



Final Project Report
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Job No: J19-009
Project Title: Dog River Litter Gitters

Prepared for:



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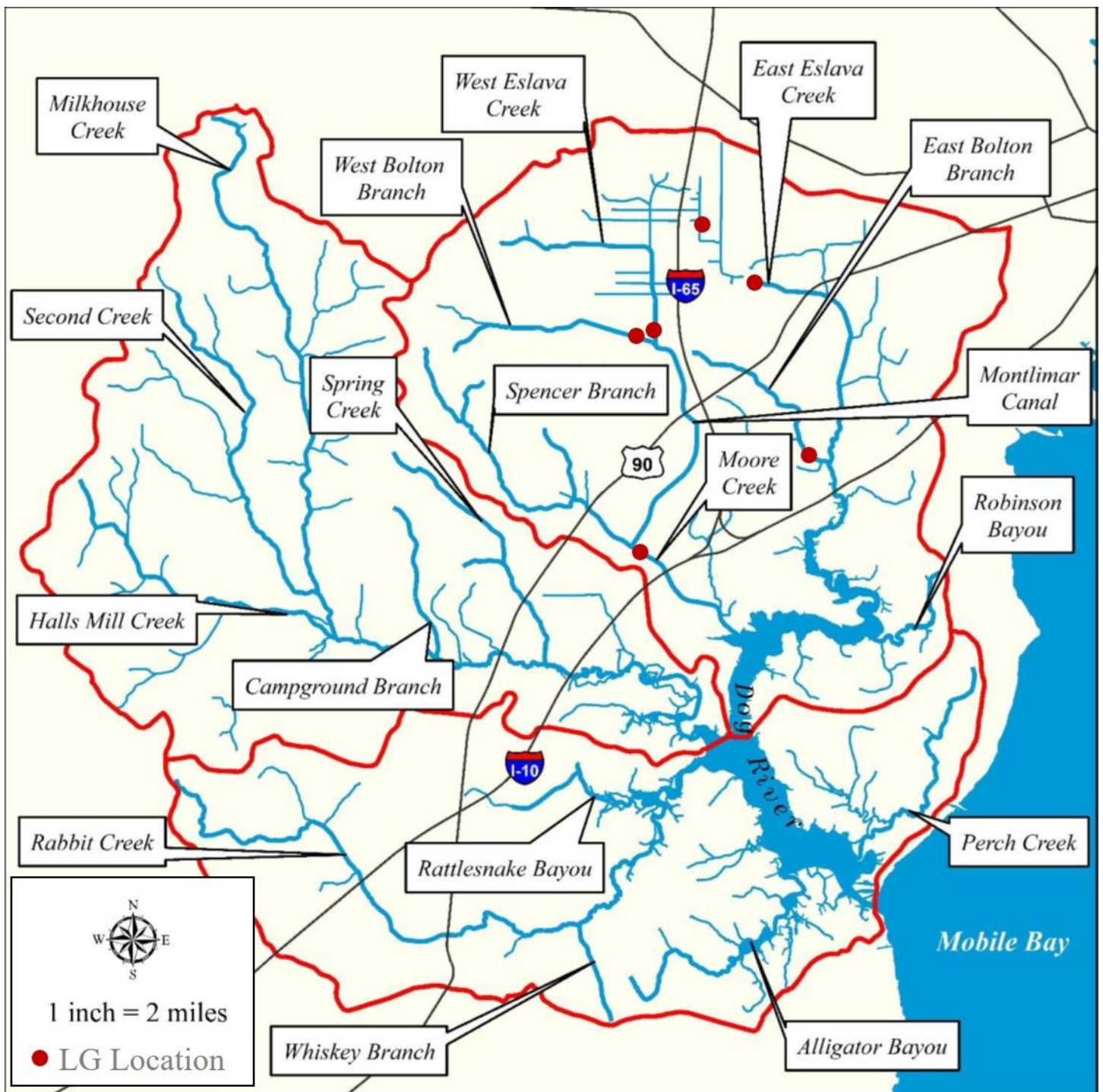


Figure 1 - Overview of Dog River Watershed (2019, MBNEP – Dog River Watershed Management Plan)

1.0 Project Overview

This report provides a detailed summary of the efforts by Osprey Initiative, LLC (Osprey) in support of Dog River Clearwater Revival's (DRCR) "Comprehensive Trash Abatement Program for the Dog River (DR) watershed, AL" project. As part of this project, Osprey was contracted to deploy and maintain six (6) Litter Gitters at strategically located stormwater outfalls for 18 months, collect data using a modified version of the U.S. EPA's Escaped Trash Assessment Protocol (ETAP), provide on-call field crews to clean identified litter "hotspots," and facilitate training in ETAP data collection methodology for designated groups.

This project built upon previous litter abatement efforts by Osprey in the DR watershed which included the deployment and maintenance of three (3) Litter Gitters dating back to August 2017. Additionally, this project remained closely connected to the City of Mobile Litter Boat Program – another project being executed by Osprey in the DR watershed. Finally, Osprey deployed several experimental litter collection booms at select stormwater outflows to further refine the collective understanding of litter conveyance within the DR watershed. While these booms were not specifically affiliated with this grant, they served to inform its principal goals and objectives.

2.0 Goals & Objectives

As outlined by DRCR, the purpose of this project was to improve water quality in the Dog River watershed by reducing trash at or near its source. The stated goals were to 1. Establish a community trash monitoring program to inform litter management; 2. Promote the introduction and use of effective trash reduction technologies and approaches; 3. Improve people's awareness, knowledge, and behavior relating to littering; 4. Improve the enactment and enforcement of laws to reduce trash.

The intended objectives were to: 1.1 Reduce trash in one stream segment of the Upper Dog River watershed by 50% through the demonstration of alternative, sustainable, litter capture devices; 2.1 Train 10 high school students and 10 community members in strategic watershed assessment to implement trash monitoring strategy; 3.1 Increase by 10%, the number of truck-owners who use a truck-bed trash can to secure litter and debris as a result of a public awareness campaign; 3.2 Present project findings and results at a minimum of three conferences to transfer lessons learned to other communities; and 4.1 Publish a Trash Reduction Strategy for the City of Mobile providing recommendations for strategically siting trash capture, engaging community in monitoring, and improving enforcement activities.

In the Quality Assurance Project Plan, the intended objectives were transposed into four overarching tasks:

- **Task A - Reduce by 50-percent, trash in one stream segment of the Upper Dog River watershed by deploying alternative, sustainable trash capture devices at strategically located stormwater outfalls.**

- **Task B** - Train 10 High School Students and 10 community members in Strategic Watershed Assessment Protocol (SWAMP) to implement trash monitoring strategy.
- **Task C** – Increase by 10 percent, the number of truck owners who use a Truck Bed Trash Can to secure litter and debris as the result of a Green Design competition and a public awareness campaign.
- **Task D** - Publish a Trash Reduction Strategy for the City of Mobile, providing recommendations for developing sustainable trash abatement through strategic placement and maintenance of litter containment devices, improved community engagement, and improving regulation and enforcement.

The primary focus for Osprey during this project was supporting the successful completion of **Task A**. While there were several specific actions associated with this task, the efforts by Osprey can best be organized into three distinct lines of effort – 1. Deploy and maintain six (6) Litter Gitters with integrated data collection; 2. Provide on-call field crews to clean identified litter “hotspots” with integrated data collection; and 3. Facilitate training in ETAP data collection methodology for designated groups.

3.0 Outcomes & Measurables

The following sections will look at these three distinct lines of effort to demonstrate the outcome with measurable impact.

3.1 Litter Gitters

The first line of effort for Osprey’s activities centered around the use of in-stream litter collection devices to reduce to downstream flow of litter by 50%. This project called for the deployment and maintenance of six (6) Litter Gitters in the Upper Dog River watershed over an 18-month period. Site selection was coordinated with project partners and based on a number of factors – anticipated volume of stormwater litter, permitting requirements/constraints, accessibility, visibility to local community. While initial discussion revolved around the intent to deploy in-stream trash collection devices focused on a single stream segment of the Upper Dog River Watershed, it was decided that it would be more effective to deploy the Litter Gitters across several stream segments to assist in the identification of trash flow throughout the watershed. The final list of sites selected for the placement of Litter Gitter devices is reflected in *Table 1* below:

Site ID	Device Type	Latitude	Longitude	Deploy Date
DR – Bolton Branch @ Navco Rd	Litter Gitter	30.64415	-88.10227	29 Jun 2018
DR – Eslava Creek @ Emogene St	Litter Gitter	30.68169	-88.12309	30 Nov 2018
DR – Eslava Creek @ Sage Ave	Litter Gitter	30.67321	-88.11316	27 Mar 2019
DR – Moore Creek @ Halls Mill Rd	Litter Gitter	30.62627	-88.13541	22 Jan 2020
DR – Moore Creek @ Michael Blvd	Litter Gitter	30.66267	-88.13180	22 Jan 2020
DR – Montlimar Canal @ Michael Blvd	Litter Gitter	30.66329	-88.13669	22 Jan 2020

Table 1 - List of selected sites for Litter Gitter deployment

It should be noted that three (3) sites were existing locations that began supporting litter abatement efforts associated with this project immediately. The remaining three (3) sites

were delayed in their deployment due to permitting requirements. These sites were serviced routinely (every two weeks at a minimum and around major rain events) to remove and record any collected litter, monitor site functionality, and determine effectiveness of site to inform future recommendations. Weight and volume of collected litter was documented by recyclable and disposable category and all material was catalogued according to a modified version of ETAP to further define litter type, condition, and potential sources. Furthermore, Osprey completed a baseline reduction comparison assessment to determine effectiveness of Litter Gitters in decreasing the downstream flow of litter. Specific discussions related to individual sites and reduction comparison assessment are detailed below. Collection totals by site for entire project and a graphical depiction of site locations in the DR watershed can be seen in *Table 2* and *Figure 2* respectively below. Full summary of Litter Gitter data can be found in *Appendix 1*.

	Amount - Recycle		Amount - Dispose		Amount - Total		Debris
	Lbs.	cf	Lbs.	cf	Lbs.	cf	
DR-Bolton Branch@Navco Rd	328	270	1,148	470	1,477	740	593
DR-Eslava Creek@Emogene St	80	77	441	246	522	323	10
DR-Eslava Creek@Sage Ave	250	222	764	412	1,015	634	96
DR-Moore Creek@Halls Mill Rd	106	106	283	158	389	263	0
DR-Moore Creek@Michael Blvd	134	121	411	185	545	307	52
DR-Montlimar Canal@Michael Blvd	123	118	333	164	456	282	40
Project Totals	1,022	915	3,380	1,634	4,403	2,549	791

Table 2 - Litter Gitter Collection Totals

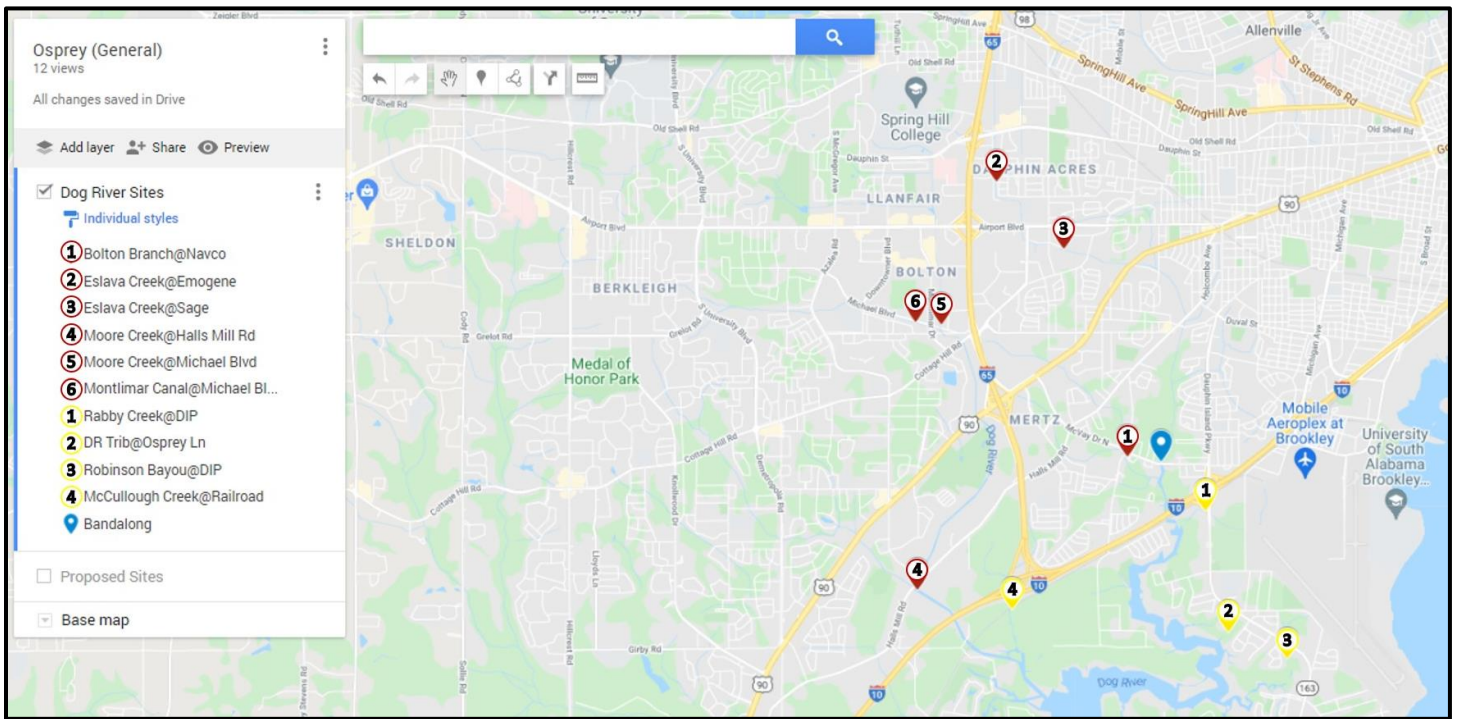


Figure 2 - Laydown of Litter Collection Devices in the DR watershed (Red = Litter Gitter; Yellow = Litter Boom; Blue = Bandalong)

3.1a DR – Bolton Branch at Navco

Site Description - The site is located on East Bolton Branch of Dog River just downstream of the Navco Drive intersection. This waterway predominantly drains a low-income residential and commercial area as it flows through concrete lined drainage ditches towards the location of the trap. The site is situated adjacent to a small nightclub with sheetpile walls directly upstream and muddy clay banks with dense vegetation downstream. Initially, we deployed a single trap, constructed with coated wire mesh basket and a PVC frame, in the center of the creek with narrow-angled, equilateral booms comprised of reinforced light weight foam floats. The trap was upgraded in late October 2019 to a heavier duty aluminum design with high-tensile strength anchor rope and high-density foam boom floats. The trap is clearly visible to pedestrian and vehicular traffic traveling nearby.

Site Discussion - The area around the site had been a common illegal dumping location with numerous tires. Also, Osprey field crews routinely found copious amounts of glass bottles (presumably from patrons of the nightclub), metal cans, and other beverage containers. This site requires special attention when entering the waterway as the metal sheetpile walls can be slippery when wet and the water surface can be 8' below the top of the wall at times. Additionally, as this site is subject to tidal influences, field crews planned their cleanouts around low-tide to gain efficiencies. Overall, this site has been an incredibly effective site as preventing the downstream flow of litter into Dog River. Due to its performance, visibility, and accessibility, Osprey recommends continued operation of this site with possible improvement through the addition of signage to educate local community members and raise awareness.

3.1b DR – Eslava Creek at Emogene St

Site Description - The site is located on the upper portion of East Eslava Creek just downstream of Emogene Street. This waterway predominantly drains a large area of high density commercial / retail development and medium density low-income housing with several high-traffic roadways, such as I-65 and Dauphin St. These areas are highly urbanized and impervious. The site is prone to litter introduction from vehicular traffic on the adjacent roadway as well as wind-conveyed litter from surrounding commercial shopping centers. Initially, we deployed a single trap, constructed with coated wire mesh basket and a PVC frame, in the center of the creek with narrow-angled, equilateral booms comprised of reinforced light weight foam floats. The trap was upgraded in late October 2019 to a heavier duty aluminum design with high-tensile strength anchor rope and high-density foam boom floats.

Site Discussion - This site consistently has single use plastic bags caught in the vegetation both upstream and downstream. The banks are steep and the exposed clay substrate can create a slipping hazard when approaching the trap system for maintenance. The creek runs adjacent to Springdale Blvd which is moderately traveled by local community members seeking to avoid the main thoroughfares. In addition to the litter removed, this site is ideally situated to promote public awareness due to its highly visible location to the

public. Overall, this site proved to be an effective location to intercept the flow of litter and Osprey recommends continued operation of this site with possible improvement through the addition of signage to educate local community members and raise awareness.

3.1c DR – Eslava Creek at Sage Ave

Site Description - The site is located on the upper portion of East Eslava Creek just downstream of Sage Ave and approximately 2,200 yds downstream of the trap at Emogene St. This waterway predominantly drains a large area of high density commercial / retail development with several high-traffic roadways, such as I-65 and Airport Blvd, and large commercial shopping centers just upstream. These areas are highly urbanized and impervious. Initially, we deployed a trap constructed with coated wire mesh basket and a PVC frame with reinforced light weight foam boom floats configured as an in-line tandem trap setup. The trap was upgraded in late October 2019 to a heavier duty aluminum design with high-tensile strength anchor rope and high-density foam boom floats and based on the performance of the upgraded trap in previous locations, we adjusted the deployment configuration to a single trap vice tandem.

Site Discussion - The location of the site provided excellent access for our field crews. While it was located to a heavily trafficked area with dense commercial development, the site itself was relatively isolated from the busy streets just upstream. The trap proved to be highly effective at capturing litter in stormwater runoff from the upstream area. On one occasion, we received a request from a local resident with property adjacent to the trap to relocate the trap further downstream. Following an initial analysis, we determined that it would be feasible to move the trap about 100 yds downstream. This positive interaction with the local community once again demonstrated the value of engaging and incorporating the public in watershed management. This site also provides excellent visibility for the public and could be improved with some additional signage to educate local community members and raise awareness. Osprey recommends continued operation of this site.

3.1d DR- Moore Creek at Halls Mill Rd

Site Description - The site is located on the main branch of Moore Creek just downstream of Halls Mill Rd and the Spencer Branch fork from Moore Creek. This site consists of wide gently sloped banks with grassy covering over a rocky substrate. The Moore Creek segment serves to drain a medium density suburban residential area with pockets of commercial development and industrial centers. The waterways extend across a large section of middle and upper Mobile. We deployed a single, aluminum design trap in the center of the creek with high-tensile strength anchor rope and high-density foam boom floats arrayed in a narrow-angled ‘V.’

Site Discussion - This site proved to be an excellent location for a litter collection device as it served to screen and capture being litter conveyed from the headwaters of West Bolton Branch and West Eslava Creek, Spencer Branch, Moore Creek, and Montlimar Canal. The site also had great accessibility for our crews and was highly visible to vehicular /

pedestrian traffic as well as local community members. Based on its location, Osprey recommends continued operation of this site.

3.1e DR – Moore Creek at Michael Blvd

Site Description - The site is located on the upper portion of Moore Creek just upstream of Michael Blvd. The site is also located approximately 100 yds upstream of the convergence of Moore Creek with Montlimar Canal. This portion of Moore Creek drains a predominantly commercial development area in vicinity of several moderate-traffic roadways. These areas are highly urbanized and impervious. This site consists of wide gently sloped banks with grassy covering over a sand and clay substrate. We deployed a single, aluminum design trap in the center of the creek with high-tensile strength anchor rope and high-density foam boom floats arrayed in a narrow-angled ‘V.’

Site Discussion - This site was coupled with the nearby trap on the Montlimar Canal to assist in identifying the contributing sources of litter between the two upstream headwaters of West Bolton Branch and West Eslava Creek. While this location captured more litter in terms of both weight and volume, the totals between the two sites was fairly comparable which indicates that both streams equally contribute to the flow of litter into the lower Dog River watershed. This site had good accessibility and high visibility. Based on the impact of this site on reducing the downstream flow of litter, Osprey recommends continued operation of this site.

3.1f DR – Montlimar Canal at Michael Blvd

Site Description - The site is located on Montlimar Canal adjacent to Michael Blvd approximately 300 yds upstream of Montlimar Drive. Montlimar Canal serves to drain a medium density low-income residential area with some commercial development. This site consists of steep banks with grassy covering over a rocky substrate. We deployed a single, aluminum design trap in the center of the creek with high-tensile strength anchor rope and high-density foam boom floats arrayed in a narrow-angled ‘V.’

Site Discussion – Accessibility at this site proved to be a challenge for our field crews as there was no good staging area near the trap. This required our crews to park offsite and walk with gear across a busy street to maintain the trap. The banks at this location are prone to erosion and can be unstable at times presenting an additional challenge. However, this site is ideally located to capture litter. The high flows routinely observed at this site coupled with the stormwater designs upstream result in the movement of large volumes of litter in a short amount of time. It was also noted by field crews that the nearby roadways were consistently littered which the wind and traffic often conveyed into the waterway downstream of the trap. The trap is highly visible from the roadway and provides an excellent platform to raise awareness and educate the public on the impact of litter in our waterways. Osprey recommends continued operation of a trap on this segment of Montlimar Canal but potentially to a location further upstream with better access.

3.1g Litter Booms

While not a specific action associated with this grant, Osprey deployed several test booms at designated locations to inform watershed management decisions regarding future litter abatement and prevention efforts. As part of an effort to address local citizen concerns regarding stormwater outfalls suspected of being a significant contributing source to litter conveyance into the DR watershed, site selection was coordinated with project partners and based solely on the recommendations from local citizens living in the DR watershed area. The collected data would seem to indicate that these outfalls are not a significant source of litter into Dog River. However, we recommend that these locations remain a location for continued assessment. Below is the list of sites selected for the deployment of test booms (*Table 3*) and the collection totals associated with each site (*Table 4*):

Location	Device Type	Latitude	Longitude	Deploy Date
DR – Rabby Creek @ DIP	Boom	30.63713	-88.09004	19 Nov 2020
DR – Dog River Tributary @ Osprey Ln	Boom	30.62067	-88.08632	20 Nov 2020
DR – Robinson Bayou @ DIP	Boom	30.61700	-88.07682	29 Dec 2020
DR – McCullough Creek @ Railroad	Boom	30.62368	-88.12065	19 Nov 2020

Table 3 - List of selected sites for Litter Boom deployment

	Amount - Recycle		Amount - Dispose		Amount - Total		Debris
	Lbs.	cf	Lbs.	cf	Lbs.	cf	Lbs.
DR-Rabby Creek@DIP	6	6	20	9	26	15	0
DR-DR Trib@Osprey Ln	0	0	3	1	3	1	0
DR-Robinson Bayou@DIP	1	1	8	4	8	5	0
DR-McCullough Creek@Railroad	1	1	8	6	9	7	0
Project Totals	8	7	39	20	47	27	0

Table 4 - Litter Boom Collection Totals

3.1h Baseline Reduction Comparison Assessment

In conjunction with DRCR, Osprey selected two sites – Bolton Branch at Navco Drive and Eslava Creek at Emogene Street – to conduct a baseline reduction comparison assessment to determine effectiveness of Litter Gitters in decreasing the downstream flow of litter. While the original project plan only called for one site, Osprey recommended that the assessment be conducted at two distinct sites to ensure a more comprehensive assessment. Bolton Branch at Navco is tidally influenced and so the downstream section is subject to litter being conveyed via tidal movement of water; however, the downstream section is relatively isolated from vehicular and pedestrian traffic. Conversely, Eslava Creek at Emogene is not tidally influenced but the downstream section is subject to litter introduction from vehicular traffic on the adjacent roadway as well as litter conveyed via wind from surrounding commercial shopping centers.

As per the Quality Assurance Project Plan, we established three collection zones for each site. The upstream zone consisted of the banks, stream bed (when accessible) and waterway from the start of the boom system to 100 yards upstream. The trap zone consisted

of the entire trap system. The downstream zone consisted of the banks, stream bed (when accessible) and waterway from the back of the trap to 100 yards downstream of the trap. The reduction comparison assessment was conducted a total of 4 times per site with every piece of trash being collected, removed, and catalogued according to volume and weight of recyclables and disposables in addition to individual ETAP data collection for each section. While the three zones were used to ensure distinct data sets were collected, the data was aggregated into two Zones (Upstream + Trap and Downstream) during the analytical phase for purpose of evaluating the effectiveness of the Litter Gitter in reducing downstream conveyance of litter. The reduction comparison assessment resulted in the demonstrated effectiveness of the Litter Gitter devices to reduce downstream flow by **over 80%** as depicted in the analyzed data sets shown below in *Table 5*:

Site Name	Date	Section	Total (lbs)	Total (cf)	Percent Decrease (Up+Trap vs. Down)	Average Reduction			
BoltonBranch_Navco	7/30/2020	Upstream	32.74	19.00	85.09	80.71			
		Trap	26.88	12.00					
		Downstream	8.89	2.50					
BoltonBranch_Navco	8/20/2020	Upstream	6.38	9.00	59.90		80.71		
		Trap	28.73	43.00					
		Downstream	14.08	10.50					
BoltonBranch_Navco	10/15/2020	Upstream	8.59	10.00	84.07			80.71	
		Trap	24.61	21.00					
		Downstream	5.29	6.00					
BoltonBranch_Navco	2/8/2021	Upstream	12.11	5.00	93.80				80.71
		Trap	25.47	7.00					
		Downstream	2.33	2.00					
Eslava_Emogene	8/17/2020	Upstream	11.12	7.00	75.21	85.15			
		Trap	12.88	19.00					
		Downstream	5.95	5.00					
Eslava_Emogene	8/20/2020	Upstream	3.64	7.00	86.34		85.15		
		Trap	8.66	8.00					
		Downstream	1.68	1.00					
Eslava_Emogene	10/22/2020	Upstream	5.97	5.00	95.59			85.15	
		Trap	5.36	4.00					
		Downstream	0.50	0.50					
Eslava_Emogene	12/7/2020	Upstream	0.25	0.50	83.45				85.15
		Trap	27.00	20.00					
		Downstream	4.51	2.00					

Table 5 - Baseline Reduction Comparison Assessment

3.2 Litter Hotspot Tactical Cleanups

The second line of effort for Osprey was to provide on-call field crews with rapid response capability to clean an identified litter “hotspot” based on notification from partners and local citizens. These field crews would respond to calls to conduct comprehensive cleanups of identified hotspots, remove all litter and debris from the site to restore its natural, pristine condition. Data collection was fully integrated into their litter removal activities and this data was provided to project partners. Osprey was able to maintain a rapid response crew for the duration of the project.

However, this would not have been feasible if it had not been for the extensive work our crews were already conducting in the Dog River watershed as part of the City of Mobile Litter Boat Program. From a programmatic standpoint, it would not be economically sustainable to maintain a work-force that only responded to complaints or alerts; rather, this capability and capacity must be incorporated into the overarching litter abatement strategy and funding must be programmed to cover the costs of maintaining a similar program to the City of Mobile Litter Boats or Litter Patrol. Throughout the project, Osprey field crews were able to respond a number of times to clean an identified hotspot or remove a particularly large debris item.

3.3 ETAP Data Collection Methodology Training

The third and final line of effort for Osprey was to facilitate training in ETAP data collection methodology for designated groups in an effort to expand the use of ETAP within the Dog River Watershed. Osprey was able to assist in the training of 10 individuals on two separate occasions. Unfortunately, the impact of the Coronavirus-19 pandemic greatly reduced Osprey’s opportunities to facilitate additional training events.

4.0 Litter Breakdown

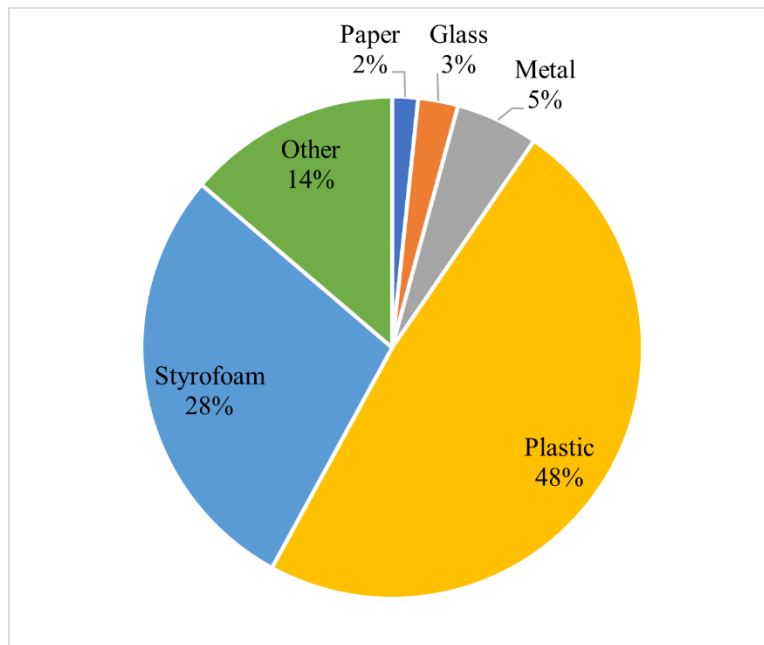


Figure 3 - ETAP Major Category Breakdown

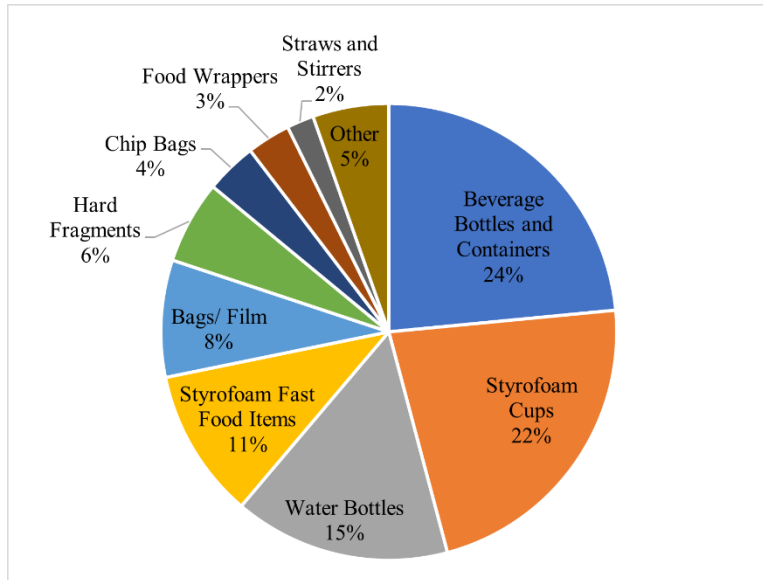


Figure 4 - ETAP Plastic/Styrofoam Breakdown

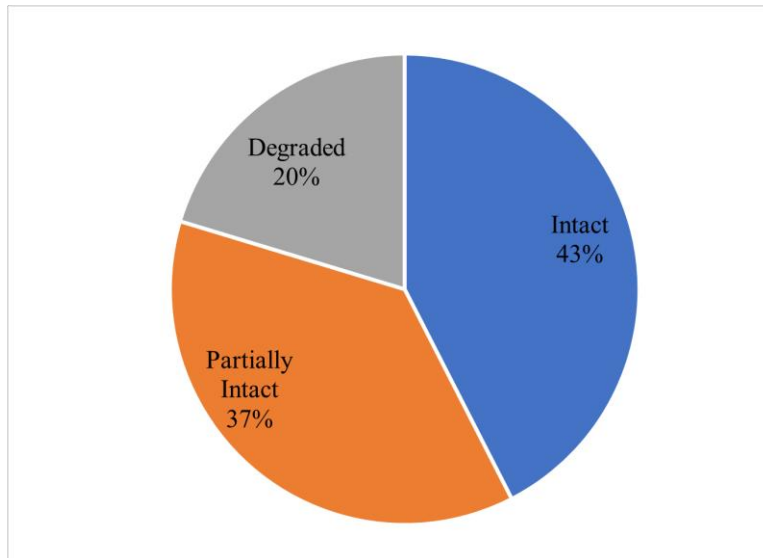


Figure 5 - ETAP Condition Breakdown

5.0 Conclusion

Overall, Osprey considers this project to have been incredibly successful due to the data-driven and team-building approach to first understand the flow of litter across a specific segment of a watershed and then develop a comprehensive litter abatement strategy. When developing a litter abatement plan for any watershed, the project should include a systematic tactical cleanup and strategic placement of interception devices. This approach allows for legacy trash to be removed from the watershed and new trash to be collected before it can impact the waterways. This can only be feasibly achieved on a sustainable level through the confluence of all parties working in partnership to leverage each organization, agency, and individual's unique skills and resources to execute the strategic vision and litter abatement plan.