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INVESTIGATING RHODE ISLAND TOWN BEACHES LITTER POLICIES

BY

SARA BENSON

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

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OF

SARA BENSON

APPROVED:

Thesis Committee:

Major Professor David Bidwell

Amelia Moore

Aaron Ley

Nasser H. Zawia
DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND
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ABSTRACT

Marine litter in coastal areas creates environmental, social and aesthetic problems. Environmental effects of marine debris include choking animals, entanglement of marine mammals and killing marine life through the leaching of chemicals. Marine debris can negatively impact humans and the economies of coastal communities. The issues pertaining to marine debris are so expansive it is difficult to assess where to start mitigating the issue. Focusing on beaches is a small, yet significant start to solving the overall marine debris issue. Many turn to beach or ocean cleanups; however, controlling litter before it enters the marine environment will be more effective than trying to clean it up once it has already been introduced into the ocean. This study investigated the different trash policies in Rhode Island, such as Carry In/Carry Out or providing trash receptacles, to understand the perceived advantages and disadvantages of different management practices. During the summer and early fall of 2016, data was collected using flexible semi-structured interviews with twelve town beach managers and two state beach managers in Rhode Island. A total of 21 town beaches and seven state beaches were involved in the study. Managers chose to implement different policies based on factors such as expectations for visitors leaving litter, cost of disposal, an obligation to provide amenities, and aesthetics. Both policies share similar issues such as visitors leaving litter, litter left after closing, residents complaining, and the need for tractor rakes to clean litter from beaches. When it comes to managing marine debris, either policy would suffice. Beaches are noticing issues that stretch beyond management issues. From this study, it is clear there is a need for stronger education, human behavioral studies, better signage, and if

trash receptacles are being used, better management practices. Human behavioral studies, such as those consistent with Community-Based Social Marketing, are the most crucial recommendation from this study.

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CHAPTER 1: INTRODUCTION

Litter entering the marine environment from land-based sources, such as beaches, storm drains, and sewers, is a significant source of marine debris (Derraik 2002; Sheavly and Register 2007; Bravo et al. 2009). It is extensively cited that 80 percent of the marine debris in the ocean originated from land based sources (Sheavly and Register 2007; Jambeck et al. 2015). Marine debris causes several environmental, social, and economic issues for coastal communities and animals (Shultz et al. 2013). Litter on beaches makes them unattractive and hazardous, deterring visitors from the area, impacting local tourism industries. Coastal communities that rely on income from aesthetics of beaches will have negative impacts to the economy, due to the more frequent cleanups and people being discouraged from visiting the beaches (Tudor and Williams 2003; Sheavly and Register 2007; Bravo et al. 2009). Rhode Island, popularly known as The Ocean State, is known for having 400 miles of shoreline with access to more than 100 beaches. Travel and tourism is a \$5.2 billion industry, employing more than 41,000 jobs in the state (“Commerce Tourism”). With tourism being an important asset to the Rhode Island economy it is important to study how to manage beaches to reduce the amount of litter from both an economic and environmental perspective.

The issues pertaining to marine debris are so expansive it is difficult to assess where to start mitigating the issue. Focusing on beaches is a relatively minor, yet significant, start to solving the overall marine debris issue. Many turn to beach or ocean cleanups to address beach litter; however, controlling litter before it enters the

marine environment will be more effective than trying to clean it up once it has already been introduced into the ocean (Jambeck et al. 2015; Rochman 2016).

This study will investigate the two different trash policies in Rhode Island, Carry In/Carry Out or providing trash receptacles, to understand the perceived advantages and disadvantages of different management practices. This information will be helpful for policy-makers or beach managers to better address trash disposal on beaches. These policies will reduce the amount of litter entering the marine environment. Starting to mitigate marine debris in Rhode Island will help to set an example for littering policies to be implemented on a larger scale in other coastal communities. With better management practices on beaches, there will be less marine debris, and in turn fewer negative environmental effects.

CHAPTER 2: BACKGROUND

This section will go into depth about the definition and impacts of marine debris in the land, ocean, and on beaches. It will also detail the policy issues found on beaches in coastal New England. Finally, it will overview the research questions for this study.

2.1. Marine Debris – Definition and Impacts

Marine debris is defined as any persistent, manufactured or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment (Gall and Thompson 2015). Sources of marine debris can be classified under two categories: land-based or ocean-based sources (Ryan et al. 2009). Ocean-based sources include debris from commercial fishing vessels, merchant, military and research vessels, recreational boats, offshore petroleum platforms, and abandoned or mismanaged fishing gear (Sheavly and Register 2007). In 1978, The International Convention for the Prevention of Pollution from Ships (MARPOL) regulated the dumping and pollution from ships. Annex V, the prevention of pollution by garbage from ships, entered into force December 31, 1988. This prohibits the disposal of all forms of plastics into the sea (Derraik 2002; Sheavly and Register 2007).

Land-based sources of marine debris include plastics and other material washed into the ocean from storm drains, sewers, and recreational beaches (Sheavly and Register 2007; Ryan et al. 2009). It is cited that 80 percent of the marine debris in ocean originated from land based sources (Sheavly and Register 2007; Jambeck et al. 2015). Although the United States has many pollution laws, there are not many internationally agreed upon laws that deal with land-based sources of marine

pollution. Unlike the internationally agreed laws for ocean-based sources, this leaves individual countries to decide their own laws and regulations for sources of marine debris from land (Boyle 1985).

A significant form of marine debris is plastic. Between 1970 and 2003, plastics have become the fastest growing portion of the US municipal waste stream, increasing nine-fold. Marine litter is now 60-80% plastic or 90-95% in some areas (Moore 2008). Plastic, a product made from hydrocarbons derived from petroleum or natural gas, was once known as the “miracle product.” It is cheap, versatile, durable and an economical replacement for glass and other products. Fifty years after the first synthetic plastic was produced, people began to witness the detrimental consequences of non-biodegradable, one-use plastics. Plastics started to clog sewers, choke animals, kill marine life and endanger our health (Kiener 2010). Since the 1960s, the global production of plastic has dramatically increased. In 1960, 0.5 million tons of plastic per year was produced compared to the 280 million tons/yr in 2012 (Avio et al. 2015). In 2010, 275 million metric tons of plastic waste was generated by 192 countries. Of that, 4.8 to 12.7 million metric tons entered the ocean (Jambeck et al. 2015).

This anthropogenic impact on our natural systems is reason for great concern. Humans are rapidly changing the Earth in many ways, one them being the increase in plastics (Moore 2015). Plastics is only one component of marine debris; however, it is a large portion of our waste stream. Plastics exemplify the point of increased consumption of packaged and disposable goods. Global sources of marine debris are growing rapidly due to the increased unsustainable consumption, production and disposability of plastics and packaging materials.

This growing problem of marine debris in coastal areas creates environmental, social and aesthetic problems (Shultz et al. 2013). Environmental effects of marine debris include choking animals, entanglement of marine animals and killing marine life through the leaching of chemicals (Kiener 2010). Marine debris is a major threat to biodiversity, affecting 17 percent of species listed as threatened or above on the International Union for the Conservation of Nature (IUNC) Red List. The U.S Marine Mammal Commission reported that 136 marine species have been involved in entanglement incidents.

A study done on 1,033 birds in North Carolina found that birds from 555 of the species recorded had plastic particles in their guts. The authors found that some of the seabirds had various shapes and sizes of plastic in their guts, which suggests they were mistaking certain plastics for prey items. Studies have shown that ingesting plastics fills birds' digestive systems and makes them less inclined to eat, causing reduced fitness (Derraik 2002).

Entanglement in nets, fishing lines, ropes, and ingestion of plastics are the more noticeable effects of marine debris (Gall and Thompson 2015; Unger et al. 2016). The less-understood impacts of marine debris involve microscopic fragments created as plastics break down in the marine environment, also known as *microplastics* (Sheavly and Register 2007). Microplastics are fragments of plastics smaller than 5mm that are manufactured for cosmetics, industrial or medical applications, or come from macroscopic debris that have worn down due to chemical, physical and biological fragmentation in the ocean (Avio et al. 2015). When plastics break down they photo degrade instead of biodegrading, meaning they break down into smaller

microscopic pieces, remaining in the environment for long periods of time (Ritch et al. 2009). When plastics are exposed to UVB radiation in sunlight, the oxidative properties of the atmosphere and the hydrolytic properties of seawater combine causing the embrittlement of the plastics. This loss of ductility in the plastics causes them to break into smaller and smaller pieces. The plastics ultimately become individual polymer molecules that can then undergo further degradation before becoming bioavailable. It is still uncertain how long this entire process takes, though some scientists estimate between 400 to 1,000 years (Moore 2008).

There is a growing environmental concern of microplastics due to the absorption of chemical pollutants by marine animals, including the fish we eat (Avio et al. 2015). These plastics leach pollutants such as polyethylene and polypropylene, which affect many organisms (Galgani et al. 1996). Rochman et al. found anthropogenic debris in over half of the species they purchased or collected from the fish market. These results show that there is a large concern from chemicals from debris to be transferring to humans through the food web (Rochman et al. 2015).

Another study also sought to find the detrimental effects of microplastics and the potential leaching of harmful chemicals. One side effect found is plastics block the gastric enzyme secretion, diminishing feeding stimulus, lowering steroid hormone levels, which then delays ovulation and results in reproductive failure (Derraik 2002). A different study suggests that ingestion of microplastics by filter feeders raises concerns due to biomagnification. Filter feeders are at the base of the food web, meaning the material they ingest will persist throughout the entire food web. The study raises the concern of toxicity levels of the plastics, especially since plastics

absorb hydrophobic pollutants (Moore 2008). A recent study found deep-sea organisms in the mid-Atlantic were ingesting microfibers, showing that exclusive habitats are being exposed to human generated materials (Taylor et al. 2016). Most of these studies are preliminary and do not include the full extent of what plastics are capable of. More research is needed on microplastics to determine the potential fatal long-term effects (Moore 2008; Rochman et al. 2015; Taylor et al. 2016). The above literature demonstrates the harmful effects marine debris has on the ecosystem.

2.2 Marine Debris on Beaches

Healthy beaches are social-ecological systems, providing many services to a community such as leisure and recreation, habitat, cultural heritage, and more (Lozoya et al. 2016). Marine debris can negatively impact humans and the economies of coastal communities.

Litter entering the marine environment from land-based sources is a significant source of marine debris (Derraik 2002; Sheavly and Register 2007; Bravo et al. 2009). Beach users and tourism on beaches has been cited as a large influence of litter on recreational beaches, with more litter being found in higher density tourist areas (Hoellein et al. 2016; William et al. 2016; Wilson and Verlis 2017). Poor waste management and behaviors of beach goers lead to the accumulation of litter on beaches (Lozoya et al. 2016). Items that enter the marine environment due to improper disposal by humans include food wrappers, cigarette filters, fishing line and beverage bottles (Sheavly and Register 2007). Other debris found on beaches such as broken glass, medical waste, fishing lines, and syringes can harm visitors (Derraik 2002). Surveys done on beach goers have stated that litter has a negative impact on the

environment due to the threat to their human health (Tudor and Williams 2003; Munoz-Cadena et al. 2012).

Litter on beaches makes them unattractive and hazardous, deterring visitors from the area, impacting local tourism industries. The coastal communities that rely on income from aesthetics of beaches will have negative impacts to the economy due to the more frequent cleanups and visitors being discouraged from the beaches (Sheavly and Register 2007; Bravo et al. 2009). If there is a perception that a beach is polluted it can lead to a loss of tourists and, in turn, financial consequences (Tudor and Williams 2003). Litter also increases the total cost of disposal because of the need for more frequent beach cleanups, creating a significant cost to coastal communities (Munoz-Cadena et al. 2012). For example, Texas coastal communities spend over \$14 million annually to pick up litter from beaches (Lang 1990).

Not only will visitors be deterred from the beaches, but more litter on beaches increases the amount of littering behavior by beachgoers. Individuals use a variety of cues from their surrounding environment to determine what is a common and accepted behavior. The presence of litter communicates a social norm indicating the acceptability of littering, therefore increasing the amount of littering (Shultz et al. 2013). Not only will more littering occur in an already littered environment, but more littering will also occur when people see someone else dropping trash into a littered environment (Cialdini 2003).

2.3 Beach Policies

Many authors have offered recommendations to reduce marine debris. Suggestions for reducing debris from land-based sources include increased educational

programs, gathering more data from cleanups, engaging relevant stakeholders, involving businesses, and writing stronger legislation (Sheavly and Register 2007). Studies show that most people perceive the main causes of litter to revolve around human laziness, lack of enforcement, recreational activities, and a lack of trash receptacles (Santos et al. 2005; Munoz-Cadena et al. 2012). Santos et al. (2005) suggests more trash receptacles at beaches reduce beach contamination. Another study observed the number of and distance between trash receptacles at a public place matters, finding that one well-placed receptacle contributes to a larger reduction in trash than several inconveniently placed receptacles. The lowest littering rates were found when the receptacle was placed less than 20 feet away from major entrances or attractions (Shultz et al. 2013).

Some beaches in coastal New England have Carry In/Carry Out beach policies, meaning, “all trash must be carried out for proper disposal” (“State of Rhode Island...”). All state managed beaches in Rhode Island implement this policy and none provide trash receptacles. Other states, like New Hampshire, also have a statewide policy of Carry In/Carry Out. There is a lack of information and research on the effectiveness of different trash disposal policies on beaches. However, the media and residents have noted dissatisfaction with Carry In/Carry Out policies. For example, New Hampshire residents have noticed a flaw in the policy. The Portsmouth Herald reported 110 pounds of trash picked up from Jenness State Beach, including cans, bottles, fishing line, balloons, a syringe, and over 100 cigarette butts. More than 13 beach cleanups have been done in the last year on that beach, totaling more than 4,000 items of litter removed from the beach. Many residents are aggravated with the current

management practice. Visitors complain there is nowhere to properly dispose of trash and store owners complain of people coming into their shops and disposing of their trash, placing extra waste removal costs on store owners (Cresta 2011). Dr. Jenna Jambeck from the University of New Hampshire conducted a survey in 2006-2007 asking residents about their attitudes toward marine debris. The survey resulted in 54 percent of respondents stating they think trash receptacles should be provided (Kennedy 2011).

Beaches, such as the state beaches in New Hampshire, implement Carry In/Carry Out because of the intensive monitoring and high costs associated with placing trash receptacles on beaches. Trash receptacles cost the city money due to increasing disposal costs, salary of workers, and constantly keeping up with overflowing trash. If trash is overflowing it can attract pests and animals to the beach area (Kennedy 2011). New Hampshire is not the only place to notice the negative effects of a Carry In/Carry Out policy. Swampscott, Massachusetts implemented the policy in 2014 to save the city money on trash disposal. They found the policy to be ineffective and not well thought out and returned trash cans to the beach mid-season ("Swampscott Scraps...").

These towns are some examples of the problems encountered when managing litter on beaches. There is a debate on the best policy to be implemented on beaches. Some feel as though Carry In/Carry Out is effective, while others favor trash receptacles to be provided. In Rhode Island, and states across the country, there is a lack of data regarding the effectiveness of different litter policies on town beaches. Knowledge of the differing policies and an understanding of why managers chose

these policies can help to determine how Rhode Island is assessing the marine debris issue from land-based sources.

2.4 Research Questions

Lucrezi et al. (2016) suggests that beach litter is an issue that needs management attention in order to improve practices on beaches. The goal of this study is to investigate how beaches in Rhode Island are handling the disposal of litter. Its focus is to understand which management practices will be the most effective, based on the perceptions of managers, on how to prevent litter from entering the marine environment. Some beaches impose a Carry In/ Carry Out policy, while others provide trash receptacles for their visitors. To date there have been no systematic studies comparing motivations for these different policies or their effectiveness on beaches.

The following research questions will be used to assess these differing opinions:

1. What are the different litter policies on town beaches in Rhode Island?
2. Why have beach managers chosen these specific policies?
3. What are the perceived effectiveness and outcomes of the chosen policy?

CHAPTER 3: METHODS

3.1 Research Design

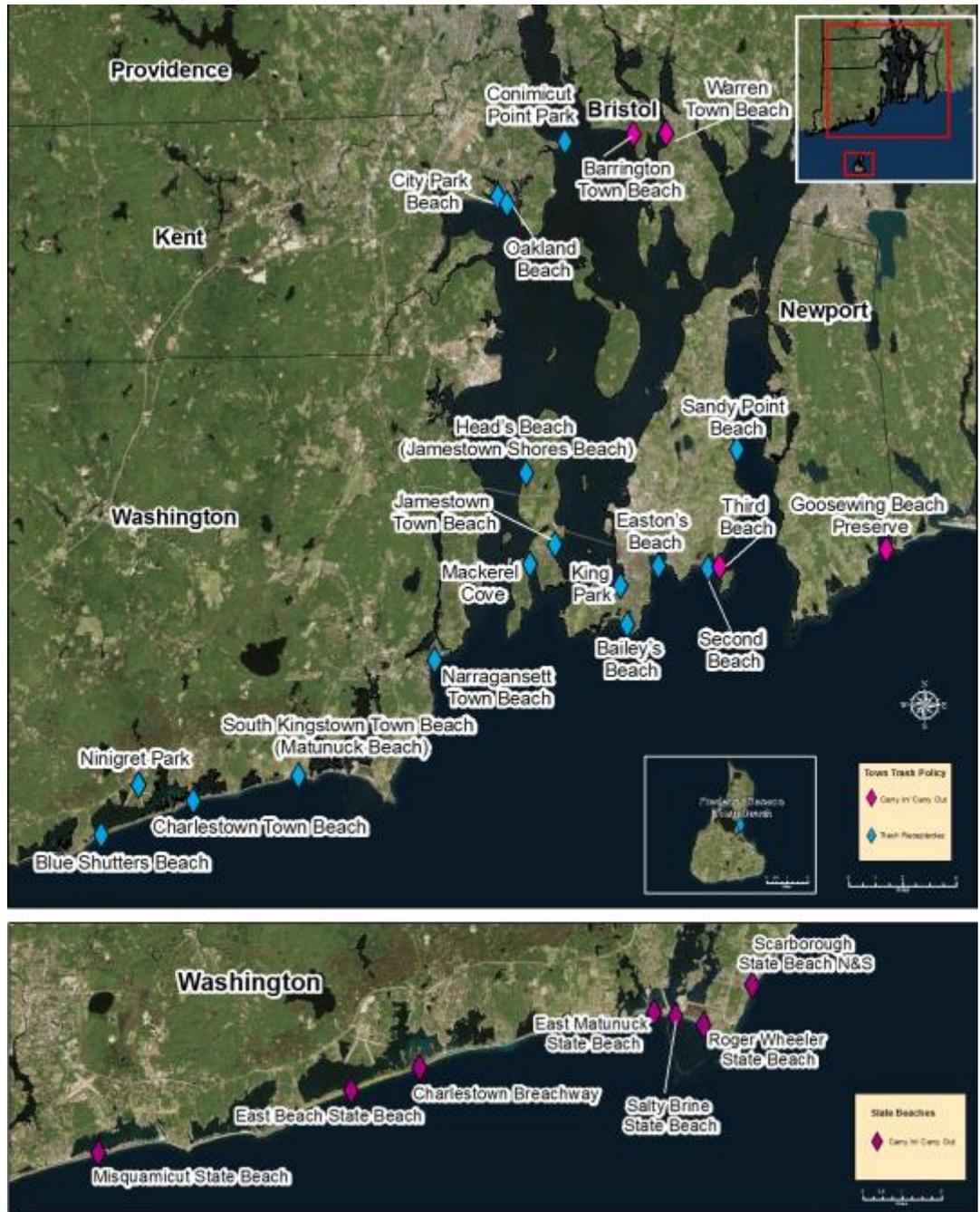
This is an exploratory, qualitative study that used flexible, semi-structured interviews with town and state beach managers in Rhode Island. This approach was chosen to get an underlying view of the manager's perspective on the topic.

Qualitative interviews are used to address a situation described from the perspective of those involved, to get a broader idea of the policy and to understand the thoughts of the managers without limiting them to specific responses (Robson 2011). A semi-structured interview was used, following a guide of certain questions to be answered. This method allowed the interviewee to have the freedom to speak about other topics they choose. From listening to the interviewee, further questions were asked by the researcher as follow up to certain things said. This method gives a more overarching view of the policies compared to a closed quantitative structure (Robson 2011). The interview questions that guided the interviews can be found in Appendix B.

These interviews were conducted in-person, with the interviewer traveling to the interviewees' location. The interviews were recorded using a digital voice recorder, along with handwritten notes as a check of reliability and to record nonverbal cues. The interviews averaged approximately 30 minutes each.

3.2 Data Collection

There is a total of 27 town beaches across 15 towns in Rhode Island which can be categorized geographically into five regions: South County (8), Block Island (1), West Bay (3), East Bay (3), and Newport County (12). This study followed a purposive sampling method, specifically choosing town beach managers in Rhode Island. “Manager” is being used as a general term, since the interviewees had diverse job titles. However, all interviewees were in charge of general maintenance, trash disposal, and policy choices on the beach and therefore will be given the term “manager”. Names, emails, and phone numbers of managers were obtained through public records provided online, with initial contact being through email. The research was conducted from July-September of 2016. In total, twelve town beach managers and two state beach managers were interviewed, for a total of 14 interviews. The interviews encompassed management practices at 21 of the 27 town beaches and all seven state beaches. The beaches in the study included every county in the state mentioned above. Only three towns were excluded from the study due to lack of response from those managers.



Author: Sara Benson
 Data: RIGIS and Sara Benson

Figure 1. The top map shows town beaches interviewed. Purple diamonds represent beaches with Carry In/Carry Out. Blue diamonds represent beaches with trash receptacles. The bottom map shows state beaches, which all have Carry In/Carry Out policies. Map created Dec. 2016.

Table 1. This table shows all the beaches involved in the study. The blue indicates town beaches and the grey indicates state beaches. The beaches in bold have Carry In/Carry Out policies.

Beach Name	Town	County	State/Town Land	Trash Policy
Narragansett Town Beach	Narragansett	Washington	Town	Trash Receptacles
South Kingstown Town Beach (Matunuck Beach)	South Kingstown	Washington	Town	Trash Receptacles
Blue Shutters Beach	Charlestown	Washington	Town	Trash Receptacles
Charlestown Town Beach	Charlestown	Washington	Town	Trash Receptacles
Ninigret Park	Charlestown	Washington	Town	Trash Receptacles
Frederick Benson Town Beach	New Shorham, Block Island	Washington	Town	Trash Receptacles
Second Beach	Middletown	Newport	Town	Trash Receptacles
Third Beach	Middletown	Newport	Town	Carry In/Carry out
Sandy Point Beach	Portsmouth	Newport	Town	Trash Receptacles
Jamestown Town Beach	Jamestown	Newport	Town	Trash Receptacles
Mackerel Cove	Jamestown	Newport	Town	Trash Receptacles
Head's Beach (Jamestown Shores Beach)	Jamestown	Newport	Town	Trash Receptacles
Easton's Beach	Newport	Newport	Town	Trash Receptacles
King Park	Newport	Newport	Town	Trash Receptacles
Bailey's Beach	Newport	Newport	Town	Trash Receptacles
Goosewing Beach Preserve	Little Compton	Newport	Private	Carry In/Carry Out
Oakland Beach	Warwick	Kent	Town	Trash Receptacles
City Park Beach	Warwick	Kent	Town	Trash Receptacles
Conimicut Point Park	Warwick	Kent	Town	Trash Receptacles
Warren Town Beach	Warren	Bristol	Town	Carry In/Carry Out
Barrington Town Beach	Barrington	Bristol	Town	Carry In/Carry Out
Scarborough State Beach N&S	Narragansett	Washington	State	Carry In/ Carry Out
Roger Wheeler State Beach	Narragansett	Washington	State	Carry In/ Carry Out
Salty Brine State Beach	Narragansett	Washington	State	Carry In/ Carry Out
East Matunuck State Beach	South Kingstown	Washington	State	Carry In/ Carry Out
Misquamicut State Beach	Westerly	Washington	State	Carry In/ Carry Out
Charlestown Breachway	Charlestown	Washington	State	Carry In/ Carry Out
East Beach State Beach	Charlestown	Washington	State	Carry In/ Carry Out

3.3 Data Analysis

The previously recorded interviews were transcribed into a Microsoft Word document using the Philips SpeechExec Transcribe software program. Each manager was given a code, which reflected the type of trash policy and a number. The code for Trash Receptacles was “TR” and the code for Carry In/Carry Out was “CICO”. There were twelve managers interviewed, with nine of the towns having beaches with trash receptacles and four of the towns having Carry In/Carry Out. One of the managers was given two codes, reflecting two different beaches with differing policies in the same town. The codes for the managers are labeled TR 1-9 and CICO 1-4, in order to ensure the confidentiality of the beach managers. Many interviewees managed more than one beach in their town, which is the reasoning for twelve interviews and 21 total beaches involved in the study.

Analysis was largely based on a thematic coding approach. The steps found in Robson 2011 were referenced. The first phase of the analysis was done by reading the transcriptions of the interviews multiple times in order to become familiar with the data. From there, initial codes were generated based on common phrases communicated by the managers. If more than five out of the twelve managers stated the code, that code was chosen to be looked at further. The interviews were read again in order to ensure the coding scheme. The codes were then separated into two different sections, factors of policy choice and factors of perceived effectiveness. The factors of policy choice include codes the managers stated on why they, or the town, maintained that certain policy. The codes under this section are listed in Figure 2. For example, “Recycling and Environmental Goals” would mean that the manager stated a reason for the policy choice was due to this factor. Similarly, “Amenity to Provide” would be another stated reason for the policy choice.

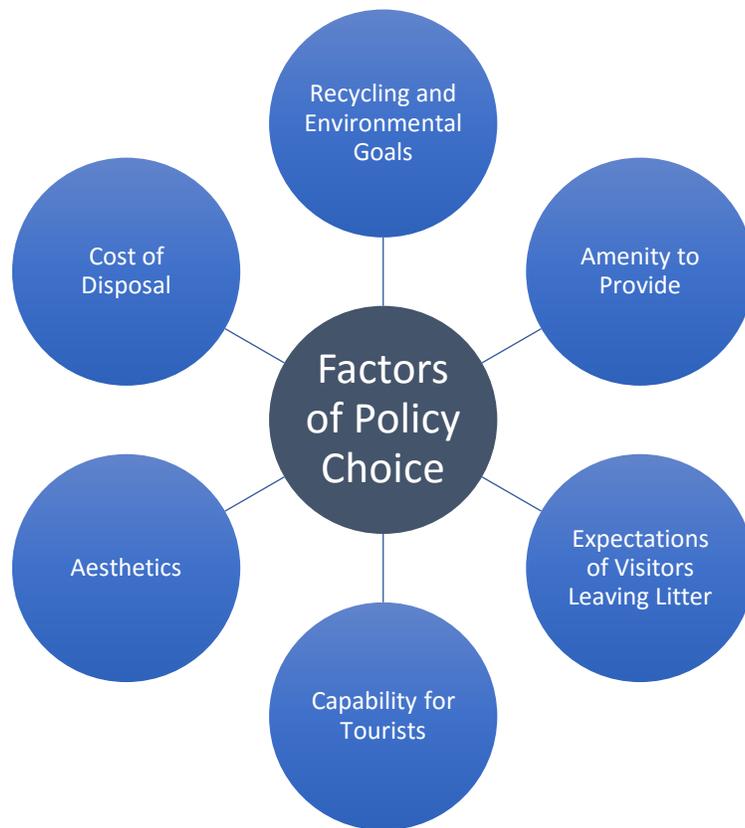


Figure 2. Flow chart of the codes used under factors of policy choice.

The second section, perceived effectiveness, contains codes of what is happening on each beach (Figure 3). These codes describe different factors that may cause effectiveness of a trash policy on managing litter. For example, the code “Tractor Rake” is if the beach participates in raking their beach to remove litter. The codes will be explained further in the results chapter.

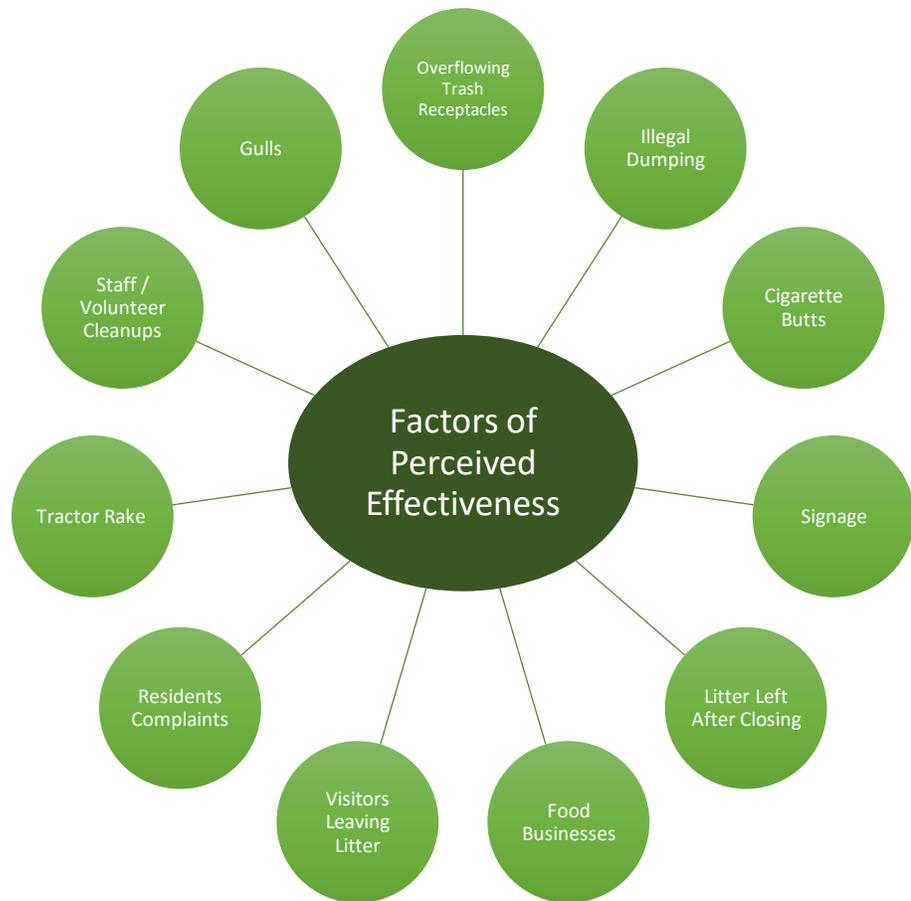


Figure 3. Flow chart of the codes used under factors of perceived effectiveness.

Once the codes were determined, they were placed into two Microsoft Excel sheets, one for policy choice and one for perceived effectiveness. The codes were placed along the top of the sheet and the beaches were placed along the left side. Each interview was then read again and direct quotes from the beach managers were placed into each cell that corresponded with the code. The results section will provide examples from the codes listed.

CHAPTER 4: RESULTS

4.1 Overview of Beaches

This study encompassed 21 town beaches and seven state beaches, ranging across 13 towns in Rhode Island. All seven state beaches have a Carry In/Carry Out policy. Seventeen town beaches provide trash receptacles on their beaches while four beaches have Carry In/Carry Out. This section will give an overview of what the twelve town managers and two state managers said during their interviews pertaining to their perceptions of how the policies are working on their beaches. The beaches range from small beaches on the uppermost part of Narragansett Bay to larger beaches bordering the Block Island Sound. The beaches have a range from five hundred to hundreds of thousands of visitors annually. Parking fees range from free up to \$25 daily, with rates depending on weekdays/weekend and residency status.

For beaches with trash receptacles, most trash receptacles are green or dark toters (trash receptacles with two wheels and lid). Other types include open trash receptacles, concrete receptacles with covers on sidewalks, or one unit with both trash and recycling receptacles combined in one. Not many managers knew the exact number of receptacles on their beaches, however numbers ranged from four to sixty receptacles, depending on the size of the beach. Most located the trash receptacles at entrances or paths to the beach, versus directly on the beach. One manager stated that their trash receptacles are in the middle of the sandy beach area. Refer to Appendix A for a longer overview of the beaches involved in the study.

4.2 Factors of Policy Choice

This section summarizes the responses of managers regarding the reasons behind the policies in place on their beaches. The factors chosen were based on the statements mentioned by five or more managers. This section is organized by the two different policies (TR vs. CICO) and will give examples of what managers said about every factor. The Discussion section will go into greater depth on what these factors mean when it comes to a manager's policy choice. The factors chosen were:

a) expectations of visitors leaving litter, b) aesthetics, c) amenity to provide, d) capability for tourists, e) recycling and environmental goals and f) cost of disposal.

Table two describes the meaning of these factors. The following results give examples of each factor.

Table 2. Definitions of factors of policy choice.

Factors of Policy Choice	Definition
Expectations of visitors leaving litter	Assumptions by managers that beach goers will choose to litter or leave their trash behind
Aesthetics	Keeping the beach clean, pristine, and beautiful
Amenity to provide	Providing a service for beach goers
Capability for tourists	The assumption that tourists visiting the beaches do not have easy access to other trash receptacles
Recycling and environmental goals	Encouraging recycling and removal of litter for environmental reasons
Cost of disposal	Reducing the costs on beaches associated with trash disposal

4.2.1 Trash Receptacles

This section summarizes perspectives of managers at beaches with trash receptacles.

a) Expectations of Visitors Leaving Litter –According to the managers, providing receptacles mitigates the amount of trash that would otherwise be left by visitors. Managers expressed the assumption that by providing the visitors a place to put their trash, fewer people will choose to litter. One manager said, “On the way out of the beach, the receptacles are there, so people try to use it... If they didn’t see [the receptacles], who knows, they would be just chucking it wherever” (TR 3). When TR 9 was asked why trash receptacles were provided versus an alternate policy, the manager said,

“The concern at the beaches is that people aren’t as responsible as we’d like them to be. It’s fear of people not being responsible... You know it’s so difficult when you would think that everybody would be responsible and that they would throw their trash in a little bag or take it home in a trash bag and it still amazes me that people don’t do that” (TR 9)

Another manager stated,

“...for me, I feel like it’s the lack of consideration of the people. People tend to do the laziest things... For example, right now since we’ve been closed, we’ve put porta johns up front, but we didn’t have any trash cans out front, so people put all their trash in the porta johns” (TR 4).

Managers worried that if they were to remove trash cans from their beach, there would be even more litter to pick-up due to visitor’s lack of consideration about leaving their trash on the beaches. One manager stated the fears of what would happen if trash receptacles were removed from the beach:

“Most people, the common person, has been taught that trash is gross, so gross that they don’t want it anywhere near themselves. So, they’re not going to go and take that back, the thought of bringing trash with you. So even if it was yours and you created it, somehow to them they are going to find a way to dump it somewhere else. They will put it next to their car in the parking lot... or just leave it on the beach and say, ‘It is job security; someone will come by and pick it up.’ It is unfortunate those attitudes exist, but they do” (TR 7).

Similarly, three managers specifically said that they provide trash receptacles to reduce the amount of litter on the beaches. One manager said,

“We provide trash cans so that trash isn’t left on the beach. That’s really the main thing. No trash can, people won’t take their trash with them. They will leave it someplace convenient for them even if its inconvenient for us. Like the porta johns or stuffed underneath the railings” (TR 4).

These managers believe that providing trash receptacles will help alleviate litter.

b) Aesthetics – When managers were asked what their goals are for their beaches, some specifically stated they wanted to keep their beach “pristine” (TR 1, TR 7, TR 8).

“We like to keep the beaches clean and pristine as possible for our residents and beach goers. It adds to the experience. Trash and litter just takes away from the scenery that we have to offer, I mean it’s a beautiful beach, we would not want it littered” (TR 1).

This factor goes hand-in-hand with the expectations of visitors leaving litter factor. When these managers are providing trash receptacles, they believe that they are eliminating litter left on the beach, creating a cleaner beach for their visitors.

c) Amenity to Provide –Many managers feel that with the high prices of parking on most beaches, along with taxes being paid by residents, visitors coming to the beaches deserve to have this amenity given to them. One manager said, “It’s a convenience for the beach users. But you know right now the town feels that it’s a service they want to provide” (TR 2). Another stated, “Personally, I think that if you invite guests to come anywhere, the most amenities you can offer them the better experience you’re going to have” (TR 7). In addition to a parking fee, many beaches provide snack bars or vendors, adding another element to the equation. Some managers feel if they are providing the public with food, they should provide receptacles to throw away their trash.

“I think the only reason it [Carry In/Carry Out] didn’t happen is because of the vendors. We have something that we’re supplying, giving trash out with their food basically, so it wouldn’t be fair to not have a receptacle...People coming in paying 25 dollars to park their car and visit the beach... and you know when you are coming in to pay that to go to the beach, wouldn’t you also want something else. The convenience, [that’s] what’s expected from the customer” (TR 5).

d) Capability for Tourists - Many beaches are in high-tourism locations, situated by hotels or summer homes. This creates another factor for wanting to provide trash receptacles. Managers stated that trash receptacles are provided for the tourists

that do not have easy access to a trash receptacle to be able to throw away the trash they take on to the beach. One manager said, “I feel that people are on vacation, they don’t have that option... I feel like if someone comes over here to [beach name] with a cooler full a beer, they are not going to cart it back with them...” (TR 4). Another manager had similar reasoning,

“We are concerned we don’t have a lot of people that drive in. We have people walking down the hill going to the beach, so how many are going to walk off with their trash, they would just throw it in the dunes” (TR 8).

e) Recycling and Environmental Goals – TR managers stated the reason they want to provide trash receptacles is to encourage recycling by visitors and to mitigate environmental issues that are found when trash is left on the beach. TR 2 stated “Goals are to reduce litter around as much as possible and also to recycle as much material as we can too.” Another manager, TR 6, said that to achieve the towns recycling goals they added ten more recycling bins on the beach to encourage the behavior. Manager TR 8 said providing trash and recycling receptacles allows the beach to be more environmentally friendly.

f) Cost of Disposal – Managers were prompted to answer this question based on the interview question “How much does trash disposal cost?” (refer to Appendix B). Many managers did not know the exact costs of their disposal; however, they say that if they could, they would want to reduce the costs as much as possible. One manager said

“We run up quite a bill, we spend thousands of dollars at the landfill hauling trash from the beach rake. That’s just from the beach rake, that has nothing to do with the people who come and empty our dumpsters” (TR 1).

Many managers stated that their disposal costs are absorbed by the town and therefore separating out the numbers would be difficult (TR 1, TR 4, TR 5, TR 7, TR 8, TR 9).

Although they do not have exact numbers, many know that the cost of disposal is high.

TR 2 stated the goal for their beach as, “Cost savings would be our disposal costs and our staffing costs. To reduce those to” (TR 2). Another stated:

“So, if you owned a business, if this was our business, you want to keep the operation cost down as much as possible. So, do you want to knock off that charge of the cost disposal? Absolutely” (TR 5).

TR 8 also stated that reducing costs on their beach would be beneficial for all parties involved. Cost of disposal is high for removing trash, however these managers choose to accept those costs due to the other factors above weighing it out. Even with trash receptacles, many are trying to find other solutions besides removing the trash receptacles to reduce costs on their beaches. However, not many know what that may entail.

4.2.2 Carry In/Carry Out and State Beaches

Three of the factors stated above were also reasons for choosing Carry In/Carry Out as a policy. The factors are a) expectations of visitors leaving litter, b) aesthetics and c) cost of disposal; the other factors were not stated by these town managers.

a) Expectations of Visitors Leaving Litter – For the managers who have a Carry In/Carry Out policy, it is their perception that not providing trash receptacles encourages people to take their trash off the beach completely, resulting in less litter on the beach. Not having trash receptacles on the beach eliminates the problem of overflowing trash receptacles or visitors piling more trash on top of the receptacles. One manager said,

“I think my understanding is that the trash cans were always overflowing, and as a result, you have more of a mess than you have without the trash cans. Because once you have overflowing trash cans, then you have the seagulls, and it [the beach] just got really messy”
(CICO 2).

Another manager stated “also in our opinion it invites people to leave their trash rather than take it out” (CICO 4). One state manager saw the issue from another side. Trash receptacles used to be provided on state beaches until they switched policies around 15 years ago:

“You are still getting the same amount of trash on the ground. Like I said before, the people who utilize the trash cans before are the people who bring their trash home. Some are very conscientious and some of them don’t care”
(State)

What this manager is trying to convey is that regardless of the policy implemented on the beach, some visitors will be irresponsible with their trash. The same people who would take the time to throw their trash in the receptacle will also carry it out if needed. The people who leave trash will leave it irrespective of the policy in place.

b) Aesthetics – As stated earlier, this factor was stated by managers as a goal to keep their beaches as clean as possible. Managers with this policy believe no trash cans on the beach creates a cleaner beach by not only keeping litter off the beach but also removing the site of trash receptacles off a beach.

“I personally want to see people treat this as a preserve rather than a recreational beach where you see trash can receptacles and things like that... We want to keep it beautiful. There are a lot of people who are stewards of the area and we want to maintain the beauty. We would love it if everybody treated it like we do.” (CICO 4).

When asked about manager’s goals for their litter policy choice, one manager said, “Well obviously, I think any town wants to keep their town as clean as possible” (CICO 2). This factor was the main factor said for the state beaches. Both managers mentioned the reasoning for the removal of trash cans was in order to make the beaches more aesthetically pleasing. One manager stated:

“They were metal barrels at the time, they were rusted, they were unsightly; we’re supposed to have parks, it’s supposed to be beautiful. When you have hundred barrels lined up against the fence it doesn’t look good... They fill up quickly and then you end up with trash around the barrels, which then makes even more of an unsightly mess” (State).

These managers believe that by removing trash receptacles on the beaches the beaches start to become more of an ecological area or a preserve. They believe that beaches should be treated more as a beautiful coastal habitat than a recreational area with trash receptacles.

c) Cost of Disposal – Two of the town beaches and the state beaches mentioned they switched from trash receptacles to Carry In/Carry Out to help alleviate costs. CICO 3 stated that the town wanted to eliminate the charge of cost of disposal on the beach. One of the state managers stated:

“Years ago, when they implemented it, they slashed the budget, and they were trying to see where they could save money, but still have the same amount of people working. The way to cut back was trash... In a way, it’s a win-win. It’s cost effective and people are responsible for whatever they bring” (State).

When the state cut the budget, the beaches turned to removing trash receptacles off their beaches. Although there are no hard numbers on how much this actually saved the state, it was clear that according the managers, eliminating trash receptacles was a way to assist the reduced budget.

4.3 Factors of Effectiveness

This section of the results goes into depth about how these managers judge the effectiveness of their trash-management policy. The codes were based on factors said most by managers throughout the interviews. Some of the codes are indicators of what could be perceived as effective by the managers, while others are further factors of how the policies are operating on each beach. There is a total of eleven factors:

a) overflowing trash receptacles, b) staff/volunteer cleanups, c) gulls, d) illegal dumping, e) cigarette butts, f) signage, g) litter left after closing, h) food businesses, i) visitors leaving litter, j) residents complaining, and k) tractor rake.

Table 3. Definitions of factors of effectiveness.

Factors of Effectiveness	Definition
Overflowing Trash Receptacles	Trash receptacles overflowing as a result of having too much trash in them
Staff/Volunteer Cleanups	Staff cleanups include lifeguards or cleanup staff that assist in sweeping the beach for litter during the day. Volunteer cleanups are organized groups that volunteer to clean off litter from the beach.
Gulls	The presence of gulls on the beach, either picking through trash receptacles or litter left on beaches.
Illegal Dumping	Household or non-native trash found in beach dumpsters or beach receptacles.
Cigarette Butts	Cigarette butts reported to be found on the beach area itself (sand, parking lot, pavilions)
Signage	The effectiveness of placing signs on beaches
Litter Left After Closing	Litter being left during the night from late beach goers, bonfires, or other activities
Food Businesses	Encompasses food trucks, restaurants, and pavilion food stands giving out food to beach goers
Visitors Leaving Litter	Litter being found on the beach as a result of the visitors.
Residents Complaining	Residents in the town calling or emailing beach managers to report dissatisfaction about the beach
Tractor Rake	Rake pulled behind a tractor to clean up excess trash and seaweed on beaches

4.3.1 Trash Receptacles

This section will give example of how managers of beaches with trash receptacles assessed the effectiveness of that policy. Definitions of each factor can be found in Table 3 and throughout the results.

a) Overflowing Trash Receptacles – Six out of nine of the TR managers mentioned this as problem seen on beaches. With the large volume of visitors to these beaches, maintaining capacity in the trash receptacles seems to be a tough task. One manager explained the problem by saying, “No matter how many bins you put, they fill them. In the summer, we empty them twice a day, but overnight they will be full,

stuff on the sides” (TR 3). Another major issue is oversized items, where people throw away umbrellas and chairs into the trash receptacles, making it fill up much faster than usual.

“If people put something big down them, let’s say you have two big cases of beer and you put those boxes and bottles in first, and then the people with diapers or smaller bags don’t have room to put their stuff. And then it fills up quickly” (TR 5).

Busy weekends, oversized items, and not enough staffing were all mentioned by managers as causes for overflowing trash receptacles on their beaches.

b) Staff/Volunteer Cleanups – All nine TR managers mentioned they have their staff participate in daily cleanups. Some beaches have separate staff for cleanups, others incorporate it as part of the lifeguard’s duties to clean up, while some have both. Provided is one example of the maintenance that occurs on these beaches:

“Every day at eight and five o’clock, some of our workers will go out and pick up trash on the beach. And at five o’clock if we feel the need and we see that any of our toters are three-quarters full or more, we empty it ourselves and put a new bag in, for the nighttime” (TR 1).

All managers mentioned their lifeguards doing litter cleanup first thing in the morning or throughout the day, making staff cleanups part of the general maintenance routine.

Of the nine TR managers, eight of them mentioned volunteer cleanup groups coming to their beaches. Volunteer cleanups range from one to five times a year on certain beaches. The most commonly named clean-up group was the Boy Scouts.

Other groups mentioned were Girl Scouts, Coastal Resources Management Council, The Nature Conservancy, Clean Ocean Access and Save the Bay.

c) Gulls – Gulls were mentioned by six of the nine TR managers as a problem for trash management. Gulls get into the trash receptacles and pull apart trash, creating more litter on beaches for staff to clean up.

d) Illegal Dumping – Most managers provide dumpsters on site along with providing trash receptacles. Managers mentioned the misuse of their dumpsters/receptacles with household trash.

“The biggest problems that I’ve seen is misuse of the trash can and the disposal of trash that is not native to the site. People will come from home and put their kitchen trash bag in there. They’ll think, ‘oh there’s a trash can there; I’ll put a tire there because someone is going to come by and pick it up’” (TR 7).

Along with household trash, some managers reported TV’s, mattresses and other items found in their dumpsters and trash receptacles (TR 3, TR 4, TR 8). Many believe it is from summer renters who need an easy way to dispose of trash as the end of their renting week. This creates additional trash to dispose of for the beaches and more work for the managers. Some beaches mitigate the problem by padlocking their dumpsters, so no one else can use them.

e) Cigarette Butts – Seven out of the nine managers mentioned a large problem with cigarette butt litter on their beaches, even with no-smoking laws in place.

“In fact, one of the biggest things is picking up cigarette butts. We are starting to see now that they aren’t allowed to smoke on the beaches. And we see a few people that are conscious of that and are walking away from the beach. At least

that's better than nobody doing it, but it is still going to take an education process telling people they can't smoke on the beach" (TR 9)

The beaches that have seen the problems of cigarette butts notice the problem on the beaches and in the parking lots. Many managers need to ask lifeguards to aid in picking up these butts. Five managers stated their beaches have signs that say no smoking, however enforcement is an issue. Some volunteer cleanup groups, Clean Ocean Access for example, keep track of how many butts are found during the cleanups. One manager believes they picked up around 13,000 cigarette butts on the beach over their cleanups (TR 8).

f) Signage – Some managers discussed the effectiveness of signs posted on their beach, which are intended to help manage trash disposal. As stated above, five of the managers have no smoking signs on their beaches. Other signage found on beaches include "please clean up after yourself" (TR 4) and "put larger items to the side of the barrels" (TR 3). These signs are indications of the policies found on the beaches. Some managers do not think their signage is working, "No matter how many signs you have up they put the old chairs and the old umbrellas [in receptacles] which fills them up instantly" (TR 3). While others, the examples shown above, are hopeful their signs are making a difference.

g) Litter left After Closing – This factor is an issue many managers are trying to solve. Once the beach closes, it is still being used by visitors. This causes trash receptacles to fill up with no staff around to maintain it. Due to the darkness, many people simply leave their trash on the beach wherever they were. Others have found problems with bonfires, including wood and beer cans or bottles being left at night.

“So once the building is closed there are still hundreds of people on the beach. And that’s when they come in and there’s no monitoring of the trash situation. So, after six o’clock they come in and just leave all sorts of trash... If there’s no one here to monitor the situation, people will just leave their trash all over the place” (TR 4).

Litter left in the night causes more maintenance for the workers in the morning. It also intensifies the issue of gulls or other animals potentially ripping apart and spreading trash on the beaches.

h) Food Businesses – As stated in Appendix A, many beaches have either food trucks, food stands, or restaurants nearby. This creates more trash being generated on the beach as a result of these services. Some do not see an issue with this (“Not from them no... They’re good about cleaning up” (TR 3)), while others see it as a large contribution to the litter problem (“This stuff is the main culprit of things” (TR 8)). The managers seem split on this issue, either commending the food businesses for taking their trash with them or finding it to be a struggle cleaning up all the extra unwanted food packaging left on the beach.

i) Visitors leaving litter– This factor was stated by managers as a problem found on beaches. Even if trash cans are provided, trash is still found on the beach. Managers find trash in parking lots, dunes, and on the sand. One said,

“Our beaches are heavily used and at the end of the day there is always a lot of trash left behind regardless of the amount of trash receptacles, roll offs, dumpsters. But yeah every day it’s a crazy amount of trash left behind that people do not throw away” (TR 8).

Four managers specifically mentioned it as an issue found on their beaches. These managers are not sure how to stop this problem from occurring.

j) Residents Complaining – This factor was prompted by a question asking if residents have ever complained about their policy or litter on the beach. Five managers stated that they have gotten complaints from residents, usually at times when the receptacles haven't been emptied yet. One manager stated there were complaints about diapers being left on beaches. Others say it mainly happens on hot, busy, weekends when the trash maintenance crews can't keep up with the demand.

k) Tractor Rake – This factor encompasses a type of trash management practice that is found on beaches. A tractor rake is when a rake is pulled behind a tractor and combs the entire beach for trash and seaweed, where it is then either disposed of in a dumpster on-site or taken off-site. Four of the managers stated that their beaches are raked using a tractor every morning.

4.3.2 Carry In/Carry Out and State Beaches

Only seven of the previously eleven named factors were stated by the managers who have Carry In/Carry Out policies on their beaches. Those factors are: a) staff/volunteer cleanups, b) gulls, c) signage, d) litter left after closing, e) food businesses, f) visitors leaving trash, g) visitors complaints and h) tractor rake. Overflowing trash receptacles, illegal dumping, and cigarette butts were not included for CICO managers because they were not stated by any of them.

a) Staff/Volunteer cleanups – All four beaches stated their staff assists in daily cleanups. The lifeguards walk the beaches in the morning or in the middle of their rotations to pick up trash. The state beaches have staff cleaning up the beaches

throughout the day, along with a person that is contracted out that picks up the beach and parking lot at night and in the morning.

Three out of the four beaches mentioned volunteer groups that come out to clean the beach. Boy Scouts, Clean Ocean Access, and The Nature Conservancy were all organizations mentioned in helping with cleanups. The state beaches also reported a lot of volunteer groups doing cleanups on their beaches, using Save the Bay as an example.

b) Gulls – Two out of the four CICO managers mentioned gulls as a problem. The gulls will pick up excess litter or will take food from people. State beaches did mention seagulls as a problem when they used to have trash receptacles; however, they did not mention it as a problem with their current policy of CICO.

c) Signage – Three of the CICO managers stated they do not have signage indicating their policy. The fourth manager said that there are signs asking visitors to bring out their trash. The state beaches also have signs indicating their policy.

d) Litter left after closing – Three of the managers discussed that a main issue when it comes to litter control is the trash left at night. One manager mentioned that cigarette butts and dog droppings only seem to be left behind after hours. “In the evening a lot people use the beach after its been closed and the trash that goes along with that,” CICO 1 stated about the issue of litter at night. State beaches did not mention this as a problem.

e) Food Businesses – These managers were also split on how food businesses are handled on beaches. One manager said that they find a lot of litter from their food truck, while the other said that the business owner is responsible for taking all of his

trash off site. The other two managers and state beaches did not mention anything about it.

f) Visitors leaving litter– All four beaches and the state beaches all mentioned this as an issue seen on beaches.

“When you have that many people come to the beach you are going to have stuff left behind unfortunately. It’s not just litter. From napkins to food waste left behind. Everything from towels, flip flops, kids’ toys, cell phones. Articles of clothing” (CICO 3).

Food wrapper, bottles, cans, drink cups, and dog poop were all mentioned as things that beach goers tend to leave most.

g) Residents Complaining – Two managers mentioned residents complaining about the policy. One manager stated the difficulty of getting people to know the policy, which was a stem of the complaints, however they attributed that to the lack of signage. Another manager said, “A lot of people would like to see trash cans at the beach, they want to see them at every park around town. It’s a phone call I get fairly frequently, how come we don’t have trash cans?” (CICO 2).

h) Tractor Rake –Two of the four beaches have a tractor rake that goes out to clean up rocks, seaweed and excess litter. The state beaches also rake their beaches during the summer season.

CHAPTER 5: DISCUSSION

5.1 Main Policy Goals

The goal of this study is to attempt to find ways to reduce the potential debris entering the marine environment. Land-based sources of marine debris encompass 80 percent of the total marine debris found in the ocean (Sheavly and Register 2007; Jambeck et al. 2015). Although some litter is the result of intentional dumping, most is due to the mismanagement of waste (Jambeck et al 2015). Jambeck et al. discusses that once litter enters the marine environment, it is extremely difficult to remove. Therefore, it is more efficient to start with reducing waste, improving solid waste management infrastructure, and increasing capture before entering the environment.

The beaches in the study heavily rely on the parking fees from the visitors that come to the beaches. Tourism in Rhode Island is a \$5.2 billion-dollar industry supporting 41,000 jobs (“Commerce Tourism: RI”). With tourism being so vital to Rhode Island’s economy, it is essential to understand ways to alleviate any factor that could jeopardize this. The literature has shown that litter from recreational beaches does enter the marine environment and causes irreversible negative effects on the environment and marine animals. This study’s purpose was to explore whether Rhode Island beach managers believe they can reduce the amount of litter on their beaches by implementing a viable policy. The interviews were insightful and allowed managers to express concerns and ideas they had about managing litter.

When it comes to policy choice, three major goals emerged from the manager’s interviews: a) financial considerations, b) amenities for their visitors and

c) reduction of litter. The financial goal incorporates the factor of cost of disposal. Amenities for their visitors include the desire to provide amenities, capability for tourists to carry out trash, and the role of food businesses. The reduction of litter goal encompasses aesthetics and recycling and environmental goals. This section of the chapter explores major goals of managers interviewed, with an emphasis on reducing litter.

5.1.1 Financial

The first goal managers have when it comes to their beaches is managing trash in a financially affordable way. Maintaining and running beaches costs an immense amount of money for the towns involved. Although only some managers expressed concern about the cost of maintaining the beach, it is still clear that maintaining trash is a costly expenditure. Six of the TR managers knew that trash disposal was expensive, estimating in high thousands, although they couldn't identify the exact numbers. Many of the managers stated they would love to find a way to reduce the costs on their beaches, although many did not know how to without removing the trash receptacles all together.

Table 4. Factors of effectiveness. Check marks indicate managers mentioning those factors within the certain policy.

FACTORS	TRASH RECEPTACLES	CARRY IN/CARRY OUT
Overflowing Trash Receptacles	✓	
Staff/Volunteer Cleanups	✓	✓
Illegal Dumping	✓	
Gulls	✓	✓
Cigarette Butts	✓	
Signage	✓	✓
Litter Left After Closing	✓	✓
Food Businesses	✓	✓
Visitors Leaving Litter	✓	✓
Residents Complaining	✓	✓
Tractor Rake	✓	✓

As shown in Table 2, TR beaches face the same issues as CICO beaches, plus additional maintenance tasks. Both TR and CICO managers mentioned factors such as daily staff cleanups, occasional volunteer cleanups, litter being left after closing, food businesses creating additional trash, residents complaining, and tractor rakes. Additionally, TR managers mentioned issues such as overflowing trash receptacles, cigarette butts, improper dumpster usage, and other types of trash maintenance such as daily pick up and dumpster removal costs. There is no evidence that providing trash receptacles eliminated other clean-up costs associated with beaches. Beaches with trash receptacles still engaged in other litter control procedures while also paying to maintain receptacles. Eliminating trash receptacles could result in a reduction of extra staff for cleaning up trash cans, dumpster costs, and trash removal costs. It would also remove factors such as overflowing trash receptacles and improper dumpster usage, which may hurt the beach economically due to visitor's being deterred from the beach. It has been shown in the literature that beaches will have financial consequences due to visitors being deterred from beaches, more frequent cleanups, and a loss of tourism

due to the perception of a polluted beach (Tudor and Williams 2003; Sheavly and Register 2007; Bravo et al. 2009; Munoz-Cadena et al. 2012). The cost of removal of improper items such as tires or mattresses left at receptacles and dumpsters will also increase disposal costs. Therefore, if a majority of the factors are seen in both policies, with trash receptacles creating additional factors, it appears that in order to reduce costs on the beach eliminating trash receptacles would suffice. However, more economic studies are needed to determine how much maintaining receptacles raises the cost of disposal on these beaches.

5.1.2 Amenities for Their Visitors

Another reason TR managers choose to place trash receptacles on their beaches is because they believe that it is an amenity the town should provide. This was also stated by the article written in Swampscott, MA, located north of Boston in the north shore area. Selectman Glenn Kessler stated his support for trash receptacles on beaches because it is the town's obligation to keep the town clean. He also stated "We have one of the highest tax rates on the North Shore. To me, this a service that our residents deserve" ("Swampscott Scraps..."). Although in Massachusetts, he echoed the way many managers in Rhode Island felt about the issue.

Managers stated when it comes to policy choice, they chose to implement a certain policy because it is what visitors prefer. As mentioned in the Appendix A, a majority of the beaches have a parking fee. The parking fees can be high, up to \$25 for a day pass in some locations. Due to these parking fees, managers feel they should give their visitors as many amenities as possible, including trash receptacles. Some beaches also provide food stands, trucks, concessions, or have restaurants in

proximity. The additional amenities complicate the policy choice, because if the managers are providing food for the visitors, they believe it is inappropriate to ask them to carry out the resulting waste. Managers with food establishments feel they have to provide trash receptacles for the visitors. Some CICO beaches mitigate this by having the food business provide their own trash receptacles for visitors to use and require the operators to carry out and dispose of their own trash.

With Rhode Island being a high-tourism state, many beaches are located around hotels or summer rental homes. This means there are many visitors who walk to the beaches from their hotels or rentals, opposed to parking a car. Managers worry if visitors have to walk back to their hotel or rental, they will not carry their trash back with them. If there are no trash receptacles near them, they will instead throw their trash where it is most convenient. Due to a fear of this occurring, TR managers continue to provide trash receptacles. The CICO beaches did not mention this as a problem; however, this can be due to the locations of these beaches. Many of them are not in high tourism areas and most visitors park their cars next to the beaches.

Although managers would appreciate a cut in costs, the additional goal of giving their visitors what they want prevents them from removing trash receptacles. While this perspective was shared in several interviews for this study, there is no empirical data to back this up; it is unknown whether visitors expect or desire trash receptacles.

5.1.3 Reduction of Litter

As stated above, both policies present issues when it comes to handling trash. The issues mentioned by managers are clearly seen on most beaches, regardless of

policy choice (Table 2). Therefore, when it comes to managing trash, either policy would be effective. Managers chose different policies based on factors such as expectations of visitors leaving litter, cost of disposal, amenities to provide, and aesthetics. Both policies share similar issues such as visitors leaving litter, litter left after closing, residents complaining, and a need for tractor rakes. When it comes to choosing a policy that reduces the most litter, it appears that the policies are relatively equal per manager experience. Due to the factors, it appears that it is not the policy choice that would affect how litter is left on beaches. There are other recommendations that should be used to prevent litter from entering into the ocean. Those policy recommendations will be considered later in the Discussion.

The argument about providing trash receptacles or having a Carry In/Carry Out policy is not new. Communities in New Hampshire and Massachusetts have expressed their concerns about these policies (Cresta 2011; Kennedy 2011; "Swampscott Scraps..."). By talking to managers in Rhode Island, this study provided a general overview of what is occurring on RI beaches, as well as why manager's chose a certain policy and their views about the effectiveness of these policies. Managers that have trash receptacles justify this policy in several ways. Many stated they expect their visitors to leave litter on the beach, so providing trash receptacles is a way to reduce the amount of litter left behind. Managers fear if they take trash receptacles off the beach visitors will leave litter in the sand, dunes, or parking lot. However, visitors leaving litter was still an issue on these beaches, according to TR managers. They need to clean this excess trash with additional cleanups by staff in the morning and throughout the day, as well as raking their beaches in the morning to get rid of the

surplus of trash and seaweed. Cigarettes were also a major issue found for TR managers, one stating they picked up around 13,000 on their beach (TR 8).

Visitors leaving litter after closing was another common issue. Most beaches in RI close around 6 o'clock p.m., while the sun is still up. This causes visitors to stay past closing to keep enjoying the sun, as well as people to coming back at night to have bonfires. Managers notice litter generated at night is a large cause of the litter they need to pick up in the mornings, as well as the trash receptacles overflowing by the time either their staff or Department of Public Works (DPW) can get to them. This allows for gulls to come by and tear trash apart or disperse it around the beach.

Managers also reported visitors complaining. Main complaints happen when trash is overflowing due to a busy beach day or litter being left at night and staff not being able to manage the trash until the morning.

The other side of the argument is Carry In/Carry Out. Managers chose this policy because of similar reasons to the managers who provide trash receptacles, but they saw another side of the issue. CICO managers agreed with TR managers that they believe visitors will leave trash on their beaches; however, to mitigate this, CICO managers chose to not give them the option of disposing trash in the receptacles. According to these managers, this forces visitors to bring out everything they brought in. They feel that providing trash receptacles gives visitors an opportunity to overfill trash receptacles or pile trash next to full receptacles. To avoid this, they removed trash receptacles from the beaches. However, these beaches still see similar issues that TR managers stated. Visitors still leave trash, with managers finding it throughout the beach and in the dunes. Litter left after closing was also an issue mentioned by CICO

managers, with bonfires and picnics being the main problem. On these beaches, there are also daily pick-ups by the staff and volunteers, along with beaches having tractor rakes to get rid of excess litter and seaweed. Residents have also complained to managers about the policy, usually asking why there are no trash receptacles on the beaches.

Most managers noted that visitors are leaving trash on all beaches, regardless of policy choices. One state manager stated, “Which brings us back to the problem, it’s not how we get rid of the trash, it’s the fact that the trash is being left there is the issue.”

5.2 Policy Recommendations

This study suggests there is a need for stronger education, human behavior studies, better signage, and if trash receptacles are being used, better management practices. Human behavior studies are the most crucial recommendation from this study. Studies show that most people perceive the main causes of litter to revolve around human laziness, lack of enforcement, recreational activities and no trash receptacles (Santos et al. 2005; Munoz-Cadena et al. 2012). The next section will provide possible policy recommendations to alleviate the amount of trash left on beaches.

Although there may not be a universal policy to recommend (TR or CICO), there are other things that can be done to reduce the amount of marine debris on a beach. Not only will some of these recommendations reduce marine debris, they may also create cost savings. Previous studies have suggested a variety of strategies such as outreach and education (Santos et al. 2005; Sheavly and Register 2007; Ryan et al.

2009; McKinley and Fletcher 2010; Eastman et al. 2013; Shultz et al. 2013), stronger laws and policies (Sheavly and Register 2007), government and private enforcement on beaches (Sheavly and Register 2007), more trash receptacles (Santos et al. 2005; Eastman et al. 2013), higher penalties or fines for littering (Santos et al. 2005; Eastman et al. 2013), and better research and information of sources of marine debris (Ryan et al. 2009). This section of the discussion will go over three different types of recommendations; signage, education, and types of receptacle. These recommendations will come from observations, the interviews, and what has been found in the literature.

5.2.1 Signage

A proper display of signage can be a useful tool to educate the public. It is important to phrase signage in the correct manner to reduce the amount of litter. Cialdini (2003) describes the difference between injunctive versus descriptive norms. An injunctive norm involves the perceptions of behaviors that are typically approved or disapproved, while descriptive norms involve the perceptions of behaviors that are typically preformed. Participants in Cialdini's previous studies showed that more littering occurred in a littered environment versus a clean environment, leading him to conclude that if a person believes they are doing something that is socially acceptable they are more likely to do it. Signage therefore needs to focus more on social disapproval rather than indicating the harm of environmental problems. Normative beliefs are strongly correlated with behaviors; it is important to promote the right social norm (Tabanico and Schultz 2007).

One manager said they placed a sign saying “leave large objects outside container” in order to prevent broken chairs, umbrellas, coolers, and large boxes from filling up the trash receptacles quickly. The manager said this helped reduce overflowing trash receptacles and the staff can easily come by and dispose of the large items into the dumpster. Signs such as this could be a useful tool to promote behavior. However, signage is still largely ineffective when it comes to changing long-term behavior (Tabanico and Schultz 2007). Studies have shown that altering behaviors through distributing brochures, flyers, and newsletters have little to no impact on overall behavior change (McKenzie-Mohr 2000). There are alternative approaches when it comes to changing human behavior that have shown to have a greater likelihood of promoting sustainable behavior. This will be discussed in the Conclusion.

5.2.2 Types of Trash Receptacles

If trash receptacles are chosen to be provided on beaches, there are ways to mitigate the amount of litter resulting from them. Placing tops on trash receptacles will decrease the issue with overflowing trash receptacles and gulls picking out trash, according to managers. As for dumpsters, in order to reduce the amount of household trash, such as tires and mattresses, from being improperly disposed of, padlocking dumpsters when not in use was recommended. The managers that padlocked their dumpsters did not mention a misuse of it.

The literature shows that more trash receptacles can reduce littering as well. Santos et al. (2005) found through their survey on a southern Brazilian beach that beach users suggested increased education and more trash bins availability reduced the

amount of litter left behind. Eastman et al. (2013) also found that providing more trash receptacles is what is preferred by beach users. In another study by Shultz et al. (2013), they conducted observations of people in city centers, retail, recreational, and other crowded areas in ten states across the United States. The study showed that the convenience, or distance to a receptacle, played a crucial role in littering behavior. Littering rates were lower when receptacles were less than 20 feet away from each other, with littering rates increasing from 21 to 60 feet away, and rates remained flat past 61 feet away. They suggest that not only should receptacles be placed less than 20 feet away from each other, but they should also be optimally placed in areas that are most easily accessible to pedestrians (Shultz et al. 2013). To relate this to beaches, it could be suggested that trash receptacles should be placed at the entrances and exits of beaches, as well as placing them in close proximity (around 20 feet away) to each other to reduce littering. These options, however, may not be acceptable to managers concerned with the natural aesthetic of their beach.

5.2.3 Education

Outreach and education is an extremely common recommendation when it comes to managing marine debris. From the literature and manager's perceptions, increasing education in schools in RI as well as having access to more outreach programs will help reduce the amount of litter found on RI beaches.

In a survey done by Santos et al. (2005), the beach goers most frequently suggested a way to reduce litter as "improvement of people education." Eastman et al. (2009) found similar findings to Santos et al., with their survey also finding that beach users' most popular recommendation was community environmental education.

Sheavly and Register (2007) suggest that knowledge is key for consumers to make the right choices when it comes to littering and disposal of waste. Many government agencies, school systems, and non-profits have created activities, lesson plans, and educational materials that should be used to further education (Sheavly and Register 2007). Incorporating educational programs into schools and having more access and information to the programs will aid in reducing marine debris (McKinley and Fletcher 2010).

Managers expressed that they believe if the public knew what goes into trash disposal and maintenance, they might be more conscious about littering. Two managers said they utilize components of an old RI state program called Ocean State Clean-up and Recycling Program (OSCAR). The state program began in 1985 in order to advance recycling and litter control in Rhode Island. The grant program was initiated by the Department of Environmental Management (DEM) in order to increase educational materials to schools. The program targeted grades 4 through 8 with information on landfilling, incineration, recycling, composting and source reduction (Jones and Edward 1990). The Community College of Rhode Island website states the program transferred from RIDEM to the Rhode Island Resource Recovery Corporation in 2001 (“Waste Recycling...”). According to one manager, the funds ran out five to ten years ago. As discovered through the interviews, Jamestown and Warwick are continuing the OSCAR programs in their towns. The Jamestown manager expressed that they valued the program so much they continued it even when the state funds ran out. They employ six to eight teenagers to work three half-days each week during the summer. These young people go to different beaches in the area

to pick up litter and also take a field trip to the RI Resource Recovery and Landfill in Johnston, RI, to have them learn about the process of trash management. The Warwick manager stated they also keep the program alive, employing eight youth to aid in picking up litter of the beaches in order to educate them on trash-disposal issues. The OSCAR program is one example of educational programs that can be used in the state of Rhode Island. Bringing back funding for the program can involve younger kids in the process, educating them along the way.

It is also important address these issues with the managers themselves. Managers running the beaches should also be informed of the long-term impacts of the litter that is found on their beaches. Many may not be full aware of the economic, social, and environmental problems marine litter causes. Communication between managers and municipal leaders about marine debris issues may help to write policies that reflect these issues. Managers should also converse between each other, educating their neighboring managers about their experiences and findings pertaining to managing litter. An open line of communication and education can further control litter on beaches.

More educational materials can be found on the Rhode Island Resource Recovery Corporation's website on trash, recycling, and litter initiatives. The website has information for residents, business, and schools on how they can better manager litter and recycling in their areas ("RIRRC"). Beach managers and schools can use this information to help educate their residents and students on reducing the amount of litter found on beaches. Hopefully, educational programs such as these, coupled with signage and policy changes, can help reduce the amount of littering seen on RI

beaches. It is also important to incorporate these education and outreach programs into the New England school systems, since most tourism in RI comes from NE states such as Connecticut and Massachusetts. Providing all potential visitors with education on littering on beaches could help reduce the amount of trash found in these areas.

CHAPTER 6: CONCLUSION

This study has given a general overview of what is happening with regards to Rhode Island beaches. Managers from all over the state expressed their concerns with litter management on their beaches. Town managers chose between two trash-management policies—Carry In/Carry Out or providing receptacles—based on factors like expectations for visitors leaving litter, cost of disposal, providing amenities, and aesthetics. Both policies share similar issues such as visitors leaving litter, litter left after closing, residents complaining, and tractor rakes. From these interviews, there is now a summary of beaches in Rhode Island, reasons why managers chose certain policies, and goals or concerns managers have when it comes to managing litter.

Depending on the manager's main goals, different policies can be recommended. If the manager is hoping to reduce costs on their beach, CICO is recommended, however more economic studies are needed to quantify the cost of trash disposal on RI beaches. If a manager perceives their visitors preferring trash receptacles and believe that it is an expected service, then trash receptacles would be the better policy choice. Again, more research is needed to know what policies are preferred by visitors in Rhode Island. When it comes to managing marine debris, neither policy choice will fix all the problems found on these beaches. There are ways to mitigate the trash; however, looking toward human behavioral studies may be the most effective. Changing beach goer's behaviors and perceptions of litter will aid in reducing the amount of litter found on beaches, and in turn, marine debris.

Other factors besides marine debris may need to be investigated to pick the most effective policy. Managers need to decide on a policy choice based on the

resources they have. Larger beaches may turn to CICO, since trash removal takes money and time, while smaller beaches may be able to maintain their receptacles. On the other hand, smaller beaches may also have residents that value the area and are more willing to carry their trash out in order to preserve the aesthetics of the area. If taxes and parking fees are high in the area, residents may want their money going toward amenities such as trash receptacles. Managers need to assess the nature of their visitors and beach in order to find a policy that works best for them. When it comes to cost of disposal, Carry In/Carry Out appears to be the most beneficial choice; however, more studies are needed. If visitors want to see trash receptacles on beaches, then trash receptacles may be the policy to choose. Again, more research is needed to better understand visitor's perceptions and desires.

6.1 Research Recommendations

This study had limitations that should be discussed. This was a qualitative study, giving an overview of what managers said during interviews. This means that the majority of the information is from the manager's perception of what is going on their beaches. The factors stated are based on their beliefs and ideas of what is going on, not necessarily what actually is happening. A study to reduce this limitation would be quantifying the amount of litter found on the beaches. Completing transects of litter found on the beaches and then comparing the amount of litter picked up between the differing policies can help answer the question of how much littering is occurring. This number should be normalized by the amount of beach goes on each beach to get a more comparative representation of litter amounts.

Another limitation was the amount of CICO beaches in RI. Out of the 21 beaches, only four had that policy. However, the study was still able to give an overview of what is going on in RI, and four interviews was enough to gain knowledge about what is happening on those beaches, as well as the state managers giving further insights. A broader study of beaches in New England or across the United States will aid to the literature and this study of marine litter policies. Understanding how Rhode Island fits into the greater picture of beach management would be a useful future study. Interviewing managers in other New England states such as this study did will open up the views and perceptions along the Northeast. A larger study can also be done by implementing mail surveys to all beach managers in the country. A mail survey will allow for the larger number of managers to be reached around the country. The questions for the survey can be created using the information discovered from this study.

Other studies can be done in order to gain a greater knowledge of the issue presented here. Beach goers' perceptions on what policy they would prefer on a beach would aid in comprehending the issue beyond what was done in this study. Understanding this issue from a visitors' perspective will expand the depth of the issue by introducing beach goers' ideas and preferences. Additionally, talking to supplementary groups of people in Rhode Island can also develop a larger knowledge of the policies. Managers expressed other parties were involved in the policy making process besides them, such as their bosses, town councils, or beach councils. Learning about policy choice from people such as these would aid in topics discussed by managers. Furthermore, managers stated there were supplementary people involved in

day-to-day cleanups, such as lifeguards, staff, and DPW. Interviewing these groups of people would expand the scope of the study and gain more insights on what is occurring on the beaches in the study. Addressing these issues further requires the cooperation of other policy leaders, workers, and groups involved with the beaches.

There are more studies that need to be done to understand how to alleviate marine debris, by reducing litter on beaches. This study had a limitation of only using managers' knowledge, and unfortunately, close to none knew how much cost of disposal is. Economic studies are needed to learn how much managing a beach costs in RI. Furthermore, managing marine debris on beaches is not something that can be completely solved by a policy choice. In order to truly see a reduction in litter there needs to be a human behavior change. Researching human behavior on the beaches in the study could help understand different ways to reduce marine debris.

6.1.1 Economic Studies

Managers in this study stated one of their goals is reducing costs. Keeping costs down on beaches is beneficial to everyone involved in the process. However, almost no managers knew how much money it costs to run a beach. Many hinted they knew it was costly, ranging in the high thousands of dollars. Most money is given to these beaches from the towns in different sources, such as money for maintenance or DPW helping out at the beach. It is hard to quantify exact amounts. Some of TR managers stated they would consider switching to CICO in order to reduce costs. CICO managers that switched from TR stated one of the reasons they switched was to reduce costs. Without hard numbers, however, it is difficult to quantify how much it costs to run a beach in RI and how much it would benefit, if at all, the town to remove

trash receptacles from their beaches. Being able to quantify cost of disposal, maintenance costs, and total cost to run a beach may help managers make a more informed decision when it comes to picking a certain policy for their beaches.

Understanding costs would also help local municipalities to distribute the budget accordingly. If the state and town officials that decide the budget are educated on the long-term effects of marine debris and know the exact money needed to manage it, the budget will be given to beaches correspondingly. The mitigation of trash on beaches has to become a priority to be funded in state and municipal budgets. Understanding the exact costs to the budget will help to better inform town and state officials, which will then in turn help with funding to beaches.

6.1.2 Behavioral Studies

No single policy choice can eliminate the amount of litter that is coming from beaches. Between the managers and the literature, it is clear that beach goers will litter regardless of the policy on the beach. In order to further solve the problem of marine debris, human behavioral studies have to be conducted.

No definitive explanation has been found when it comes to changing human behavior. Many adhere to a linear model, which believes that environmental knowledge will create an environmental attitude that will result in pro-environmental behavior; however, this model has been largely discredited. Knowledge and awareness does not necessarily lead to a behavior change (Kollmuss and Agyeman 2002). Other models, such as US linear progression models; altruism, empathy and prosocial behavior models; and sociological models, can be useful to explain the gap between attitudes and actions. Other factors such as demographics, external (economic, social,

cultural) and internal (environmental knowledge, attitudes, values, motivation, etc.) need to also be examined to understand the holes between environmental knowledge and environmental behavior and displaying pro-environmental behavior (Kollmuss and Agyeman 2002).

An alternative approach to information-intensive campaigns is Community-Based Social Marketing (CBSM). CBSM is a hybrid of psychological and social marketing by identifying the activity to be promoted, as well as the barrier to that activity, and then designing a strategy to overcome those barriers (McKenzie-Mohr 2000). CBSM incorporates psychology with applied research methods to obtain a framework to promote behavior change over various environments (Tabanico and Shultz 2007). CBSM has shown to have a greater probability of promoting sustainable behavior and is becoming more widely accepted in the United States as a way to enhance environmental responsible behaviors (McKenzie-Mohr 2000; Tabanico and Shultz 2007). Studies such as CBSM can provide insights on littering behavior. If these types of behavioral studies can be conducted on these beaches in Rhode Island, hopefully there can be further recommendations given to reduce littering on beaches.

6.2 Conclusions

Controlling marine debris is an enormous issue in this new anthropogenic age. The increased consumption of one use plastics has changed our society's behaviors and waste removal habits, causing irreversible problems in our environment. Marine debris is found in all areas of our oceans, ranging from the arctic to the deep sea. Marine animals are becoming sick from ingesting plastics, as well as dying from entanglement in debris. Human health issues are emerging from pollutants of plastics

bio accumulating through the food web, including the fish we consume. This issue is not one that can be solved overnight. Industry and consumers need to work together to achieve goals of reducing the amount of plastics in our everyday lives. Looking at the management of beach litter is a small portion of the larger problem, but it is one step toward creating a better environment. Humans have already altered the environment in ways that cannot be mended. This does not mean that all hope is lost, even a small modification in our actions can cause change.

Dietz et al. (2009) discussed the importance of using behavioral approaches for near-term reductions. Changing different aspects of a person's everyday life has the potential to make a bigger difference in the overall picture. In that study, it was shown that grassroots efforts at home will achieve a reduction in carbon emissions. Changing simple behaviors at home can make a large a large impact for the better good of the country (Dietz et al. 2009). This concept can be related to reducing marine debris. Simple changes, such as reducing littering on beaches, can help impact the amount of debris in the ocean. Looking at litter policies on beaches is a small piece of the larger issue at hand, but individual behavior changes can make a broad cumulative impact.

Managing beaches to reduce the amount of marine debris is a complex issue, that goes far beyond the policy choice of trash receptacles or Carry In/ Carry Out. The larger, more complex, issue of unsustainable consumption, production, and disposability drives the problem of marine debris found on beaches. This study uncovered problems found on beaches here in Rhode Island and gave small steps to achieve the greater end goal of reducing marine debris. However, there is substantially more work to be achieved to eliminate debris from the ocean.

APPENDICIES

Appendix A. Overview of Beach Demographics and Litter Policies

This section will explain the policies found on town beaches in Rhode Island. There is a total of 21 beaches involved in this study, spanning over twelve towns. The beaches will be broken up by whether they have trash receptacles or Carry In/Carry Out policies on their beach, separated by town and then further separated by beach name. The information in Appendix A is taken from personal experiences from visiting the beaches, communication with the beach managers and internet research.

A. Trash Receptacles

a. South Kingstown

South Kingstown Town Beach – The maintained part of the beach spans 1.5 acres with a boardwalk, 1,300 linear feet of sand, a pavilion, restrooms, picnic area, a volleyball court, playground and parking area (“Town Beach”). The beach is open from Memorial Day through Labor Day with approximately 50,000 visitors annually. The beach has a parking charge ranging from \$10-25 depending on certain factors based on residency and age. There is not a charge to walk onto the beach. Since the building of the pavilion in the early 90’s, the town beach has provided trash receptacles. There are open trash receptacles located at the top of the sandy beach that are taken off during the off-season. Enclosed barrels located on the pavilion are taken



Figure A. Top picture shows trash receptacle on the beach. Bottom picture shows trash receptacle on the pavilion of SK Town Beach.

off during the off-season except for one, and there are permanently mounted trash barrels located in the picnic area. There are currently no recycling barrels.

During the season, there is a beach maintenance employee who empties the trash receptacles daily or more than once a day if needed. The trash is emptied into an onsite dumpster that is picked up twice a week.

b. Narragansett

Narragansett Town Beach – This beach is located in the center of town, with ample parking on site, along with food, restrooms, a first-aid office, surfing areas, and a sandy beach area, all totaling approximately 19 acres (“Narragansett...”). The beach receives roughly 100,000 visitors annually, with a daily beach fee of \$8 per person, per day, and seasonal resident passes ranging from \$0-50 and non-resident passes ranging from \$20-50.

Located on and around the beach during the summer season, there are approximately 50-60 trash and recycling totes. The season is from Memorial Day to Labor Day, however trash receptacles are provided from May 1st- October 1st, with a couple trash receptacles being left throughout the winter season. Trash receptacles have always been provided on this beach, with recycling totes being offered 3-4 years ago.

The beach is raked every morning for seaweed and trash, which is brought to Rose Hill Transfer Station. A man is contracted out to come every morning during the on-season to empty the trash tote receptacles. On average three beach workers will also go around picking up trash throughout the day, along with some workers

emptying trash totes around 5pm if more than $\frac{3}{4}$ full. In order to dispose of trash, the beach has three locked enclosed dumpsters for general trash and two for recycling.



Figure B. From left to right: trash and recycling totes on the pavilion, trash and recycling totes in a corral on the beach, and enclosed dumpster all located at Narragansett Town Beach.

c. Charlestown

Blue Shutters Beach – This town beach is located on Block Island Sound and is equipped with lifeguards, outdoor showers, restrooms, concession stands, and picnic tables (“Blue Shutters...”). This beach usually sees around 90,000 annual visitors, with a parking charge of \$20 for residents. There are separate trash and recycling receptacles, each are 50 gallon cans with tops. The trash and recycling receptacles are bolted together to create one unit. There are 10 total receptacles, 5 trash and 5 recycling, located at the entrance ways. The bins are emptied twice a day in the summer by Department of Public Works (DPW), along with help from lifeguards and other beach staff. The recycling is taken off site to the recycling center while the trash is taken from the receptacles to the onsite dumpster.

Charlestown Town Beach – The town beach has identical policies as Blue Shutters, with the exception of 12 receptacles; 6 trash and 6 recycling.

Ninigret Park – Ninigret Park is a 227-acre park that has services such as basketball courts, a playground, a bike course and tennis courts. The park also has

access to Ninigret Pond with a public beach, which is the area of focus in this thesis (“Ninigret Park”). Ninigret also has similar policies to the other beaches in Charlestown, however it is free to park.

d. Middletown

Second Beach (Sachuest Beach) – Sachuest Beach, more well-known as Second Beach, is a mile-long beach with a concession stand, bathrooms, grills, picnic areas, surfboard rentals and lessons, a Del’s Lemonade Truck and additional vendors (“Sachuest...”). This beach averages around 150,000 visitors annually with ample parking available. Seasonal parking rates vary for resident versus non-resident and weekday vs. weekend. Daily passes are \$15 for weekdays and \$25 for weekends. This beach provides two trash receptacles at the end of each path, with eight total paths. There are an additional two sets of trash receptacles at the set of stairs leading to the beach, along with four more along the ramp leading to the beach. An additional barrel is kept at an unguarded camp area portion of the beach. The trash is emptied and taken to a compactor on site. There is currently no recycling on the beach. There is a staff of 15-20 people that work the crew; they are in charge of sweeping the boardwalks, emptying the trash cans and picking up litter.

e. Portsmouth

Sandy Point Beach – This is a natural beach that is located on the Sakonnet River. The beach contains changing rooms, restrooms, and picnic tables (“Beaches Portsmouth...”). The beach is open from May-September, averaging approximately 5,000 visitors annually. Portsmouth residents park free, while non-residents pay \$10 on weekdays and \$15 on weekends. There are approximately ten trash receptacles on

site, which have closed push door tops. Along with trash receptacles, this beach has ten blue recycling bins, to aid with the towns 35 percent recycling goal. The Department of Public Works empties the trash cans every Monday and Friday and takes the trash off-site, however the beach should be getting a large dumpster soon. Every morning the staff walks the beach and parking lot for around an hour to clean up the excess litter.

f. Jamestown

Jamestown Town Beach (East Ferry) – This smaller beach area is located on Narragansett Avenue and is a popular boating, fishing and viewing area. There is a small sandy beach along with a lawn in this area (“Jamestown”). This beach is across from East Ferry and it is a non-guarded beach. It is primarily used as a launching point for people who have moorings or boats out in the bay. There are no trash receptacles directly on this beach, however there are permanent receptacles by the sea wall that a private contractor empties.

Mackerel Cove – This beach off of Beaver Tail Road is open from June 6th – September 7th. Parking fees are \$15 a day for non-residents or \$15 recreational seasonal pass for residents (“Jamestown”). Trash receptacles are located at each pedestrian access point leading to the sandy beach. Every morning the beach is raked with a tractor to pull seaweed and litter off the beach, and then the maintenance team empties the receptacles every morning. On busy weekends, the barrels are emptied again around lunch time. Lifeguards also participate in cleaning litter of the beaches.

Head’s Beach (Jamestown Shore’s Beach) – This beach is 1.7 acres of the three-acre shorefront purchased by State Department of Environmental Management

and Town of Jamestown (“Jamestown”). This beach is the most inviting swimming beach in Jamestown. This beach requires residents to buy a recreation sticker for \$15 for the summer to allow access to this beach and other parts of town. This beach has similar trash policies as stated above for Mackerel Cove.

g. Newport

Easton’s Beach – This ¾ mile long beach is located on Memorial Boulevard at the beginning of the Cliff Walk. This beach is open to swimming and surfing, along



Figure C. *Easton’s Beach trash receptacles. Top picture show concrete barrels and bottom shows green toters.*

with having a carousel, boardwalk, seasonal public facilities, snack bar, a ballroom and Save the Bay Aquarium on site (“City of Newport...”). The fee to park is \$20 per car on weekends and holidays and \$10 on weekdays. The beach is open from Memorial Day to Labor Day or a little longer, weather and staff depending. The trash receptacles are located on the boardwalk and not the sandy area of the beach. There are concrete trash receptacles that stay year-round and are emptied by a contractor negotiated by Clean City Program Newport. These receptacles are dumped daily or twice a day during peak season by the contractor that takes care of trash for the entire city. Additionally, there

are green and black trash toters on the beach during the season that also get picked up by the contractor. The area also has two 8 yard dumpsters for the snack bar, ballroom and oversized trash, that gets picked up twice a week, Monday’s and Friday’s. Every

morning the lifeguards pick up litter off the beach, along with a tractor rake that collected trash, seaweed, and rocks. The raked material gets disposed of onto and hopper and then on to a roll-off container. There is a recycling 8-yard dumpster used by the snack bar, however there is no recycling open to the public.

King Park – This beach has a public swimming area on Wellington Avenue. This area has eight green toters, with one restroom attendant that cleans up the park and brings the trash toters to the sidewalk for collection every day.

Bailey's Beach – This beach is located at the end of the Cliff Walk and is abutting a private beach. There is no parking or attendants, however there is a security guard and a trash receptacle located there. There is a 4-yard roll-off also on site, but it is part of the private section of the beach to empty the trash receptacles and put it in the roll-off, which is paid for by the Town of Newport.

h. Warwick

Oakland Beach – This beach is located on the Bay inlet area. It is a saltwater beach with restaurants close and a boat ramp off Bay Avenue (“Parks &...”). Around 10,000 visitors attend this beach annually. There is currently no charge to park at any of the Warwick beaches. There are 28 trash receptacles located on this beach. From Memorial Day to Labor Day, Monday-Sunday, there is a person that goes around to all three beaches and empties the trash receptacles. During the off-season the trash receptacles stay, however they are only emptied Monday-Friday. During larger events on Oakland Beach such as festivals or fireworks, the trash receptacles will be emptied more than once a day. All the trash receptacles have lids on them. During the summer season, there is a program called the OSCAR kids, based off the retired OSCAR state

instituted program, that contains around eight youth that go to the beaches and pick up trash on the beaches daily.

City Park Beach – This park area has a sandy beach, along with three baseball fields, picnic areas, three-miles of paved bicycle paths and toilet facilities (“Parks &...”). Annually this beach sees around 5,000 visitors, receiving more visitors every year. There are ten trash receptacles found here.

Conimicut Point Park – Located on Point Avenue, it is a park with a sandy beach area (“Parks &...”). This smallest of the Warwick beaches, only around 500 visitors come here annually and only four trash receptacles are located here.

j. New Shoreham, Block Island

Fredrick Benson Town Beach – Although Block Island is known for its beaches, the only town maintained and owned beach is Fred Benson. All other beaches on the Island are open to the public and do have few trash receptacles that are emptied by the road crew. This beach is town managed with a large volume of visitors, approximately hundreds of thousands annually. There is no charge for parking on this beach. On this beach, there are four trash receptacles, four recycling bins, a dumpster and a pavilion with food and restrooms.

The trash receptacles are located in the front and side of the pavilion, in the foyer area and by food pick up for concessions. They get emptied several times, up to five times a day, depending on the volume and taken to the dumpster on site. The town then picks up and removes the dumpster. If there is a free concert during the summer, the dumpster is left open for visitors to dispose their trash away more easily. Every morning the staff comes in a removes trash off the beaches. The road crew, that

maintains the entire towns trash receptacles, will also drive the beach and remove trash, usually on Monday.

B. Carry In/ Carry Out + State

a. Middletown

Third Beach – Located near the mouth of the Sakonnet River, this beach, close to Second Beach, is a family-friendly beach with less waves. The beach has grills, picnic tables, and a shade structure near a boat ramp (“Sachuest...”). Third Beach is smaller than Second Beach, with no facility or electric attached to it. There are two solar lights, along with a Del’s Lemonade truck, and an equipment rental area for kayaks and stand up paddle boards. Daily passes are \$25 for weekends and \$15 for weekdays, with varying rates for seasonal passes. The switch from trash receptacles to carry in/ carry out occurred around 5-6 years ago and the beach currently has very little maintenance when it comes to handling trash. Staff will assist in picking up litter on the beaches as part of their duties. Bags are not handed out for litter disposal.

b. Little Compton

Goosewing Park Preserve – Although this is private preserve owned by The Nature Conservancy (TNC), this beach was included in the study since there is public access to the beach through Little Compton Town Beach. The preserve area includes up to the mean high tide water mark and above, however visitors pay the parking fee for Little Compton Town Beach to gain access. The fee is



Figure D. Where Goosewing Park Preserve meets Little Compton Town Beach.

from Memorial Day- Labor Day for non-residents only, residents park free. This area of the beach gets thousands of visitors annually, with around 600 people engaging in TNC educational programs. Lifeguards are staffed on this portion of the beach, provided by Little Compton. With the limited staff of TNC, the beach heavily relies on visitors and residents to take their trash off the beach.

c. Warren

Warren Town Beach – This town beach is located at the end of Water Street on the Warren River. The area has a sandy beach, along with a recreational place for playing and a picnicking area (“Town of Warren...”). Receiving around 5,000 visitors annually with no charge to park, this beach is new to the Carry In/Carry Out policy, implementing it the summer of 2016. If trash was carried in the lifeguards would notify visitors to carry it out as well. No additional trash bags were provided. The lifeguards assist with raking the beach every morning and also cleaning up the grassy area. DPW also comes once a week to cut the grass, so they also assist with picking up additional litter.



Figure E. Barrington Town Beach

d. Barrington

Barrington Town Beach – This four-acre beach is located on Bay Road, on Narragansett Bay. Lifeguards are staffed from June-September. Resident day pass is \$5 and non-resident passes are \$10. Residents are allowed to have seasonal passes, which are \$30 (“sports in...”). In 2016, around 1,800 seasonal passes and 700 day passes were sold. The entire town has a no trash

receptacle ordinance; therefore, none are provided on the beach. The town also has a no plastic bag ordinance so none are provided for trash pick-up. The lifeguards walk the beach daily to pick up litter using a brown lawn bag. DPW rakes the beach every Monday, Wednesday, and Friday for trash and seaweed. On a major holiday, they will come on Saturday to rake the beach as well. There is one vendor on the beach, who is also in charge of taking his own trash off the beach.

e. State Beaches

The main focus of this study is on town beach policies, however with the state beaches being heavily used in this state and their overarching policy of Carry In/Carry Out, two different managers were

interviewed to get a view of the policy.

The state beaches are not a key part of this study; however, their policies are worth discussing. The following beaches owned by the state of Rhode Island are:

Scarborough N&S, Roger Wheeler, Salty

Brine, East Matunuck, Misquamicut, Charlestown Breachway, and East Beach. All

state beaches are in Washington County, bordering the Block Island Sound. These beaches see millions of visitors annually. An overview of fees to park on the beaches can be found at riparks.com.

Trash receptacles were removed off all state beaches approximately 20 years ago. Since then, a Carry In/Carry Out policy has been in place. The gate attendant will offer a bag for you to dispose of trash and take home. If needed, more bags are



Figure F. Scarborough State Beach

available by asking a manager or employee. There are signs located on every lifeguard chair notifying visitors of the policies, along with signs at the entrance, pavilion and on the website. As for litter pick-up, the state contracts out an independent vendor to pick up the parking lots and beaches at night and tractor rake the beaches in the morning. Employees will also pick up litter on the beach throughout the entire day.

Appendix B. Interview Questions

1. How long have you been involved in managing this beach?
2. How many visitors does this beach receive annually?
3. Is there a charge to get onto the beach and if so how much?
4. Who is responsible for making decisions at the beach? How are these decisions made?
5. What is the town's main concerns/goals with regarding litter management?
6. What is the current policy regarding management of trash/litter on this beach?
 - a. How long has this policy been in place?
 - b. Were you in charge when this policy was implemented?
 - i. If not, who was?
 - c. Was this policy choice influenced by the other beach policies/managers around you?
 - d. If Carry in/ carry out:
 - i. Do you provide individual trash bags?
 - ii. Why do you not provide trash cans? (prompt: animals, cost of disposal)
 - e. If trash receptacles:
 - i. Why do you provide trash cans?
 - ii. How much does trash disposal cost?
7. Are there problems that have been seen with the current policy?
 - a. Is litter left by beach goes a problem at your beach? If so how do you take care of this?
 - i. Does the town/beach conduct clean ups?
 - ii. If so, how much does the town spend on clean ups?
8. If Carry In/Carry Out:
 - a. Do you see litter on the beaches?
 - b. Have people in the town complained of the policy? What are their main complaints?
9. If trash receptacles provided:
 - a. Are overflowing trash cans a problem (monetary or aesthetic wise)?

- b. Have you had issues with animals on the beach?
 - c. Do you see litter on the beaches?
 - d. Have people in town complained of the policy? What are their main complaints?
10. Have you or the town thought of alternate policies?
- a. If so, which ones and why?
 - b. What is the status of those decisions?
11. Do you find this to be an effective trash management policy?
12. Any additional thoughts to add to the subject

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