

Year 1
2022 Permit

Dog Waste Study

About the Authors

Maddy Broda was awarded a stipend through the Bates College Center for Purposeful Work to conduct this research during the summer of 2022. She is studying geology and biology and is interested in water quality and geochemistry.

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The [Cumberland County Soil & Water Conservation District](#) (District) works “to assist and educate the public to protect soil and water resources”. Founded in 1946 and based in Windham, Maine, the District coordinates water quality improvement programs throughout the Southern Maine region. The District facilitates the Interlocal Stormwater Working Group (ISWG), a regional approach of 14 municipalities and two nested MS4 to implement stormwater permit requirements. In addition, the District implements Minimum Control Measures 1 and 2 requirements for ISWG.

The [New England Environmental Finance Center](#) is one of 10 university-based Environmental Finance Centers in the nation and serves the 6 New England states of EPA Region 1. Its mission is to build local capacity to pay for the growing costs of protecting the environment and to be better prepared to manage the chronic and acute problems of environmental protection and finance. The New England Environmental Finance Center is based at the [University of Southern Maine](#) (USM), part of the University of Maine system and situated in Portland, Maine’s economic and cultural center. USM is a public university with 8,000 undergraduate and graduate students and is known for its academic excellence, student focus and engagement with the community.



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Summary

The purpose of this project is to record and analyze the prevalence of dog waste pollution at parks, trails, and beaches in the fourteen Interlocal Stormwater Working Group (ISWG) communities in Cumberland and York Counties to establish a baseline and comply with the 2022 MS4 Stormwater Permit regulations. For this study, improper disposal is defined as dog waste left at the site either bagged or unbagged. Data is collected at 15 locations through field work that examined locations of dog waste, as well as presence of trash cans, restrooms, bag stations, and signage. All data is compiled and analyzed to assess the extent of improper dog waste disposal, both locally and regionally, to determine recommendations.

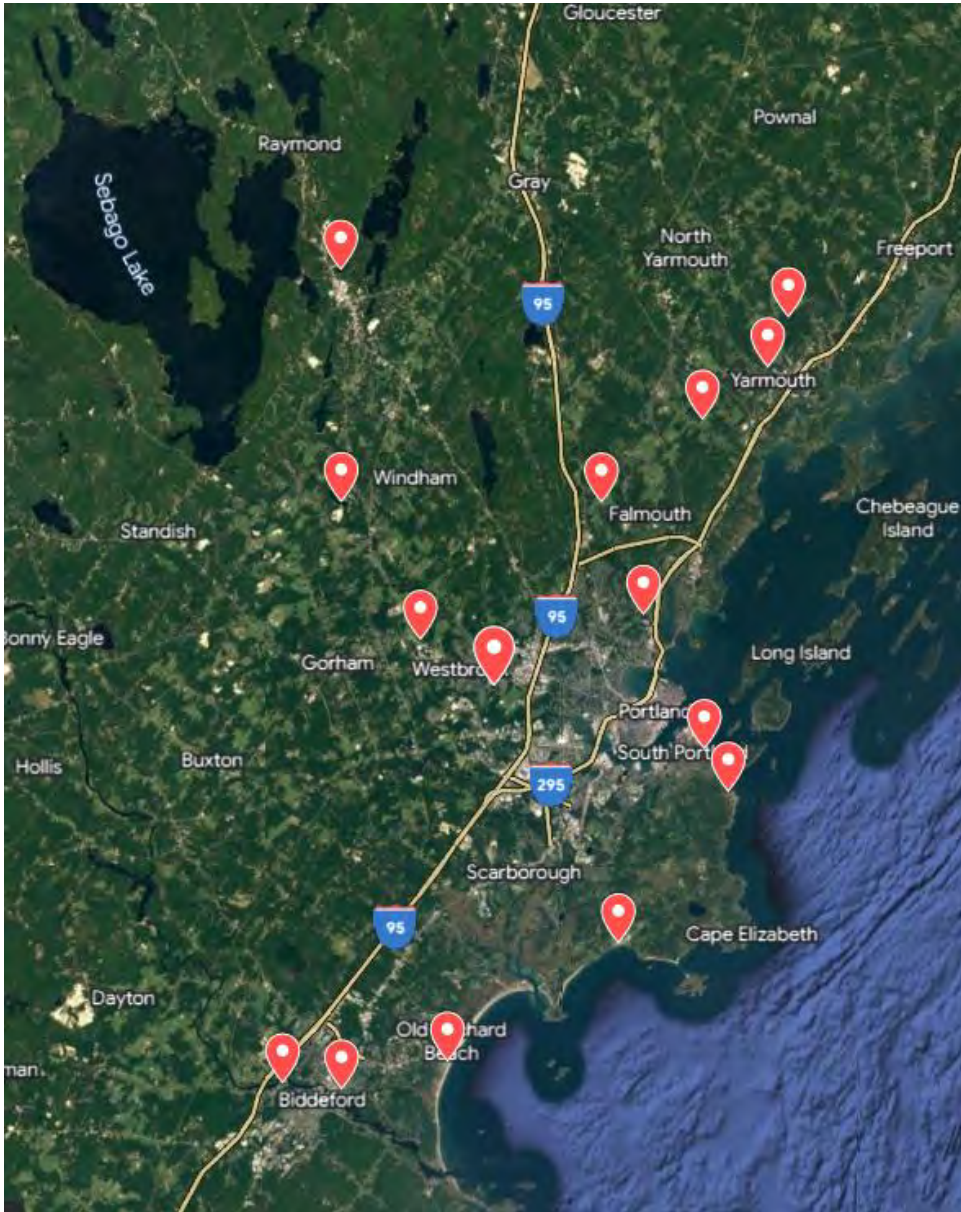


Figure 1. Selected Survey Locations

Methods

Pre-survey Methods

Prior to surveying the selected sites, municipal officials are contacted and informed of our two survey dates. Trail and park clean-up operations are asked to stop during the two-week period between the survey dates to ensure an accurate count of how much dog waste was left behind.

Field Methods

At each site, every trail is walked with two or more surveyors, with each surveyor scanning a side of the trail for dog waste. ArcGIS Quick Capture App is used to track surveyors' routes on trails and for cross sections across fields. This app also allows for recording the location of trash cans, bathrooms/porta potties, different types of signs (educational, ordinance, simple, and litter), entrances, bag stations, and bagged or unbagged dog waste. Once recorded, if the waste is not already bagged, the waste is bagged and added to a larger trash bag for disposal.

Community Engagement Methods

While completing field work, surveyors wear reflective orange safety vests and carry field kits with dog waste bagging supplies, trash bags, and other equipment. The surveyors often attract the attention of park-goers and dog owners. Field work is often paused to talk to community members about the project and the issue of dog waste pollution. Additionally, community members are asked about their observations and experiences with dogs and dog waste pollution at the site. Many of these conversations are noted in the datasheets and considered in analysis of the parks.

Analytical Methods

ArcGIS Quick Capture and Survey123 are used to record general site and survey information, track locations accurately, and tag all objects on the same device and automatically upload the data to ArcGIS online. These apps allow for same day visualization of the data on ArcGIS maps. Additional information about these apps and methods can be found in Appendix A.

Results

Individual Findings

The findings, analysis, and recommendations for each individual surveyed site are included for the five-year study starting in 2022. **Data is presented visually through maps, in which orange markers represent bagged dog waste and red markers represent unbagged dog waste. Signage, bag stations, trash cans, and bathrooms/porta potties are also represented by various colorful markers. Some markers may overlap each other.** Municipalities are listed in alphabetical order. Additional information about each site can be found in Appendix A.

Biddeford

Rotary Park and Dog Park, in Biddeford, contains a dog park, a beach, a disc golf course, and a trail encompassing the park. Dogs are required to be leashed outside of the dog park and are not permitted on the beach in the summer season. There are trash cans and a bag station located at the dog park entrance, along with several signs detailing harms of dog waste and information on leash laws (Figure 2).

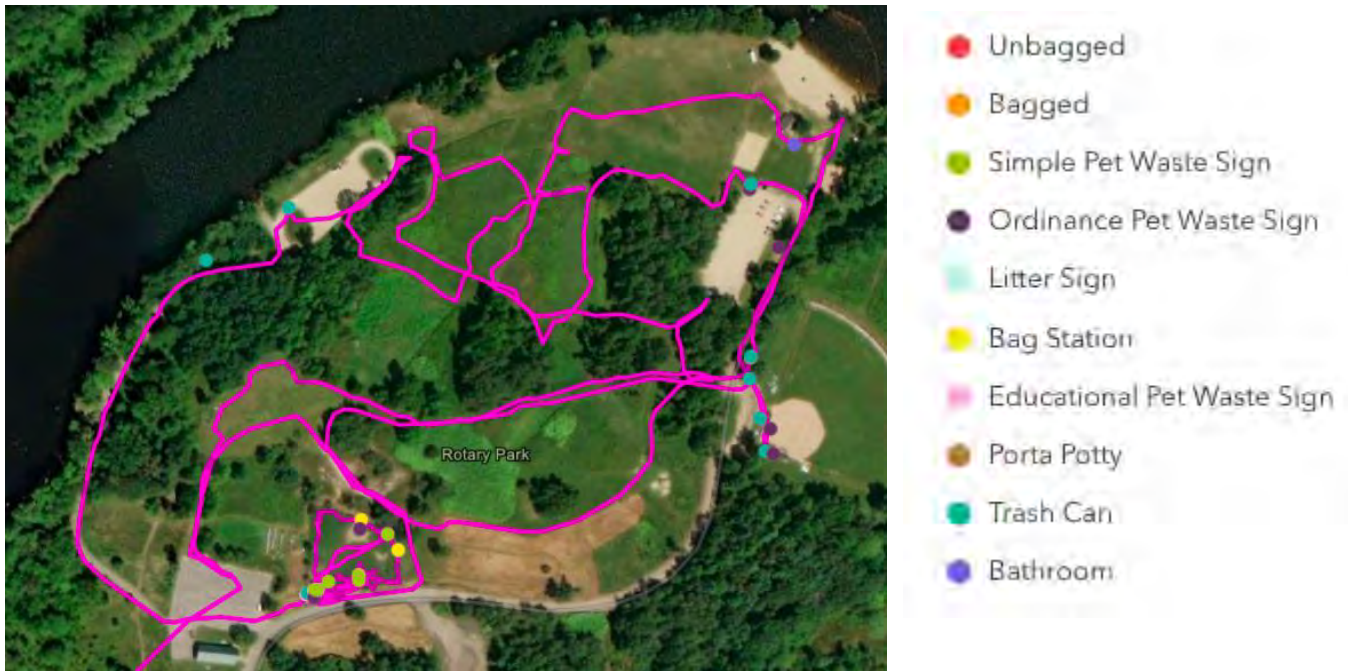


Figure 2. Map of infrastructure and route of survey at Rotary Park and Dog Park.

2022

The park's trails and dog park were surveyed on July 11, 2022 and on July 25, 2022. During the first survey, 44 deposits were found. During the second survey, there were **78 deposits**. Most of the dog waste was found inside the dog park and more specifically along the perimeter and towards the back of the dog park (Figure 3).

Recommendations: Since the park already has multiple bag stations, trash cans, and signage, this may be a great place for a couple of information sessions at the entrance to the dog park on why it is important to pick up after your dog!



Figure 3. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Rotary Park and Dog Park, 2022.

Cape Elizabeth

Fort Williams Park, in Cape Elizabeth, is a popular park with open fields and large looping trails. There is an off-leash section of the park, but most of the space requires leashes. The Park has a few trash cans by the popular dog off-leash area but otherwise is a carry in-carry out facility. There are two bag stations: one at the off-leash area and the other on the Pond Loop Trail. These stations have signage explaining the importance of their use and there are other dog waste signs around this area (Figure 4).



Figure 4. Map of infrastructure and route of survey at Fort Williams Park.

- Unbagged
- Bagged
- Simple Pet Waste Sign
- Ordinance Pet Waste Sign
- Litter Sign
- Bag Station
- Educational Pet Waste Sign
- Porta Potty
- Trash Can
- Bathroom



Figure 5. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Fort Williams Park, 2022.

2022

The park's trails and open fields were surveyed on July 5, 2022 and on July 19, 2022. During the first survey, 3 deposits were found. During the second survey, **13 deposits were found**. Most of the dog waste was found nearby the off-leash area and near the parking lots (Figure 5). This site added a trash can in the off-leash dog area, but the rest of the facility is carry in-carry out and does not say there is a trash can in the back of the park.

Recommendations: Additional trash cans near the perimeter of the park.

Cumberland

Twin Brook Recreation Area, in Cumberland, is a large recreational facility. Due to the size, the study focused on the park accessed from Tuttle Road, covering the several open, mowed sports fields and large network of surrounding wooded trails. There is no formal leash law, though there is a voice control requirement. There are bag stations and trash cans at each parking area at the Tuttle Road entrance and at the Greely Road entrance. Additional trash cans are located at the end of the trail into the sports fields and at the trail heads of the Paved Trail, Hill Trail, and Ravine Trail. Dog waste signage is located on information boards at each entrance (Figure 6).



Figure 6. Map of infrastructure and route of survey at Twin Brook Recreation Area.

2022

The park's trails and open fields were surveyed on July 8, 2022 and on July 22, 2022. During the first survey, 9 deposits were found. During the second survey, **16 deposits were found**. One thing to note is the addition of a trail and open fields for the second week. Most of the dog waste was found on Ravine Trail and the dog trails in the back (Figure 7).

Recommendations: More signage in areas of high concentrations, not just trail heads.



Figure 7. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Twin Brook Recreation Area, 2022.

Falmouth

Community Park, in Falmouth, consists of both recreational fields and trails in an adjacent meadow. Dogs are required on leash within 300 feet of the parking area. There are no bag stations or trash cans (per town ordinance Section 14-121 d. all town parks and facilities are currently “carry in-carry out”) and one sign encouraging the cleanup of dog waste at the very entrance (Figure 8). Falmouth Parks Department staff conduct daily dog waste cleanups during the weekdays while mowing the fields.



- Unbagged
- Bagged
- Simple Pet Waste Sign
- Ordinance Pet Waste Sign
- Litter Sign
- Bag Station
- Educational Pet Waste Sign
- Porta Potty
- Trash Can
- Bathroom

Figure 8. Map of infrastructure and route of survey at Falmouth Community Park.

2022

The park's trails and open fields were surveyed on July 7, 2022 and on July 21, 2022. During the first survey, 16 deposits were found. During the second survey, **23 deposits were found**. Most of the dog waste was found in the front trails and in the fields near the trails despite some of the signage nearby (Figure 9).

Recommendations: Reconsider the carry in-carry out policy for dog waste and add a dog waste trash can at the entrance.



Figure 9. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Falmouth Community Park, 2022.

Gorham

Cherry Hill Farm, in Gorham, consists of a large main trail running through farmland and into the forest with multiple side loops. There are no trash cans or bag stations, with one sign encouraging people to pick up dog waste at the entrance of the park, but none on the trails (Figure 10).



Figure 10. Map of infrastructure and route of survey at Cherry Hill Farm.

2022

The park's trails were surveyed on July 7, 2022 and on July 21, 2022. During the first survey, 19 deposits were found. During the second survey, **24 deposits were found**. Most of the dog waste was found on the Ecomaine Trail (first front loop) and many bagged deposits in a makeshift trash can near the porta potty at the entrance (Figure 11).

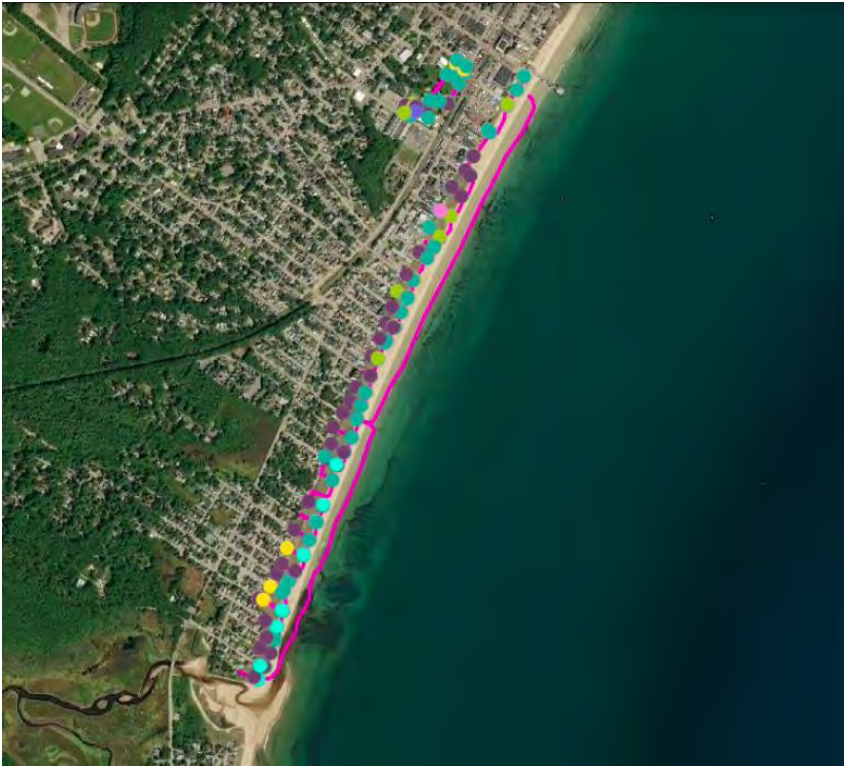
Recommendations: Reconsider the carry in-carry out policy, add a bag/trash can station, and increase signage on Ecomaine trail.



Figure 11. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second Cherry Hill Farm, 2022.

Old Orchard Beach

The **Ocean Park Beach and Dog Park** in Old Orchard Beach has a lot of visitors. The beach is open to dogs for certain hours dependent on the season. There are trash cans at every exit from the beach and several bag stations as well (Figure 12). The Ocean Park Association has a very active volunteer litter cleanup group in this area, with cleanup walks occurring multiple days a week.



- Unbagged
- Bagged
- Simple Pet Waste Sign
- Ordinance Pet Waste Sign
- Litter Sign
- Bag Station
- Educational Pet Waste Sign
- Porta Potty
- Trash Can
- Bathroom

Figure 12. Map of infrastructure and route of survey at Ocean Park Beach and Dog Park.

2022

The area's beach and dog park were surveyed on July 11, 2022 and on July 25, 2022. During the first survey, 6 deposits were found. During the second survey, **24 deposits were found**. Almost all the dog waste was found inside the dog park and there were none on the parallel running roads to the beach, perhaps due to additional bag stations on some of those parallel streets (Figure 13).

Recommendations: Add more educational signage to dog park, no recommendations for beach.



Figure 13. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Ocean Park Beach and Dog Park, 2022.

Portland

The **Quarry Run Dog Park and Trails** in Portland has a network of trails extending from Quarry Run Dog Park. Dogs are allowed off-leash if under voice command on the trails. There is a trash can, bag station, and signage at the entrance to the dog park (Figure 14).



- Unbagged
- Bagged
- Simple Pet Waste Sign
- Ordinance Pet Waste Sign
- Litter Sign
- Bag Station
- Educational Pet Waste Sign
- Porta Potty
- Trash Can
- Bathroom

Figure 14. Map of infrastructure and route of survey at Quarry Run Dog Park and Trails.

2022

The park's trails and dog park were surveyed on July 7, 2022 and on July 21, 2022. During the first survey, 46 deposits were found. During the second survey, **64 deposits were found**. Most of the dog waste was found inside the dog park and near the trail/dog park parking lot (Figure 15).

Recommendations: Add a bag station, trash can, and signage on the trail just past the dog park where the deposits are most concentrated.



Figure 15. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Quarry Run Dog Park and Trails, 2022.

Saco

The **Saco Dog Park** in Saco is a small fenced-in field that allows dogs to be off leash. There are two sections, one for large dogs and one in the back for small dogs. There is one trash can in the small dog area. There is one trash can and bag station at the large dog entrance with several signs about picking up dog waste (Figure 16).

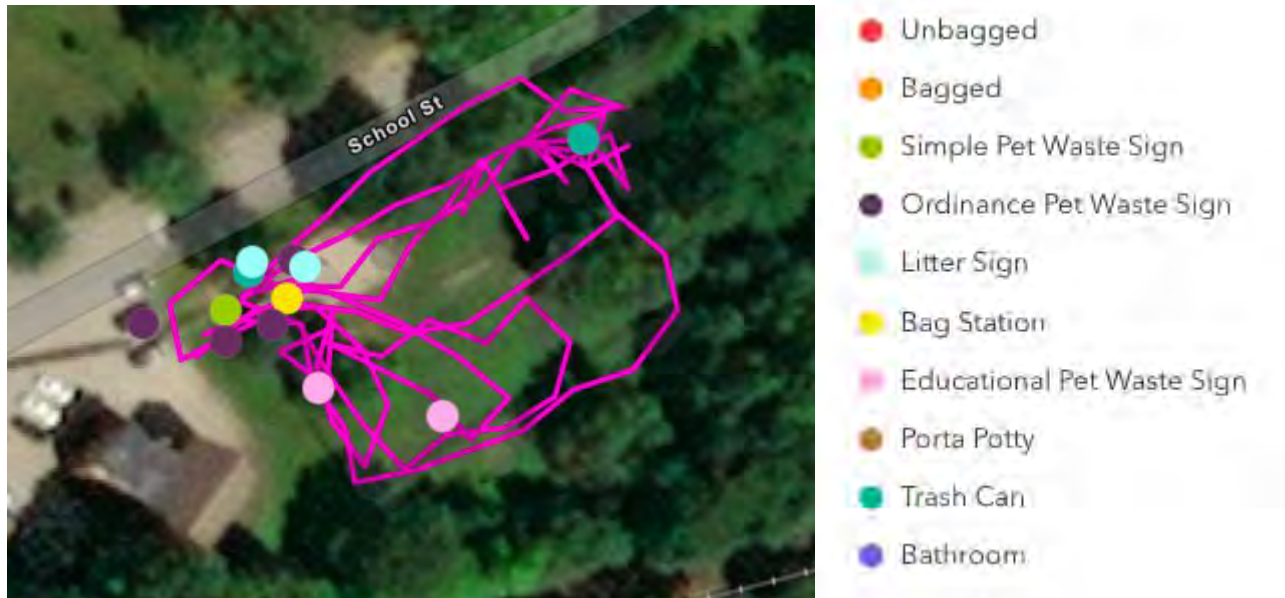


Figure 16. Map of infrastructure and route of survey at Saco Dog Park.

2022

The dog park was surveyed on July 11, 2022 and on July 25, 2022. During the first survey, 37 deposits were found. During the second survey, **34 deposits were found**. Most of the dog waste was found inside the dog park and more specifically along the perimeter and towards the back of the dog park (Figure 17). Users present during the survey suggested the owners may do a better job picking up if there are more dog bag stations dispersed between the two sections.

Recommendations: Add additional bag stations around the dog park and do an informational session on the importance of picking up after your dog.



Figure 17. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Saco Dog Park, 2022.

Scarborough

Higgins Beach in Scarborough is a small beach with one main entrance in the middle. Dogs are allowed off season and on a portion of the beach during peak summer season only if leashed or under voice control and only from sunrise to 9am or after 5pm until sunset. There are trash cans, bag stations, and signage near the neighborhood entrances (Figure 18).

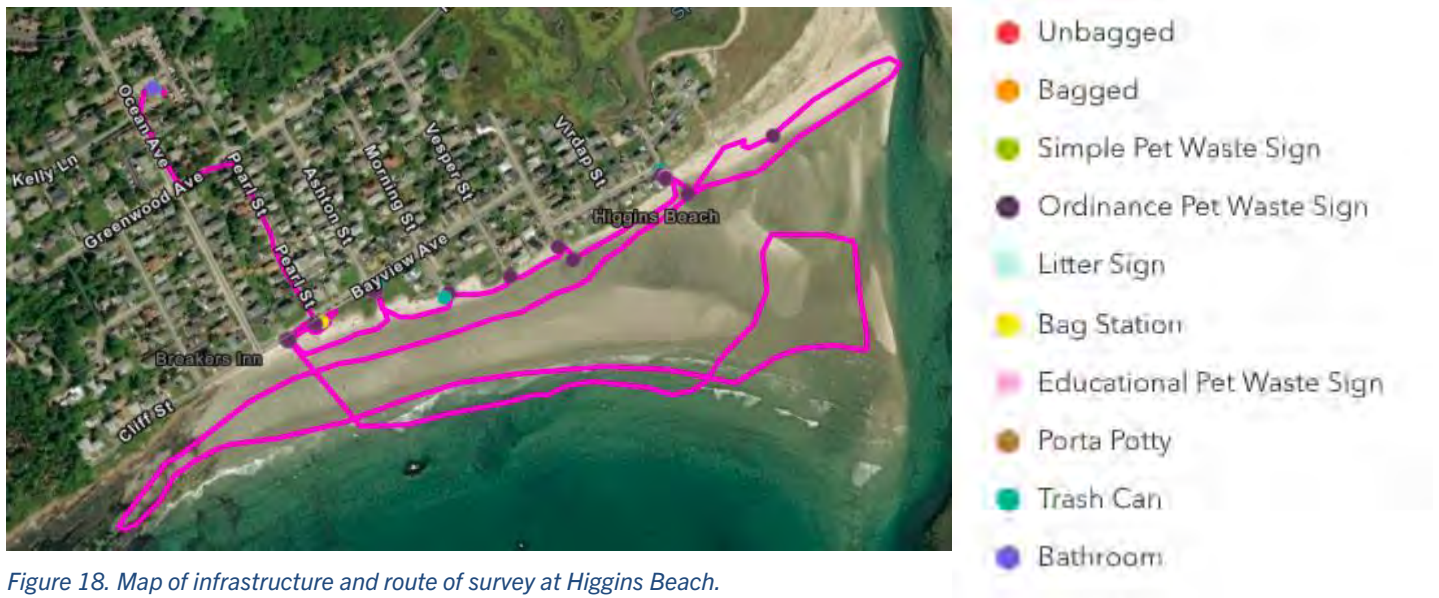


Figure 18. Map of infrastructure and route of survey at Higgins Beach.

2022

The area's beach and main street to the beach were surveyed on July 6, 2022 and on July 20, 2022. During the first survey, 1 deposit was found (bagged by the stairs to the beach). During the second survey, **0 deposits were found**. Many of the owners carried dog bags visibly and seemed to respect the rules on when and where on the beach their dogs were allowed to be.

Recommendations: None

South Portland

Willard Beach and Spring Point Trail in South Portland, allows off-leash dogs from 7-9 AM and 7-9 PM on the beach. At the access points on Willard Street and Beach Street, there are trash cans, by-donation bag stations, and signage encouraging the pickup of dog waste (Figure 19).

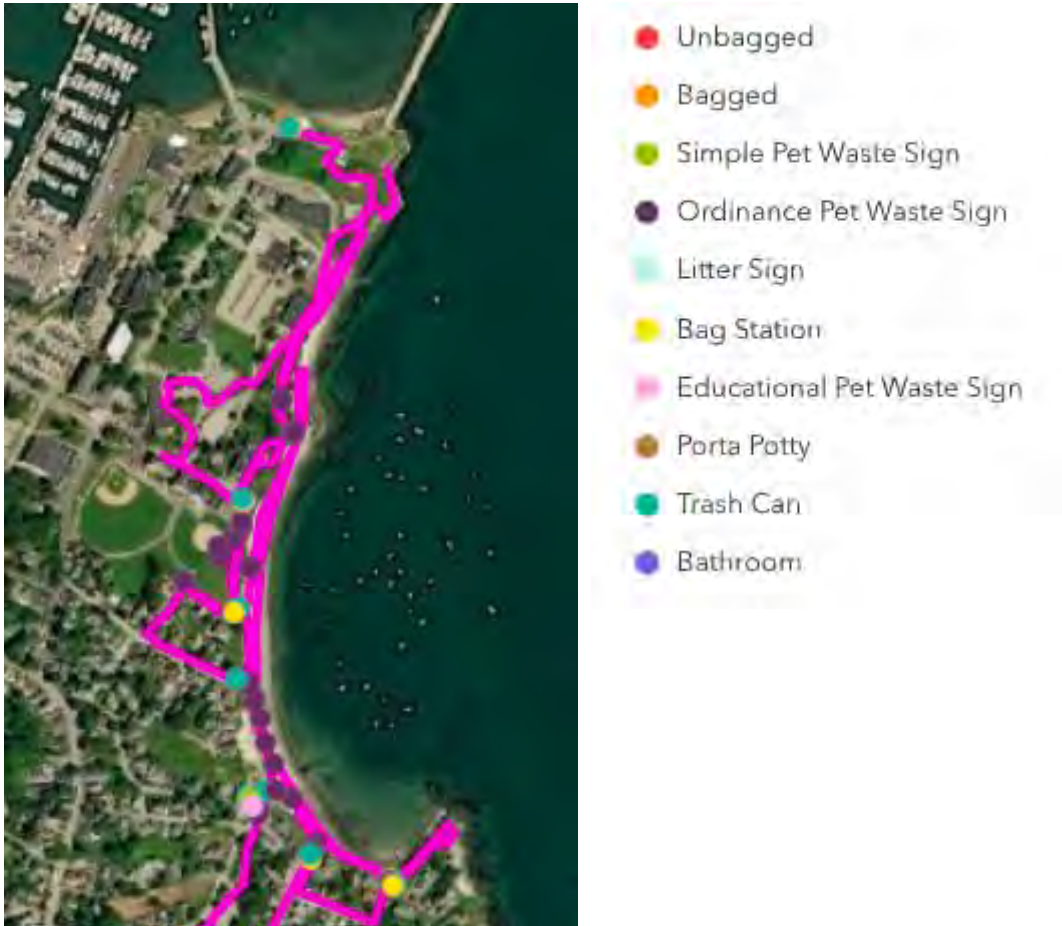


Figure 19. Map of infrastructure and route of survey at Willard Beach and Spring Point Trail.

2022

The area's trails and beach were surveyed on July 8, 2022 and on July 22, 2022. During the first survey, 3 deposits were found. During the second survey, **13 deposits were found**. Most of the dog waste was found on the Spring Point Trail (Figure 20).

Recommendations: Since there are already bag stations and trash cans, an increase in educational signage along the trail may help.



Figure 20. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Willard Beach and Spring Point Trail, 2022.

Westbrook

The **School to Skatepark Trail and Dog Park**, in Westbrook, begins at the skate and dog park, goes along several roads, through the high school sports fields before weaving between several residential neighborhoods and behind the Greater Portland Animal Refuge League shelter. The path did not appear to be heavily used and there are several signs stating that dogs are not permitted on the sports fields, which are right in the middle of the trail. Dogs are required to be on leash, but there are no dog waste signs, bag stations, or trash cans past the dog park (Figure 21).

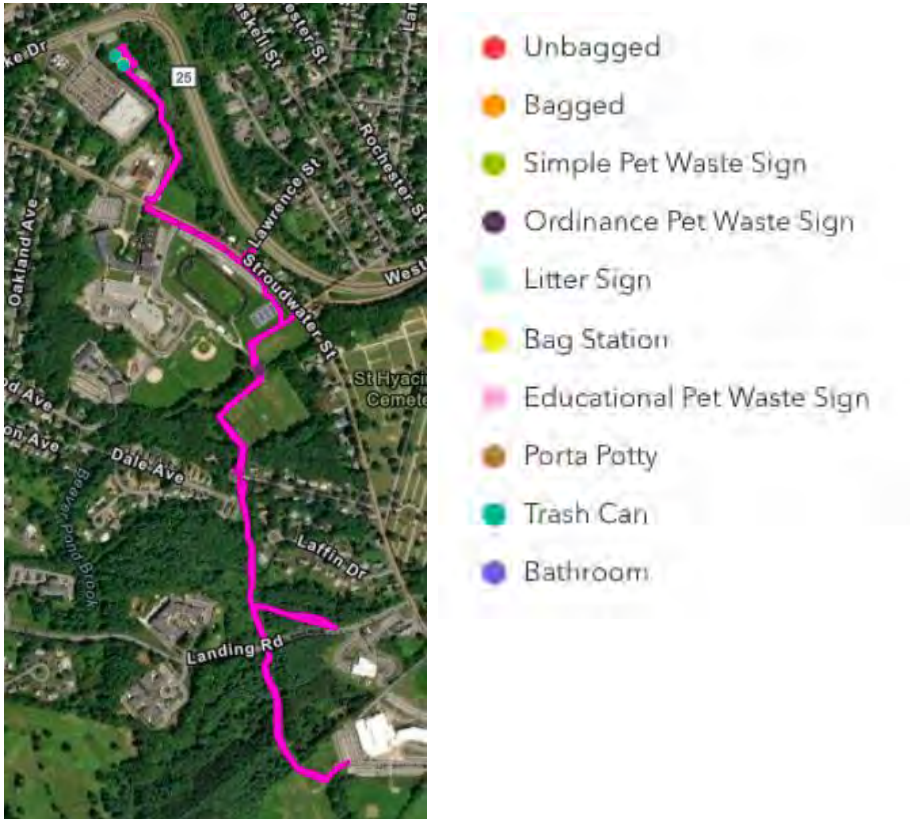


Figure 21. Map of infrastructure and route of survey at School to Skatepark Trail and Dog Park.

2022

The trail was surveyed on July 7, 2022 and on July 21 2022. During the first survey, 4 deposits were found. During the second survey, **22 deposits were found**. Most of the dog waste was found inside the dog park and near the Landing Road portion of the trail (Figure 22).

Recommendations: More signage and a bag station/ trash can on the Landing Road end of the trail.



Figure 22. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at School to Skatepark Trail and Dog Park, 2022.

Windham

Donnabeth Lippman Park in Windham consists of a main loop with several alternate loops circling Chaffin Pond. There are multiple signs at the entrance encouraging the removal and disposal of dog waste, as well as a trash can and a bag station (Figure 23). Dogs are not allowed on the playground which is located near the parking lot.



Figure 23. Map of infrastructure and route of survey at Donnabeth Lippman Park.

2022

The park's trails were surveyed on July 1, 2022 and on July 15, 2022. During the first survey, 7 deposits were found. During the second survey, **7 deposits were found**. Most of the dog waste was found closer to the parking lot and on the main trail that goes around the pond (Figure 24).

Recommendations: Continue signage past the trail heads and parking lot.



Figure 24. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Donnabeth Lippman Park, 2022.

Mountain Division Trail

A three-mile portion of the **Mountain Division Trail** in Windham and Gorham which is used for walking and biking had signage throughout the trail but only one bag station and trash can located at the Windham Gambo parking lot (Figure 25).



Figure 25. Map of infrastructure and route of survey at Mountain Division Trail.

2022

The park's trails were surveyed on July 1, 2022 and on July 15, 2022. During the first survey, 149 deposits were found. During the second survey, **97 deposits were found**. Most of the dog waste was found near the three main entrances (Figure 26).

Recommendations: More signage, trash cans, and bag stations spread out throughout the trails especially near those three concentrated entrances.



Figure 26. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Mountain Division Trail, 2022.

Yarmouth

Royal River Park in Yarmouth is an urban park that loops alongside the west bank of the Royal River. There are multiple access points from the city. A trash can and bag station are located at the primary trail parking lot with a bag station and additional trash cans located at other access points and signage encouraging their use (Figure 27).

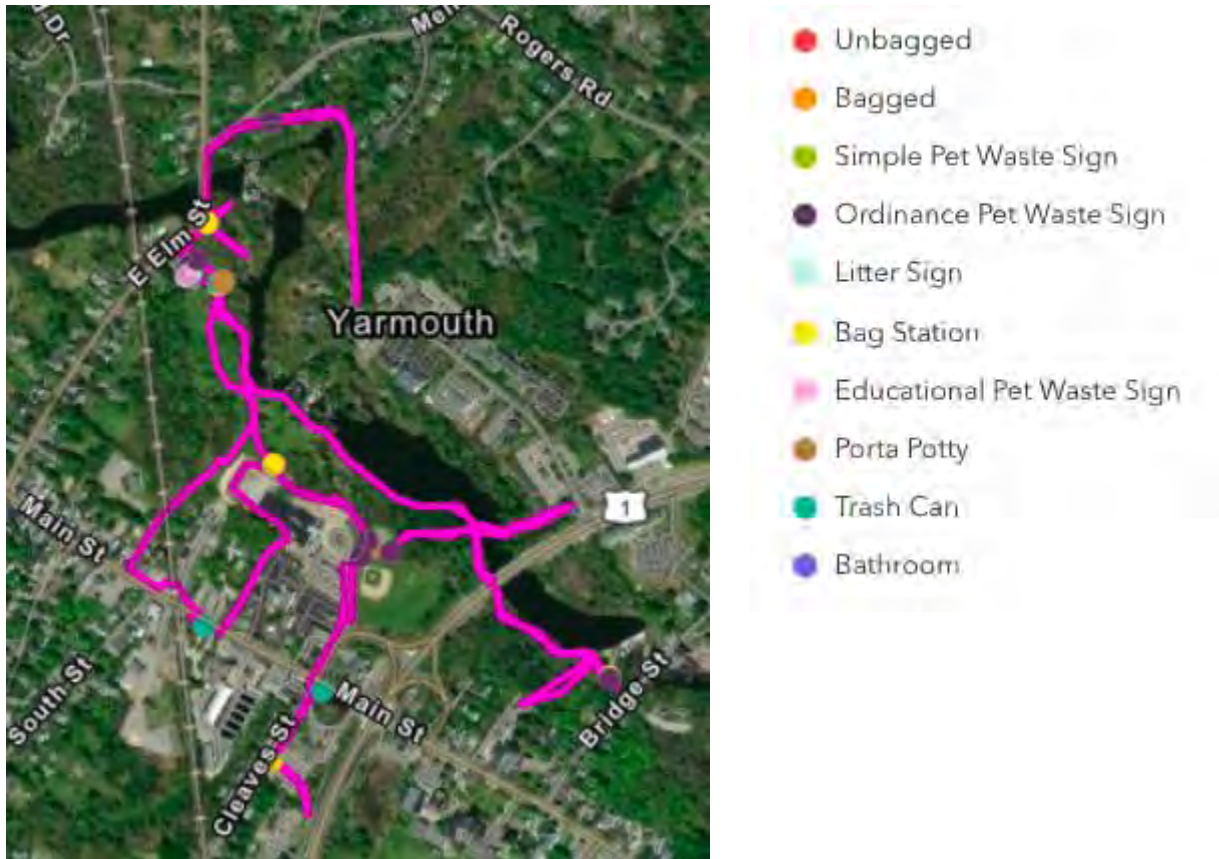


Figure 27. Map of infrastructure and route of survey at Royal River Park.

2022

The park's trails were surveyed on July 9, 2022 and on July 23, 2022. During the first survey, 3 deposits were found. During the second survey, **8 deposits were found**. Most of the dog waste was found by the Bridge Street entrance (Figure 28).

Recommendations: Add more signage by the Bridge Street entrance since there is already a trash can and bag station.



Figure 28. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Royal River Park, 2022.

Pratt's Brook Park in Yarmouth consists of a large network of trails through the forest. Off-leash dogs are permitted on the trails and many were encountered during the survey. There are no bag stations or trash cans and the only signage against leaving dog waste was on a kiosk at the entrance. There is signage at the entrance saying when you can let your dog off leash and when to put them back on leash near the parking lot (Figure 29).

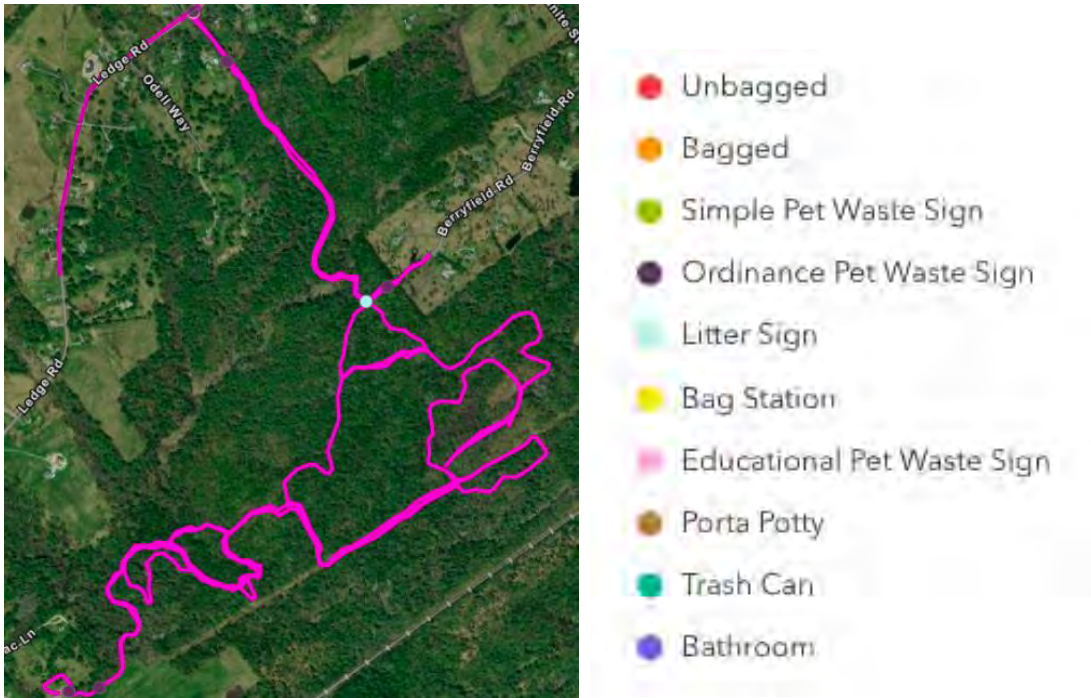


Figure 29. Map of infrastructure and route of survey at Pratt's Brook Park.

2022

The park's trails were surveyed on July 9, 2022 and on July 23, 2022. During the first survey, 13 deposits were found. During the second survey, **6 deposits were found**. Most of the dog waste was found by the three main entrances which do not have bag stations or trash cans (Figure 30).

Recommendations: Add a small trash can and bag station at each entrance.

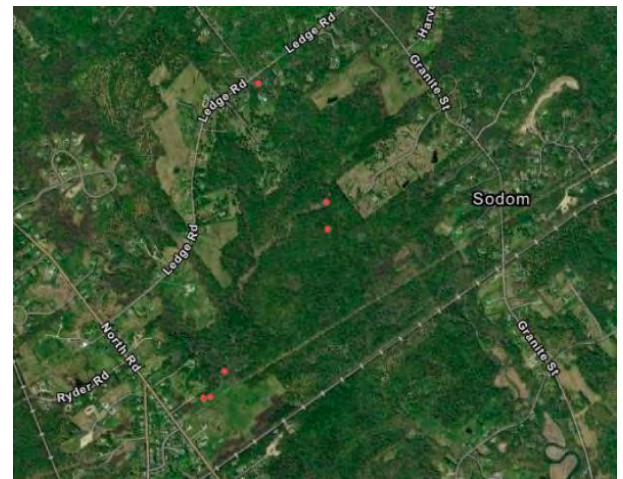


Figure 30. Collected dog waste deposits (showing unbagged in red and bagged in orange markers) during second survey at Pratt's Brook Park, 2022.

Regional Findings

Within the ISWG region, a wide variety of trail and park types were sampled from dog parks to beaches, forested trails, and open fields. This makes it difficult to test one variable, such as the presence of trash cans or bag stations for meaningful differences in how much dog waste is collected. While we are unable to adjust based on park popularity, we do know how many licensed dogs are in each municipality. In 2022, there are 25,867 licensed dogs in the ISWG region, additional unlicensed dogs and dogs accompanying tourists are unable to be accounted for but exacerbate the dog waste problem (Table 1).

Table 1. Density of licensed dogs in each municipality.

Municipality	Land (mi ²)	Licensed Dogs 2022	Licensed Dogs/mi ² 2022
Biddeford	59.08	2,200	37.23
Cape Elizabeth	45.93	1,082	23.56
Cumberland	26.25	1,145	43.62
Falmouth	36.34	1,275	35.09
Freeport	46.47	1,532	32.97
Gorham	51.29	3,150	61.42
Old Orchard Beach	22.53	1,232	54.68
Portland	21.54	1,857	86.21
Saco	52.83	2,770	52.43
Scarborough	70.63	2,830	40.07
South Portland	14.01	1,180	84.23
Westbrook	17.36	1,332	76.73
Windham	50.00	3,322	66.24
Yarmouth	22.94	960	41.85

Regional Deposits

After sampling 15 sites twice in July 2022, a total of 789 improperly disposed of deposits were collected, 360 in the first round of surveys and 429 in the second round of surveys. The range of dog waste deposits per site was evenly distributed and most improperly disposed of dog waste deposits were unbagged (Figures 31 and 32).



Figure 31. Range of dog waste deposits in survey sites

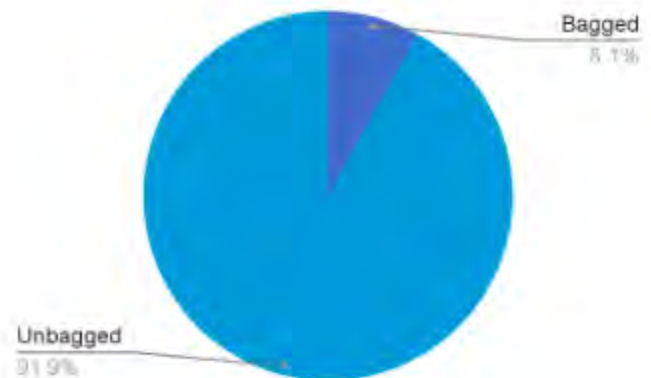


Figure 32. Percent total unbagged vs. bagged dog waste deposits

Observations

Another portion of data collection included site use observations in permit year one and five. A subsample of the sites were picked based on site type, regional location, and deposit density. Observers were stationed at entrances to the site and documented the total number of dogs observed, if a dog defecated within line of site of the observer, and if the person bagged and carried the dog waste out with them. The people with dogs were broken into two observed age groups, 25-34 and 35-55, due to permit requirements. The observations were conducted twice for three hours during popular site trail use hours based off Google data trends. The observations will be conducted again in permit year five as part of the behavior change analysis.

More 25–34-year-olds are prepared to pick up after their dogs based on the presence of visible dog waste bags. However, at almost every observation site, more 35–55-year-olds were observed walking their dog(s). Almost every observed deposit was properly disposed of, except for Portland’s Quarry Run Dog Park site (Table 2). However, from the field surveys of these sites, we know dog waste is still being left behind at all these locations which means the observers either were not observing when the irresponsible dog owners are using the sites or the observer’s presence was enough social pressure to have them pick up after their dog in that instance.

Table 2. Observed age groups with number of dogs, visible dog waste bags, and successful dog waste cleanup.

Site Name	25-34 Year Olds			35-55 Year Olds		
	Number of Dogs	Percent with Bags	Percent of Successful Pickup	Number of Dogs	Percent with Bags	Percent of Successful Pickup
MDT Blue Seal	7	28.6%	N/A	2	0.0%	N/A
MDT Gambo	16	56.3%	100.0%	18	33.3%	100.0%
MDT Shaw	9	55.6%	N/A	18	33.3%	100.0%
Royal River Park	8	25.0%	N/A	22	40.9%	100.0%
Willard Beach	44	61.4%	100.0%	55	50.9%	100.0%
Quarry Run Dog Park	26	65.4%	75.0%	21	52.4%	60.0%
Saco Dog Park	6	100.0%	100.0%	3	66.6%	100.0%

Trash Cans and Bag Stations

Other studies of dog walkers have shown lack of dedicated dog waste bins is the most important factor in respondents not properly disposing of their dog waste¹. Dog owner behavior observed during this study included people properly bagging their dog’s waste but then leaving it on the side of the trail or at the trailhead. This suggests that these dog owners know that it’s wrong to not pick up the dog waste, but the carry in-carry out policy of the park is too inconvenient. Similarly, at some sites, “community established” trash receptacles were observed in response to a lack of trash cans or having a carry-out policy. This results in high densities of bagged dog waste concentrated at trailheads, often overflowing due to a lack of a cleanup schedule.

Parks with only bag stations should consider adding trash cans. The bags left behind indicate that people are observing their dog and taking the time to deal with the waste, so it is very likely that they would also dispose of it if a trash can was nearby. It is important that sites utilize both trash cans and bag stations.

¹ Lowe, C. N., Williams, K. S., Jenkinson, S., & Toogood, M. (2014). Environmental and social impacts of domestic dog waste in the UK: investigating barriers to behavioral change in dog walkers. *International Journal of Environment and Waste Management*, 13(4), 344-345.

The existence of trash cans and bag stations also does not account for their location. If the bag stations and trash cans are in inconvenient locations, they are less likely to be used. Some parks might have signage and bag stations at the very entrance to the trail but none throughout the trail system that could have multiple access points. Therefore, the individual site recommendations should be used to determine if dog waste infrastructure is necessary and how to locate the infrastructure as close as possible to dog waste hotspots.

Signage

Signage varied between parks but generally focused on requests to keep parks and the community clean, the fact that not picking up dog waste is illegal and carries a fine, or education surrounding the stormwater impacts of dog waste (Figure 33 and 34). Education signage appeared more effective than signs that simply pointed out the illegality of leaving dog waste.



Figure 33. Examples of educational signage found at sites surveyed.

Signage focused on local ordinances and fines have little impact on dog owner behavior if ordinance enforcement is perceived to be low. It is recommended sites use a combination of signs with “keep community clean” requests to pick up litter or “carry in-carry out” along with educational signs which discuss the stormwater impacts of dog waste.



Leash Laws

Some parks in ISWG communities have recently enacted leash requirements for environmental and safety reasons. Of the 15 sites surveyed, 11 sites (73.3%) have an off-leash component, either being a dog park or off-leash areas, and 4 sites (26.6%) require leashes everywhere. While enacting these ordinances was not solely caused due to perceived dog waste issues, they seem to have helped reduce improper dog waste disposal. This aligns with other studies that conclude that leash requirements are effective in preventing improper dog waste disposal. Since dogs are most likely to defecate within the first quarter mile of a trail², leash requirements within a certain distance of a trailhead would help ensure dog owners observe their dog defecate, making them more likely to properly dispose of the waste.

² Blenderman, A., Taff, B. D., Schwartz, F., & Lawhon, B. (2018). Dog Guardian's Perceptions and Behaviors Related to the Disposal of Pet Waste in City of Boulder Open Space and Mountain Parks. Final Report prepared for City of Boulder, Colorado, Open Space and Mountain Parks by Pennsylvania State University and the Leave No Trace Center for Outdoor Ethics. pp.11-12.

Additional Considerations

This project and report are just the beginning of what is necessary to respond to improper dog waste disposal behavior in the ISWG communities. Each site was surveyed two times each year, meaning the study was just a snapshot of the site at that date and time. Several additional variables may have affected findings from this study, such as unknown municipal or volunteer cleanup schedules, poor weather, and leash laws allowing dogs to defecate off trail in an area surveyors could not access. These factors could mean some areas have a higher number of users who improperly dispose of dog waste than was captured in these surveys.

Future studies should incorporate visitor use demographics and trends. Sites were selected for surveying based on a perceived dog waste issue, however after observing some sites, it was clear this was not the case. For many sites, it is unclear how many dog owners use many of the trails. This information would help determine the percentage of users who do not pick up after their dog, putting lesser-used and heavily used trails on an even playing field. Additionally, knowing the age range of users, as well as if they are residents using the area or visitors would help determine if any specific groups of users are improperly disposing of dog waste more than others, allowing a more targeted education plan. Age of users in correlation to their behavior will be observed at some sites through an observational study in permit year one and five (Appendix A), however, usage demographics and statistics would likely need to be obtained in collaboration with the municipality or organization managing the area.

Conclusions

This year serves as baseline data going forward in the study. The use of bag stations, trash cans, signage, and education in purposeful locations may help decrease the deposits found at each site. Although each of these strategies separately may not show a decrease in the results alone, combined strategies may make for better results. Additionally, observing the behavior of the owners at selected sights and comparing this year's data with the observational data at the end of this study may also help provide more insight on the changes being made. Trash cans can be highly effective at taking away the inconvenience of carrying out dog waste, a major barrier to proper dog waste disposal. Along with trash cans, bag stations are an important additional piece of infrastructure to minimize dog waste being left behind. It is important that if bags are offered to users, there are adequate trash cans to avoid users leaving bagged dog waste behind. Both trash cans and bag stations should be placed in areas determined to be hotspots for dog waste to minimize reluctance to properly dispose of dog waste by visitors.

While installation and maintenance costs can be a prohibitive factor for these being installed, collaboration with interagency partners should be considered to maximize impact of dog waste prevention efforts. Many parks have multiple organizations who play a part in management, including "Friends" groups in some cases. Collaboration on infrastructure installation and maintenance, as well as volunteer cleanups, would be beneficial in reducing the municipal burden, while also providing a source of community pride.

One of the most important takeaways gained from this project is the value of community engagement and education. Educating dog owners and park goers on the importance of picking up dog waste is potentially the most impactful way to address the issue. There are many ways to work towards better community education, ranging from more comprehensive signage explaining the environmental impacts of dog waste in parks, to social media outreach, to cleanup awareness campaigns. As community members become more aware of the issue and how they can help, the responsibility is shared by a larger group which can often better address the issue.

Appendix A. Procedure Document

There are two components to the behavior change study as it relates to dog waste; performing a survey of 15 trails in ISWG communities to inventory dog waste deposit quantities and performing observations at five sites to determine age group behavior regarding dog waste disposal.

Site Walk Surveys

To determine if behavior change is occurring, dog waste quantities and locations will be tracked each year from Permit Year 1 through Permit Year 5 at 15 sites using site walks surveys. The purpose of collecting this data is to track the amount of dog waste not being properly disposed of along public trails and parks. This data allows trends to be identified, as well as management practices to be recommended to increase dog owner compliance. The sites selected are included in Table 3.

Sites were selected to ensure diversity in location throughout the region, trail surface, site type, and use patterns. Some communities in the region have fewer public trails and parks for people to access with their dog which may result in certain communities having more people walking their dog along neighborhood streets. This hypothesis will be tracked using the presence of dog waste in catch basin cleaning in those communities. Site walks are performed between July 1 and September 30. Each site walk survey should have two surveyors to ensure both sides of trails are checked for dog waste, as well as for efficiency.

Table 3. Sites Selected for 2022 Permit Site Walks

Site Name	Location	Site Type	Leash Requirement
Rotary Park & Dog Park	Biddeford	Dog park and gravel trails around park	Yes, on trails. No, in dog park
Fort Williams Park	Cape Elizabeth	Tourist-oriented park with paved walking paths and off-leash fields	Yes, except in designated off-leash areas
Twin Brook Recreation Area	Cumberland	Sports fields surrounded by forested trail network	No, voice control required
Falmouth Community Park	Falmouth	Sports fields surrounded by forested trail network	Yes, within 300' of trailheads
Cherry Hill Farm	Gorham	Forested and gravel trails	Yes
Ocean Park Beach & Dog Park	Old Orchard Beach	Beach and dog park	No, voice control required
Quarry Run Dog Park & Trails	Portland	Dog park and gravel trails	No, voice control required
Saco Dog Park	Saco	Small, grassy dog park	No
Higgins Beach	Scarborough	Beach	No, voice control required
Willard Beach & Spring Point Trail	South Portland	Beach and adjacent paved trail	No, on beach 7-9 AM and PM; Yes, on trail
Schools to Skatepark Trail & Dog Park	Westbrook	Neighborhood connector path, multiple trail surfaces	Yes
Donnabeth Lippman Park	Windham	Forested trail network	Yes
Mountain Division Trail	Windham/Gorham	Paved trail used by residents and neighboring communities	Yes
Pratt's Brook Park	Yarmouth	Forested trail network	No, except within 300' of trailhead
Royal River Park	Yarmouth	Paved trail	Yes

Surveyors complete the “ISWG Trail Survey Pet Waste” form on ArcGIS Survey123 and record all improperly disposed of dog waste and infrastructure using ArcGIS Quick Capture while completing the site walk. The Survey123 data sheet is used to record the site name, date, time started, weather, end time, and notes. Surveyors should begin their site walk at the parking area designated on the map. While on a site walk, surveyors will use the Quick Capture App on their smartphone to record locations of the following through picture geo-tagging: bagged dog waste; unbagged dog waste; trash cans; bag station; dog waste simple signs, educational signs, and ordinance signs; litter signs; restrooms; porta potties; and entrances.

ArcGIS Quick Capture App

Setting up the App: ArcGIS Quick Capture was setup online to have a point layer for all the items being photographed and a line layer to document the routes surveyed. Users can scan a QR code to save the Quick Capture project on their phone’s Quick Capture App.

In the Field: Upon arrival at the site, open the Quick Capture app, select the “Pet Waste Survey” project, select the site name, and start the transect by pressing the track button (a red recording icon will appear) so that the survey route is recorded. Bring dog waste bags, trash bags, hand sanitizer/wet wipes, solar phone charger and cord, and a fully charged phone in the pockets of the District orange safety vest. When an object of interest was found (such as dog waste) the corresponding button should be tapped, which opens the camera feature to take a required picture of the object. If the object is dog waste, the deposit should then be picked up and placed in a trash bag. Once a photo is taken the app will automatically record the location and upload the data. Surveyors follow the track designated on the map, with one checking the left side of the trail while the other checks the right side. Sides off-trail should be inspected as far out as can be reasonably observed from the trail (about 6’, the standard length of a leash). In some cases, surveyors may split up to cover diverging trails more efficiently. When this is required, surveyors should walk slowly, checking both sides of the trail and edges for dog waste as they walk if the trail will rejoin another trail later. If the off-shoot trail is an out and back, then the surveyor should check the right side of the trail going out and the left side of the trail on the return. Splitting up may also be required when checking large open fields. In this case, surveyors should travel on transects 30 feet apart to maximize line of sight. Once the site is completely surveyed, end the transect by hitting the track button again (the red recording icon will disappear), upload all data, and close out the Quick Capture button page to finish the site.

Back at the Office: Log into ArcGIS online to access the map with all the data from Quick Capture shown. The layers will show the route walked (transect line) and all the data that was photographed in the field in this tab. The different colored data points allow for quick analysis of the area as well as being able to see concentrated areas. This data can also be exported to use in applications such as Google Sheets or Excel.

Owner Observations

To determine if behavior change is occurring in age groups 25-34 and 35-55, observations will be performed at multiple popular dog-walking locations during Permit Year 1 and Permit Year 5 (Table 6). These observations will be performed unobtrusively during high-traffic times to observe if people with dogs are properly cleaning up their dog’s waste. Each site is observed two times between July 1 and September 30.

Surveyors should be at the designated observation location before the start time of the observation window. To not affect behavior, surveyors should wear plain clothes and perform actions to appear inconspicuous to visitors, such as texting on their phone, reading a book, or sketching in a sketchbook. Surveyors will also need dog waste bags,

trash bags, and a fully charged phone. Before the observation period begins, the date, time, and weather should be recorded on the Survey123 “Dog Waste Site Observations” form. Take pictures (with geotagging turned on) of the specific observation station so we know exactly where to return to on the second week and in PY5.

All people with dogs who enter the line of sight of an observer should be recorded as a tally in “Total Number of Dogs Observed” for the age group pertinent to the owner, and if the owner is noticeably carrying dog waste bags, a tally should be added to the pertinent box as well. If dog is off leash, look for the person carrying a leash or other dog related items to determine the age group. Each person with a dog in the two target age groups should be observed to determine if their dog defecates while in sight. If the dog does defecate, the person will be observed to determine if they properly dispose of the dog waste. **For this study, “Proper Disposal” is defined as bagging the dog waste and carrying the bag out as the walk is continued.** People who do not bag their dog’s waste or who bag the waste but leave the bag on the ground will be counted as improper disposal. A tally should be added to the “Yes” or “No” column of the relevant age group based on the person’s actions. If improper disposal is observed, a tally should be recorded, and the waste should be documented using ArcGIS QuickCapture and properly disposed of by the surveyor at the end of the observation period. After the observation period, surveyors should enter the end time, complete all notes, and submit their Survey123 form. Surveyors should confirm their data is showing in ArcGIS.

Table 6. Site selected for age group observations.

Site	Location	Popular Day of the Week ³	Time	Number of Observers	Observation Locations
Willard Beach	South Portland	Friday	7-9 AM	2	Each end of beach
Royal River Park	Yarmouth	Saturday	9 AM-12 PM	2	Fields near East Elm Street entrance
Quarry Run Dog Park	Portland	Saturday	9 AM-12 PM	1	Entrance for gravel loop path
Mountain Division Trail	Windham/Gorham	Saturday	9 AM-12 PM	3	Trail entrances at Route 202, Windham parking, and Gorham parking
Saco Dog Park	Saco	Saturday	9 AM-12 PM	1	Dog park

³ Day of week observation is made may vary due to weather conditions.