston Bay over time. It is also clear from all graphs that spikes in the concentration of bacteria are not consistent over time, but rather fluctuate greatly depending on events which affect each location such as rain or a localized issue. In addition to these data trends, the impact of the water monitoring team can be seen particularly in two examples, described below:

- Based on results collected by the Water Quality Interns and shown in Appendix 5, the concentrations of bacteria at the Galveston Bay at Pier 19 has been a persistent issue for years. GBF continues to work with the City of Galveston and TCEQ to attempt to locate the source of the bacteria pollution. Although this process is looking to be a long-term one, the efforts of the Water Quality Interns has proven invaluable in providing a recorded history of bacterial contamination that will eventually lead to a solution and cleaner Bay. Without measuring and tracking the bacteria concentrations, this work would otherwise not be done.
- The Bayou Vista Water Quality Committee formed after high bacteria samples collected by a member of the WMT at the Jones Bay at Bayou Vista location created a community concern. GBF met with the committee regularly to discuss possible sources, strengthen their water sampling resources as a community to gain more samples, and empower the residents to take ownership of their community's water. This kind of community initiative and ownership of an environmental condition would not have happened without the work of the GBF water monitoring program. According to the graph of concentrations over time, this location has seen lower concentrations of bacteria following an increased interest by the community in ways to reduce local bacteria concentrations.

5.2 Behavior Tracking

One of the primary sources of behavior change tracking for this project historically has come from the long-term results from the Dockwalkers Program, begun in 2014, which surveyed boaters about environmentally-sound practices, assessed knowledge gaps and perceptions, and provided them with tools to improve water quality. Information from this program and the 2020 virtual version of this survey have helped the gauge the success of the program and the lessons learned directed and informed program efforts.

Over the past four years of this program, GBF has surveyed 231 recreational boaters within Galveston Bay. The purpose of this survey was to understand the values of boaters within Galveston Bay, how these values impact their behavior, and how those behaviors affect the water quality. The surveys took less than five minutes to complete and were conducted both online and in person at marinas and boater organization events from 2016 to 2020. Incentives were offered to increase boater participation, and included koozies, floating keychains, and whistles with the Pump Don't Dump brand. The vast majority of boaters that participated had many years of experience and spent most of their time on their vessel. This establishes that the respondents have sufficient experience on the water to form insights valuable to the purposes of this study. These respondents were important because they are the heaviest users of marinas and waterways. They are familiar with the management of on-board waste and therefore could offer unique insights to the day to day conditions of the water.

Between 2016 and 2020, the number of participants reporting that they would not eat or swim in their marina has increased from 59% to 87%. This is likely the result of GBF's extensive information campaign educating the public on the importance of water quality and may reflect a more informed and empowered boating population. For example, 92% of boaters surveyed in 2018 rating clean water as important or highly important to boating and in 2020 75% wanted more information regarding boater waste to be available in their Marina. The public is also more aware of where multiple pumpout stations are located. In 2016, only 14% of respondents knew where more than three stations were located, in 2020, 62% know where three or more stations were located. When asked about potential issues in their marinas, respondents expressed concerns consistent with campaign goals, focusing primarily on illegal dumping of waste and other materials from vessels, including oils and gas. We believe the inclusion of petroleum products to be the result of several high-profile spills in the Galveston Region in recent years.

Long-term trends over the years regarding overall water quality, availability of pumpout stations or marina facilities, and abundance of wildlife have all stayed relatively stable over the survey period. The amount of litter observed in marinas has gotten worse, which may be an indicator of increasing population trends; however, this is offset by a general indication that boaters see an increase in the variety of waste disposal options, such as monofilament tubes and recycling bins.

Survey results also indicate that respondents are very concerned with the health of the environment and believe that pumping out waste in a facility is an important contributing factor to environmental health and general recreation. Additionally, most of the general boating population has never seen someone dumping waste directly into Clear Lake or Galveston Bay, but believe a small portion of the boating population do. A common theme when talking with boaters was their frustration over the lack of enforcement of policies and regulations that are currently in place. Many boaters believe that fewer people will follow the rules if there are no consequences to breaking them. They cite a lack of direction and leadership as a primary contributing factor to other boater's behaviors. However, the prevailing

opinion of boaters is that boater waste is responsible for a small proportion of the bacteria found in the Bay. They believe that most bacteria are sourced from land, either through insufficient treatment by wastewater treatment facilities or via storm water runoff. Access, operations, and cost are not major barriers to getting boaters to use a pump-out station or service, but most boaters only know of and use the pump-out located in their preferred marina. The data collected in these surveys, as well as anecdotal evidence obtained through conversation between respondents and the surveyor, indicate that convenience is the largest hurdle preventing more widespread use of pump-out facilities. Many liveaboard boaters exclusively use land-side facilities provided in marinas because they do not want to go through the hassle of routinely going to a pump out station. Boaters believe that a greater number of their peers would use pump-out stations if there were more available, and they were more convenient.

Deliverables for this task are attached in Appendix 5, and include the following:

- Results summary based on Dockwalker and Water Monitoring Team data collection, attached.
- Results from all behavior/knowledge change tracking, above and attached.

Task 6: Project Monitoring and Reporting

GBF conducted regular grant administration, financial reporting, and correspondence as outlined in the project description and executed contract throughout the life of the grant, this included monthly billings and progress reports, and this final report with the Grant Closeout Report. Beginning in March 2020, GBF began relocating offices and additionally felt the effects of COVID-19-related social distancing requirements. This resulted in delayed billings and financial reports, which was communicated to the grants administrator.

On grant extension was approved in February 2020 which extended the termination date of the contract to September 30, 2020. Three budget amendments were made throughout the project period, as described below:

- GBF submitted a requested budget amendment in September 2019 with the most recent monthly billing to better reflect matching fund availability.
- GBF submitted a requested budget amendment in March 2020 to reallocate funds from “travel” to “other”, in response to a reduced number of in-person events and an increase in attending virtual conferences and networking events.
- GBF submitted a requested budget amendment in July 2020 to reallocate funds from supplies to other, in response to a reduced number of in-person events and an increase in usage of digital tools.

Appendix 1



**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 1.1**

Boater Waste Workgroup Active Roster

Names	Organization	Email
Christian Rines	Galveston Bay Estuary Program	Christian.Rines@tceq.texas.gov
Scott Tuma	City of League City	Scott.Tuma@leaguecity.com
Steven Johnston	H-GAC	Steven.Johnston@h-gac.com
Jennifer Demers	Maritime Sanitation	jennifer.demers@maritimesanitation.com
Jean Wright	Clean Rivers Program	Jean.wright@h-gac.com
Katie Wilson	Galveston County Health District	kwilson@gchd.org
Philip Kropf	Texas Mariners Cruising Association	pkropf@flash.net
Ron Schultz	Galveston County Health District	rschultz@gchd.org
Marie Stewart	Marina del Sol	info@marinadelsoltx.com
Sean Fitzgerald	Maritime Sanitation	maritimesanitationservices@gmail.com
Allie Fitzgerald	Maritime Sanitation	maritimesanitationservices@gmail.com
Catherine Eisele	Redfish Marine	eisele.catherine@gmail.com
Jim Eisele	Redfish Marine	Jim.Eisele@cmc.com
Ken Hutchinson	TMCA: recreation boater	khutchinson@gmail.com
Lori Freimel	TMCA: recreation boater	lfriemel@airmail.net

Water Quality Steering Committee Active Roster

Name	Organization	Email
Dr. Antonietta Quigg	Texas A&M Galveston	quigga@tamug.edu
Jim Dobberstine	Lee College	jdobberstine@Lee.Edu
T'Noya Thompson	Galveston Bay Foundation	tthompson@galvbay.org
Charriss York	Texas A&M Agrilife Extension	cyork@tamu.edu
Ryan Bare	Houston Advanced Research Center	rbare@harcresearch.org
Dr. Anna Armitage	Texas A&M Galveston	armitaga@tamug.edu
Rachel Powers	Citizens Environmental Coalition	rachel@cechouston.org
Dr. Laurence Yeung	Rice University	lyeung@rice.edu
Dr. Cindy Howard	University of Houston – Clear Lake	howardc@uhcl.edu
Carl Young	High School Teacher, volunteer monitor	carldyoung@hotmail.com
Glenn Taylor	Volunteer Water Quality Monitor	gtaylor70@att.net
Adam Griggs	River Network	agriggs@rivernetnetwork.org
Manuel Villasmil Rubio	Univision	mwillasmil@ev-houston.com



**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 1.2**

Date & Time	Meeting	Location
November 14, 2018; 2pm	Boater Waste Workgroup	GBF Conference Room
February 28, 2019; 1pm	Boater Waste Workgroup	GBF Conference Room
March 20, 2019; 1pm	Water Quality Steering Committee	GBF Conference Room
August 29, 2019; 10am	Boater Waste Workgroup	GBF Conference Room

Amendment - the following meetings took place beyond the above schedule:

Date & Time	Meeting	Location
February 26, 2020; 2pm	Boater Waste Workgroup	GBF Conference Room
May 21, 2020; 2pm	Boater Waste Workgroup	Zoom

**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 1.3**

I. Recommendations from Boater Waste Workgroup

Tasks	Goals	Recommendations
Develop Marketing/Outreach Materials	Increase numbers of boaters advocating for proper waste disposal, increase number of pumpout stickers on boats,	Share signs at private boat ramps and in private marinas, partner with Texas Sailing Association, continue to strengthen partnership with marinas and boating groups
Social Marketing and Behavior Change Campaign	Increase number of individuals involved with the campaign	Partner with private boat ramps, use boating groups such as TMCA to spread BWEC materials, social media campaigns,
Facilitate Boat Sewage Discharge Reporting and Enforcement	Improve culture of perceived enforcement	Hang signs at boat ramps and marinas, partner with USCG auxiliary to increase patrols, increase authority of who can cite illegal boater discharge
Facilitate Volunteer Programs	Sustain a core group of active volunteers to conduct WQ monitoring, Share data findings with stakeholders and decision makers	Share data on Swim Guide and with boaters. Include messaging about the harmful impacts of bacterial contamination.
Track Behavior/Knowledge/Environmental Change	Increase awareness of boater waste issues and engagement in proper waste disposal	Track GBAN reports Monitor volunteer water quality data trends Continue surveying recreational boaters and participating in CLMA meetings

II. Recommendations/Suggestions from Water Quality Steering Committee

Data Portal Suggestions

Have pre-defined setting to auto populate the graphs (ex: all historic data)

Make title more visible (replace with “User Instructions”)

Start with a line plot, not the datasheet summary

Include directions on what the pie chart tells us (not intuitive)

Mouse over instructions/description for icons?

Grey out Enterococci for sites without bacteria

Target Audiences

Academic community

Media



Private land owners

Land managers

Educators/students

Outreach Ideas

Create a synthesizing blog post of different parameters

**blog story series on some of the high-level trends we're seeing. One post per parameter.

Wildlife post

Other trends & their implications

**weekly Twitter posts with bacteria updates (Twitter Bot?) create a unique hashtag for this

What are the advantages of this program/data?

Data component (WQ data collection) and human component (grassroots education).

Community engagement – sets us apart (citizen science & education)

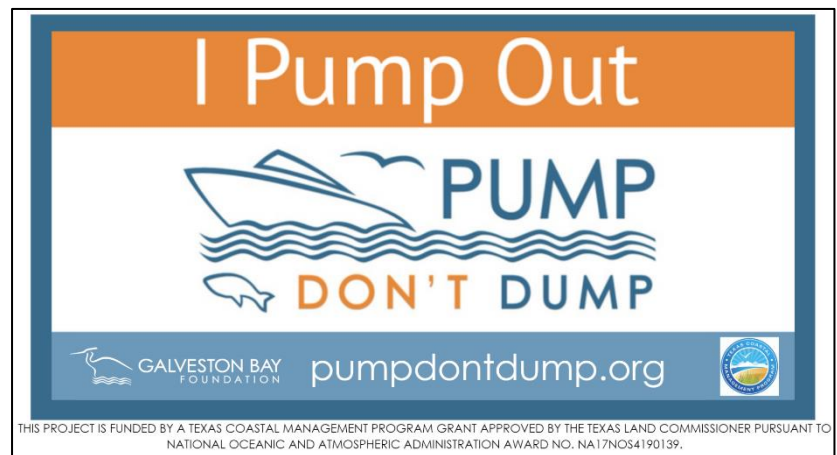
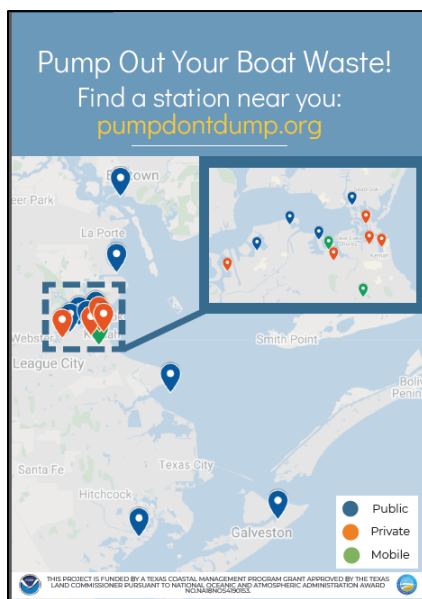
Resource that is non-governmental

**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 1.4**

Copies of new marketing/outreach materials

Copies of new marketing and outreach materials created throughout the project period are shared below.

General BWEC Materials



GBAN Materials



KEEP OUR WATER CLEAN
SECURE YOUR TRASH
AVOID FINES UP TO \$500 PER DAY

**Dispose of trash in the trash cans
or take it with you, if trash is full.**

Galveston Bay Action Network



Report Pollution or Litter:
Download the Galveston Bay Action
Network app or report at
galvbay.org/GBAN
ENSURE THE FASTEST POLLUTION CLEANUP!





THIS PROJECT IS FUNDED ("IN PART" IF APPROPRIATE) BY A TEXAS COASTAL MANAGEMENT PROGRAM GRANT APPROVED BY THE TEXAS LAND COMMISSIONER PURSUANT TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AWARD NO. NA18NOS4180153.

**REPORT
POLLUTION
ON GBAN**




**REPORT
POLLUTION
ON GBAN**




**REPORT
POLLUTION
ON GBAN**




**REPORT
POLLUTION
ON GBAN**





GBAN Materials, Continued.

Post Details

Galveston Bay Foundation
Published by Claire Everett · March 5

Austen Anderson, a surfer and Texas A&M University graduate, has become a leader in the Galveston community when it comes to keeping our shorelines clean. Join Austen and Galveston Bay Foundation this Saturday, March 8th from 3-8pm at Devil and the Deep Brewery for a music and science event. Check out the link for details!

And remember, YOU can be our #EyesOnTheBay by using the Galveston Bay Action Network app to report trash on land or in the water. No report is too small.



GALVBAYGRADE.ORG
A Local Surfer Dedicated to Keeping Galveston Shorelines Clean | Galveston Bay Report Card [Learn More](#)

6,228	1,003	Boost Again
People Reached	Engagements	

Boosted on Mar 5, 2020
By Claire June Everett

People Reached	3.1K	Link Clicks	69
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[View Results](#)

Maggie Matthews, Carlis Danna Cole and 105 others · 6 Comments · 56 Shares

Like Comment Share

Performance for Your Post

6,228 People Reached

572 Reactions, Comments & Shares

362 Like	98 On Post	264 On Shares
107 Love	10 On Post	97 On Shares
1 HaHa	0 On Post	1 On Shares
1 Wow	0 On Post	1 On Shares
45 Comments	10 On Post	35 On Shares
56 Shares	56 On Post	0 On Shares

431 Post Clicks

0 Photo Views	112 Link Clicks	319 Other Clicks
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NEGATIVE FEEDBACK

0 Hide Post	0 Hide All Posts
0 Report as Spam	0 Unlike Page

Insights activity is reported in the Pacific time zone. Ads activity is reported in the time zone of your ad account.



Galveston Bay Action Network

**SEE POLLUTION?
REPORT IT!**

**DOWNLOAD
THE APP NOW**

**KEEP YOUR
COMMUNITY CLEAN.**



**SEE POLLUTION?
REPORT IT!**

DOWNLOAD THE APP NOW

Galveston Bay Action Network

KEEP YOUR COMMUNITY CLEAN.

Galveston Bay Action Network



Pile of broken furniture in the street?
Take a pic and send it in!

Trash along the water or oil slick on the surface?
Let us know!

Debris along I-45?
Next time you park, send a description of where you saw it!



No Report Is Too Small!

<https://galvbay.org/gban-reporting-tool/>



Galveston Bay Action Network




**SEE POLLUTION?
REPORT IT!**

**KEEP YOUR
COMMUNITY CLEAN.**

**DOWNLOAD
THE APP NOW**

GBAN Materials, Continued.

Post Details
✕



Galveston Bay Foundation

Published by Tina Found [?] · June 8 at 12:57 PM

Happy World Oceans Day! The health of Galveston Bay impacts the health of our oceans. Everything that we do, from Dallas to Galveston Island, affects the Bay. Learn about your local piece of the puzzle with the Find Your Watershed Tool and see how you can help today! galvbaygrade.org/findyourwatershed | HARC #WorldOceansDay #LoveYourBay

Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.

3,510
People Reached

250
Engagements

Boost Post

Like
 Comment
 Share

1 Comment 28 Shares

Performance for Your Post

3,510 People Reached

141 Reactions, Comments & Shares

96 Like	50 On Post	46 On Shares
13 Love	3 On Post	10 On Shares
4 Comments	1 On Post	3 On Shares
28 Shares	28 On Post	0 On Shares

109 Post Clicks


48 Photo Views	4 Link Clicks	57 Other Clicks
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NEGATIVE FEEDBACK

0 Hide Post	0 Hide All Posts	
0 Report as Spam	0 Unlike Page	

Reported stats may be delayed from what appears on posts

Post Details
✕



Galveston Bay Foundation

Published by Claire Everett [?] · February 28

We're out with Texas A&M University on their research vessel helping students learn how to collect macro and microplastics in the Bay today. You can report pollution on the Galveston Bay Action Network App (GBAN) available for free download in the Apple Store or via Google Play. #EyesOnGalvBay

Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.

1,657
People Reached

241
Engagements

Boost Post

Like
 Comment
 Share

3 Shares

Performance for Your Post

1,657 People Reached

94 Reactions, Comments & Shares

73 Like	41 On Post	32 On Shares
16 Love	3 On Post	13 On Shares
2 Comments	0 On Post	2 On Shares
3 Shares	3 On Post	0 On Shares

147 Post Clicks

89 Photo Views	0 Link Clicks	58 Other Clicks
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NEGATIVE FEEDBACK

2 Hide Post	0 Hide All Posts	
0 Report as Spam	0 Unlike Page	

Reported stats may be delayed from what appears on posts

Water Monitoring Team Materials



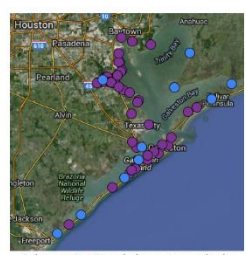
GALVESTON BAY
FOUNDATION

Volunteer Water Quality Monitor



galvbay.org/watermonitor

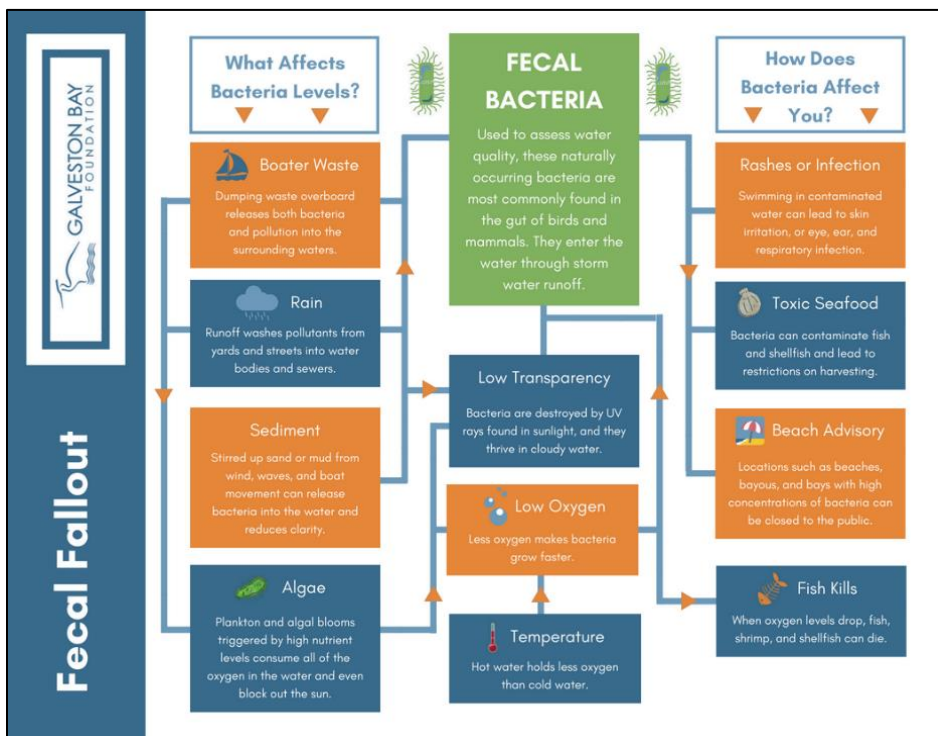
Galveston Bay Foundation's Water Monitoring Team is an integral part of preserving, protecting and enhancing the water quality in Galveston Bay. Volunteers conduct water quality data such as dissolved oxygen, salinity, pH and transparency around Galveston Bay that includes chemical analyses, physical sampling, and field observations to create a unique portrait of water quality for each site.



Galveston Bay Foundation water monitoring sites around the Bay.

Visit galvbay.org/watermonitor to view our data and learn more.

THIS PROJECT IS FUNDED BY A TEXAS COASTAL MANAGEMENT PROGRAM GRANT APPROVED BY THE TEXAS LAND COMMISSIONER PURSUANT TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AWARD NO. NA17O5496036





**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 1.5**

Summary of campaign expansion efforts with other boater groups

Partnerships with boaters is a crucial part of the BWEC programming. They are the main audience to reduce waste in the Bay and also are GBF's eyes and ears on where potential sources may be. Throughout this cycle GBF continued to engage with local boater groups and organizations in-person and through social media groups to ensure boater waste topics were addressed as concerns were identified and as part of any regularly implemented programming. GBF also often provided printed and promotional materials such as stickers and infographics to create a general awareness of clean boating and ensure that the impacts would continue past the life of the project. In-person meetings included the boater waste workgroup meetings, as well as individually reaching out to organizations, marinas, and community leaders to schedule one-on-one discussions.

Partners included:

- Houston Power Squadron
- Sea Star Base Galveston Community Sailing Center
- The Recreational Boater Information Guy
- Salt-Water Recon
- Clear Lake Sailing Club
- Texas Corinthian Yacht Club
- Lakewood Yacht Club

Appendix 2

Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 2.1

Social Marketing and Behavior Change Plan for NDZ Designation & Proper Waste Disposal

Recreational Vessels

Goal: Increase pumping out of waste, increase GBAN use, increase support for NDZ Designation

Conducting community-based behavior change campaigns for recreational boaters will include the following:

1. Continue Dockwalking program to better understand barrier and benefits to pumping out waste
2. Engage with TMCA, GBCA, and other recreational boating groups to listen to conduct community analysis of potential barriers and benefits to pumping out waste
3. Refine existing programs and develop new messaging, based on community analysis.

Current plans based on analysis of existing survey data is outlined below:

Based on the audience research conducted to date, the behaviors of pumping out boater waste and of reporting boater waste to the proper authorities have high benefits but also high barriers. Because of this, the primary behavior change tools that should be employed are ones that primarily focus on reduction of the barriers.

These will include:

- Increasing knowledge of current regulations, pump-out locations, and other resources
- Increasing prompts to engage in pumping out and reporting waste
- Increasing convenience to pump out waste by working to add more pump out stations
- Education on impacts of boater waste and what it looks like in the water

Hypothetical Strategy Table

Research Findings	Strategy Element	Key Messages	Messengers	Channels
Lack of knowledge of where to pump out waste and who to call to report boater waste dumping	Education	-Waste from boats is unsafe to swim or boat in. It's also harmful for the economy and environment. -Reporting boater waste through our mobile app ensures it is cleaned up.	Partners in app development & marketing, Local marina managers & local boater "celebrities"	Presentations and workshops at marinas and boater associations

	Convenience	All waste or pollution in Galveston Bay can be reported on this app. Reports are automatically sent to the proper authority.	Partners in app development & marketing, Local marina managers & local boater "celebrities"	Presentations and workshops at marinas and boater associations
Forgetting who to call/where to report pollution	Prompts	Report pollution in the water on this mobile app.	Partners in app development & marketing, Local marina managers & local boater "celebrities"	- sticker to put on boat - signs posted at marinas
Lack of knowledge on rules and laws around dumping boater waste overboard in Galveston Bay and Clear Lake	Education	-Dumping untreated waste overboard is illegal in Clear Lake and harmful to Galveston Bay.	Partners in app development & marketing, Local marina managers & local boater "celebrities"	-Pass out educational information to new and existing tenants at marinas -Post signs at local marinas informing boaters of laws -In person communication
Lack of knowledge of appearance of boater waste in the water	Education	Boat sewage is a film of particulate matter on the water surface, generally gray in color and smells bad. During sewage dumping, this waste is expelled from the boat hull (include photo).	Partners in app development & marketing, Local marina managers & local boater "celebrities"	-Educational videos, print materials, online materials, in-person educational workshops

Commercial Vessels

Goal: Garner support for NDZ Designation

Types of vessels: Tug Boats, Cruise Ships, Ferries, vessels & barges

I. Determine current commercial infrastructure

Initial Questions:

- How do most Galveston Bay commercial vessels handle their waste?
- Are there existing commercial pump-outs?
- How many towboats, etc. Exist in the bay that would be impacted by NDZ?
- How many of these vessels would need to be retrofitted?

Stakeholder Groups to Engage

1. Tug Boat companies.

- List all tug boat companies
- Call to gather information:
 - how many tugs to they deploy in our region?
 - What kind of MSDs do they have on their tugs?

- How do they dispose of their sewage waste?

2. Port of Houston.

- How many tug boats operate in the port? 40-45 per day (max. Approx. 50 in fleet)
- Who are the major players?
- How many tow boats operate in the port? Who are the major players?
- Do you know if any of the vessels/barges dump their waste into the port? How do they handle their waste?
- Who are the major local vessel & barge operators?
- Are there existing commercial pump-outs? What would installing these entail? Would Port of Houston be able or willing to help with this?

3. Wastewater treatment facilities

- What would it take to hook up to new commercial pump out facilities

4. Pump Out Station Installers – How much do commercial pumps cost? What is involved in their installation and operation? What requirements are there for installing them?

5. Barge Operators

- How do their barges currently dispose of their waste?
- What relationship do they have with the tug boat operators and owners?
- Would Kirby support the designation of Galveston Bay as an NDZ?
- What messaging would resonate best with this community?

5. Determine other groups that will be affected by NDZ

II. Based on conversation, identify & list potential barriers to commercial support, solutions to these barriers, and what messaging may assist them in overcoming these desires

III. Identify individuals to contact for NDZ support and develop compelling messaging, framed around reducing barriers to NDZ support and highlighting benefits to NDZ support

Initial groups include:

- Port of Houston
- Kirby Marine
- Marine Industry Association
- Marina Association of Texas
- Local marinas
- Local fishing groups
- Commercial shell fishermen

IV. Contact and engage with identified groups using established messaging

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Schedule of outreach and partnership activities

Date	Event / Organization - Topic
1/18/2019	TMCA Monthly meeting
1/18/2019	GISD-Oppe Elementary
1/29/2019	U of H- HSPA
2/19/2019	TAMUG
2/19/2019	Double Bayou WPP
2/19/2019	Groundworks Dallas/Dallas Zoo
2/26/2019	Delores Fenwick Nature Center
3/9/2019	Dolores Fenwick Nature Center Grand Opening
3/18/2019	Tegler Career Center- PISD
4/2/2019	UHCL Conservation Club
4/2/2019	Ball High School
4/6/2019	Bayou Greenway Day
4/6/2019	Us Power Squadron
4/9/2019	Houston Press, Menu of Menus
4/12/2019	Evelyn Meador Branch Library
4/14/2019	Earth Day Houston
4/15/2019	Crenshaw School
4/15/2019	Lee College
4/23/2019	Nokturne Art Night
4/23/2019	Johnson Space Center
4/27/2019	Nassau Bay Street Eatz
4/27/2019	Houston Maritime Museum
4/28/2019	Exploration Green Earth Day Event
4/30/2019	LaPorte Rotary Club
5/2/2019	GBRC: General
5/2/2019	Bay Connect: Media/Spanish Influencers
5/3/2019	Water Works Festival
5/20/2019	Mark Twain Elementary
5/25/2019	Asher's Birthday Party
5/28/2019	Forest Broke Middle School (NWF)
5/28/2019	Fondren Middle School (NWF)
6/5/2019	North American Prarie Association
6/6/2019	Houston Zoo-Collegiate Interns

Date	Event / Organization - Topic
6/7/2019	HMNS World Oceans Day
6/8/2019	Houston Zoo World Oceans Day
6/8/2019	Java Lava Brew World Oceans Day
6/8/2019	Artist Boat World Oceans Day
6/15/2019	Bakfish Rain Barrel Workshop
6/17/2019	Trinity River Partners
6/19/2019	Galveston Island Nature Tourism Partnership
7/2/2019	GBF- Lunch and Learn
7/9/2019	Teacher Workshop
7/10/2019	CW39- Morning Dose Segment
7/11/2019	Sierra Club
7/13/2019	Texas City Rain Barrel Workshop
7/16/2019	Lakewood Yacht Club WADE training
8/1/2019	Java LAva Brew Open House
8/2/2019	UT San Antonio architecture students
8/19/2019	BayCAP- GBRC, WQ, & Incident Response
8/23/2019	Rhapsody on the Reef
8/24/2019	Report Card Preview Party
8/25/2019	Creation Care-Environmental Web Series
8/28/2019	Report Card Launch
10/3/2019	Trinity Bay Master Naturalist
10/3/2019	Master Naturalist Meeting
10/17/2019	NAAEE Conference
11/12/2019	White Oak Bayou Association Annual Meet
11/13/2019	Galveston Kiwanis Club - Report Card
11/27/2019	Seeding Galveston - Report Card/GBAN
12/3/2019	GBF Membership Meeting
12/5/2019	Port Houston - Report Card, Outreach efforts
12/10/2019	Green Craft Night - Making bay-friendly choices
12/13/2019	Marina del Sol Clear Lake
10/15 - 10/16	Marina Association of TX Conference
10/12/2020	North American Association of Environmental Educators
10/14/2020	Moody Gardens- Galveston Free Day
10/19/2020	City of Pasadena
10/31/2020	JSC Health and Safety Fair
11/2/2020	Northside High School
11/9/2020	TAMUG Gulf Estuarine Research Symposium
11/13/2020	Gloria Dei Lutheran- Men's Group
11/13/2020	North Pasadena Neighborhood Association
11/15/2020	Converation and Cocktails

Date	Event / Organization - Topic
11/15/2020	WQ Open House - Galveston
11/28/2020	Lee College
12/11/2020	North Pasadena Neighborhood Association
12/17/2020	The Rice School
1/9/2020	Winter Texans Tradeshow
1/19/2020	Houston Conchology Society
1/21/2020	Gloria Dei Lutheran Church Group (Gary Bell)
1/22/2020	State of the Bay Symposium
2/16/2020	Rain Barrel Workshop
2/20/2020	Total Action! Volunteer Fair
2/22/2020	Abandoned Crab Trap Removal
2/27/2020	Devil & the Deep/TAMUG, River & Bay Pollution
2/28/2020	TAMUG R/V Trident plastic pollution on the Bay
2/29/2020	Wetland Walkabout
3/7/2020	On The Bay with Jeff Corwin
3/7/2020	Sounds For Ocean - Pollution awareness/GBAN
3/8/2020	Mountain Ocean Project - Bay beach cleanup
3/12/2020	Surfrider Galveston - Pollution prevention/cleanup
3/26/2020	Plastic Pollution Prevention Partnership
4/9/2020	CEC Environmental Educators Workgroup
4/20/2020	Reusable Bag Conservation Craft Lesson
4/22/2020	Virtual Earth Day - Sustainability, Trash Prevention
4/22/2020	City Nature Challenge Kick-Off Workshop
4/28/2020	Marine Debris Monitoring Workshop
4/30/2020	Houston-Galveston Trash and Marine Debris Summit
5/12/2020	Partners in Litter Prevention: Removal Working Group
5/27/2020	Johnson Space Center - Protecting Biodiversity at home and while volunteering with GBF
6/11/2020	Kemah Blessing of the Fleet event
6/18/2020	HGAC Coastal Communities Toolkit Roundtable
7/1/2020	Johnson Space Center - Plastic Free July Kickoff Mtg
7/13/2020	GOMA Marine Debris Prevention Workgroup
8/29/2020	Creation Care Fest - Protecting Wonders of the Bay

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Summary of NDZ meetings and stakeholder list

The Galveston Bay No Discharge Zone Workgroup was conducted as a sub-group within the Boater Waste Workgroup. During these meetings, stakeholders discussed the strategic direction necessary to designate Galveston Bay as a federal No Discharge Zone.

- GBF hosted an NDZ subcommittee workgroup meeting on November 14, 2018.
- GBF hosted an NDZ subcommittee workgroup meeting on February 28, 2019.
- GBF hosted an NDZ subcommittee workgroup on August 29, 2019.

Strategies discussed at the subcommittee meetings included overviews of current NDZs in other states, current status of NDZs in Galveston Bay, increasing enforcement, and designating upcoming tasks and next steps. Workgroup members provided assistance with various data gathering tasks, such as contacting Washington State environmental agencies and generating maps showing current facilities. Members also provided innovative suggestions such as partnering with the US Coast Guard Auxiliary to patrol marinas, even if they are not able to issue citations, they would help increase the perception of monitoring and enforcement occurring. Workgroup members were informed of the decision to halt pursuit of the Galveston Bay NDZ at the August meeting.

Appendix 3

**Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 3.1**

List of Enforcement agencies tied into GBAN app

Partners	Official Email	Contact
Texas Commission on Environmental Quality	R12Comp@tceq.texas.gov	Valerie Lara
Brazoria County Environmental Health	karenc@brazoria-county.com	Karen Carol
Galveston County Health Department	environmental@gchd.org	Katherine Wilson
Texas General Land Office (GLO)	landoffice@glo.texas.gov	Greg Pollock
Harris County Pollution Control	pollution.control@pcs.hctx.net	Nancy Sibley
Texas Parks and Wildlife Department (TPWD)	laporte.le-communications@tpwd.texas.gov	Steven Mitchell
City of Galveston	KHockersmith@GalvestonTX.Gov	Kyle Hockersmith
Chambers County Environmental Health & Permitting	rtunze@co.chambers.tx.us ;	Rex Tunze
City of Houston	311@houstontx.gov	Paulette Pastor
Houston-Galveston Plastic Pollution Prevention Partnership (P3P)	stenmead@aol.com	Stennie Meadours
City of Houston Health Department	FOGcomplaints@houstontx.gov	Emily Chacon

List of all agencies currently receiving GBAN reports

**Galveston Bay Foundation
Boater Waste Education Campaign
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Summary of GBAN Reports

Date of Incident	Pollution Type	Municipality
2018-09-03	Storm Drains	Galveston
2018-09-10	Storm Drains	Webster
2018-09-10	Sanitary Sewers	Webster
2018-09-14	Sanitary Sewers	Galveston
2018-10-28	Trash and Debris	Seabrook
2018-12-19	Discolored Water	Seabrook
2019-01-15	Oil Sheen	Aldine
2019-02-04	Trash and Debris	Houston
2019-02-10	Storm Drains	Houston
2019-02-19	Discolored Water	Unknown
2019-02-20	Sanitary Sewers	Houston
2019-02-21	Trash and Debris	Houston
2019-03-17	Unknown	La Porte
2019-03-30	Trash and Debris	Pasadena
2019-03-30	Trash and Debris	Brazoria
2019-03-30	Unknown	Jamaica Beach
2019-04-12	Sanitary Sewers	Galveston
2019-04-13	Oil Sheen	Kemah
2019-04-21	Chemicals	Houston
2019-04-25	Pet Waste	Bayou Vista
2019-05-07	Storm Drains	Beaumont Place
2019-05-29	Trash and Debris	La Porte
2019-05-29	Trash and Debris	La Porte
2019-06-07	Septic Systems	Brazoria
2019-06-11	Trash and Debris	Morgans Point
2019-06-23	Chemicals	Galveston
2019-06-27	Chemicals	Galveston
2019-06-27	Sanitary Sewers	Galveston
2019-07-14	Trash and Debris	Kingwood
2019-07-16	Unknown	Galveston
2019-07-30	Chemicals	Clear Lake Shores
2019-07-30	Storm Drains	Galveston
2019-08-02	Trash and Debris	League City Galveston
2019-08-08	Unknown	Morgans Point

2019-08-11	Storm Drains	League City Galveston
2019-08-20	Trash and Debris	La Porte
2019-08-21	Trash and Debris	Cloverleaf
2019-10-09	Boat Sewage	Galveston
2019-10-29	Unknown	Houston
2019-11-10	Abandoned Vessel	League City Galveston
2019-11-20	Abandoned Vessel	Brazoria
2019-11-22	Storm Drains	Texas City
2019-12-05	Unknown	Sheldon
2019-12-23	Storm Drains	Nassau Bay
2019-12-28	Pet Waste	Bayou Vista
2020-01-02	Trash and Debris	Unknown
2020-01-14	Storm Drains	Galveston
2020-01-17	Unknown	Hitchcock
2020-02-02	Unknown	Houston
2020-02-03	Pet Waste	Galveston
2020-02-06	Trash and Debris	La Porte
2020-03-01	Trash and Debris	League City Galveston
2020-03-01	Unknown	League City Galveston
2020-03-01	Chemicals	Galveston
2020-03-05	Trash and Debris	Galveston
2020-03-10	Trash and Debris	Santa Fe
2020-03-14	Fish Kill	Galveston
2020-04-30	Trash and Debris	La Porte
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-02	Trash and Debris	Unknown
2020-05-03	Trash and Debris	Unknown
2020-05-05	Trash and Debris	Galveston
2020-05-14	Chemicals	Nassau Bay
2020-05-26	Unknown	Baytown
2020-05-27	Sanitary Sewers	El Lago
2020-05-28	Sanitary Sewers	Seabrook
2020-06-01	Trash and Debris	San Leon
2020-06-05	Storm Drains	La Porte
2020-06-05	Unknown	Morgans Point
2020-06-07	Sanitary Sewers	Bayou Vista
2020-06-08	Unknown	Baytown

2020-06-08	Sanitary Sewers	Bayou Vista
2020-06-16	Abandoned Vessel	Bacliff
2020-06-19	Oil Sheen	Crystal Beach
2020-06-29	Storm Drains	Baytown
2020-07-07	Trash and Debris	La Porte
2020-07-17	Trash and Debris	Freeport
2020-07-20	Sanitary Sewers	Bolivar Peninsula
2020-07-24	Storm Drains	Baytown
2020-08-29	Trash and Debris	Galveston
2020-08-29	Trash and Debris	Galveston
2020-09-03	Storm Drains	La Porte

Appendix 4

Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverables, Task 4

1. List of Water Monitoring Team and Dockwalkers

Site ID	Active Site Description	Monitor	Latitude	Longitude	Monitoring Schedule
81444	Burnet Bay at Baytown Nature Center	Denise Bell	29.75956	-95.053053	3rd Wednesday
81035	Christmas Bay at 257S County Boat Ramp	Becky Kowalski	29.04855	-95.165262	3rd weekend at 1000
81174	Clear Lake at 18 Waterford Oak Lane	James Dismukes	29.5459524	-95.043871	4th Monday at 0830
80955	Clear Lake at Bal Harbor Marina	Beverly Morrison	29.554958	-95.072739	1st week 0730
80956	Clear Lake at Blue Dolphin Yachting Center	Claire McNulty	29.558397	-95.028258	1st Saturday at 0800
15105	Clear Lake at Clear Lake Park Pier	Diane Humes	29.563703	-95.066049	Last Monday at 0815
80759	Clear Lake at Clear Lake Shores	Arline Laughter	29.551061	-95.03268	2nd Tuesday
80953	Clear Lake at Endeavour Marina	Mike Petitt	29.559879	-95.042235	1st Wednesday at 1000
80758	Clear Lake at Jarboe Bayou Park	Helle Brown	29.542023	-95.030541	2nd Tuesday
81045	Clear Lake at Kemah Boardwalk Aquarium	Kendra Havlik	29.548575	-95.021002	2nd Sunday at 9am
80467	Clear Lake at Lakewood Yacht Club	Claire McNulty	29.554589	-95.03102	3rd Tuesday at 0800
30012	Clear Lake at Marina Del Sol	Larry Watson	29.55207	-95.052056	3rd Thursday 1000
30010	Clear Lake at Nassau Bay Upper Bay Road	Elizabeth Cornwell	29.544286	-95.085907	20th at 1700
81040	Clear Lake at Nassau Bay Yacht Club	Helen Lane	29.541451	-95.09718	2nd Tuesday at 0900
81049	Clear Lake at Portofino Harbor Marina	Catherine Eisele	29.547255	-95.025551	1st Friday
81283	Clear Lake at Sea Cove Ct	Jane Webb	29.537825	-95.084316	1st Wednesday at 0900
81037	Clear Lake at South Shore Harbor	Derrick Gelino	29.54733	-95.064334	3rd Tuesday at 1300
81217	Clear Lake at Taylor Lake Entrance and Nasa Road	Steve Ellerbe	29.565483	-95.053867	1st Sunday at 0900

Site ID	Active Site Description	Monitor	Latitude	Longitude	Monitoring Schedule
81173	Clear Lake at Waterford Harbor Marina	Mary Christian	29.54755	-95.043812	1st Wednesday at 0900
81164	Clear Lake at Watergate Yachting Center Pier 4	Tyler Dudley	29.545271	-95.036368	3rd Monday at 0900
81305	East Bay at East Bay Boat Ramp	Cindi Barrett	29.57498	-94.55566	2nd Monday
81280	East Bay at Frenchtown Road	Becky Gantert	29.371335	-94.777401	2nd Sunday of month at 1130
80961	East Bay at Frozen Point 3 (Anahuac National Wildlife Refuge)	Cindi Barrett	29.540939	-94.520594	2nd Monday
80949	East Bay at Stingaree Restaurant Bar	Inactive	29.482082	-94.605146	3rd Wednesday at 1300
30008	Galveston Bay at 1109 6th St. San Leon	Mark Niles	29.478655	-94.920231	1st Tuesday at 1800
80952	Galveston Bay at 3903 Bayshore Bacliff	Dianne Forthman and Joe Cavallaro	29.515548	-94.9857	30th of each month
30009	Galveston Bay at Bayland Park	Lana Berkowitz	29.713048	-94.993137	1st Thursday at 0900
80951	Galveston Bay at Bayshore Park	Steve Ellerbe	29.506474	-94.95805	4th Tuesday
81281	Galveston Bay at GBF	Nick Ellis	29.532912	-95.009303	15th at 1000
81162	Galveston Bay at Houston Yacht Club	Emily Innes	29.619129	-94.999132	3rd Tuesday at 1730
81284	Galveston Bay at Morgan's Point	Lori Glasgow	29.678835	-94.982656	2nd week at 1130
81042	Galveston Bay at Pier 19	Becky Gantert	29.310333	-94.79159	Third Thursday
80463	Galveston Bay at Pine Gully Park	David Clement	29.58958	-94.990566	Middle of month
80418	Galveston Bay at Seascape Pier	Gary Bell	29.584541	-94.996785	2nd Wednesday at 1100
81044	Galveston Bay at Shoreacres Pier	Kay and Kendall Pickett	29.62203	-95.004664	3rd Sunday at 1300
81304	Galveston Bay at Smiths Point Boat Ramp	Joan Ward	29.54666	-94.78755	3rd Monday
80950	Galveston Bay at Sylvan Beach Park	Dan and Ann Hoge	29.652914	-95.005539	2nd weekend at 0900
30013	Galveston Bay at Texas City Dike	Cindy Liening	29.387027	-94.874629	2nd Thursday at 1600

Site ID	Active Site Description	Monitor	Latitude	Longitude	Monitoring Schedule
81160	Galveston Bay at Texas Corinthian Yacht Club	Kris Johnson	29.529115	-95.003242	4th Tuesday
81218	Galveston Bay at Todville Rd	Suzanne Milby	29.569982	-95.009848	the 28th at 1400
81051	Galveston Bay at Topwater Grill	Mark Niles	29.470799	-94.925598	4th Saturday
81159	Jones Bay at Bayou Vista	Chris Roper	29.323449	-94.946625	Every Other Tuesday at 0830
80958	Jones Bay at Tiki Tom's RV Park	Janet Mason	29.304188	-94.906542	3rd Wednesday
81302	Lake Anahuac at Turtle Bayou	Shelli Ellerbe	29.828532	-94.669831	4th Tuesday
80719	Moses Lake at Texas City Prairie Preserve	Scott Buckel	29.428824	-94.95047	Mondays and Fridays
30007	Offatt's Bayou at Camarone's Coastal Tex Mex	Stan Conley	29.278705	-94.83472	3rd Sunday at 1200
81034	Offatt's Bayou at Sea Star Base Galveston	Joe Bryan	29.285622	-94.853502	2nd Tuesday at 1600
81041	Swan Lake at 257J Boat Ramp	Becky Kowalski	28.979729	-95.268679	3rd Friday at 1000
81036	Trinity Bay at Carroll Road	Bob Lanser	29.68569	-94.86612	2nd Friday at 1000
81301	Trinity Bay at Fort Anahuac Park	Laurie Gonzales and Karen Morris	29.75533	-94.69028	1st Sunday
81047	Trinity Bay at Galveston Bay RV Resort	Paul and Sabra Francis	29.698141	-94.945875	3rd Sunday at 0900
81303	Trinity Bay at McCollum Park	Valerie and Mickey Redus	29.74486	-94.82787	3rd Friday at 1300
81050	Trinity Bay at Oak Island Lodge	Susan Webb	29.654094	-94.699173	2nd Tuesday
81517	West Bay at Bay Harbor	Dana Kurtin, David and Margaret Labbe	29.1315278	-95.07128	3rd Sunday 0900
81038	West Bay at Eckert Bayou	Suzanne Dehart	29.221619	-94.933181	13th-16th at 0900
81282	West Bay at Jamaica Beach	Wayne O'Quin	29.189151	-94.980308	2nd Tuesday at 1400
81048	West Bay at Oak Bayou	Skyler Carey	29.204895	-94.957483	3rd Sunday at 1000
81158	West Bay at Pirate's Cove	Sandra Metoyer	29.217963	-94.949425	1st Sunday at 0900
80954	West Bay at Sportsman Road	Becky Kowalski	29.255152	-94.918154	Every 3rd Thursday

Site ID	Active Site Description	Monitor	Latitude	Longitude	Monitoring Schedule
81046	West Bay at Sweetwater Preserve	Cindy Sivon	29.272506	-94.881102	1st Sunday

List of Dockwalkers

Name	Dockwalking Dates	Role @ GBF
Ted Driscoll	February – August 2020	GBF Community Engagement Coordinator

2. WMT Training/Meeting Schedule

Date	Presenters	Event/Organization Topic	Location	Estimated Audience
10/30/2017	Sarah Gossett	Texas Stream Team Phase I & II training	GBF Office	2
11/7/2017	Sarah Gossett	Texas Stream Team Phase III Training	Sea Cove Court	2
11/10/2017	Sarah Gossett	Bacteria Training	GBF Office	2
12/15/2017	Lindsey Nolan & Sarah Gossett	Bacteria Training	GBF Office	7
1/26/2018	Lindsey Nolan & Sarah Gossett	Quality Control Training	Texas Corinthian Yacht Club	13
1/27/2018	Lindsey Nolan & Sarah Gossett	Quality Control Training	Texas Corinthian Yacht Club	11
2/23/2018	Lindsey Nolan & Sarah Gossett	Texas Stream Team Phase I & II training	Marina Del Sol	12
3/7/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Bluewater Bait Camp	1
3/8/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Texas Corinthian Yacht Club	1
3/9/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Nassau Upper Bay Road	1
3/10/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Frenchtown Road	1
3/13/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Eckert Bayou	1
3/16/2018	Lindsey Nolan	Texas Stream Team Phase III Training	257S County Boat Ramp	1
3/20/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Endeavour Marina	1
3/21/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Bayshore Park	1
3/28/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Taylor Lake Entrance	1
3/28/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Sylvan Beach	1
4/29/2018	Lindsey Nolan	Texas Stream Team Phase III Training and Bacteria Training	Pier 19, Galveston	1
6/6/2018	Lindsey Nolan	Texas Stream Team Phase I & II training	GBF Office, Clear Lake Park Pier	6
6/12/2018	Lindsey Nolan	Texas Stream Team Phase III Training	GBF Kemah Property	1
6/21/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Pier 19	1
8/6/2018	Lindsey Nolan	Quality Control Training	Lakewood Yacht Club	5

Date	Presenters	Event/Organization Topic	Location	Estimated Audience
8/13/2018	Lindsey Nolan	Quality Control Training	Lakewood Yacht Club	6
8/24/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Nassau Bay Upper Bay Road	1
8/26/2018	Lindsey Nolan	Quality Control Training	Clear Lake Park	4
9/8/2018	Lindsey Nolan & Sarah Gossett	Texas Stream Team Phase I & II training	Marina Del Sol	14
9/16/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Sweetwater Lake	1
9/20/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Marina Del Sol	1
9/21/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Bal Harbor Marina	1
10/5/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Portofino Harbor	1
10/5/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Bay Harbor	3
10/11/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Morgan's Point	1
10/12/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Sylvan Beach	2
10/13/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Texas A&M Galveston	1
11/16/2018	Lindsey Nolan	Texas Stream Team Phase III Training	Galveston Bay RV Resort	2
5/1/2019	Nick Ellis & Sarah Gossett	Quality Control Training	Marina del Sol	6
5/1/2019	Nick Ellis & Sarah Gossett	Quality Control Training	Marina del Sol	4
6/12/2019	Nick Ellis & Sarah Gossett	Texas Stream Team Phase I & II training	Lakewood Yacht Club	9
7/8/2019	Nick Ellis	Quality Control Training	Texas City Prairie Preserve	1
7/9/2019	Nick Ellis	Texas Stream Team Phase III training	Kemah Boardwalk	1
7/13/2019	Nick Ellis	Texas Stream Team Phase III training	Bayshore Park	1
7/14/2019	Nick Ellis	Texas Stream Team Phase III training	South Shore Harbor Marina	1
7/17/2019	Nick Ellis	Texas Stream Team Phase III training	Sweetwater Preserve	1
7/18/2019	Nick Ellis	Texas Stream Team Phase III training	Pine Gully Park	1
9/5/2019	Nick Ellis	Quality Control Training	Pine Gully Park	2
1/14/2019	Nick Ellis	Quality Control Training	Pine Gully Park	3

3. Water Quality Monitoring Plan, Logic Model, Action Plan, and Schedule

Water Quality Monitoring Plan

GBF’s Water Monitoring program trains and equips citizen scientists to collect and understand essential water quality data from Galveston Bay. Through regular discussions and educational outreach opportunities, community members can improve their understanding of how specific impacts affect Galveston Bay and the numerous shipping, recreation, eco-tourism, and industry groups that rely on the Bay. GBF and local partners will serve as a regional network that can address specific challenges facing Galveston Bay. The action plan and associated documents (logic model, information blueprint, etc.) identified three key goals for the Water Quality Program going forward:

1. To strengthen organizational capacity by building networks that foster interdisciplinary collaboration through information exchange and data sharing
2. To build individual capacity within the community by creating a more scientifically literate and environmentally aware public that strives to beneficially impact local water quality
3. To generate informational and scientific capacity within GBF by establishing a long-term, adaptable database for our water quality data, analyzing water quality data for validity, trends, and predictive capacity, and identifying areas for improvement in our data collection protocol

BWEC Three-Year Strategic Plan

Goal 1: The lands and waters of Galveston Bay support healthy habitats and functioning natural systems.

Strategy	2019	2020	2021
Strategy 1.4 Guide others in implementing projects and best management practices that preserve and enhance the Bay	Provide effective language and support to partner marinas to improve enforcement of proper boater waste disposal and reduce dumping of boat sewage.	Evaluate and refine strategies to support marina managers in enforcement, as needed	
	Update and distribute outreach and marketing materials to local and regional partners to better promote the GBAN app and increase pollution reports.	Update outreach and marketing materials and expand reach by sharing materials with new community partners.	

Goal 2: The public understands and values the benefits of a healthy Galveston Bay and works collaboratively to ensure long-term, multiple benefits.

<i>Strategy</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>
Strategy 2.1 Engage priority audiences to teach, inspire, and promote positive behavior in support of the Bay	Provide resources and engage TMCA and GBCA members in BWEC messaging, creating community advocates to spread the message and reduce illegal dumping in Galveston Bay.	Continue to provide support and resources to TMCA and GBCA to create peer-to-peer advocates for proper boater waste management.	
	Develop and promote marketing and outreach plan for GBAN app	Implement marketing and outreach plan for GBAN app	Implement and refine marketing and outreach plan for GBAN app
	Design and establish GBAN advocacy program, funding provided.	Implement GBAN community advocacy program, funding provided.	
	Post bacteria data on Swim Guide and promote this resource to the public, encourage recreators to check bacteria levels before swimming or boating and improve community knowledge on bacterial pollution.		
	Train, manage, and foster relationships with GBF's citizen science water monitoring volunteers, maintaining 60 to 70 volunteers and monitoring sites, to collect high quality data and serve as ambassadors for the Bay in the community.		

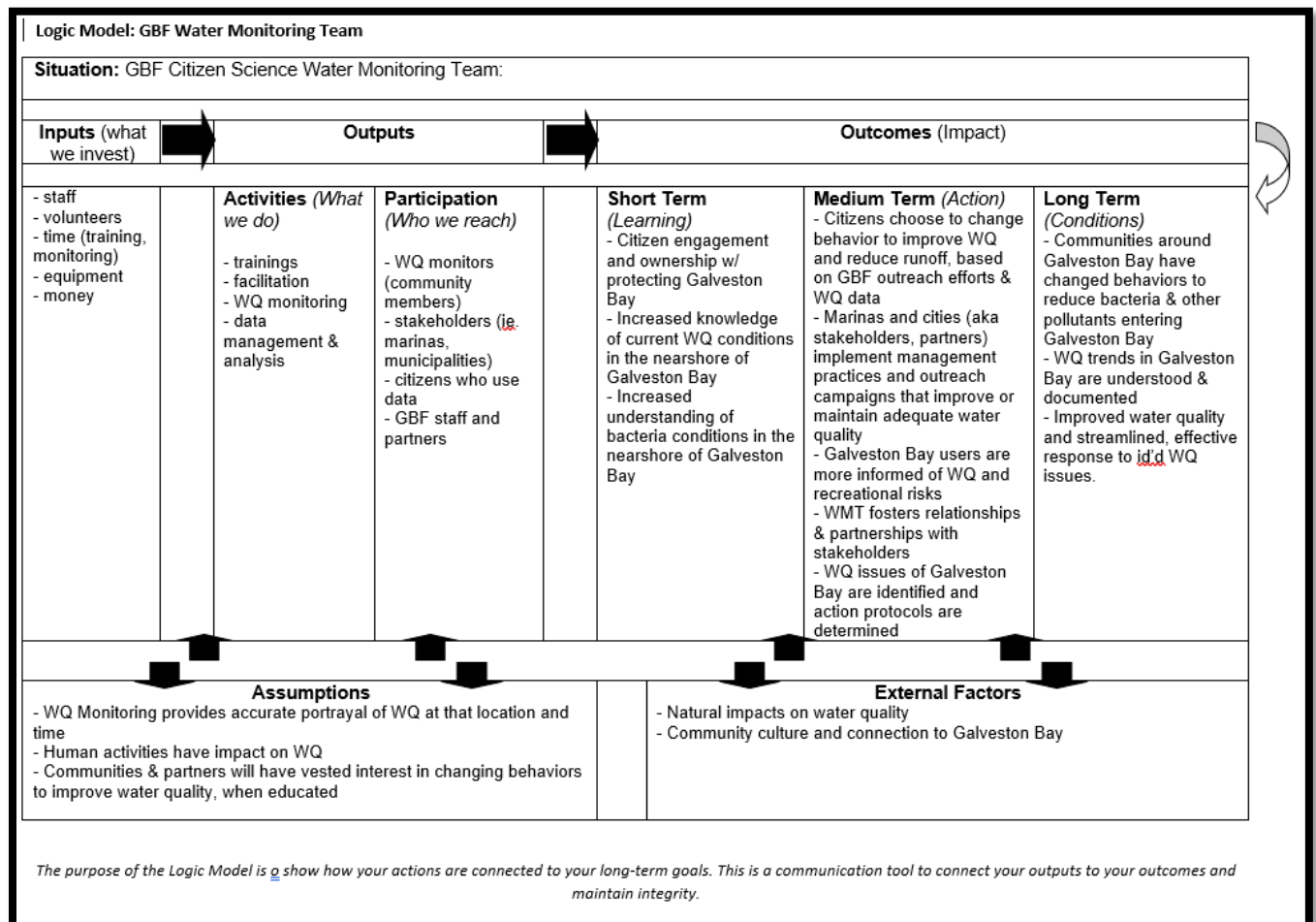
<i>Strategy</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>
Strategy 2.2 Host community-based events that broaden the public's understanding of and appreciation for Bay resources	Host three community-facing public presentations to promote water quality programs and campaigns.	Host three community-facing public presentations to promote water quality programs and campaigns.	Host three community-facing public presentations to promote water quality programs and campaigns.
	Host Water Monitoring Team trainings for new volunteer water monitors, as needed.	Host Water Monitoring Team trainings for new volunteer water monitors, as needed.	Host Water Monitoring Team trainings for new volunteer water monitors as needed.

Strategy	2019	2020	2021
Strategy 2.3 Cultivate relationships with critical Bay stakeholders that keep them engaged in and informed of Bay issues	Meet with key stakeholders to garner support for NDZ petition. Update draft petition, as necessary.		Review draft application for potential submittal for approval.
	Identify new targeted stakeholder group to engage in water quality programming.	Engage with and establish relationship with ID'd stakeholder group to determine needs and priorities. Create messaging and outreach specific for stakeholder group.	Implement programming for targeted stakeholder group.
	Continue to collect and analyze Dockwalker and boater perception surveys.	Begin analysis of all Dockwalker and water quality data for "Boater Waste Education Campaign capstone report."	Complete and submit capstone report and guidance for future BWEC campaign activities.

Strategy	2019	2020	2021
Strategy 2.4 Provide leadership and resources to support sound policies and practices that protect the Bay and benefit the community	Facilitate revisions of NDZ draft application.		Seek and promote Galveston Bay federal No Discharge Zone approval by the U.S. EPA.
	Provide effective language and support to partner marinas to improve enforcement of proper boater waste disposal and reduce dumping of boat sewage.	Evaluate and refine strategies to support marina managers in enforcement, as needed.	
	Update and distribute outreach and marketing materials to local and regional partners to better promote the GBAN app and increase pollution reports.	Update outreach and marketing materials and expand reach by sharing materials with new community partners.	
	Develop and promote marketing and outreach plan for GBAN app to increase community pollution reporting.	Implement marketing and outreach plan for GBAN app to increase community pollution reporting.	Implement and refine marketing and outreach plan for GBAN app to increase community pollution reporting.

Strategy	2019	2020	2021
Strategy 2.4 Continued	Identify strategic monitoring locations for bacteria monitoring.	Shift bacteria sites to identified locations.	Ongoing, consistent bacteria monitoring at identified locations.
	Promote and share water quality findings, based on refined Water Monitoring Action Plan.		Refine Water Monitoring Action Plan for improved stakeholder engagement and action.

Water Monitoring Team (WMT) Logic Model



WMT Action Plan

Action Plan ID	Action Plan Step
A1	Find development data or quantify human activity
A1	Analyze development info vs WQ data
A2	ID communities to focus on (pick 3 communities)
A2, B2	Conduct community survey & ID contacts
A2, B2	Create information products & messaging based on results
B1	Conduct analysis on impacts of marinas on WQ
B1	Share information products with marinas
C2	Conduct analysis on bacteria levels
D2	Promote bacteria map & findings
D3	Communicate data to public
A4	Data analysis to determine overall health & problem areas
B1	ID marinas & contact info
C1	Create action limits for various threshold limits of bacteria
C2	ID contact for each site to notify if high bacteria levels
D2	ID criteria & communication methods

WMT Schedule

Site ID	Active Site Description	Monitor	Monitoring Schedule
81444	Burnet Bay at Baytown Nature Center	Denise Bell	3rd Wednesday
81035	Christmas Bay at 257S County Boat Ramp	Becky Kowalski	3rd weekend at 1000
81174	Clear Lake at 18 Waterford Oak Lane	James Dismukes	4th Monday at 0830
80955	Clear Lake at Bal Harbor Marina	Beverly Morrison	1st week 0730
80956	Clear Lake at Blue Dolphin Yachting Center	Claire McNulty	1st Saturday at 0800
15105	Clear Lake at Clear Lake Park Pier	Diane Humes	Last Monday at 0815
80759	Clear Lake at Clear Lake Shores	Arline Laughter	2nd Tuesday
80953	Clear Lake at Endeavour Marina	Mike Pettitt	1st Wednesday at 1000
80758	Clear Lake at Jarboe Bayou Park	Helle Brown	2nd Tuesday
81045	Clear Lake at Kemah Boardwalk Aquarium	Kendra Havlik	2nd Sunday at 9am
80467	Clear Lake at Lakewood Yacht Club	Claire McNulty	3rd Tuesday at 0800
30012	Clear Lake at Marina Del Sol	Larry Watson	3rd Thursday 1000
30010	Clear Lake at Nassau Bay Upper Bay Road	Elizabeth Cornwell	20th at 1700
81040	Clear Lake at Nassau Bay Yacht Club	Helen Lane	2nd Tuesday at 0900
81049	Clear Lake at Portofino Harbor Marina	Catherine Eisele	1st Friday
81283	Clear Lake at Sea Cove Ct	Jane Webb	1st Wednesday at 0900
81037	Clear Lake at South Shore Harbor	Derrick Gelino	3rd Tuesday at 1300
81217	Clear Lake at Taylor Lake Entrance and Nasa Road	Steve Ellerbe	1st Sunday at 0900
81173	Clear Lake at Waterford Harbor Marina	Mary Christian	1st Wednesday at 0900
81164	Clear Lake at Watergate Yachting Center Pier 4	Tyler Dudley	3rd Monday at 0900
81305	East Bay at East Bay Boat Ramp	Cindi Barrett	2nd Monday
81280	East Bay at Frenchtown Road	Becky Gantert	2nd Sunday of month at 1130

Site ID	Active Site Description	Monitor	Monitoring Schedule
80961	East Bay at Frozen Point 3 (Anahuac National Wildlife Refuge)	Cindi Barrett	2nd Monday
80949	East Bay at Stingaree Restaurant Bar	Inactive	3rd Wednesday at 1300
30008	Galveston Bay at 1109 6th St. San Leon	Mark Niles	1st Tuesday at 1800
80952	Galveston Bay at 3903 Bayshore Bacliff	Dianne Forthman and Joe Cavallaro	30th of each month
30009	Galveston Bay at Bayland Park	Lana Berkowitz	1st Thursday at 0900
80951	Galveston Bay at Bayshore Park	Steve Ellerbe	4th Tuesday
81281	Galveston Bay at GBF	Nick Ellis	15th at 1000
81162	Galveston Bay at Houston Yacht Club	Emily Innes	3rd Tuesday at 1730
81284	Galveston Bay at Morgan's Point	Lori Glasgow	2nd week at 1130
81042	Galveston Bay at Pier 19	Becky Gantert	Third Thursday
80463	Galveston Bay at Pine Gully Park	David Clement	Middle of month
80418	Galveston Bay at Seascape Pier	Gary Bell	2nd Wednesday at 1100
81044	Galveston Bay at Shoreacres Pier	Kay and Kendall Pickett	3rd Sunday at 1300
81304	Galveston Bay at Smiths Point Boat Ramp	Joan Ward	3rd Monday
80950	Galveston Bay at Sylvan Beach Park	Dan and Ann Hoge	2nd weekend at 0900
30013	Galveston Bay at Texas City Dike	Cindy Liening	2nd Thursday at 1600
81160	Galveston Bay at Texas Corinthian Yacht Club	Kris Johnson	4th Tuesday
81218	Galveston Bay at Todville Rd	Suzanne Milby	the 28th at 1400
81051	Galveston Bay at Topwater Grill	Mark Niles	4th Saturday
81159	Jones Bay at Bayou Vista	Chris Roper	Every Other Tuesday at 0830
80958	Jones Bay at Tiki Tom's RV Park	Janet Mason	3rd Wednesday
81302	Lake Anahuac at Turtle Bayou	Shelli Ellerbe	4th Tuesday
80719	Moses Lake at Texas City Prairie Preserve	Scott Buckel	Mondays and Fridays
30007	Offatt's Bayou at Camarone's Coastal Tex Mex	Stan Conley	3rd Sunday at 1200

Site ID	Active Site Description	Monitor	Monitoring Schedule
81034	Offatt's Bayou at Sea Star Base Galveston	Joe Bryan	2nd Tuesday at 1600
81041	Swan Lake at 257J Boat Ramp	Becky Kowalski	3rd Friday at 1000
81036	Trinity Bay at Carroll Road	Bob Lanser	2nd Friday at 1000
81301	Trinity Bay at Fort Anahuac Park	Laurie Gonzales and Karen Morris	1st Sunday
81047	Trinity Bay at Galveston Bay RV Resort	Paul and Sabra Francis	3rd Sunday at 0900
81303	Trinity Bay at McCollum Park	Valerie and Mickey Redus	3rd Friday at 1300
81050	Trinity Bay at Oak Island Lodge	Susan Webb	2nd Tuesday
81517	West Bay at Bay Harbor	Dana Kurtin, David and Margaret Labbe	3rd Sunday 0900
81038	West Bay at Eckert Bayou	Suzanne Dehart	13th-16th at 0900
81282	West Bay at Jamaica Beach	Wayne O'Quin	2nd Tuesday at 1400
81048	West Bay at Oak Bayou	Skyler Carey	3rd Sunday at 1000
81158	West Bay at Pirate's Cove	Sandra Metoyer	1st Sunday at 0900
80954	West Bay at Sportsman Road	Becky Kowalski	Every 3rd Thursday
81046	West Bay at Sweetwater Preserve	Cindy Sivon	1st Sunday

4. Dockwalker Plan and Survey Schedule

Dockwalker Plan

The GBF Community Engagement Coordinator will walk dock during Spring and Summer 2020 and attended various boating events to collect commercial boater surveys.

Dockwalker Survey Schedule

Date	Marina
02/2020	Pier 19
03/2020	Galveston Yacht Basin
04/2020	San Leon
05/2020	Port Bolivar

Appendix 5

Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 5.1

Results summary based on Dockwalker and Water Monitoring Team data collection

The percentage of samples with enterococci bacteria samples measuring greater than 105 most probable number (mpn) varies greatly between the water monitoring team site locations, as shown in **Figure 1**. The locations with the two highest frequencies (Galveston Bay at Pier 19, **Figure 2**, and Lake Anahuac, **Figure 3**), the lowest frequency with an exceedance (Galveston Bay at Texas City Dike, **Figure 4**), and one location in the middle (Jones Bay at Bayou Vista, **Figure 5**) are provided below for analysis.

All of the example sites, with the exception of the Galveston Bay at Texas City Dike, the trend line shows a decrease in mpn over time. This indicates that there is generally less bacteria present in the waters of Galveston Bay over time. It's also clear from all graphs that spikes in the concentration of bacteria are not consistent over time, but rather fluctuate greatly depending on events which affect each location such as rain or a localized issue. Two of these sites also are locations where active outreach work is being conducted. The Galveston Bay at Pier 19 location has a known bacteria issue, which has prompted working with the Texas Commission on Environmental Quality and the City of Galveston to identify the problem, given the proximity of the sampling location to a storm outflow. Without measuring and tracking the bacteria concentrations, this work would otherwise not be done. The second location is Jones Bay at Bayou Vista, which has seen lower concentrations of bacteria following an increased interest by the community in ways to reduce local bacteria concentrations.

Figure 1:

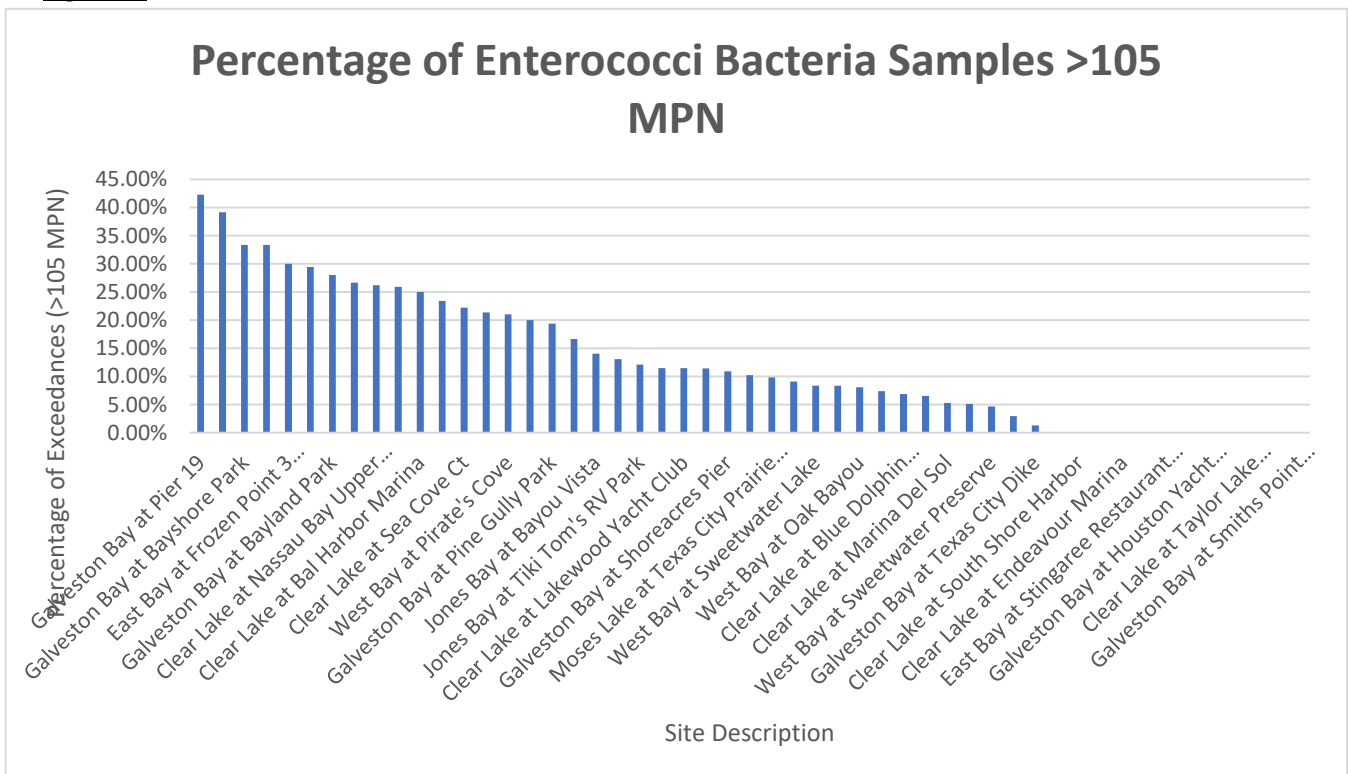


Figure 2:

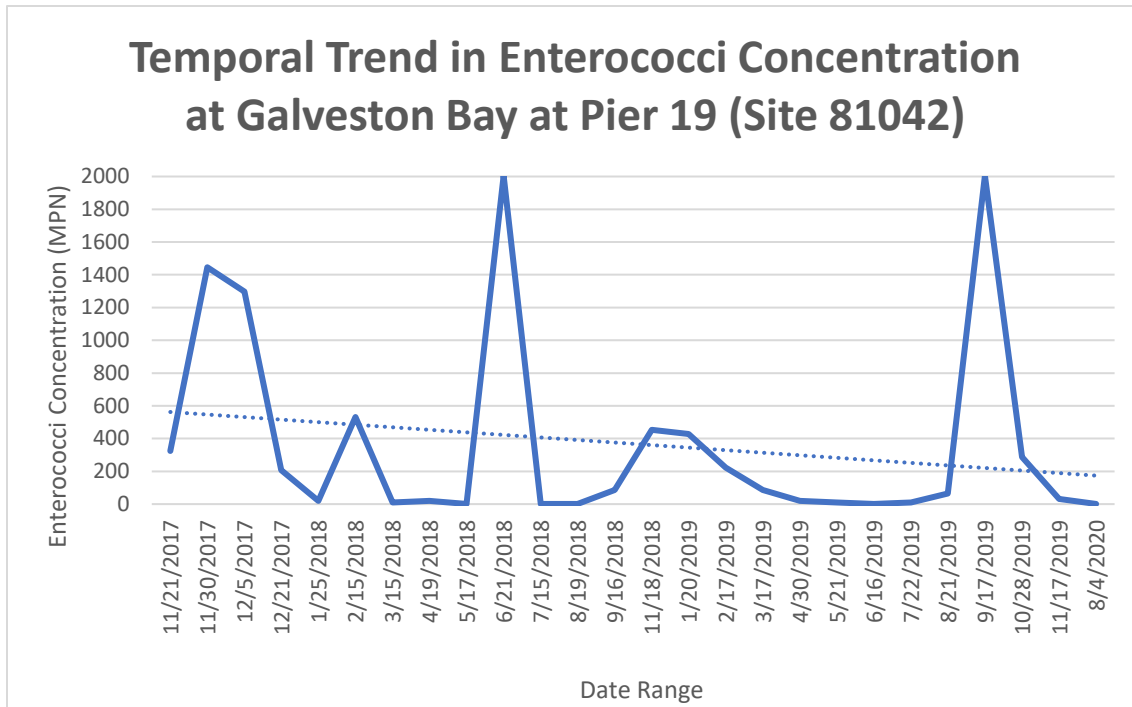


Figure 3:

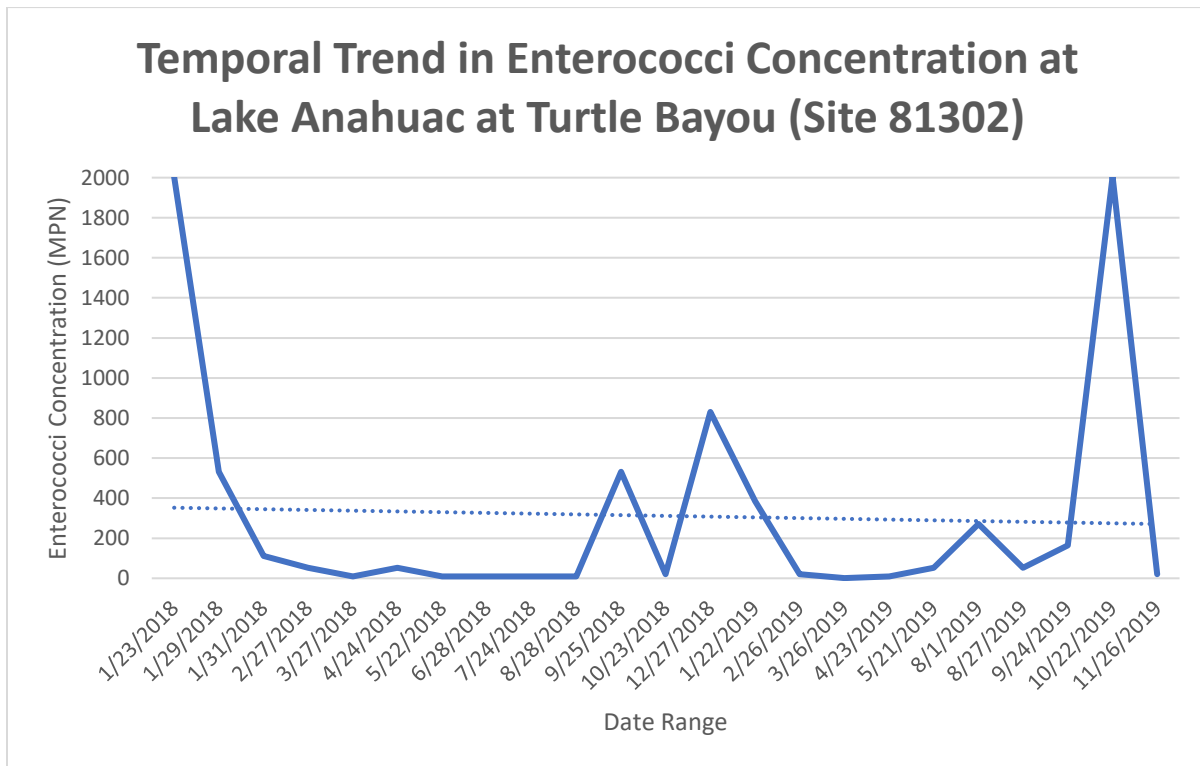


Figure 4:

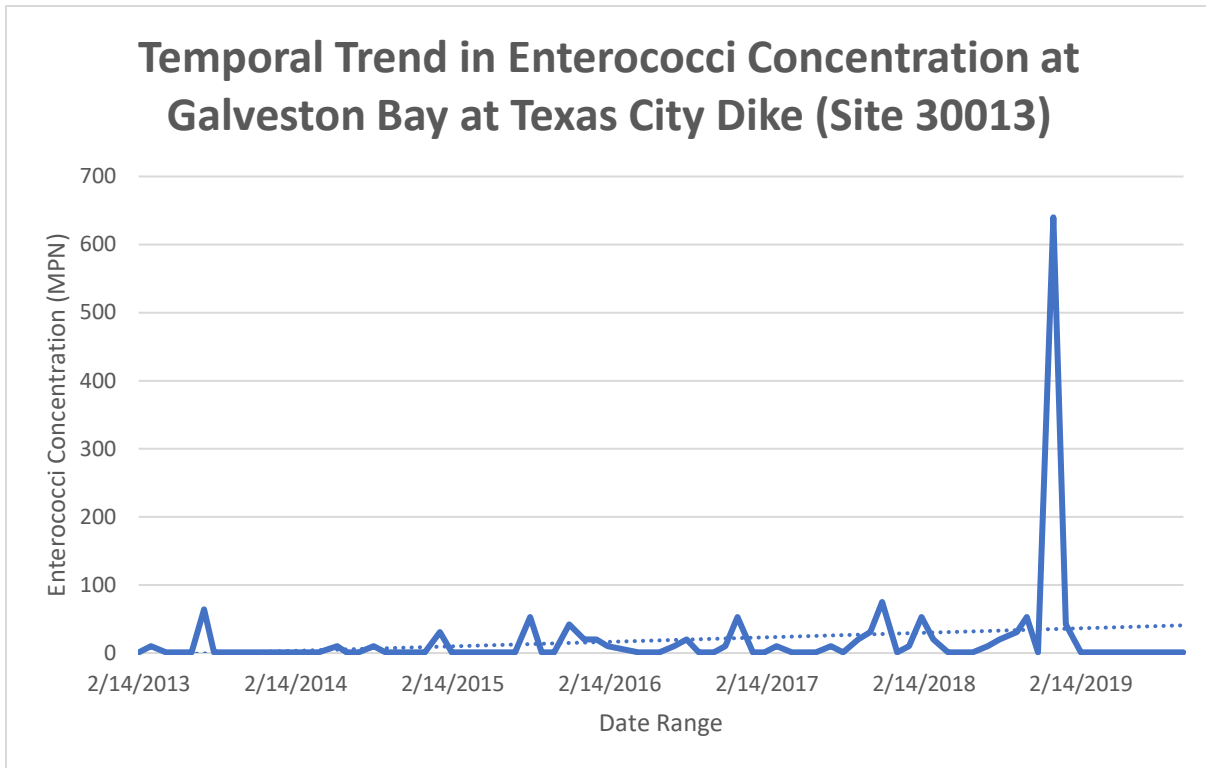
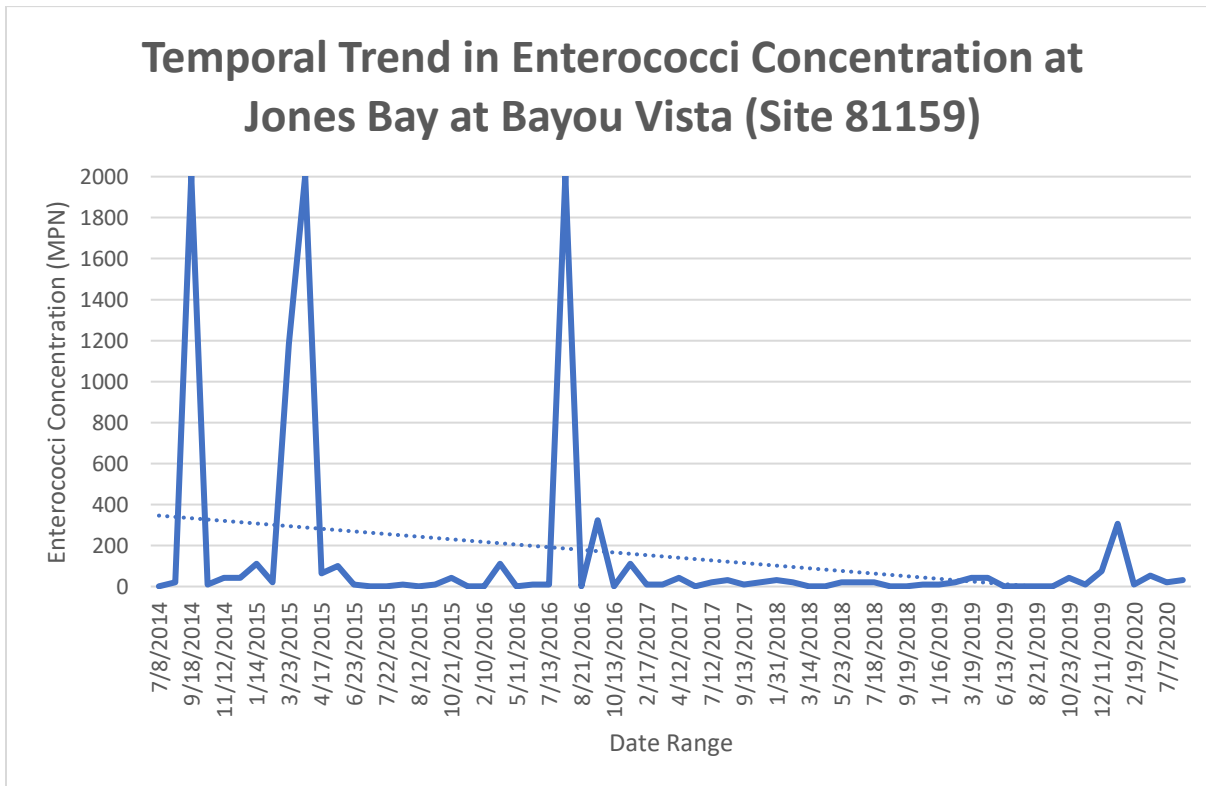


Figure 5



Galveston Bay Foundation
Boater Waste Education Campaign
GLO Contract No. 19-039-000-B073
Cycle 23 Deliverable, Task 5.2

Results from all behavior/knowledge change tracking

One of the primary sources of behavior change tracking for this project historically has come from the long-term results from the Dockwalker Program, begun in 2014, which surveyed boaters about environmentally-sound practices, assessed knowledge gaps and perceptions, and provided them with tools to improve water quality. Information from this program and the 2020 virtual version of this survey have helped the gauge the success of the program and the lessons learned directed and informed program efforts.

Over the past four years of this program, GBF has surveyed 231 recreational boaters within Galveston Bay. The purpose of this survey was to understand the values of boaters within Galveston Bay, how these values impact their behavior, and how those behaviors affect the water quality. The surveys took less than five minutes to complete and were conducted both online and in person at marinas and boater organization events from 2016 to 2020. Incentives were offered to increase boater participation, and included koozies, floating keychains, and whistles with the Pump Don't Dump brand. The vast majority of boaters that participated had many years of experience and spent most of their time on their vessel. This establishes that the respondents have sufficient experience on the water to form insights valuable to the purposes of this study. These respondents were important because they are the heaviest users of marinas and waterways. They are familiar with the management of on-board waste and therefore could offer unique insights to the day to day conditions of the water.

Between 2016 and 2020, the number of participants reporting that they would not eat or swim in their marina has increased from 59% to 87%. This is likely the result of GBF's extensive information campaign educating the public on the importance of water quality and may reflect a more informed and empowered boating population. For example, 92% of boaters surveyed in 2018 rating clean water as important or highly important to boating and in 2020 75% wanted more information regarding boater waste to be available in their Marina. The public is also more aware of where multiple pumpout stations are located. In 2016, only 14% of respondents knew where more than three stations were located, in 2020, 62% know where three or more stations were located. When asked about potential issues in their marinas, respondents expressed concerns consistent with campaign goals, focusing primarily on illegal dumping of waste and other materials from vessels, including oils and gas. We believe the inclusion of petroleum products to be the result of several high-profile spills in the Galveston Region in recent years.

Longterm trends over the years regarding overall water quality, availability of pumpouts or marina facilities, and abundance of wildlife have all stayed relatively stable over the survey period. The amount of litter observed in marinas has gotten worse, which may be an indicator of increasing population trends; however, this is offset by a general indication that boaters see an increase in the variety of waste disposal options, such as monofilament tubes and recycling bins.

Survey results also indicate that respondents are very concerned with the health of the environment and believe that pumping out waste in a facility is an important contributing factor to environmental health and general recreation. Additionally, most of the general boating population has never seen someone dumping waste directly into Clear Lake or Galveston Bay, but believe a small portion of the boating population do. A common theme when talking with boaters was their frustration over the lack of enforcement of policies and regulations that are currently in place. Many boaters believe that fewer people will follow the rules if there are no consequences to breaking them. They cite a lack of direction and leadership as a primary contributing factor to other boater's behaviors. However, the prevailing opinion of boaters is that boater waste is responsible for a small proportion of the bacteria found in the Bay. They believe that most bacteria are sourced from land, either through insufficient treatment by wastewater treatment facilities or via storm water runoff. Access, operations, and cost are not major barriers to getting boaters to use a pump-out station or service, but most boaters only know of and use the pump-out located in their preferred marina. The data collected in these surveys, as well as anecdotal evidence obtained through conversation between respondents and the surveyor, indicate that convenience is the largest hurdle preventing more widespread use of pump-out facilities. Many liveaboard boaters exclusively use land-side facilities provided in marinas because they do not want to go through the hassle of routinely going to a pump out station. Boaters believe that a greater number of their peers would use pump-out stations if there were more available, and they were more convenient.