



March 31, 2016

General Land Office  
Resource Management Program Area  
1700 N. Congress Avenue, Room 617  
Austin, TX 78701-1495

Attn: Ms. Melissa Porter and Ms. Julie McEntire

Re: Boater Waste Education Campaign  
GLO Contract No. 15-045-000-8390  
Final Report

Dear Ms. Porter and Ms. McEntire:

Enclosed please find the final report for the Boater Waste Education Campaign project. GBF is very excited with the enhancements made to this project and we thank you for your continued feedback and encouragement.

Please feel free to call me at (281) 332-3381 ext. 215 with any questions you may have regarding the project. We are currently preparing the final invoice and the appropriate match documentation.

Again, thank you for your support. I look forward to working with you on future projects.

Sincerely,

A handwritten signature in black ink that reads "Charlene Bohanon".

Charlene Bohanon  
Water Programs Manager

Enclosure: Final Report

# Boater Waste Education Campaign

GLO Contract # 15-045-000-8390

## FINAL REPORT

Submitted: March 31, 2016

Prepared by:



17330 Highway 3  
Webster, TX 77598  
281-332-3381  
[www.galvbay.org](http://www.galvbay.org)

Prepared for:



**A report funded by a Texas Coastal Management Program grant approved by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration award No. NA14NOS4190139.**

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### **Project Description**

Approximately 50% of Galveston Bay oyster waters are impaired for bacteria, based on the Texas Commission on Environmental Quality's Six Total Maximum Daily Loads for Bacteria in Waters of the Upper Gulf Coast. The primary sources addressed in the Implementation Plan include insufficient treatment by wastewater treatment facilities and septic systems, sanitary sewer overflows, boat sewage dumping, and stormwater runoff. These impairments result in negative impacts to environmental and public health, as well as the economy.

Water and sediments are often degraded in and around marinas from boat sewage and introduction of dockside wastes and other non-point sources. It has been demonstrated that the combination of poor circulation and discharge from boaters and boat maintenance operations can create serious localized water quality and potential public health concerns (Jeong et al., 2005). The purpose of the Boater Waste Education Campaign (BWEC) is to decrease the incidences of illegal discharge of boater sewage waste in the Galveston Bay Estuary, particularly Clear Lake since it has the third highest concentration of privately owned marinas in the U.S. Due in large part to a lack of local data and communication of these potential environmental and public health impacts, and lack of enforcement of the existing No Discharge Zone in Clear Lake, behavior change through outreach alone is difficult and improvements are hard to track. GBF has continued to work toward overcoming these barriers to success.

Throughout the BWEC, GBF communicated the campaign message directly to boaters and marinas. This was achieved by contacting marinas, boating organizations, and boating events to arrange presentations and/or exhibits where boaters were exposed to the campaign message, in addition to distributing education packets to new tenants through our marina partners. The campaign emphasizes 1) negative environmental and public health impacts caused by sewage, 2) where boaters can properly dispose of their waste and report illegal dumping, and 3) the existing laws and fines associated with illegal boat discharges. As part of the initiative, boaters and marinas have been encouraged to join the Clean Texas Marina and Clean Boater Programs. Marinas have also been encouraged to seek funding through the Clean Vessel Act Program to construct, renovate, or replace pump-out stations. Outreach programs have proved to be effective in the past, but there is a need for a strong campaign in the Clear Lake area to reach new boaters and reawaken awareness of the issue. GBF has directed the development and distribution of the message with the input of a workgroup comprised of stakeholders representing 12 different boating and environmental groups, as well as members of the recreational boating community.

Funding from the Texas Coastal Management Program has played a key role in the distribution of the BWEC messages by covering costs associated with marketing, advertisement, outreach, illegal discharge reporting, marina partnerships, and volunteer water monitoring. The BWEC has been well received in the Clear Lake/Galveston Bay community and GBF plans to continue carrying out and enhancing this project indefinitely.

## **Task 1: Maintain Active Workgroup and Marketing/Outreach Materials**

### **BWEC Workgroup**

A campaign workgroup continued to guide BWEC activities, and consisted of representatives from the Galveston Bay Estuary Program, Clean Marina Program, Clear Lake Marina Association, Texas Parks and Wildlife, and other relevant, bay-area groups. The workgroup was originally formed under a Galveston Bay Estuary Program grant beginning in 2007. The committee members were solicited in the fall of 2007; the original invitation sent to bay area entities predated the beginning of this grant cycle. The workgroup was formed to develop and execute the campaign. The current workgroup consists of several original members, but GBF continually recruits new members in order to keep the BWEC ideas fresh. Participation in the workgroup is open to any interested parties. **Table 1** includes a list of the participating individuals during this grant cycle. The meeting schedule is included in **Table 2**. In addition to the scheduled meetings hosted by GBF, GBF staff regularly attended Clear Lake Marina Association, Gulf Coast Yacht Broker Association, Houston Safe Boating Council, and Marina Association of Texas meetings in order to stay in communication with these and many other local and state representatives in the boating community. These meetings are key to many successes in the BWEC because GBF has built a good reputation in that community.

The workgroup members contributed to the project in different ways. The Clear Lake Marina Association provides the business perspective to BWEC efforts and acts as an effective means to disseminate information and build networks in the local boating community. The Clean Texas Marina Program offers technical information and a statewide perspective of the boating industry. Both of these organizations are associated with the Marina Association of Texas and aid in getting the BWEC efforts publicized statewide. Redfish Island Marine and Maritime Sanitation are the two mobile pump-out companies currently in operation in Clear Lake and Galveston Bay. They provide in-kind donations for marina outreach events, as well as technical information on pump-out equipment. Additionally, Maritime Sanitation has been a long-time partner in donating pump-out services for the annual Redfish Raft Up event and assistance to marinas interested in applying for Clean Vessel Act grants to install pump-out facilities. Texas Parks and Wildlife Department, Texas Commission on Environmental Quality, and Galveston Bay Estuary Program assist the workgroup with questions relating to environmental regulations, access to data, and aid in the workgroup's efforts to get Galveston Bay designated as a No Discharge Zone. Several members of the workgroup are solely recreational boaters, or in addition to their involvement in the boating industry. Their knowledge and experience in the community is invaluable to the BWEC efforts.

The most valuable result of continuing this workgroup has been the fact that GBF has a group of committed stakeholders from the boating industry that are always available to bounce ideas off of and to give feedback on BWEC efforts. During this funding cycle, **organizational representation at the workgroup meetings was about 70%**, which is good considering the group's size. In addition, **100% of the organizations were directly involved in assisting with campaign tasks**, such as assembling and distributing education packets, connecting GBF to audiences for giving presentations, implementing the campaign at their marina, providing technical assistance for the Water Monitoring Team, etc. The performance indicators used during this funding cycle were approved by the workgroup, and can be downloaded and saved from **Appendix I**. The measured results corresponding to these indicators are addressed throughout this final report in the appropriate sections.

**Table 1. Boater Waste Education Campaign Workgroup**

Last	First	Organization
Tuma	Scott	City of League City/Clear Lake Racing Association
Hollin	Dewayne	Clean Texas Marina Program
Marshall	Lisa	Galveston Bay Estuary Program
Bohanon	Charlene	Galveston Bay Foundation
Gossett	Sarah	Galveston Bay Foundation
Rhea	Neally	Galveston Bay Foundation
Fitz Simmons-Evans	Lori	Galveston County Health District
Johnston	Steven	Houston-Galveston Area Council
Wright	Jean	Houston-Galveston Area Council
Hall	Lynda	Lakewood Yacht Club/Clear Lake Marina Association
Paige	Helen	Marina Bay Harbor/ Clear Lake Marina Association
Fannin	Paul	Marine Surveyor/Recreational Boater
Walker	Sterling	Onward/Maritime Sanitation, Inc.
Christopher	Jonathon	Onward/Maritime Sanitation, Inc.
Hutchinson	Ken	Onward/Maritime Sanitation, Inc.
Demmers	Jennifer	Onward/Maritime Sanitation, Inc.
Broach	Linda	Texas Commission on Environmental Quality
Morris	Chip	Texas Commission on Environmental Quality
Kropf	Philip	Texas Mariners Cruising Association
Carrier	Mary	Texas Parks and Wildlife Department

**Table 2. Workgroup meeting schedule**

CMP Cycle	Date	Location	Time	Attendance
18/19	3/19/15	GBF Office	1:00pm	10
19	8/21/15	The Admiral at Endeavour Marina	9:30am	30
19/20	11/17/15	GBF Office	9:30am	7

**Technical Advisory Committee**

GBF maintained communication with members of the Technical Advisory Committee (TAC) (**Table 3**) for the Boater Waste Impact Study, consisting of academic and environmental professionals from local universities, TCEQ and the workgroup chair. The TAC makes recommendations to GBF on strategies for collecting key data to quantify the potential impact of boat sewage on bacteria levels in the bay. They

gave advice and comments on the Boater Waste Impact Studies conducted by the Water Quality Research Interns, the Dockwalker Team surveys, and the background research being conducted for the No Discharge Zone application (**Table 4**).

**Table 3.** Technical Advisory Committee

Last	First	Organization
Dobberstine	Jim	Lee College Environmental Science
Feiveson	Alan	NASA Statistician
Glenn	Stephanie	Houston Advanced Research Center
Hall	Lynda	Lakewood Yacht Club/Clear Lake Marina Association
Henderson	Andrew	University of Texas School of Public Health
Lane	Helen	GBF Board Member/Retired NASA Chemist
Paige	Helen	Marina Bay Harbor/Clear Lake Marina Association

**Table 4.** Technical Advisory Committee meeting schedule\*

CMP Cycle	Date	Location	Time	Attendance
19	N/A	N/A	N/A	N/A

\*To date, communication has been via phone/email/individual meetings. Five out of seven members gave input on the summer 2015 research projects, with Alan Feiveson and Helen Lane advising on our sampling design and Stephanie Glenn advising extensively on our statistical analysis.

**Marketing/Outreach Materials**

Marketing and outreach materials were maintained or newly developed, as needed, for all of the various programs within the BWEC, including Pump Don't Dump, GBAN, GBF Water Monitoring Team, Water Quality Outreach Internship, and Dockwalkers.



**Figure 1.** Pump Don't Dump campaign materials distributed this cycle through CMP funding



Figure 2. Redesigned Pump Don't Dump floating keychains

Pump Don't Dump education packets and campaign giveaways were updated and reprinted for distribution during this cycle. Items included Pump-Out Guide postcards, GBAN plastic cards, and Pump Don't Dump koozies, and floating key chains (Figure 1), in addition to the Clean Texas Boater pledge cards, Scoop on Poop, and Clean Boater Tip Cards donated by the Marina Association of Texas (MAT). In an effort to develop a unified campaign appearance with materials developed by the Hatcher Group last cycle, koozies and floating keychains were ordered in a new color-scheme that matches the most recent campaign logo (Figures 2 and 3). The overarching goal was to use these items to direct boaters to the campaign website and pump-out map, and to provide boaters with tools that empower them to improve water quality through their actions. These materials act as a conversation starter so we can more easily share the campaign message, direct the boating community to the campaign website, provide boaters with tools to help improve water quality, and help create ambassadors that will help spread the campaign message. Campaign messaging was continually analyzed and simplified throughout this grant cycle. GBF decided to eliminate handing out TCEQ and Sea Grant educational materials with our campaign materials, because Dockwalker data that will be discussed later led us to believe that they buried the Pump Don't Dump message – effectively rendering the outreach materials useless by information-overload. Instead, GBF focused on creating a simple, direct call-to-action with our outreach materials distribution strategy. Figure 4 shows the new campaign handout method that will be used.



Figure 3. Redesigned Pump Don't Dump koozies





**Figure 4. New Pump Don't Dump handout method to be used in 2016 boating season**

In addition, GBF wrote Facebook posts, newsletter articles, and press releases to advertise BWEC campaign messages, as well as to share our campaign work with GBF followers and supporters. GBF wrote a new article (**Appendix I**) with updated messaging for Pump Don't Dump and GBAN calls-to-action and targeted the Southwest International Boat Show and MAT for publishing it. These publications reached our target boating audience with intentional messaging. GBF will continue to look for opportunities to publish our article and others as we develop them. PowerPoint presentations and hands-on activities were developed for various audiences such as the Houston Safe Boating Council's W.A.D.E. summer program, GBF's Bay Day event, the Southwest International Boat Show, and the Texas Mariners Cruising Association. Furthermore, during this grant cycle GBF had constructive communication with the Marina Association of Texas (MAT) in which the adoption of the Pump Don't Dump Campaign as the state-wide boater waste education program was discussed. MAT is very excited about this possibility moving forward, and the Texas Parks and Wildlife Department is fully supportive of state-wide implementation of Pump Don't Dump. Dialogue regarding this recent development will continue into the future, as the Pump Don't Dump Campaign's role in the state-wide program is determined. GBF is very optimistic about this progression.

One major enhancement carried out during this cycle was that GBF refocused and simplified the Pump Don't Dump campaign messaging to our target audience and will implement this change during the next grant cycle. Dockwalker data has shown that roughly 98% of boaters surveyed in our area were unaware of how many pump-out facilities are truly available around the bay, proving that continued focus on the interactive pump-out map was required. By using social and digital media developed by The Hatcher

Group last cycle, GBF executed the Pump Don't Dump social media campaign (**Figure 5**).



**Figure 5. Social media graphics used in executing Pump Don't Dump social media campaign**

Overall, the marketing materials developed and used through this project have added significant depth to the BWEC by being able to connect with boaters on multiple levels and adding a updated, professional image to the campaign. GBF has engaged boaters through social media using professionally-developed materials. This additional branch of the campaign has allowed GBF to reach a broader audience by giving boaters the opportunity to take action and empower them to spread the campaign message to their fellow boaters.

GBF continued to distribute GBAN cards (**Figure 6**) at various presentations and outreach events. At the end of this cycle, GBF created two new, more compelling GBAN cards (**Figures 7 and 8**) that will be printed and distributed at future events. GBF also created a banner (**Figure 9**) that will be used to increase visibility of GBAN at outreach and GBF events.



**Figure 6. Original GBAN Card**



Figure 7. New GBAN Card design one



Figure 8. New GBAN Card design two



Figure 9. New GBAN Banner for outreach events

GBF contracted with the Hatcher Group, who created a social media toolkit for the Galveston Bay Action Network to increase awareness of this pollution reporting tool. This toolkit included sample posts and graphics to be used on both GBF's Facebook and Twitter pages. The Hatcher Group also identified a

unique social media hashtag (#EyesOnGalvBay) related to the campaign to help spread our message. GBF used these tools to execute a GBAN social media campaign during the fall of 2016. Graphics created by GBF were also used during this social media campaign and for other posts.

GBF created and distributed a GBAN Citizen Engagement Toolkit via email (**Figure 10**) through a downloadable folder filled with GBAN graphics, posts and information (**Appendix I**). This toolkit is intended to help our partners advertise and market GBAN within their own websites and publications. To date, GBF has tracked 3 partner organizations who have added a GBAN graphic and link to their website, and 2 partner organizations who have featured an article about GBAN in their organization's newsletter (**Table 8**).



Figure 10. GBAN Citizen Engagement Toolkit email blast

GBF continued to manage the outreach and training materials for running the GBF Water Monitoring Team and Bacteria Monitoring Lab. GBF updated the Water Monitoring Team webpage on the GBF website and maintained the Google map of all of our current and potential monitoring sites in order to make it easier to communicate with volunteers when they are trying to choose a site, as well as with the public to let them know where we monitor. GBF also maintained the Citizen Science webpage. This page houses information about our bacteria sampling, including our bacteria concentrations map, as well as information about past Water Quality Research Internship projects. All of this information can be found at [www.galvbay.org/watermonitors](http://www.galvbay.org/watermonitors). GBF was also instrumental in helping to launch the Gulf of Mexico Coastal Ocean Observing System's (GCOOS) Citizen Science Data Portal, which is available to the public at <http://www.gulfcitizenscience.org> or [www.galvbay.org/watermonitors](http://www.galvbay.org/watermonitors) and houses all of GBF's Water Monitoring Team data. This portal aims to make citizen science data widely accessible so that it can fill data gaps and enable state, federal and academic programs to allocate their budgets more efficiently and effectively. It is getting national attention from programs across the country that would like to have a similar system and was even highlighted at the White House Water Summit in honor of World Water Day 2016. We will continue to work with GCOOS to update and improve the data portal, as well as to work on marketing and outreach efforts to ensure that the boating community knows about this valuable resource for accessing local water quality data.

## **Task 2. Develop Outreach Schedule and Distribution Plan**

During this project period, outreach was carried out through print media and education booths/presentations, as well as through several BWEC volunteer programs including the Galveston Bay Action Network, Dockwalkers, GBF Water Monitoring Team, Water Quality Research Internship, and Water Quality Policy and Outreach Internship (new for this cycle). BWEC outreach and distribution is detailed below for print media, booths, presentations, and details on the reach of BWEC volunteer programs are found under Task 3. Total impressions achieved through the BWEC will be discussed under Task 5.

### **Print Media, Education Booths, and Presentations**

GBF contacted marinas and popular boating events to schedule outreach presentations and booth displays, and to offer printed materials for inclusion in tenant packets and event goodie bags. **Table 5** shows the list of marinas that were contacted during this grant cycle and **Table 6** shows the yacht brokers and other boating-related businesses that were contacted.

Workgroup members and campaign partners frequently help with directly promoting the BWEC through donating banner space at events, inviting us to speak or host education booths, and even distributing campaign materials at their booths. GBF staff and volunteers have hosted many education exhibits throughout the project area to ensure one-on-one interaction with boaters. In addition, during this grant cycle GBF presented at the Marina Association of Texas' annual conference to highlight BWEC efforts that have been successful, areas that need improvement, and suggestions on how MAT can help make it even more successful by using their combined influence on a state level. **GBF is very pleased that many of our suggestions are being taken into consideration and that MAT is even looking into adopting Pump Don't Dump as the statewide boater education program and supplementing our printing budget for outreach materials with some of their TPWD grant funds, helping us to be able to reach even more boaters around Clear Lake and Galveston Bay.**

In addition to these outreach booths, several group presentations were made throughout the BWEC project period. GBF continues to have quality interactions with the boating community through giving live presentations due to the fact that it facilitates better discussions and the opportunity to disseminate more detailed information than can be done with a passive booth audience. Please see **Table 7** for a schedule of both types of education events carried out during this grant cycle. **Through these activities, GBF reached over 104,000 people at 54 live events.**

In terms of advertising, GBF has promoted the campaign through magazines, websites, social media, and local print and online news sources (extensive press release list managed by GBF’s Marketing Coordinator). All of the ad and article space utilized during this grant cycle was donated because of the publications’ support for the BWEC. Numbers of impressions for the various BWEC advertisements, posts, and articles GBF was able to track are found in **Table 8**. **Through print and digital media, GBF was able to reach over 239,000 people with the various BWEC messages through 20 different media outlets.**

**Table 5. Marinas contacted about the BWEC**

Marina Name and Location			
<b>Clear Lake</b>			
Bal Harbor Marina	123 Lakeside Lane	Houston	(281) 333-5168
Blue Dolphin Yachting Center, Inc.	P.O. Box 123	Seabrook	(281) 474-4450
Clear Lake Marine Center, Inc.	P.O. Box 716	Seabrook	(281) 326-4426
Constellation Point and Marina	451 Constellation	League City	(281) 334-2527
Endeavour Marina	3101 NASA Parkway	Seabrook	(832) 864-4000
Kemah Boardwalk Marina	555 Bradford St.	Kemah	(281) 334-2284
Lakeside Yachting Center, Inc.	2511- B Nasa Rd. 1, Ste. 101	Seabrook	(281) 326-5547
Lakewood Yacht Club	2425 Nasa Parkway	Seabrook	(281) 474-2511
Legend Point	1300 Marina Bay Drive	Clear Lake Shores	(281) 334-3811
Marina Bay Harbor Yacht Club	P.O. Box 478	Kemah	(281) 535-2222
Marina Del Sol	1203 Twin Oaks Blvd.	Kemah	(281) 334-3909
Nassau Bay Homes and Marina Assoc., Inc.	1120 Nasa Pkwy, Ste. 109	Nassau Bay	(281) 333-2570
Nassau Bay Yacht Club	1120 Nasa Pkwy, Ste. 109	Nassau Bay	(281) 333-2570
Portofino Harbour	One Portofino Plaza	Clear Lake Shores	(281) 334-6007
Seabrook Shipyard & Marina Inc.	1900 Shipyard Dr.	Seabrook	(281) 474-2586
South Shore Harbour	2551 South Shore Blvd., Ste B	League City	(281) 334-0515
Waterford Harbor Marina	800 Mariners Drive	Kemah	(281) 334-4400
Watergate Yachting Center	1500 Marina Bay Drive	Clear Lake Shores	(281) 334-1511
Wharf at Clear Lake	P.O. Box 1208	League City	(281) 334-5976
<b>Galveston Bay</b>			
Bayland Marina	2651 S. Highway 146	Baytown	(281) 422-8900
Eagle Point Fishing Camp, Inc.	Route 1 Box 1718	San Leon	(281) 339-1131
Galveston Yacht Basin	715 North Holiday Dr.	Galveston	(409) 762-9689

Harborwalk Marina	P.O. Box 2328	Hitchcock	(409) 935-3737
Houston Yacht Club	3260 Miramar Drive	Shoreacres	(281) 471-1255
Payco, Inc.	501 Blume Dr.	Galveston	(409) 744-7428
Pelican Rest Marina	7819 Broadway	Galveston	(409) 744-2618
Ray's Marina	6310 Herds Lane	Galveston	(409) 744-2111
San Leon Marina	100 6 <sup>th</sup> St.	Dickinson	(281) 339-1515
Waterman's Harbor, Inc	16426 Clearcrest	Houston	(281) 339-1416

**Table 6. Yacht brokers and other boating businesses that received BWEC materials**

Yacht Broker	Location	Address	Phone Number
Lauderdale Yacht Sales	League City	2551 South Shore Harbour Blvd Suite B	281-535-0900
Galati Yacht Sales	Seabrook	1902 Seabrook Shipyards	281-474-1470
United Yacht Sales	Kemah	1115 Marina Bay Drive	281-538-6231
Sea Lake Yacht Sales	Kemah	1500 FM 2094 rd	281-334-1993
Jay Bettis & Co Yacht Sales	Seabrook	2509 Nasa Parkway	281-326-3333
Flagship Yachts	Seabrook	2511 Nasa Parkwat #107	281-532-3200
Nautic Yacht Sales	Kemah	585 Bradford St	281-334-2628
J M Yachts	Clear Lake	1500 Marina Bay Dr #1570	281-538-0761
Texas Marine & Brokerage Inc	Seabrook	2700 Nasa Parkway	281-326-9595
HSH Yacht Sales	Kemah	1500 Marina Bay Drive #132b	832-864-2030
Lone Star Yachts Sales	Kemah	1500 Marina Bay Drive #3380	281-334-3500
Texas Sport Fishing Yachts Sales	Seabrook	802 Hardesty Ave	281-474-9600
Discovery Yachts Inc	Seabrook	2101 Todville Road	281-291-9109
Texas Coast Yachts	Kemah	1500 Marina Bay Drive Suite 122-A	281-957-9046
Gibson Weaver Yacht Sales	Seabrook	2511B Nasa Parkway	281-326-1574
Kent Little @ Little Yacht Sales	Kemah	Waterford Harbor, 800 Mariners Drive	713-817-7216
Southern Cross Yacht Sales	Kemah	585 Bradford Ave	281-334-7411
Seawinds International Inc	Kemah	703 Bay Ave	281-334-5296
Marine Max Inc.	Seabrook	3001 Nasa Parkway	281-326-4224
Maritime Sanitation	Clear Lake Shores	1500 Marina Bay Drive	281-334-5978
Redfish Island Marine	Clear Lake Shores	1500 Marina Bay Drive, Suite 112	832-282-8202
Kevin E. Severance Insurance Agency	League City	3027 Marina Bay Drive, Suite 309	281-333-3100
Ron Hoover RV and Marine	La Marque	1903 Gulf Frwy	409-935-7101

**Table 7. Distribution schedule of education booths and presentations**

Audience	Date	Impressions	Description
General public	10/4/14	30	Buffalo Bayou Shrimp Festival booth

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General public	10/8/14	680	National Night Out booth in Nassau Bay
University students	12/3/14	100	U of H Sustainability Fest booth
Boaters	1/2/14 – 1/11/14	75,000	Pump Don't Dump campaign materials distributed at Houston Boat Show through GBF and partner booths
GBF Development Team	2/17/15	6	GBF Water Quality Program overview
H-GAC Clean Water Initiative Workshop	2/25/15	35	Galveston Bay Action Network: Citizen Pollution Reporting Made Easy
Environmental student	3/3/15	1	GBF Water Quality Program overview
Marina staff	3/13/15	6	WQRI results/GBAN/Dockwalkers - Clear Lake Marina Association
Boaters	3/26/15 – 3/29/15	10,000	Southwest International Boat Show partner outreach booths (GB Sail and Power Squadron and The Yacht Sales Company)
Boaters	3/28/15	2	Marine Sanitation Codes and GB No Discharge Zone – Southwest International Boat Show
General public	3/28/15	1,000	GBF Trash Bash site @ Bay Area Park – GBAN outreach at lunch tables
Boaters	3/29/15	1	Dockwalker and GBAN volunteer spotlight – Southwest International Boat Show
Environmental students	3/31/15	1	WMT and GBAN overview – GBF Intern
Teachers	4/11/2015	7	Marsh Mania teacher workshop - Water quality monitoring in the classroom
General public	4/11/2015	200	Earth Day Houston - GBAN
Students/boaters	4/17/2015	13	GBF Marina Service Learning Day
Scouts	4/18/2015	200	Scout Fair - GBAN
General public	4/22/2015	200	DOW Earth Day - GBAN
General public	4/23/2015	50	Pasadena Household Hazardous Waste & Recycling Fair - GBAN
General public	4/25/2015	67	Pasadena Rain Barrel Workshop - GBAN
General public	4/27/2015	20	Oyster Waters public comment meeting - GBAN
General public	4/28/2015	4	Jarboe Bayou meeting – GBF Water Program updates
General public	4/28/2015	15	Oyster Waters public comment meeting
Environmental organizations	5/4/2015	30	River Rally 2015 (3-day conference) - GBF Water Program updates highlights
Boaters	5/7/2015	12	Gulf Coast Yacht Brokers Association Meeting
Boaters	5/9/2015	30	Galveston Bay Sail and Power Squadron
General public	5/9/2015	1,000	Woodlands Water Fest
Students	5/14/2015	50	Ball High School - water quality data discussion
General public	5/23/2015	2,500	GBF Bay Day
Boaters	6/10/2015	40	Lakewood Yacht Club Seahorse Camp STEM night - EnviroScape/BW presentation
General public	6/13/2015	42	GBF Rain Barrel Workshop - Seabrook
Students	6/14/2015	22	Ranger Rick photo shoot - AquaKids: Scientist for a Day and marsh planting
Young professionals	6/24/2015	20	CAST Happy Hour
General public	7/18/2015	79	GBF Rain Barrel Workshop - Friendswood



General public	7/21/2015	20	UHCL Rain Barrel Workshop
Environmental organizations	8/10/2015	25	GCOOS Outreach and Education Council annual meeting - GBF Water Monitoring Team
Boaters/marinas/enforcement	8/21/2015	30	GBF Water Quality Intern Presentations
General public	8/22/2015	60	GBF Rain Barrel Workshop - Dickinson
Boaters	8/28/2015	300	Pot Licker Poker Run
General public	9/10/2015	20	Dig'n Design Garden Club - El Lago
General public	9/26/2015	300	La Porte Health and Safety Fair
General public	9/29/2015	20	University of Houston-Clear Lake - Rain barrel workshop
General public	10/3/2015	400	La Porte Sip and Stroll
General public	10/10/2015	500	El Jardin BayFest
General public	4/24-4/26	2,000	Earth Day Dallas
General public	9/12-9/13/2015	500	Gator Fest
Teachers	4/11/2015	7	Marsh Mania teacher workshop - Water quality monitoring in the classroom
General Public	10/24/2015	20	GBF Rain Barrel Workshop – La Porte
General Public	11/7/2015	25	GBF Rain Barrel Workshop – Nassau Bay
Environmental Professionals	1/13/2016	25	Galveston Bay Estuary Program State of the Bay Symposium
College Students	3/2/2016	16	Lee College Environmental Science class – presentation
General Public	3/5/2016	22	GBF Rain Barrel Workshop - Baytown
Boaters	3/18-3/19	15	Southwest International Boat Show – seminar presentation
Boaters	3/17- 3/20	10,000	Southwest International Boat Show partner distribution
	<b>TOTAL</b>	<b>104,368</b>	

**Table 8. Media outlets and impressions for outreach distribution**

Media Outlet	Distribution Period	Impressions
Dock Line Magazine – Baytown issue (PDD ad)	2014: December 2015: Feb, Mar, Apr, May, Jun, Jul, Aug, Sept, Oct, Nov, Dec 2016: Jan, Feb, Mar	112,500 (7,500/month)
GBF Main Page (GBAN ad)	October 2014 – December 2015	18,000
GBF Pump Don't Dump Webpage	October 2014 – March 2016	1,301
GBF Dockwalker Webpage	October 2014 – January 2016	107
GBF Water Monitoring Team Webpage	October 2014 – March 2016	2,160
GBAN news article on GBF Webpage	January 2015 – March 2016	366
New GBAN Webpage (with mobile optimized application)	January 2015 – March 2016	1,828
GBF E-Newsletter (BWEC articles)	2015: Jan, Mar, Oct (GBAN), Nov (NDZ app), 2016: Feb (WMT)	9,365 (1873/month)
GBF Facebook Page (BWEC posts)	October 2014 – March 2016 (23 posts)	63,852
GBF Twitter Page (BWEC posts)	October 2014 – March 2016 (20 posts)	10,461
GBF Gazette (article) GBAN	2014: Winter (all programs)	8,000

	2015: Spring (GBAN)	(4,000/issue)
GBF YouTube Videos (Pump Don't Dump: Maritime Sanitation, Marina Del Sol, South Shore Harbour, How To Pump Out Your Boat, Pump Don't Dump – Message to Boaters)	Oct 2014 – March 2016	8,044
City of Nassau Bay newsletter – Pump Don't Dump article	2015: Mar	2,000 (2,000/issue)
Marina Association of Texas newsletter – PDD ad	2015: Mar, Jun, Sept, Dec 2016: Mar	1,000 (200/issue)
Texas Stream Team newsletter – WMT article	Fall 2015	Unknown
The Midden – Galveston Bay Area Chapter of TX Master Naturalists newsletter article about marina research	October 2015	Unknown
Double Bayou Watershed Partnership Newsletter – GBAN article	Winter 2015	290 (290/newsletter)
Galveston Bay Estuary Program website – GBAN ad	February 2016 - Present	Unknown
Maritime Sanitation website – GBAN ad	February 2016 - Present	Unknown
Little Yacht Sales website – GBAN ad	February 2016 – Present	Unknown
<b>* Total Impressions:</b>		<b>239,274</b>

\* Total impressions are higher than reported due to content views on partner websites that we are unable to track.

### **Marina Partnerships**

Through the BWEC, GBF aims to develop relationships with marinas through long-term participation in various programs that support the goals of the BWEC. **Table 9** shows which programs each marina plays an active role in.

**Table 9. Cycle 19 marina participation**

<b>Clean Water Partner</b>	<b>Partnership Activities</b>
Bal Harbor Marina	GBF Water Monitoring Team
Bayland Marina	Marina Service Learning Program
Blue Dolphin Yachting Center	GBF Water Monitoring Team
Endeavour Marina	GBF Water Monitoring Team
Galveston Yacht Basin	Dockwalkers
Harborwalk Marina	Dockwalkers
Houston Yacht Club	GBF Water Monitoring Team; Marina Service Learning Program
Lakeside Yachting Center	Dockwalkers
Lakewood Yacht Club	GBF Water Monitoring Team; Water Quality Research Internship; Boater Waste Workgroup
Marina Bay Harbor Yacht Club	Pump Don't Dump; Boater Waste Workgroup
Marina Del Sol	GBF Water Monitoring Team
Maritime Sanitation	Pump Don't Dump; Boater Waste Workgroup
Nassau Bay Yacht Club	GBF Water Monitoring Team
Pelican Rest Marina	GBF Water Monitoring Team

Portofino Harbour Marina & Yacht Club	GBF Water Monitoring Team
Redfish Island Marine	Pump Don't Dump
Seabrook Marina	Pump Don't Dump
South Shore Harbour Marina	GBF Water Monitoring Team
Star Fleet Yachts	GBF Water Monitoring Team (training site)
Topwater Grill	GBF Water Monitoring Team
Waterford Harbor Yacht Club & Marina	GBF Water Monitoring Team; Dockwalkers
Watergate Yachting Center	Pump Don't Dump; GBF Water Monitoring Team ; Dockwalkers

### Task 3. Boat Sewage Discharge Reporting and Enforcement

#### **Galveston Bay Action Network (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 more citizens reporting illegal discharges will open the eyes of marina owners, boaters, and enforcement agencies to the reality of the boater waste issue instead of GBF and workgroup members just receiving the reports via word of mouth. Having a central location for citizens to submit reports makes it easier on them and provides regulatory agencies with quicker reports. With the site developed in Cycle 18 ([www.galvbay.org/GBAN](http://www.galvbay.org/GBAN)) (Figure 11), citizens fill out a simple form with critical details of the pollution incident and the report is automatically emailed to the appropriate authority based on the type of pollution and municipality that they select. On the back-end, regulatory agencies at the state, county, and city levels are tied into the app to receive reports and have generally been very excited about the technology! Our ultimate goal with GBAN is to keep our water fishable and swimmable through the transparent exchange of information. This transparency should be similar to a neighborhood crime watch program and result in safer and more desirable marinas.



Figure 11. GBAN web and mobile reporting tool

The major focus for this task during Cycle 19 included working with the GBAN developer, Vertices, LLC, to work through all the technical problems that arose as people began to use the GBAN website. Before moving forward with the creation of a downloadable mobile application, GBF wanted to ensure that the GBAN tool worked as it was supposed to for both the users and the partner agencies. During this time GBF also continued to add partner agencies to GBAN, ensuring quicker and more efficient responses to GBAN reports. During this cycle the following partners were added to receive relevant pollution complaints: Brazoria County Department of Environmental Health, City of Galveston, and Texas Parks and Wildlife Department: Environmental Crime. This tool has allowed us to continue bridging relationships with these new partners and previously existing partners.

GBF used the launch of the GBAN online tool, the strength of its partnerships and the improved

functionality of the tool to leverage funding for a new grant through the U.S. EPA Gulf of Mexico Program to fund the creation of a GBAN downloadable iOS and Android application. GBF is now talking with Vertices, LLC to move forward with the development and launch of this application. CMP funding will continue to help support the annual licensing fees or minor updates to the desktop and mobile-optimized sites, as well as continued outreach to the boating community. Details on GBAN outreach and results are details in **Tasks 1, 2, and 5**.

**Illegal Discharge Fine/Reporting Signs**

- Endeavour Marina, Kemah Boardwalk Marina, Lakewood Yacht Club, Marina Bay Harbor Yacht Club, Marina Del Sol, Maritime Sanitation
- These signs are small, with simple graphics, and include bracketed holes for easy installation on pilings. They were updated by GBF from a past sign used by the Clean Texas Marina Program and were purchased with their grant funding. GBF, Maritime Sanitation and the Clean Texas Marina Program have all made efforts to get these signs distributed, but unfortunately, marinas are not interested in posting them. Due to this barrier, GBF has decided to move away from trying to push education signage in marinas through the BWEC.

**Enforcement-Related Meetings/Presentations**

GBF prepared our first presentation that was focused on lack of enforcement and the need for a federal No Discharge Zone on Galveston Bay for a seminar that we gave at the Southwest International Boat Show in March 2015. This information, along with the extensive research carried out with our interns in 2015, now make up some standard content that we included in all presentations for the boating community. The presentations that we delivered during this grant cycle that incorporated enforcement-related information are listed in **Table 10**. The information in these presentations has opened up great dialogue with the recreational boating community and will continue to provide GBF the opportunity to gain stakeholder support for a federal No Discharge Zone in Galveston Bay.

**Table 10. Enforcement-related meetings and presentations**

Audience	Date	Impressions	Description
Boaters	3/28/2015	2	Southwest International Boat Show - GBF developed and delivered a boat show seminar specifically to address the status of marine sanitation enforcement and the pending application for a No Discharge Zone for Galveston Bay. Although attendance was low, the conversation had depth and was very helpful for a first go around with this presentation. The attendees were most interested in discussing the NDZ since one of them has a boat with a treatment system on board with no holding tank.
Environmental students	3/31/15	1	WMT and GBAN overview – GBF Intern
Students/boaters	4/17/2015	13	GBF Marina Service Learning Day
General public	4/27/2015	20	Oyster Waters public comment meeting - GBAN
General public	4/28/2015	4	Jarboe Bayou meeting – GBF Water Program updates
General public	4/28/2015	15	Oyster Waters public comment meeting

Environmental organizations	5/4/2015	30	River Rally 2015 (3-day conference) - GBF Water Program updates highlights
Boaters	5/7/2015	12	Gulf Coast Yacht Brokers Association Meeting
Boaters	5/9/2015	30	Galveston Bay Sail and Power Squadron
Boaters/marinas/enforcement	8/21/2015	30	GBF Water Quality Intern Presentations
Environmental Professionals	1/13/2016	25	Galveston Bay Estuary Program State of the Bay Symposium
College Students	3/2/2016	16	Lee College Environmental Science class – presentation
Boaters	3/18-3/19	15	Southwest International Boat Show – seminar presentation

**Enforcement Efforts Carried Out**

During this grant cycle, GBF focused efforts on advocating for improvements to the TCEQ’s Clean Water Certification Program. Several years ago, GBF supported the TCEQ’s effort to create the Clean Water Certification Program, which (via the Texas Administrative Code) requires all boaters with a marine sanitation device (MSD) to self-certify it every two years for \$15 and display the sticker on their boat. Marinas with pump-out stations are required to self-certify them every two years with the initial certification costing \$35 and the renewals costing \$25. The hope was that this program would allow the state to collect valuable data about the number of MSDs in the area, provide a means for enforcement that was easier for the authorities to pick up on, and provide money from the fees to fund education efforts in the boating community. Criminal penalties are supposed to be enforced by game wardens and peace officers certified as marine safety enforcement officers under the Parks and Wildlife Code. Violations of the rules can result in a Class C misdemeanor and fines up to \$500. In addition, The Texas Water Code authorizes TCEQ to assess administrative fines of up to \$10,000 per day for any violation of the Clean Water Certification Program. However, this program is not taken seriously by enforcement entities in the Galveston Bay and Clear Lake areas and is not well administered (hard to use their online system and not well advertised), resulting in a very low percentage of registered boats over 25 feet or marinas with pump-out stations being certified. In addition, the self-certification model with no oversight causes most boaters to scoff at this as “just another tax.” The Coast Guard Auxiliary won’t even include it as a requirement to receive a Vessel Safety Certification sticker because they don’t take it seriously and look at it only as a burden to the boaters with no benefit to the environment. For these reasons, GBF no longer supports this program in its current form and was able to present this case to the Marina Association of Texas during a presentation at their annual conference in 2015 and in follow up conversations. We are pleased that they have taken the initiative to use their leverage at the state level to try to work toward having TPWD take over the program, in hopes that it will streamline the administrative side by lumping it in with the boater registration process, as well as working toward funneling a percentage of the funds to education and a portion to game wardens in hopes of encouraging them to enforce the program. GBF is hopeful and will continue to stay in the conversation.

The other main enforcement effort GBF carried out was to prepare a draft petition for a No Discharge Zone in Galveston Bay. The draft content was modeled off of an approved application submitted for Boston Harbor, Massachusetts and can be viewed in **Appendix II**. The draft required a lot of research, which was compiled by two summer interns and overseen by GBF staff. The draft still needs to go through a deep review and round of edits internally, in addition to strengthening the background

information related to the commercial boating industry. In addition, GBF staff needs to meet with TCEQ leadership in order to determine who on their staff will be in charge of reviewing and approving the petition so that the state can submit it to the U.S. EPA for approval. The EPA is already prepared to receive the application, but TCEQ hasn't had to process an application since Clear Lake's in 1994, so GBF suspects that it could take a while for us to get the right people on board to do this. GBF will continue work on the application and review process with TCEQ in the next grant cycle.

Throughout this cycle, GBF continued to network with the entities listed in **Table 11** that either can directly enforce illegal dumping of boat sewage or that can influence policy in some way. We will continue to keep these lines of communication open as we move forward with advocating for increased enforcement.

**Table 11. Entities that can enforce or influence enforcement practices and are in communication with BWEC**

Last	First	Organization
Brand	Bryan	City of Seabrook Police Department
Hollin	Dewayne	Clean Texas Marina Program/Marina Association of Texas
FitzSimmons-Evans	Lori	Galveston County Health District
Bower	Justin	Houston Galveston Area Council
Johnston	Steve	Houston Galveston Area Council
Hall	Lynda	Lakewood Yacht Club/Clear Lake Marina Association/MAT
Paige	Helen	Marina Bay Harbor/Marina Association of Texas
Derrick	Cassandra	TCEQ Clean Water Certification Program
Morris	Chip	Texas Commission on Environmental Quality
Sears	Beth	Texas Commission on Environmental Quality
Wiles	Kirk	Texas Department of State Health Services
Carrier	Mary	Texas Parks and Wildlife – Boater Education
Moses	Dale	Texas Parks and Wildlife - Law Enforcement
Sidman	Ross	Texas Parks and Wildlife - Law Enforcement
Pelland	Jeff	U.S. Coast Guard - Houston
Franklin	Kim	U.S. Coast Guard - MSU Texas City
Naker	Keith	U.S. Coast Guard - MSU Texas City
White	Christina	U.S. Coast Guard - MSU Texas City

#### **Task 4. Facilitate Volunteer Programs**

Volunteer programs can be a very cost effective way to increase the visibility of a campaign and spread your message further. When the BWEC began in 2007, the only volunteer components were the BWEC

Workgroup and occasional volunteers to assist with education booths and assembling outreach materials. There are now five additional volunteer programs, Galveston Bay Action Network, Dockwalkers, GBF Water Monitoring Team, Volunteer Water Quality Internships, and Marina Service Learning Days, three of which were launched during this funding cycle. **BWEC volunteer programs generated a total of over 2,700 volunteer hours during this funding cycle and engaged 171 volunteers through four volunteer programs, citizen pollution reporters on GBAN, and the Boater Waste Workgroup.** Each of the volunteer programs are described below.

### **GBF Dockwalkers**

Dockwalkers is a volunteer program for boaters to educate other boaters on environmentally sound practices through positive “pier” pressure, to provide them with physical tools to keep the bay fishable and swimmable, and to collect local statistics to aid in environmental planning. GBF’s program is based off of a very successful program in California, but has been personalized to focus on



Figure 12. Dockwalker volunteer kit



Figure 13. Clean Boater Kit giveaways

the immediate water quality needs in the Galveston Bay area. GBF trains volunteers, particularly from boating organizations or companies, to take quality controlled surveys. The survey contains questions that helps us obtain data to improve the Pump Don't Dump campaign, provide marinas with data on pump-out usage and functionality, as well as statistics to be considered in the process of applying for a Galveston Bay No Discharge Zone. Dockwalkers ask boaters to take a few minutes to fill out the educational survey (**Figure 12 and Appendix III**) and the boaters receive a Clean Boater Kit (BWEC education materials, Pump Don't Dump zip tie for discharge valve, dye tablet, and bilge oil absorbent pad) (**Figure 13**) in exchange for their participation. Dockwalkers are also trained to submit water pollution reports through GBAN. Details on the survey sampling design can be reviewed in the Dockwalker Plan found in **Appendix III**.

**Table 12** shows the Dockwalker volunteers and survey plan and **Table 13** shows the Dockwalker training and survey schedule. GBF’s Spring 2015 and Summer 2015 Water Quality Policy and Outreach Interns surveyed and compiled their results and lessons learned. This information was used to tweak and improve the program and we have since determined that the Dockwalker Program is most effectively employed when GBF staff, interns and a small number of highly engaged volunteers are utilized so we

will no longer try to recruit a large volunteer team. This also aids in quality control of the data. GBF has received applications for a summer intern to assist with this program during the summer of 2016. Up-to-date results since program establishment are summarized under **Task 5**.

**Table 12. Dockwalker volunteers and survey plan**

Name	Organization	Survey Schedule	Target Locations
Sarah Gossett	Galveston Bay Foundation (staff)	As needed	GBF random sampling plan
Charlene Bohanon	Galveston Bay Foundation (staff)	As needed	GBF random sampling plan
Sarah Cunningham	Galveston Bay Foundation (staff)	As needed	GBF random sampling plan
Danny Parker	Galveston Bay Foundation (intern)	Spring 2015	GBF random sampling plan
Caitlyn Mitts	Galveston Bay Foundation (intern)	Summer 2015	GBF random sampling plan
Candy Capuano Day	Galveston Bay Sail and Power Squadron	Whenever conducting Vessel Safety Checks or at boat shows	Wherever conducting Vessel Safety Checks or at boat shows
Raymond Underwood	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
Robert Stevenson	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
Linton Arbaugh	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
James Stanley	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
Mary Carrier	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
Susan Morawski	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS
John Morawski	Galveston Bay Sail and Power Squadron	Spring 2016 at the Southwest International Boat Show – volunteer under Candy Day	2016 SWIBS

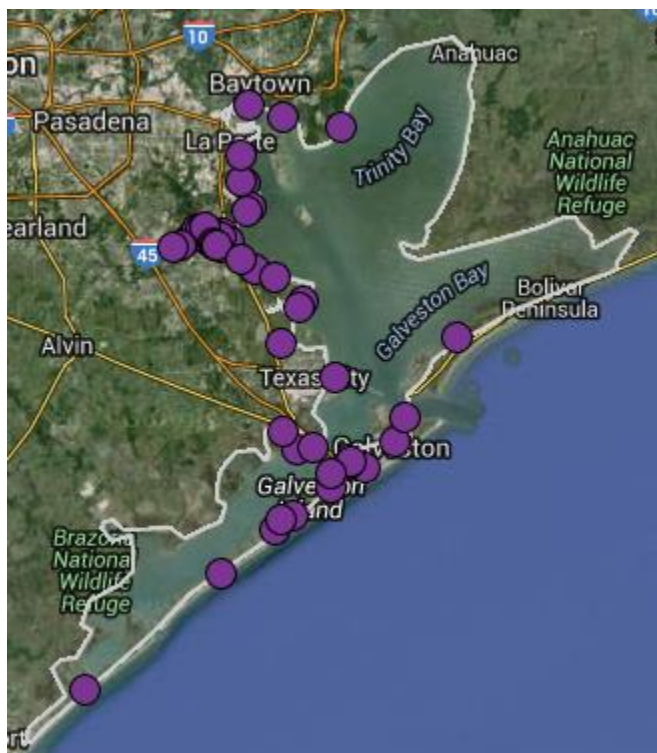
**Table 13. Dockwalker trainings and survey schedule**

Date	Event	Site	Dockwalkers	# Volunteer Interactions	# Surveys
3/24/2015	Training	GBF Office	Danny Parker – Water Quality Policy/Outreach Intern and Candy Capuano Day - GB Sail and Power Squadron	2	0
3/26/2015 –	Surveying	Southwest International Boat Show	Candy Capuano Day – GB Sail and Power Squadron	1	62



3/30/2015					
4/5/2015	Surveying	South Shore Marina	Candy Capuano Day – GB Sail and Power Squadron	1	1
5/9/2015	Surveying	Legend Point Marina	Danny Parker - Water Quality Policy/Outreach Intern	1	9
5/9/2015	Surveying	South Shore Marina	Danny Parker – Water Quality Policy/Outreach Intern	1	8
5/16/2015	Surveying	Bayland Marina	Danny Parker – Water Quality Policy/Outreach Intern	1	5
5/23/2015	Surveying	Spring Fling TMCA Event	Candy Capuano Day – GB Sail and Power Squadron	1	23
6/25/2015	Training	GBF Office	Caitlyn Mitts – Water Quality Policy/Outreach Intern	1	0
7/3/2015	Surveying	Bal Harbor Marina	Caitlyn Mitts – Water Quality Policy/Outreach Intern	1	5
7/18/2015	Surveying	Galveston Yacht Basin	Caitlyn Mitts – Water Quality Policy/Outreach Intern	1	4
7/25/2015	Surveying	Blue Water Marina (Stingaree)	Caitlyn Mitts – Water Quality Policy/Outreach Intern	1	4
10/3/2015	Surveying	Bal Harbor Marina	Candy Capuano Day – GB Sail and Power Squadron	1	1
3/17 – 3/20/2016	Surveying	Southwest International Boat Show	Candy Capuano Day – GB Sail and Power Squadron	8	52
<b>TOTAL</b>				<b>21</b>	<b>174</b>

### **GBF Water Monitoring Team**



The GBF Water Monitoring Team (a group within the Texas Stream Team) launched in February 2012 and the Bacteria Sampling Program 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 Bay Ambassadors
- 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

**Figure 14. Water Monitoring Team site map**

- 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 and Clear Lake for core parameters (temperature, pH, dissolved oxygen, salinity, transparency, and field observations), as well as Enterococci bacteria. Core certification consists of a full day, Phase I and II group training session and a one-on-one Phase III training at the volunteer's site with a GBF staff member, and is based on the Texas Stream Team training protocol. During the Phase I and II session, volunteers hear an overview presentation of water quality in the Bay, the importance and expectations of being on the Water Monitoring Team, and what each of the parameters that they will measure means. Then they practice all of the sampling techniques as a group with tap water sample, step-by-step as GBF staff demonstrate the proper techniques and observe their techniques for quality control. Finally, they learn how to properly take a bucket grab sample and record field observations, and then work with a partner to complete all of the core techniques on a field sample. GBF staff members observe and compare their results to an advanced monitor for quality control. During Phase III the volunteer is encouraged to use their field guide to demonstrate the entire sampling process from beginning to end with the GBF staff member observing and not giving any input. They receive feedback at the end on any improvements needed and GBF staff determines if they meet all of the quality control checks to become a certified Water Monitoring Team volunteer. They commit to sample their site(s) on at least a monthly basis. GBF's team is part of the Texas Stream Team by being a group within the Houston Galveston Area Council's region, in addition to having our own Volunteer Bacteria Sampling Program. **The monitoring team currently has 31 volunteers sampling from 36 locations, 16 of whom have advanced certification to collect bacteria samples.** Monitoring locations are shown in **Figure 14** and the full map can be accessed at <http://www.galvbay.org/watermonitors>. The entire monitoring program is conducted under an EPA-approved Quality Assurance Project Plan and Quality Management Plan.

The WMT has allowed GBF to develop a strong relationship with the local chapter of Master Naturalists, who are also interested in preserving, protecting, and enhancing Galveston Bay. 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, including the creation of a Water Monitoring Plan to outline desired measurable results to be achieved from monitoring. GBF plans to continue training new volunteers to fill in some of the gaps around the Galveston Bay coastline and marinas that are not yet monitored, as well as to refill sites if volunteers decide to stop monitoring. **Table 14** shows the total number of volunteers trained since GBF began the WMT, the number with advanced certification to sample for bacteria, and calculates the percentage of active volunteers compared to total certified volunteers. **GBF is very proud to show a continued increase in our percentage of active volunteers on the team over the years, reaching 100% active monitors this year!** A list of certified volunteers and their monitoring schedule is found in **Table 15**, a list of newly trained monitors that are still finishing their training are listed in **Table 16**, and a detailed list of WMT training events is listed in **Table 17**.

**Table 14. GBF Water Monitoring Team active monitor data**

Reporting Period	# Phase I and II's completed this period	# Phase III's completed this period	Total # Bacteria Samplers	Total # GBF Monitoring Sites	Total # GBF Certified Monitors	Total # Active Monitors**	% Active
Before GBF started team*	0	10	0	9	10	4	40%
11/31/12	36	17	0	23	24	8	33%
5/31/13	16	14	11	27	28	21	75%
1/31/14	21	15	13	39	38	32	84%
12/8/14	26	19	20	49	50	40	80%
3/15/16	37	12	16	36	31	31	100%

\*These monitors were previously trained by other Texas Stream Team trainers and adopted onto GBF's team upon formation

\*\*Active monitors are those who submit data on at least a monthly basis with very few missed months

**Table 15. Current GBF Water Monitoring Team volunteers, sites and monitoring schedule**

Site ID	Site Description	Name	Group	Lat	Long	Monitoring Schedule
81181	Christmas Bay @ Drum Bay	Glenn Taylor	34	29.012245	-95.218408	3rd Sunday @ 1pm
81173	Clear Lake @ 18 Waterford Oak Lane	James Dismukes	34	29.545952	-95.043871	4th Monday @ 8:30am
80956	Clear Lake @ Blue Dolphin Yachting Center	Tricia Lestarjette	34	29.558397	-95.028258	1st Thursday @ 7:00am
15105	Clear Lake @ Clear Lake Park Pier	Diane Humes	34	29.563703	-95.066049	Last Monday @ 8:15am
80759	Clear Lake @ Clear Lake Shores	Arline Laughter/Helle Brown	34	29.551061	-95.032680	2nd Tuesday
80758	Clear Lake @ Jarboe Bayou Park	Helle Brown/Arline Laughter	34	29.542023	-95.030541	2nd Tuesday
81045	Clear Lake @ Kemah Boardwalk Aquarium	LeAnn Kincaid	34	29.548575	-95.021002	1st Wednesday @ 9am
80467	Clear Lake @ Lakewood Yacht Club	Tricia Lestarjette	34	29.554589	-95.031020	1st Thursday @ 8:00am
30010	Clear Lake @ Nassau Bay Upper Bay Road	Helen Lane	34	29.544286	-95.085907	2nd Tuesday
81040	Clear Lake @ Nassau Bay Yacht Club	Helen Lane	34	29.541451	-95.097180	2nd Tuesday @ 9am
81049	Clear Lake @ Portofino Harbour Marina	Sarah Gossett	34	29.547255	-95.025551	4th Tuesday @ 9am
81173	Clear Lake @ Waterford Harbor Marina	Tom Fightmaster	34	29.54755	-95.043812	3rd Sunday @ ~ noon
30014	Clear Lake @ Watergate Yachting Center	Cindy Liening	34	29.545433	-95.040012	3rd Thursdays
81164	Clear Lake @ Watergate Yachting Center Pier 3	Tyler Dudley	34	29.5452708	-95.0363678	3rd Thursday @ 4pm

81163	East Bay @ 1317 Siever's Cove	Mike Petit	34	29.4336492	-94.7068303	3rd Monday @ 9am
30008	Galveston Bay @ 1109 6th St. San Leon	Mark Niles	34	29.478655	-94.920231	15th and 30th
80952	Galveston Bay @ 3903 Bayshore Bacliff	Dianne Forthmann and Joe Cavallaro	34	29.515548	-94.985700	1st Tuesday @ 6pm
80951	Galveston Bay @ Bayshore Park	Brenda Gonzales		29.506474	-94.958050	30th of each month
80463	Galveston Bay @ Pine Gully Park	Madeleine Barnes	34	29.589580	-94.990566	4th Monday @ 10am
80418	Galveston Bay @ Seascape Pier	Gary Bell	34	29.584541	-94.996785	Middle of month
81044	Galveston Bay @ Shoreacres Pier	Kay and Kendall Pickett	34	29.622030	-95.004664	2nd Wednesday @ 11am
81161	Galveston Bay @ Sunset Cove	Glenn Taylor	34	29.151222	-95.030368	3rd Sunday @ 1pm
80950	Galveston Bay @ Sylvan Beach Park	Brenda Gonzales		29.652914	-95.005539	30th of each month
30013	Galveston Bay @ Texas City Dike	Cindy Liening	34	29.387027	-94.874629	2nd Thursdays
81160	Galveston Bay @ Texas Corinthian Yacht Club	Laurence Neuhaus	34	29.5291152	-95.0032425	2nd Thursday @ 4pm
81051	Galveston Bay @ Topwater Grill	Mark Niles	34	29.470799	-94.925598	4th Tuesday
80957	Jones Bay @ 267 Isles End Tiki Island	John Wright	34	29.299985	-94.927089	4th Saturday
81159	Jones Bay @ Bayou Vista	Chris Roper	34	29.323449	-94.946625	2nd Wednesday @ 9am
80719	Moses Bay @ Texas City Prairie Preserve	Scott Buckel	34	29.428824	-94.950470	Every Other Tuesday @ 8:30
81034	Offatt's Bayou @ Sea Scout Base Galveston	Abigail Hills	34	29.285466	-94.853900	Mondays and Fridays around 14th of each month
81036	Trinity Bay @ Carroll Road	Bob Lanser	34	29.685690	-94.866120	
81047	Trinity Bay @ Galveston Bay RV Resort	Genevieve Genest	34	29.698141	-94.945875	2nd Friday @ 10am
81038	West Bay @ Eckert Bayou (see notes about Settegast Rd)	Amber Wisber	34	29.221619	-94.933181	3rd Sunday @ 9am
81048	West Bay @ Oak Bayou	Skyler Carey	34	29.204895	-94.957483	2nd Wednesday @ 8am
81158	West Bay @ Pirate's Cove	Sandra Metoyer	34	29.217963	-94.949425	3rd Sunday @ 10am
81046	West Bay @ Sweetwater Preserve	Mary Warwick	34	29.272506	-94.881102	1st Sunday @ 9am

**Table 16. New WMT volunteers completing final phase of training**

Site ID	Site Description	Name	Group	Lat	Long
81037	Clear Lake @ South Shore Harbor	Adeola Mosuro	34	29.547330	-95.064334
30010	Clear Lake at Nassau Bay Upper Bay Road	Amel Ryman	34	29.544286	-95.085907
TBD	West Bay @ Sweetwater Oyster 1	Arnold Leija	34	TBD	TBD

81049	Clear Lake at Portofino Harbor	Betty Henriquez	34	29.547255	-95.025551
81048	Lab Assistant (West Bay @ Oak Bayou)	Cassandra Carey	34	29.204895	-94.957483
81042	Galveston Bay @ Pier 21	Catherine Navarro	34	29.309929	-94.793224
TBD	Clear Lake at Taylor Lake Entrance NASA Road 1	Dawn Gibler	34	29.56548	-95.05387
80958	Jones Bay @ Tiki Tom's RV Resort	Doug Fullilove	34	29.304188	-94.906542
TBD	Clear Lake at Taylor Lake Entrance NASA Road 1	Ed Gibler	34	29.56548	-95.05387
81039	East Bay @ Bluewater	Kate Magree	34	29.450572	-94.668544
30009	Galveston Bay @ Bayland Park	Lana Berkowitz	34	29.713048	-94.993137
80953	Clear Lake at Endeavor Marina	Lauren Secino	34	29.55988	-95.04224
TBD	Clear Lake at Encore On the Bay	Marie Pope	34	29.5648	-95.05955
80953	Clear Lake at Endeavor Marina	Michael Secino	34	29.55988	-95.04224
80959	Offat's Bayou at Pelican Rest Marina	Minna Tambourides	34	29.284831	-94.856150
30012	Clear Lake @ Marina del Sol	Rodney Ray	34	29.552070	-95.052056
30007	Offatts Bayou @ Camorone's	Stan Conley	34	29.27871	-94.834720
TBD	Galveston Bay @ 2612 Todville Road	Suzanne Milby	34	29.56482	-95.01354
81052	Galveston Bay @ Seawolf Park	Tera Alexander	34	29.338162	-94.778087
81162	Galveston Bay @ Houston Yacht Club	Teresa Wheeler	34	29.619129	-94.999132

**Table 17. GBF Water Monitoring Team training events**

Date	GBF Staff	Event	Location	# Volunteers
12/3/2014	Katie McCann	Phase 1 and 2 Training	GBF and Nassau Bay Park	1
12/4/2014	Katie McCann	Bacteria Sampler Training	GBF	1
12/5/2014	Katie McCann	Phase 3 Training - water monitoring team	Clear Lake Park	1
12/8/2014	Katie McCann	Quality Control Training	Marina del Sol	9
12/17/2014	Alexandra Stiles	TST Training	Jessie H. Jones Park	10
1/19/2015	Alexandra Stiles	Phase 3 Training-Water Monitoring Team	Sunset Cove, Galveston	1
3/12/2015	Alexandra Stiles	Bacteria Sampler Training	GBF	3
4/24/2015	Alexandra Stiles, Charlene Bohanon	Texas Stream Team Phase I & II training	Star Fleet Marina	15
5/20/2015	Neally Rhea	Texas Stream Team Phase III Training	Seawolf Park	1
5/22/2015	Neally Rhea	Texas Stream Team Phase III Training	Texas City Yacht Club	1
5/22/2015	Charlene Bohanon	Texas Stream Team Phase III Training	Pirate's Cove	1
5/27/2015	Neally Rhea	Texas Stream Team Phase III Training	Watergate Marina	1
5/28/2015	Neally Rhea	Texas Stream Team Phase III Training	Siever's Cove	1
5/29/2015	Neally Rhea	Texas Stream Team Phase III Training	Waterford Marina	1

6/3/2015	Neally Rhea	Texas Stream Team Phase III Training	Baytown RV Resort	1
6/19/2015	Charlene Bohanon	Texas Stream Team Phase III Training	Eckert Bayou	1
6/25/2015	Charlene Bohanon	Texas Stream Team Phase III Training	18 Waterford Oak Lane	1
7/21/2015	Charlene Bohanon	Texas Stream Team Phase III Training	Sweetwater Preserve	1
9/9/2015	Sarah Gossett	Bacteria Sampler Training	GBF Office	1
10/9/2015	Sarah Gossett	Bacteria Sampler Training	GBF Office	3
11/19/2015	Sarah Gossett	Quality Control Training	Marina del Sol	5
12/12/2015	Sarah Gossett	Quality Control Training	Marina del Sol	7
1/27/2016	Sarah Gossett	Quality Control Training	Marina del Sol	6
2/25/2016	Sarah Gossett, Charlene Bohanon	Texas Stream Team Phase I & II training	Star Fleet Marina	21
3/4/2016	Sarah Gossett	Bacteria Sampler and Volunteer Lab Assistant Training	GBF Office	2
			<b>TOTAL</b>	<b>96</b>

In November 2015, GBF staff began participation in a webinar series titled *Monitoring That Guarantees Measurable Results*, hosted by River Network. This five-part series facilitated the creation of a comprehensive monitoring plan that will guide GBF water monitoring efforts to measurable results. The creation of this plan outlines the strengths and limitations of the WMT data through a series of listed desired outcomes. For each desired outcome the monitoring plan lays out monitoring questions, targeted decision makers, information needed and further required action. The Monitoring Plan created as a result of this webinar series is included in **Appendix III**. This will drive the work of the Water Quality Volunteer Coordinator as well as the actions of the Water Monitoring Team. Going through this process is one of the reasons that we decided to eliminate the Water Quality Research Internships, however those three summers of research will continue to provide value and have spurred interest from local research groups to take over the project. That, in and of itself, is a measureable result that we can show as a result of this Monitoring Plan. GBF staff understands that this Monitoring Plan is a working document that it will continue to evolve with the Water Monitoring Team. GBF has already seen the benefits of this plan in action, as staff are better able to communicate the need and purpose of our team, to both volunteers and the community as a whole. The Action Plan outlines an estimated timeline for when each component will be completed and these enhancements to the Water Monitoring Team will be carried out during the next grant cycle.

**Water Quality Internships (WQI)**

During this grant cycle, GBF hosted one Water Quality Policy and Outreach Intern (WQPOI) in spring 2015 and two in summer 2015, as well as two Water Quality Research Interns (WQRI) in summer 2015 (**Figure 15**). We definitely had a very busy year leading all of these interns! However, they accomplished some great things for the BWEC.

GBF’s Water Quality Research Internship (WQRI) was started in 2013 because there was very little existing water quality data for marinas in the Galveston Bay area. To our knowledge, the only study

conducted took place over 20 years ago (Guillen et al., 1993). That study was conducted over a 3 month period, looking at various water quality parameters in comparison to flow rates, in order to make recommendations for marina designs.



**Figure 15. Summer 2015 interns with GBF staff**

WQRIs provide university students the opportunity to develop and execute a short-term water quality research project from start to finish including planning, design, sampling, data analysis and creating a final research product. This program was started in order to provide the many university students in the Clear Lake/Galveston Bay area an opportunity to participate in a hands-on, professional internship experience. Students are introduced to the Upper Gulf Coast Oyster Water TMDL Implementation Plan and the BWEC, certified to sample under GBF's QAPP, and carry out a project to help answer research questions related to the BWEC. This intern program helps provide the BWEC Workgroup and Clean Vessel Committee with focused data to help guide campaign activities, as well as track potential improvements in marina water quality over time in a more focused way than is possible with monthly ambient monitoring at just one site per marina. This year, the interns conducted only conducted their research in Lakewood Yacht Club, as opposed to both the yacht club and Marina Del Sol. This was due to the fact that Marina Del Sol was undergoing major work on all of their floating docks. The Boater Waste Impact Studies that were completed as a result of their work are referenced under **Task 5**. After three successful years of conducting marina research through the WQRIs, GBF has made the tough decision to cut this part of the BWEC because of how resource intensive it is in both supplies and staff time. We are essentially down a full-time staff person for a third of the year if you added up all of the time devoted to leading these projects. We feel that our resources would be better spent on expanding the Pump Don't Dump campaign and driving increased measureable outcomes from our Water Monitoring Team data. However, the three years of preliminary data collected through the WQRIs will continue to be invaluable to the BWEC as we continue to use it in our conversations with boaters and marinas. Additionally, there is serious interest from the Galveston Bay Estuary Program's Water and Sediment Quality subcommittee to see this research continued by an entity that specializes in research and the Houston Advanced

Research Center is currently in discussion on how they can take over the research and begin to look for funding. This is a huge success as a result of our preliminary research! This is also very rewarding because the very first intern to come through our summer research internship now works on their staff as a research assistant.

WQPOIs allow the students to conduct background research to aid in preparation of the No Discharge Zone application and conduct Dockwalker surveys and outreach in marinas. These interns have proved to be the most efficient way to collect quality survey data for the Dockwalker program, so this will be GBF’s primary focus for summer internships. In addition, one of our summer interns wrote the complete first draft for the No Discharge Zone application – a great feat. The results of their work is referenced in **Task 3** with the No Discharge Zone application, as well as in **Task 5** with the Dockwalker data discussion.

**Marina Service Learning Days**

Data collection is often limited by either monetary or human resources, making citizen monitoring a beneficial option for non-regulatory purposes. However, collecting quality data requires a amount of dedication from both staff and volunteers in terms of training and quality control. GBF created the Marina Service Learning day out of a desire to create a protocol that would allow for local college classes to receive streamlined training and collect a substantial amount of data in one day, while still upholding a high level of quality control. While this program allowed us to give more students the opportunity to participate in hands-on citizen science and increase outreach and presence in local marinas, this program was very time-intensive for outcomes that don’t contribute to our Water Monitoring Team dataset. Because of this, GBF has decided to eliminate this portion of the Boater Waste Education Campaign in order to pour more effort into Pump Don’t Dump campaign outreach and marketing. This program was still executed in April 2015, and a similar group sampling day with members of the Water Monitoring Team was executed in November 2015 (**Table 18**). Lee College, who has been our primary partner to execute this program, is interested in setting themselves up to have their Environmental Science classes setup a bacteria lab so that they can continue to execute this program, since they found so much value in the experience for their students. This is a great outcome resulting from this program because if they take it over and execute it a couple times per year over a long period of time, then GBF will be able to use that data to support the BWEC and it will be more cost effective on our end. As a result, we will advise Lee College’s professors as they try to setup the program on their campus to ensure that their data will meet the quality objectives that we require in our Quality Assurance Project Plan for the Water Monitoring.

**Table 18. Marina Service Learning Day schedule, sites, and volunteers**

<b>Date</b>	<b>Event</b>	<b>Site</b>	<b>Representatives</b>	<b># Volunteers</b>
4/17/2015	Lee College Marina Learning Service Day	Bayland Marina; Houston Yacht Club	Neally Rhea and Charlene Bohanon	18
11/4/2015	WMT Group Marina Sampling Day	Bayland Marina; Houston Yacht Club	Sarah Gossett and Charlene Bohanon	4



## **Task 5. Track Behavior Change and Resulting Environmental Improvements**

GBF is continuously looking for ways to improve our tracking methods in order to better demonstrate behavior change and environmental improvements resulting from the BWEC. Due to the nonpoint source, transient nature of boater waste pollution, it can be difficult to attribute changes in water quality specifically to this one source. This is compounded by the fact that data in marinas was lacking. During this funding cycle, GBF continued to carry out several volunteer programs that began in Cycle 17, which will help increase the amount of water quality and supporting data that is able to be collected in marinas. The following sections will detail results for this funding cycle and will address opportunities for improvement in future cycles.

### **Galveston Bay Action Network (GBAN)**

GBF launched the official GBAN website in December of 2014. Between then and March 2016 this webpage has received 1,825 page views compared to only 425 during the last grant cycle.

GBF launched two GBAN social media campaigns this cycle, one in October and one at the end of the year. Combined these campaigns received a reach of 47,296 on Facebook, with 1,699 Facebook Likes/Comments/Shares and 1,017 post clicks. Previously there had been no direct GBAN presence on GBF's Facebook page.

Since October 2014, GBAN has received 44 reports. The most popular types of pollution reports were Oil/Sheen and Trash/Debris. GBF looks forward to continuing its marketing campaign, including the creation of a more focused marketing plan to increase usage of this pollution reporting tool.

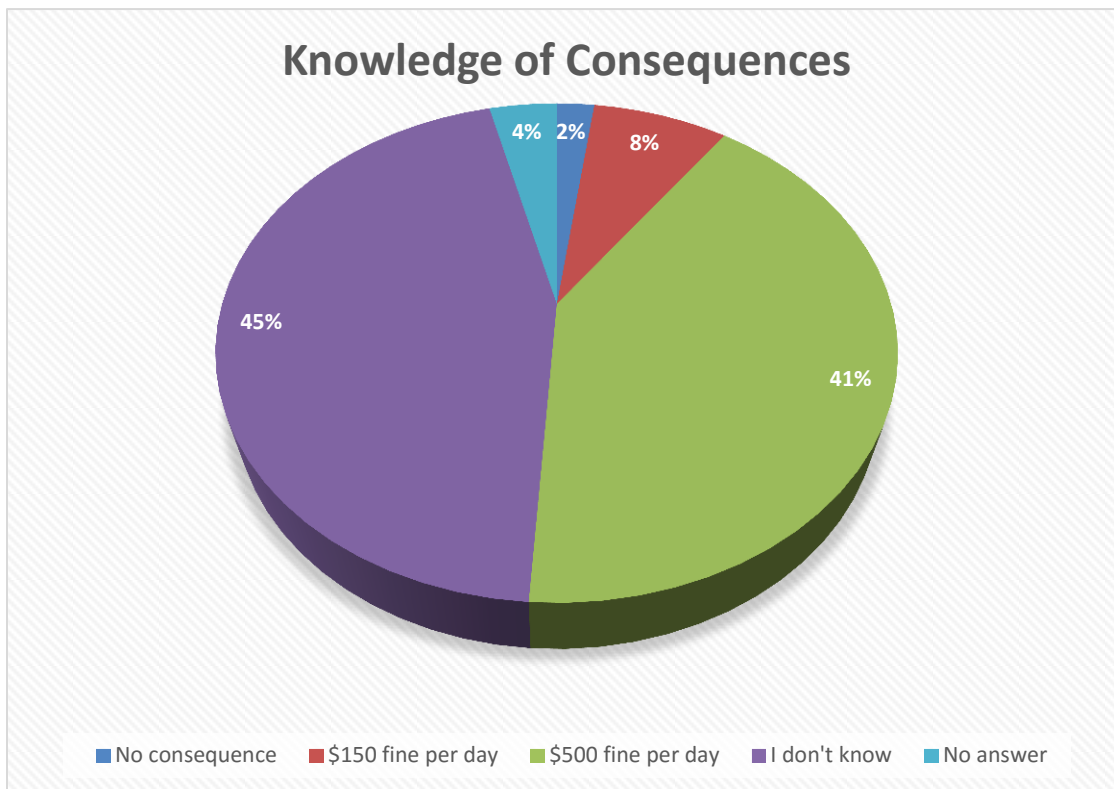
GBAN serves as a tool to help the public report all types of pollution they see more easily. In the past, people would often see pollution but have no idea who to call to report this pollution. To help with this, GBF created a table of various contacts to call, based on the type of pollution and location. However, this list was long, complex, and difficult to use leading to pollution often going unreported, and ultimately with no response from authorities. Through GBAN, citizens are now able to easily report any pollution they see, making them more likely to report it in the first place. Additionally, GBAN sends the reports to the proper authority automatically, expediting the response time from the responding agency. In the past, many pollution reports were sent to TCEQ, who would then have to determine who the report needed to be sent to, increasing the amount of time before the proper authority would receive the report.

In an effort to increase of the use of GBAN by the boater audience, GBAN has created new cards for distribution that specifically target the boating community (**Figures 7 and 8**) and have increased GBAN messaging within the Pump Don't Dump campaign materials. GBF distributed the GBAN Citizen Engagement Toolkit to partner marinas and other boating groups to increase marketing efforts for GBAN within the boating community specifically. To date, two organizations in the boating community have used this toolkit to market GBAN on their website: Maritime Sanitation and Little Yacht Sales (**Table 8**).

During this cycle, GBAN received one report under the boat sewage pollution category. On April 15, 2015 GBF received an anonymous report of sewage dumping in Galveston Bay by Baywatch Dolphin Tours. The company owns two vessels, both of which were reported as being guilty of dumping sewage

into the Galveston Ship Channel and at the dock of Pier 21. The reporter stressed that this is an ongoing issue. We have also received two phone calls from different reporters citing this same company as consistently dumping sewage and other chemicals in the Bay. Unfortunately, we haven't received any photos of the dumping yet so this makes it harder to get a response from the authorities. GBF is working to gather more information and determine a path forward for getting some sort of response from the authorities.

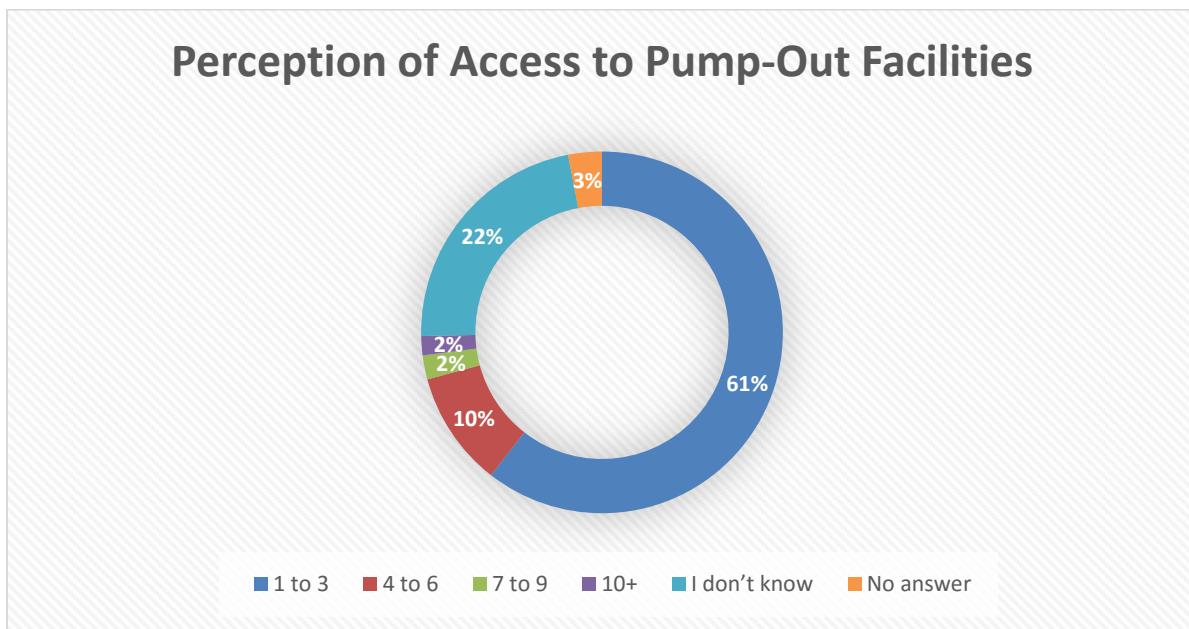
**GBF Dockwalkers**



**Figure 16. Boater knowledge of consequences for discharging sewage into Galveston Bay**

To date, we have a total of 11 trained volunteers, and 232 surveys have been conducted since the inception of this program. This data represents 1.0% of the boating population with boats > 25 feet and covers numerous diverse marinas. In order for this data to be statistically significant, GBF calculated that we must reach 370 surveys – this is GBF's goal and then we will continue surveying past this in order to watch how boater education and behavior changes over time. These surveys will then be representative of all boats in the boating population surround Galveston Bay. **Figures 16 – 20** summarize a few key findings. The data in **Figures 16 and 17** informed us that we needed to take a new approach to our Pump Don't Dump messaging and distribution since so many people were unaware of how many pump-out stations there really are around the Bay and the consequences for not securing the y-valve/main discharge valve. As a result, GBF created a new giveaway for Pump Don't Dump outreach materials which focuses more specifically and simply on targeted messaging. This giveaway included the Pump-Out Postcard with an updated pump-out map and simplified list of marine sanitation codes, the Pump

Don't Dump koozie and floating keychain, and a GBAN card which empowers boaters to be the #EyesOnGalvBay. The results in **Figure 17** are not surprising considering the ongoing lack of enforcement by state and federal entities. However, GBF will continue to try to drive improvements in enforcement by educating boaters on where to report illegal dumping in hopes that the authorities will take notice of this issue. The data in **Figure 18**, along with other data collected on the survey, will assist GBF in calculating the waste production on the average boat on Galveston Bay and multiply that by the total number of registered boats to get a basic idea of the amount of waste that boaters produce per year. More importantly, it gives the boating community a great visual to show that a large proportion of boaters in our area do, in fact, use their onboard sewage facilities. **Figure 19 and Figure 20** will help us determine how many boats will be impacted by a No Discharge by determining the percentage of boats already in compliance with No Discharge Zone. Figure 15 represents an extremely positive finding from our survey, because it shows that roughly 95.25% of boaters surveyed would already be in compliance with an established No Discharge Zone. Only 4.75% of boaters around Galveston Bay, based on our findings, would have to actively make a change onboard their vessel to become compliant with the law. Ultimately, that means that a very small percentage of the recreational boating population would be required to afford the installation of a holding tank. Another positive finding based on our Dockwalker data showed that of boaters surveyed with boats over 25 ft., 100% of the boaters agreed that bacteria from sewage is harmful to the Bay. Based on these and future results, GBF will be able to tailor campaign messaging and strategy to improve knowledge and behavior change, determine priority areas for new pump-out facilities, share valuable market information with mobile pump-out companies, etc.



**Figure 17. Boater knowledge of pump-out facilities located around Clear Lake and Galveston Bay**

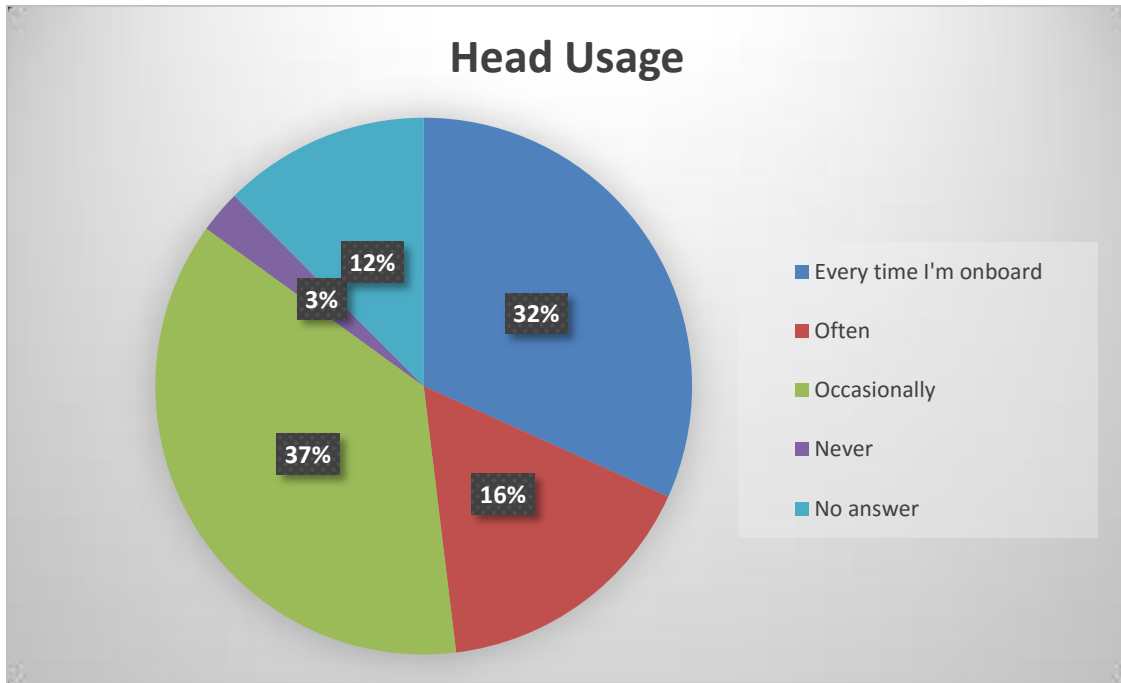


Figure 18. Occurrence of toilet usage while onboard

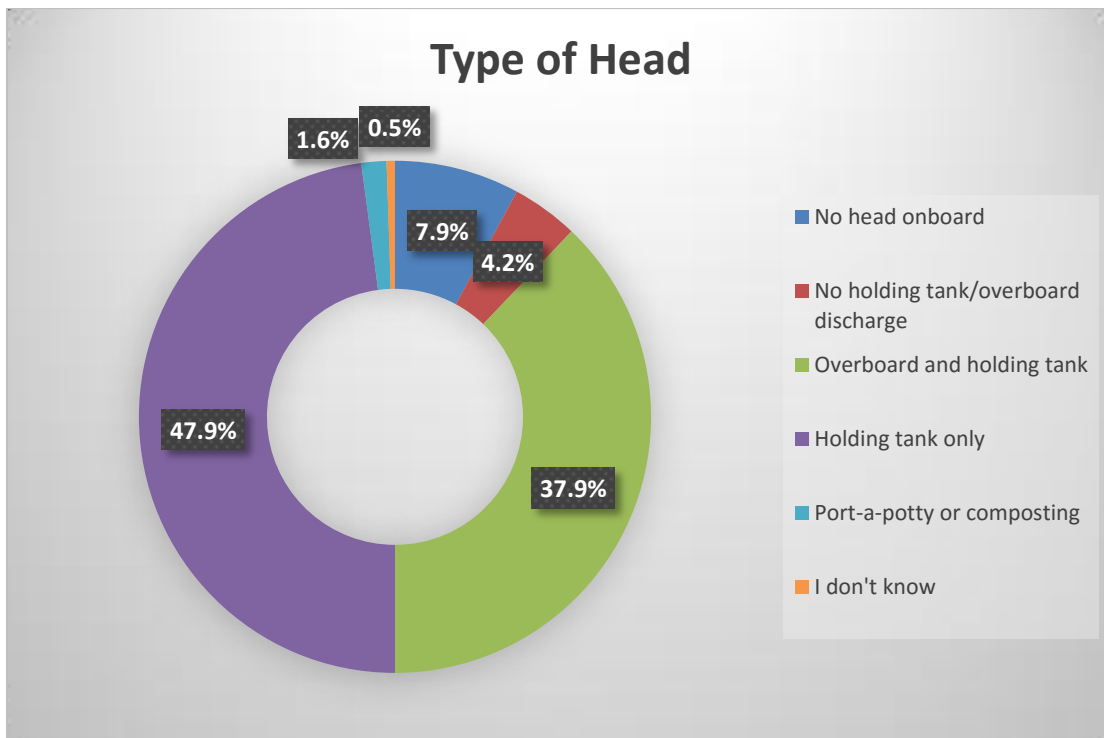
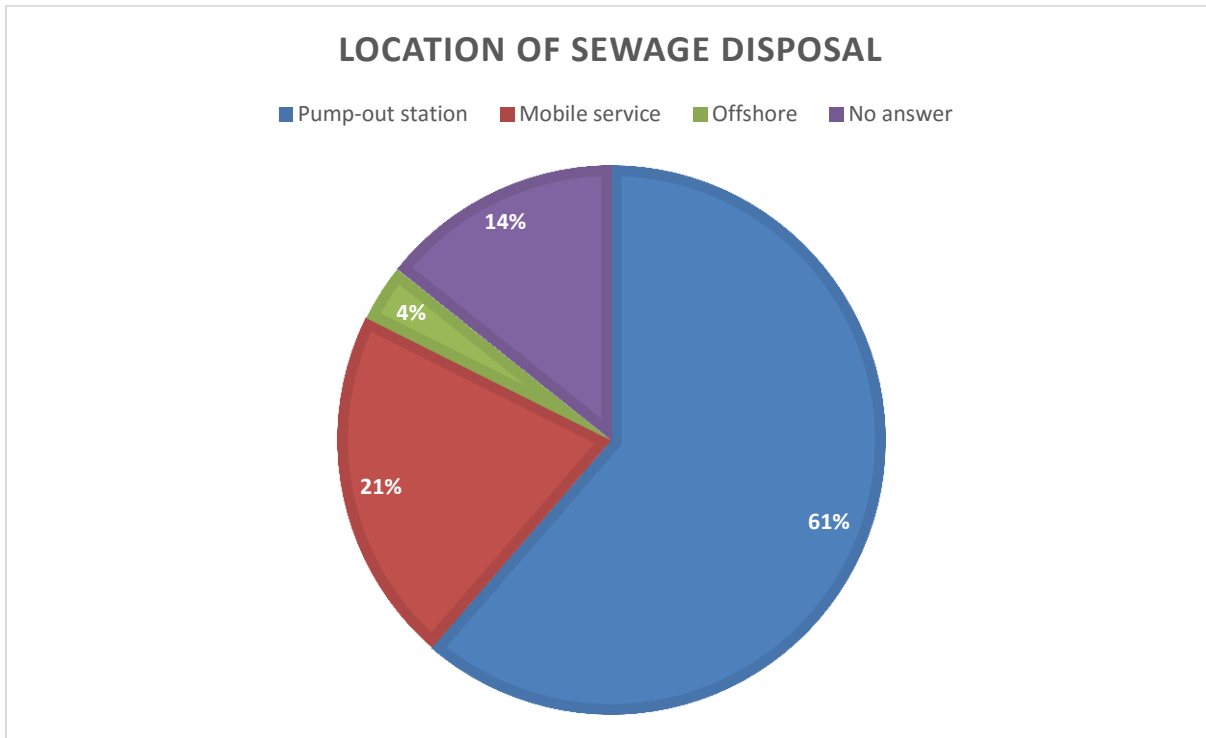


Figure 19. Types of marine toilets found onboard participants' boats



**Figure 20. Locations/facilities boaters most often use to discharge their sewage**

**GBF Water Monitoring Team (WMT)**

GBF continued to collect ambient water quality data at marina and near-shore sites around Clear Lake and Galveston Bay throughout this funding cycle. Please see **Appendix IV** for the Water Quality Data Analysis.

**Water Monitoring Team Photos**

Marina Sampling Day, November 2, 2015





Mary Warwick at monitoring site, West Bay @ Sweetwater. December 5, 2015





TST Phase I/II Training, February 25, 2016





### **Water Quality Research Internship (WQRI)**

As a result of the WQRIs for this cycle, GBF completed two Boater Waste Impact Studies to guide the work of the BWEC and continue building relationships with the boating community. Results of these studies can be found in **Appendix IV**.

### **Pump-Out Facilities**

The number of pump-out stations/carts and mobile pump-out companies remained the same this year, although our knowledge about these pump-out facilities has drastically increased. To date, the Galveston Bay region has 30 pump-out facilities, including stations, mobile boats, carts, dump stations, and commercial or governmental facilities. One of GBF's summer interns compiled a detailed, updated table detailing key information on pump-out facilities around Galveston Bay and Clear Lake (**Appendix IV**) as part of the draft No Discharge Zone application. Although no new pump-out facilities have been installed this cycle, there has been discussion about the Kemah Boardwalk Marina installing a public pump-out station. This is very encouraging news, as Kemah is a prime location to pump-out as the point of entrance to the Clear Lake No Discharge Zone. The static number of pump-out facilities is likely due to the fact that the Clean Vessel Act funding has been on hold as Texas Parks and Wildlife tries to fill the position for the person who is in charge of that program since he retired. However, this position was refilled in late 2015 so this problem has been overcome. While mobile pump-out companies are involved in assisting with pump-out facility installation at marinas, we believe that there is a lack of knowledge amongst marina managers that aren't members of the Marina Association of Texas about available funding through the Clean Vessel Act. This may be due to the fact that those marinas aren't as in tune with the latest industry news, as well as the relatively high staff turnover rate in the marina business—those managers whom are directly involved with installing a pump-out station at the marina are the most knowledgeable about the source of funding for that pump-out, as well as how reliable the pump-out is. When a new manager is placed at a marina, the prior knowledge about the pump-out is rarely passed on. This lack of knowledge provides an opportunity for further education of marina managers through partnership with GBF. A former TPWD employee is now working as a consultant for the Marina Association of Texas (MAT), of which GBF's Water Programs Manager is a board member, so we are hopeful to see many enhancements to the use of these grant funds statewide. MAT is currently working with TPWD to offer MAT members the opportunity to recoup annual funds spent on maintaining and operating their pump-out facilities in hopes of encouraging more marinas to install new facilities by lessening their financial burden even further. GBF will continue to advocate for this with MAT and promote the program in the Clear Lake and Galveston Bay area.

### **Conclusions and Lessons Learned**

The Boater Waste Education Campaign saw many rewarding enhancements during this funding cycle. Our partnership with the Marina Association of Texas and the work of our interns helped give a much needed push to some enforcement efforts that the BWEC Workgroup has been trying to accomplish for several years including a draft No Discharge Zone application for Galveston Bay. Volunteer programs including the Dockwalker Program and GBAN have and will continue to grow and provide the campaign with much needed data. The Pump Don't Dump campaign was given a fresh look and will incorporate new distribution strategies thanks to results from the Dockwalker Program. And finally, teen and elementary-aged boaters were engaged in the campaign through hands-on activities at the WADE camp with the Houston Safe Boating Council and through Lakewood Yacht Club's Seahorse Camp.

To summarize our major findings, 70% of the organizations on the BWEC workgroup attended meetings and 100% directly contributed to campaign activities such as distributing Pump Don't Dump campaign materials and helping us build relationships with and gain access to marinas for the various volunteer programs. Through education booths, presentations, and workshops, the BWEC reached over 104,000 people at 54 live events. Through print and digital media outlets, GBF was able to reach over 239,000 people with the Pump Don't Dump campaign message through 20 media outlets. The GBAN mobile reporting tool was launched and marketed through a social media campaign developed by The Hatcher Group, as well as through outreach booths and presentations – receiving 1,825 page views and 44 pollution reports during this cycle. The GBF Water Monitoring Team remained strong at 31 certified volunteer monitors at 36 sites around Clear Lake and Galveston Bay and 16 of them have their advanced certification to sample for bacteria. Twenty one new monitors are almost finished with their certification to take over vacant monitoring sites and continue collecting long-term data at marinas and other near-shore sites. GBF's Volunteer Lab Assistant helped us run the lab by analyzing hundreds of bacteria samples and we recruited and trained a second Volunteer Lab Assistant, as well as hosted a total of five Water Quality Interns this cycle compared to two interns last year.

Overall, GBF and the workgroup are pleased with the advances that have been made to the campaign. The information collected during this cycle will assist us as we continue to strive for authorities to more proactively enforce existing boater waste laws. GBF recognizes that the BWEC is a complex balance of education and advocacy efforts and we look forward to continuing work on this project. Thank you to the Coastal Management Program and NOAA for your ongoing support of this important environmental, economic, and public health issue.

**References:**

- Guillen, G., Ruckman, M., Smith, S., & Broach, L. (1993). *Marina impacts in Clear Lake and Galveston Bay* (Special Report D7-001A). Report prepared for Texas Water Commission, Houston, Texas: Author.
- Jeong, Y., Grant, S. B., Ritter, S., Pednekar, A., Candelaria, L., & Winant, C. (2005). Identifying pollutant sources in tidally mixed systems: Case study of fecal indicator bacteria from marinas in Newport Bay, Southern California. *Environmental Science & Technology*, 39, 9083-9093.

**Appendices:**

Appendix I, II, III, and IV can be downloaded and saved via this temporary link:

<https://www.dropbox.com/sh/rxdfc4zevv7mfcp/AADNIUKUJpKYY4LZ7pPJ3iVJa?dl=0>