KNOW BEFORE YOU GO: UNDERSTANDING BOATERS’ ATTITUDES, KNOWLEDGE AND BEHAVIORS ASSOCIATED WITH THE RHODE ISLAND NO DISCHARGE ZONE AND MARINE PUMP-OUT FACILITIES

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UNDERSTANDING BOATERS’ ATTITUDES, KNOWLEDGE AND
BEHAVIORS ASSOCIATED WITH THE RHODE ISLAND NO DISCHARGE
ZONE AND MARINE PUMP-OUT FACILITIES

BY

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REQUIREMENTS FOR THE DEGREE OF
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OF

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APPROVED:

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DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND
2021
ABSTRACT

Rhode Island was the first state in the nation to designate all waters a No Discharge Zone (NDZ) which makes it illegal for boaters to release treated or untreated sewage from their vessels into state waters. Yet, there is little understanding of recreational boaters’ perceptions and behaviors associated with the NDZ, and what factors might influence these behaviors. This study explores how Rhode Island boaters who have vessels with marine sanitation devices (MSDs) comply with the NDZ program, support the program, and perceive its effectiveness, as well as the factors that relate to these variables. Data were gathered through an online structured survey that specifically targeted Rhode Island registered boat owners with vessels 25 feet in length or greater, as they are more likely to have an MSD on their boat. This thesis analyzed the responses of 271 survey participants to explain their attitudes, knowledge, and behaviors towards the NDZ and its related infrastructure.

Findings show that RI boaters who have vessels with an MSD typically comply with the program, find it effective, and support the NDZ. Important factors related to compliance with the regulation and positive attitudes towards the NDZ include both satisfaction with RIDEM and a feeling that it is a trustworthy agency. Rhode Island boaters who have vessels with an MSD also do not find that the NDZ regulation hinders their overall boating experience, an important factor related to compliance with the program. Managers can use these findings to implement more effective outreach strategies, increase interactions with the boating community, and emphasize the ease at which boaters can comply with the program utilizing the
provided pump-out facilities. Studies, like this thesis, are useful for supporting the continued success of the RI NDZ program.
ACKNOWLEDGMENTS

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PREFACE

This thesis is written in the manuscript format and is prepared for submission to the academic journal *Coastal Management*. 
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INTRODUCTION

Since 1998, Rhode Island waters have been designated a No Discharge Zone (NDZ), which makes it illegal for boaters to release treated or untreated sewage from their vessels into state waters. There is little understanding of recreational boaters’ attitudes and behaviors associated with the NDZ, and what factors might influence these behaviors. Notably, NDZs are associated with an improvement in water quality, which may lead to the expansion of available shell fishing grounds, human recreation opportunities, and a decrease in bacteria-related public health issues (E. Coakley, 2016). These matters are pertinent to the waters of Rhode Island which rely on marine tourism and seafood industries as major financial entities in the state (Pacheco & Tyrrell, 2003; Hayes, 1992). The Rhode Island Department of Environmental Management (RIDEM) is tasked with the upkeep and monitoring of all Rhode Island marine pump-out sites, essentially the facility a boater uses to dispose of human waste from their onboard toilet (i.e. marine sanitation device or MSD).

There has been no assessment of the Rhode Island NDZ program, including the pump-out facilities, from the boaters’ perspective. It is essential for the continued success of the NDZ program, and inherently the health of Rhode Island’s waters, to better understand the factors that influence recreational boater’s attitudes and behaviors associated with the NDZ. This study addresses this need.
RI Water Quality & NDZ Designation

Prior to its NDZ designation, sometimes referred to as a no discharge area (NDA), Rhode Island coastal waters suffered from discharges of pathogens, excessive nutrients, and toxic pollutants, all hazardous to human health and marine biodiversity (James Boyd et al., 2017). Studies describe the role boat-related waste plays in water quality as a substantial contributor to its degradation (Lipp, 2011; Milliken, 1990). Microorganisms, including pathogens and bacteria may introduce risks to human health through diseases like hepatitis, typhoid fever, and gastroenteritis to anyone who may come in contact with the contaminated water (EPA, 1998). In addition to human health impacts, raw sewage discharge from recreational vessels has also been shown to cause severe environmental damage to the marine and freshwater environment.

Excess nutrient buildup from boater discharge may cause algal blooms which often lead to hypoxic water conditions through the process of eutrophication (Granger et al., 2000). RI waters have seen numerous eutrophication events that lead to mass die-off of fish and other aquatic species (Nixon, 1989, Melrose et al., 2007, Hale et al., 2016). While it is difficult to quantify the exact percentage that the discharge of human waste from recreational boats has contributed to the degradation of RI water quality, it is believed to be significant. The Narragansett Bay Estuary Program released a technical report highlighting that the current state of water quality in Rhode Island has greatly improved in recent years (James Boyd et al., 2017).

Under the United States Clean Water Act of 1972 (CWA), it is illegal to discharge any untreated marine sewage into U.S. waters within three miles of shore, and legal to dump waste beyond the three mile limit ("Federal water pollution control
act amendments of 1972," 1972). Yet, an added NDZ designation protects the area from chemically treated sewage discharge that is often released through the use of marine sanitation devices (MSDs). Essentially, the NDZ designation acts as an added layer of protection from harmful discharges of chemically treated or untreated human waste. To comply with the NDZ program, marine vessels with a permanent toilet are required to use a type III MSD, basically a holding tank that must be properly emptied through pump-out and waste reception facilities (DEM, 1993) which can be located on shore or on a boat. Under Section 312(f)(3) of the CWA, states have the authority to petition the EPA for an NDZ designation ("Clean Water Act," 1972). To support compliance within NDZs, the U.S. Fish and Wildlife Clean Vessel Act grant program (CVA) of 1992 established federal funds that can be utilized to “build, maintain and operate waste reception facilities” (PL 102-587). CVA grant program covers 75% of installation costs and helps with maintenance costs for up to ten years (Fish and Wildlife, 1992). Rhode Island, RIDEM is the state designated water pollution control agency (DEM, 1993) and in 1998, Rhode Island became the first state in the nation to designate all its waters including all marine waters, all of Narragansett Bay, salt
ponds, estuarine and coastal waters within the three-mile limit from the RI coastline, an NDZ (Figure 1). Since 1994, RIDEM has awarded more than $2 million in CVA grants (U.S. Fish and Wildlife, 2021) to marinas which require a 25% match and must be made available to any boater, even if the location of the pump-out is in a private facility (RIDEM, 1998). According to a RIDEM press release, over 600,000 gallons of sewage were pumped out in 2020 alone (RIDEM, 2021).

There are currently sixty-six pump-out facilities in the state of Rhode Island (Figure 2), sixty of which are funded through the CVA grant program. Seventeen of

Figure 1: Geographical representation of the Rhode Island NDZ since 1998 (epa.gov, 2021)
the pump-outs in Rhode Island are mobile pump-out boats, while the rest are stationary (typically at a dock). The Rhode Island No-Discharge Compliance Program, enacted by state law in 2006 requires all RI registered vessels with a type III MSD to

Figure 2: Rhode Island pump-out facilities (dem.ri.gov, 2021)
be properly inspected. If the MSD is accurately configured, RIDEM will provide the boater with a decal to be placed “in a prominent position” which remains valid for four years (RIDEM, 2021). Penalties for non-compliance range from monetary fines of $500 to $1,000 and/or possible imprisonment (RIDEM, 2021).

As of June 2020, there were 35,672 recreational marine vessels registered in Rhode Island (RIDEM, 2020) placing stress on the marine environment (RIDEM, 1993). Understanding recreational boaters’ knowledge of and attitudes toward state regulations and locations of pump-outs, as well as overall compliance with the program will support the NDZ policy’s success.

*Previous Pump-out and NDZ studies*

Lyons (2008) conducted thesis research in the state of Maine that evaluated the NDZ program in Casco Bay after its 2006 designation. This research involved surveying Casco Bay boaters and pump-out facility operators, followed by site visits to all Casco Bay pump-out facilities, resulting in a multi-method analysis. Findings from this study showed an overall successful NDZ implementation and provided some suggestions for management improvement. Lyons (2008) notes that some boaters (11%) requested more pump-out boats in an open-ended question about suggestions to further improve the program. This study builds upon Lyons’ (2008) work by asking survey participants in Rhode Island if they prefer a certain type of pump-out facility and which factors influence their preferences.
Lyons found that only half of study respondents had experience with marine pump-out facilities while the other half reported using “port-a-pottie” systems instead (Lyons, 2008). Using a more purposive approach, my study targets boaters with installed toilets to focus on those boaters most impacted by the NDZ, and those who have the most experience with marine pump-out infrastructure. This study, centered on Rhode Island, differs greatly from the study conducted in Maine because of the difference in timing from the implementation of the NDZ designation to when the study took place. For example, Casco Bay was designated an NDZ in 2006, and the research was conducted in 2009, three years later. Rhode Island waters have had the NDZ designation for the past twenty-two years, meaning survey respondents are less likely to notice physical changes in water quality as a direct result of the NDZ program, one piece that the Casco Bay study focuses on.

In addition to Lyons’ (2008) study, Hellin et al. (2004) conducted a large-scale evaluation of a pump-out program from the perspective of boaters, pump-out facility operators, and state and municipal officials throughout the South Shore of Massachusetts. Hellin et al. (2004) highlights that the average rating and quality of pump-out services differ depending on geographical area. To build upon this work, my thesis intentionally asks RI boaters where their preferred pump-out location is and what factors (ease of access, location, operators, etc.) influence their preference.

This study draws upon these prior evaluations of NDZ policies, but solely from the boaters’ perspective. This study advances knowledge of RI recreational boaters’ attitudes and behaviors associated with a NDZ policy and incorporates some theoretical aspects from the literature.
Environmental Behavior Models and Theories for Analysis

Knowledge, attitudes, and behaviors associated with an environmental regulation are often examined using psycho-social theoretical frameworks. This research utilizes aspects of two theories of behavioral psychology to frame survey questions as well as to understand responses given by research participants. According to Stern (2000), it is typical to combine variables from different theories to best understand behavior. These theories will help to investigate how selected factors found to influence environmental behavior are related to compliance, support for the NDZ policy, and the perceived effectiveness of the program. This study is particularly interested in behaviors associated with the marine pump-outs in Rhode Island and the factors related to boating behaviors. Behaviors of interest include compliance with the NDZ program, use of certain pump-out locations, and use of certain pump-out types (stationary at a dock or mobile pump-out vessel).

Theory of Planned Behavior

Ajzen’s theory of planned behavior (TPB) is a psychological model that is used in this study to interpret why Rhode Island boaters behave in a certain way. According to this theory, behavioral attitudes, subjective norms, and perceived behavioral control are three factors called “predictors of intention” that can be utilized to understand factors that influence the intent to behave, the precedent of behavior. Attitudes alone, such as a boater's attitude toward compliance, towards water quality and towards the NDZ, provide a “poor predictor of behavior in specific situations”
Ajzen proposes factoring in two other predictors of intention, in an effort to increase validity.

This study is particularly interested in behaviors associated with the marine pump-outs in Rhode Island and the factors related to boating behaviors. Behaviors of interest include compliance with the NDZ program, use of certain pump-out locations, and use of certain pump-out types (stationary at a dock or mobile pump-out vessel). Findings from this study will provide valuable information that could potentially improve the NDZ program in Rhode Island by targeting specific facility locations and strategies for improvement.

The second factor in the TPB, subjective norms, a social factor, refers to the societal pressures to perform or not perform a behavior (Ajzen, 1991). In this study, subjective norms center around the “culture” of the Rhode Island boating community and the effect this culture may have on a boaters’ intention to behave in a certain way. For example, peer compliance may be an influential factor for boater compliance; if a boater is aware that other boaters in the community are illegally dumping their waste, they might be more inclined to do so as well.

Perceived Behavioral Control refers to the difficulty that is associated with performing or not performing a behavior. Ajzen points out that most often, prior experience with the behavior informs perceived behavioral control. For example, if a boater has had a poor experience with a pump-out facility operator, has been turned away from a pump-out, or has difficulty finding a pump-out location, they may have a lower degree of perceived behavioral control, and would be less likely to comply with the NDZ regulation. Higher perceived behavioral control might be associated with the
feeling that finding a pump-out is easy, meaning boaters feel they have more control over their behavior. Questions in this research that address difficulty accessing pump-out facilities and availability of attendants at pump-out facilities from boaters’ past experiences provide insights on why certain behaviors are performed.

Montes et al. (2018) utilized the theory of planned behavior to understand factors that influence recreational boaters’ compliance with Right Whale regulations. Montes et al. (2018) measured subjective norms by asking their survey respondents to rate the following statements on a scale of 1 to 10 (10 being the highest): “Concerning Right Whales: (1) I want to do what my family thinks I should do; (2) I want to do what my friends think I should do; (3) I want to do what other boaters think I should do; (4) I want to do what members of my boating club or group think I should do” (pg. 477). In this study, I use similar methods, and frame questions similarly to Montes et al. (2018) to gauge the level of importance each subjective norm has on their intention to comply with the program.
Environmentally Significant Behavior

To complement the theory of planned behavior, Stern’s model of environmentally significant behavior can be used to understand factors that influence Rhode Island boaters’ behaviors associated with the NDZ program. Stern (2000) suggests that environmentally significant behaviors (ESBs) are influenced by four types of “causal variables”: 1) Attitudinal factors made up of values, beliefs, attitudes and norms that subconsciously influence an individual to behave in an environmentally significant way, 2) Personal characteristics such as education level or occupation, 3) Contextual or external conditions such as legal, economic, or political features that influence behavior, and 4) Habit or routine causal variables that include difficult or expensive habits that overall influence a users’ behavior (Stern, 2000).

This study uses a combination of personal characteristics of research participants, such as education levels, age, number of years as a mariner, and boat characteristics, like vessel length, type (sailboat, powerboat, houseboat), and the type
of location where their boat is kept (marina, dock, mooring, trailer). Some examples of attitudinal factors in this study include attitudes towards the RI NDZ (support and perceived effectiveness), favorability of pump-outs on shore vs. pump-out boats, the agency responsible for carrying out the NDZ policy (Rhode Island DEM), and the importance of water quality in Rhode Island. Finally, external conditions, like the upkeep of the pump-out facility and the effectiveness of the RIDEM outreach materials that are meant to educate boaters in Rhode Island waters on the NDZ program have been assessed through survey questions.

This project investigates the factors that influence a recreational boaters’ knowledge, attitudes and behaviors associated with the RI NDZ policy and pump-out infrastructure and how selected factors from the two theoretical models above relate to compliance, support and perceived effectiveness of the NDZ policy, as well as chosen pump-out facility type preference.
Research Questions

This study will address these guiding research questions:

I. What are boaters’ attitudes, knowledge and behaviors associated with the RI NDZ program and associated marine pump-out facility infrastructure?

II. What factors (personal characteristics, subjective norms, perceived behavioral control, attitudes, external conditions) are related to boaters’ support, compliance, and perceived effectiveness of the NDZ program and preference for pump-out facility type?
METHODOLOGY

Study sample

Rhode Island is the chosen study location for this thesis because of the high concentration of registered recreational boats and the state’s waters’ designation as an NDZ. This study specifically targets respondents with Rhode Island registered boats and experience utilizing marine pump-outs. For that reason, a purposive approach was used to extract names and mailing addresses of boat owners with vessels 25 feet or larger. Purposive sampling is a common and useful method for researchers to satisfy specific needs of their projects by targeting a sample population based on certain attributes (Robson, 2002). This specific length recommendation came from RIDEM in an effort to most accurately identify vessels with an installed marine toilet. Smaller vessels often do not have an installed MSD onboard, or may utilize a “port-a-pottie” system that does not involve the utilization of marine pump-outs. Other theses studies have surveyed boaters’ attitudes towards an NDZ policy without targeting certain vessel lengths likely to have a marine toilet onboard (e.g., Lyons 2009); this meant survey data were often incomplete or not applicable to respondents.

The RIDEM active boat license registration database served as the source of contact information to recruit survey participants. This database includes contact names of boaters with registered vessels in Rhode Island, their mailing addresses, boat make, year, registered length, type, and mooring area. This database was solely used to extract a purposive population sample and recruit participants. As of June 15, 2020, there were 35,672 registered vessels in this database and 6,616 of these vessels were equal to, or greater than, 25 feet in length. With a chosen 95% confidence level and +
6% margin of error, this study needed a sample size of 257 respondents. With an average estimated 20% response rate (Robson, 2011) in mind, I chose a random sample of 2,000 boaters from the study population of 6,616 to recruit at least 400 surveys. Although we received a lower-than-expected response rate, this study is still within ideal sample size with 271 respondents.

**Sampling methodology**

Through the RI Boater Database, only mailing addresses were available, and no email addresses. Therefore, since only mailing addresses were available in the RI Boater Database, participants were recruited through a postcard with a corresponding virtual link to access an online survey.
Figures 4 and 5 show the postcard that was mailed out to 2,000 boat owners in RI. The postcard included a Quick Response (QR) Code as a second method to access the survey. To increase response rate, two rounds of postcards were mailed to the study sample (Millar & Dillman, 2011). The initial postcard mailing went out on Thursday October 22, 2020, and a second reminder postcard was mailed out two weeks later Thursday November 5, 2020.

Data were collected anonymously through Qualtrics online survey software. The survey data collection began at the end of October 2020 and closed in December 2020. Response totals varied between questions because survey respondents were given the opportunity to leave the survey or skip a question at any time. Out of 2,000 mailed invitations, 271 Rhode Island registered recreational boat-owners responded to this survey, for a response rate of 13.5%. While this is lower than the response rate of similar studies (23%) conducted with recreational boaters (e.g., Jett, Thapa, and Swett
2013), this is not surprising given the two-step recruitment process for respondents to access the electronic survey.

Prior to the start of the survey, participants were given a brief explanation of the purpose of the research, a notice of confidentiality, and were given contact information of the researchers. The participants all had to agree to the terms outlined in this section before proceeding with the rest of the survey.

Survey design

A structured survey was designed to understand a range of factors influencing boaters’ attitudes, knowledge and behaviors, largely based on environmental behavior theory and models adapted from The Theory of Planned Behavior (Ajzen, 1991) and Environmentally Significant Behaviors (Stern, 2000). Specifically, some questions were adapted from previous environmental sociological studies (Beardmore 2015; Fishbein and Ajzen, 2011; Kim et al. 1997; Wang et al. 2018) as well as previous studies on boater behavior as it pertains to the NDZ (Lyons, 2008; UHI, 2004).

The survey included five parts: (1) Descriptive information about the boater and their vessel, (2) Questions pertaining to the boaters’ knowledge of the RI NDZ, (3) Questions pertaining to the boaters’ behaviors and attitudes related to the RI NDZ, (4) Questions pertaining to the boaters’ experiences with pump-out facilities in Rhode Island, (5) Demographic questions about the respondent (see Appendix A for full survey).
Some questions in this survey were drawn from similar studies like Dalton and Jin (2018) which investigated attitudinal factors and personal characteristics that influence support for aquaculture in Rhode Island; Dalton and Thompson (2013), which studied recreational boaters’ perceptions of scenic value in Rhode Island coastal waters; and Montes et al. (2018) that investigated the factors influencing recreational boaters’ intentions to comply with Right Whale regulations in Florida. The majority of questions in the survey used a five-point Likert scale, mainly, 1=Strongly Disagree to 5= Strongly Agree. Some descriptive questions necessitated an open-ended response such as the respondent’s occupation, location of where their boat is kept, and suggestions for program improvement.

Data analysis

Four causal or dependent variables were used in this study to understand boater attitudes toward the NDZ policy and pump-out facilities. These variables included (1) support for the NDZ program, (2) perceived NDZ program effectiveness, (3) boater compliance with the NDZ policy, and (4) pump-out facility preference type (i.e. stationary or mobile).

The variables for Support and Effectiveness are Likert scale questions, i.e. “I support the NDZ policy in Rhode Island” (1=Strongly Disagree to 5=Strongly Agree). Mann Whitney U statistical tests were used to examine relationships between the independent variables and these dependent variables.

The variable for Compliance is a combination of two questions: 1: How often do you release untreated waste into the water from your boat within 3 miles of RI
And 2: How often do you release treated waste into the water from your boat within 3 miles of RI shore? Likert scale options for these questions were stated as, “(1) Never, (2) Almost never, (3) Occasionally, (4) Almost every time I release waste, (5) Every time I release Waste”. Responses (2) through (5) were re-coded in the SPSS software as 0 = Does not Comply, and response (1) = Comply because simply discharging of treated or untreated waste one time is enough to violate the NDZ sanctions. These two questions were then combined to form one variable for Compliance.

Similarly, the variable for chosen pump-out facility type (1) Mobile pump-out boat, (2) Stationary, (3) No Preference) was re-coded so that (3) was treated as a missing variable. Statistical analysis for the two dichotomous variables Compliance and chosen pump-out facility type was performed using a Chi-Square test to examine statistical relationships between these variables and other factors. Chi-square tests were only performed between dichotomous independent and dependent variables, like Satisfaction with DEM and NDZ Compliance (Error! Reference source not found.).

The following independent variables:

- RIDEM trustworthy,
- RIDEM satisfaction,
- Compliance law necessary,
- NDZ limits boating experience,
- All RI water should be NDZ,
- Centrality of boating lifestyle,
- Peer compliance,
• Perceived ability to influence coastal water quality,
• Pump-outs easy to find,
• Pump-outs well maintained,
• Pump-outs accessible,

were all re-coded from a five-point scale (1 = Strongly Disagree, 2= Disagree, 3 = neither agree nor disagree, 4 = Agree, 5= Strongly Agree) into dichotomous variables. Responses 1 and 2 were recoded to 0 = No/Disagree and responses 4 and 5 were recoded into 1 = Yes/Agree. Response 3 (neither agree nor disagree) was coded as a missing variable. Significance of all statistical tests was determined at the commonly accepted 5% level.

Open-ended response questions were grouped into thematic codes for the purpose of graphing frequency visualizations. Like responses were coded and labelled together as a theme. For example, a survey question asked for boaters’ overall suggestions to improve the NDZ program in RI, and similar responses were categorized into 14 different groups. It is important to note that these open-ended coded responses are less representative of the study sample because the response rate is much lower. This survey allowed all participants to skip questions when they preferred to, and many chose to skip the open-ended responses, maybe because they take a bit more thought and time. However, thematic coding is useful in a descriptive or exploratory basis, as seen in this thesis (Robson, 2002).
RESULTS

Characteristics of respondents and their boats

On average, respondents were 61 (SD=9.81) years of age, 89.7% male, with an average income level between $100,000 and $199,999. The majority of survey respondents (96.27%) stated that their MSD is in compliance with the Rhode Island NDZ policy, with 250 respondents reporting a Type III MSD with a holding tank. When asked which type of marine vessel respondents used most frequently, 59% answered powerboat, while 40% answered sailboat, and less than one percent answered survey questions regarding their houseboat (Figure 6).

Figure 6: Respondents' reported vessel types (N=271)

Overall, the respondents to this survey were avid boaters that spent an average of 35 days on their vessel in the last year and felt knowledgeable about the rules and regulations of boating (M=4.53). Boaters in this survey also agreed they were knowledgeable about water quality (M= 4.09) and environmental issues in RI
Respondents also find boating to be their most enjoyable activity (M=4.56) and find that their life is organized around boating (M=4.05) (Table 2).

Table 1: Respondent's Stated Knowledge on a 5-point scale of 1= Strongly Disagree at all to 5= Strongly Agree (N=262)

<table>
<thead>
<tr>
<th>Knowledgeable about…</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RI Water Quality Issues</strong></td>
<td>4.09</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Rules and Regs of Boating</strong></td>
<td>4.53</td>
<td>0.90</td>
</tr>
<tr>
<td><strong>Environmental Issues in RI</strong></td>
<td>4.12</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Table 2: Respondents’ centrality of boating to lifestyle along 4 different dimensions on a 5-point scale where 1 = Strongly Disagree to 5= Strongly Agree (N=266)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boating is my most enjoyable activity</strong></td>
<td>4.56</td>
<td>1.10</td>
</tr>
<tr>
<td><strong>Boating is important to me</strong></td>
<td>4.58</td>
<td>0.97</td>
</tr>
<tr>
<td><strong>Boating says a lot about me</strong></td>
<td>4.02</td>
<td>1.08</td>
</tr>
<tr>
<td><strong>My life is organized around boating</strong></td>
<td>4.05</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Boaters were asked to respond to questions regarding the vessel they use most frequently. On average, these boaters own vessels that are 33 feet in length (SD=6.817) and bring an average of 3 (SD= 2.3) passengers onboard a typical boating trip. 26% of the boaters report having been employed in a marine-related field at some point throughout their life (n=70).

Respondents to this survey typically store their vessel at a marina or on a mooring, compared to other options (Figure 7) and most respondents’ boats are kept
in Warwick (n= 38), Newport (n=32) and North Kingstown (n=32) (Figure 8).

Figure 7: Where respondents keep their vessel (Storage location type). (N= 271)

Figure 8: R.I. Towns where respondents keep their vessels (N=269)
Survey respondents report frequenting the Southern Bay region of Rhode Island coastal waters the most which includes Newport, Jamestown, South Kingstown, and Narragansett (Figure 9).

![Figure 9: Frequencies of areas respondents typically boat in. (Respondents were asked to choose all locations that apply)](image)

The following sections describe findings related to pump-outs, the RI NDZ policy, and factors influencing attitudes and behaviors associated with the NDZ policy and pump-out facilities.

**Attitudes Knowledge and Behaviors Associated with Marine Pump-out Infrastructure**

Overall, respondents agreed that Rhode Island pump-out facility prices are fair, pump-outs are easy to find, and boaters who illegally discharge their sewage should be fined (Table 3). Respondents tend to slightly agree that there are enough pump-out facilities available in Rhode Island waters. Respondents also tended to agree (M=3.66) that Rhode Island marine pump-out facilities are well maintained.
78.6% of respondents understood that Rhode Island DEM is the agency
designated with the upkeep and monitoring of pump-out facilities in Rhode Island
(Table 3). When asked if they had ever been turned away from a pump-out facility
that they intended to use, most respondents (78.9%) reported they had not been turned
away. Those that had been turned away (21.1%) report broken facilities and
inaccessibility as the main reasons (Figure 10).

![Figure 10: Frequencies of coded responses for pump-out facility inaccessibility (N = 53)](image)

On average, boaters reported pumping out their vessel Bi-Weekly and pay an
average of $2.67 per pump-out service (SD=4.89). While boaters paid less than the
average state pump-out price ($5.00/25 gallon pump-out), they slightly agree that the
state pump-out average price is fair.
Table 3: Summary of boaters' attitudes, behaviors, and knowledge associated with pump-out facilities.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump-out price</td>
<td>The average cost of pump-outs is fair ($5.00) (1=Strongly Disagree to 5= Strongly Agree)</td>
<td>247</td>
<td>3.75</td>
<td>1.27</td>
</tr>
<tr>
<td>Pump-outs easy to find</td>
<td>It is easy to find a pump-out in R.I. when I need one. (1=Strongly Disagree to 5= Strongly Agree)</td>
<td>247</td>
<td>3.74</td>
<td>1.09</td>
</tr>
<tr>
<td>Number of pump-outs</td>
<td>There are enough pump-out facilities located in R.I. (1=Strongly Disagree to 5= Strongly Agree)</td>
<td>247</td>
<td>3.17</td>
<td>1.08</td>
</tr>
<tr>
<td>Fine for Dumping Sewage</td>
<td>Boaters should be fined for discharging sewage into the water. (1=Strongly Disagree to 5= Strongly Agree)</td>
<td>247</td>
<td>4.39</td>
<td>0.98</td>
</tr>
<tr>
<td>Pump-outs well maintained</td>
<td>Rhode Island pump-outs seem well-maintained. (1=Strongly Disagree to 5= Strongly Agree)</td>
<td>247</td>
<td>3.66</td>
<td>0.94</td>
</tr>
<tr>
<td>Pump-outs accessible</td>
<td>While boating, I can easily access a pump-out site. (1=Strongly Disagree, 5= Strongly Agree)</td>
<td>247</td>
<td>3.71</td>
<td>1.02</td>
</tr>
<tr>
<td>Average pump-out price</td>
<td>Average price respondents paid for a pump-out (USD)</td>
<td>230</td>
<td>2.67</td>
<td>4.89</td>
</tr>
<tr>
<td>Pump-out Frequency</td>
<td>How often respondents pump-out their vessel (1= Daily, 2=Weekly, 3=Bi-Weekly, 4=Monthly, 5= Once at the end of boat season)</td>
<td>248</td>
<td>Bi-Weekly (37.2%)</td>
<td>Median Value used*</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td>Frequency: Yes (1)</td>
<td>Frequency: No (0)</td>
</tr>
<tr>
<td>Organization associated with pump-outs</td>
<td>Are respondents knowledgeable about the organization responsible for the maintenance and upkeep of the pump-outs? (1= Yes, 0= No)</td>
<td>262</td>
<td>206 (79%)</td>
<td>56 (21%)</td>
</tr>
<tr>
<td>Behaviors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turned away from a pump-out</td>
<td>Has the respondent ever been turned away from a pump-out facility? (1= Yes, 0= No)</td>
<td>251</td>
<td>53 (21%)</td>
<td>198 (79%)</td>
</tr>
</tbody>
</table>
To explain further why boaters in this survey chose a preferred pump-out facility type, Chi square analysis was conducted to compare boaters’ preferred type and their most frequently used facility type. This test showed there was a statistically significant relationship between the two variables ($\chi^2 = 108.217, p < 0.01$) (Figure 11). Boaters that have a stated preference for stationary pump-outs are more likely than those preferring mobile pump-outs to use stationary pump-outs.

![Figure 11: Relationship between preferred pump-out type and frequently used pump-out type. Chi Square Results](image-url)
The majority of boaters in this survey noted that convenience was the most influential factor affecting their chosen pump-out facility location (Figure 14). Most boaters found pump-out location information through signage (n=159) and word of mouth from other boaters (n=150) (Figure 13).

Figure 12: Respondents’ reasons for preferring certain pump-out locations. Similar responses to open-ended questions were grouped into five categories. (N=227)

Figure 13: How boaters encounter information on pump-out facility locations. (Respondents were asked to choose all options that apply) (N=331)
NDZ Policy

Generally, boaters did not think the NDZ policy limited their boating experience (M=1.46) and agreed that all Rhode Island waters should be a designated NDZ (M=4.16). Respondents were generally supportive of the NDZ policy (M=4.34) and find that the policy is effective (M = 3.92) (Table 4).

Table 4: Summary of boaters’ attitudes, knowledge, and behaviors associated with the RI NDZ Policy.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitudes:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All RI water should be NDZ</td>
<td>All Rhode Island waters should be designated as a no-discharge zone (NDZ) (1=Strongly Disagree to 5=Strongly Agree)</td>
<td>255</td>
<td>4.16</td>
<td>1.22</td>
</tr>
<tr>
<td>Boater perception of NDZ</td>
<td>The NDZ policy is effective (1=Strongly Disagree to 5=Strongly Agree)</td>
<td>255</td>
<td>3.92</td>
<td>0.87</td>
</tr>
<tr>
<td>Boater support for NDZ</td>
<td>I support the NDZ policy in Rhode Island (1=Strongly Disagree to 5=Strongly Agree)</td>
<td>248</td>
<td>4.34</td>
<td>1.33</td>
</tr>
<tr>
<td><strong>Knowledge:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of NDZ policy</td>
<td>I feel knowledgeable about the NDZ policy in RI (1=Strongly Disagree to 5=Strongly Agree)</td>
<td>262</td>
<td>4.34</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Frequencies:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penalty</td>
<td>Is there a penalty for disobeying the NDZ policy? (yes, no)</td>
<td>262</td>
<td>99.4% = Yes, 0.4% = No</td>
<td></td>
</tr>
<tr>
<td>Prior Knowledge</td>
<td>Did you know what an NDZ was before this survey? (yes, no)</td>
<td>262</td>
<td>92.7% = Yes, 7.3% = No</td>
<td></td>
</tr>
<tr>
<td><strong>Behaviors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vessel Compliance</td>
<td>Is your vessel in compliance with the NDZ policy? (yes, no)</td>
<td>262</td>
<td>97.7% = Yes, 2.3% = No</td>
<td></td>
</tr>
<tr>
<td>Limits to boating Experience</td>
<td>Following the NDZ policy in Rhode Island limits my boating experience. (1=Strongly Disagree to 5=Strongly Agree)</td>
<td>255</td>
<td>1.46</td>
<td>0.92</td>
</tr>
</tbody>
</table>
Boaters in this survey were asked how they found out about the Rhode Island NDZ designation. Their most frequent responses included brochures (n=109), other boaters (n=107), and signage (n=83) (Figure 14). When asked if boaters had any suggestions to improve upon the NDZ program, the improvement mentioned most frequently was an increase in information on pump-out locations (n=18), followed by an increase in the amount of pump-out boats (n=15), pump-out services should be free (n=13), increase in NDZ enforcement (n=12), and an increase in the amount of pump-out facilities (n=12). The remaining suggestions have frequencies less than 7. (Figure 15).

Figure 14: How boaters are informed of the NDZ designation. (Respondents were asked to choose all options that apply) (N=331)
Figure 15: Respondents’ suggestions for improving the NDZ program in RI. Similar open-ended responses were grouped into multiple categories. (N=102)
Factors related to attitudes and behaviors associated with the NDZ policy and pump-out facilities

Table 5: Continuous Dependent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
</table>
| Boater Support for NDZ            | I support the NDZ policy in Rhode Island.  
(1=Strongly Disagree, 5=Strongly Agree) | 255| 4.34 | 1.33     |
| Boater perception of NDZ effectiveness | I think the NDZ policy is effective.  
(1=Strongly Disagree, 5=Strongly Agree) | 255| 3.92 | 0.88     |

Table 6: Dichotomous Dependent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>Number of boaters (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Comply</td>
</tr>
<tr>
<td>Boater compliance</td>
<td>Whether boaters ever discharge treated or untreated sewage into the water from their boat.</td>
<td>271</td>
<td>233 (86%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mobile (Pump-out Boat)</td>
</tr>
<tr>
<td>Pump-out Facility Type Preference</td>
<td>Facility Type Preference</td>
<td>166</td>
<td>70 (42.2%)</td>
</tr>
<tr>
<td>Variable</td>
<td>N</td>
<td>Number of boaters (Percentage)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>--------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>RIDEM trustworthy</td>
<td>206</td>
<td>Yes: 189 (91.7%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 17 (8.3%)</td>
<td></td>
</tr>
<tr>
<td>RIDEM satisfaction</td>
<td>206</td>
<td>Yes: 191 (92.7%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 15 (7.3%)</td>
<td></td>
</tr>
<tr>
<td>Compliance law necessary</td>
<td>250</td>
<td>Yes: 240 (96%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 10 (4%)</td>
<td></td>
</tr>
<tr>
<td>NDZ limits boating experience</td>
<td>239</td>
<td>Yes: 16 (6.7%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 223 (93.3%)</td>
<td></td>
</tr>
<tr>
<td>All RI water should be NDZ</td>
<td>230</td>
<td>Yes: 196 (85.2%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 34 (14.8%)</td>
<td></td>
</tr>
<tr>
<td>Centrality of boating lifestyle</td>
<td>235</td>
<td>Yes: 210 (89.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 25 (10.6%)</td>
<td></td>
</tr>
<tr>
<td>Boater compliance</td>
<td>271</td>
<td>Yes: 233 (86%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 38 (14%)</td>
<td></td>
</tr>
<tr>
<td>Peer compliance</td>
<td>250</td>
<td>Yes: 240 (96%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 10 (4%)</td>
<td></td>
</tr>
<tr>
<td>Perceived ability to influence coastal water quality</td>
<td>227</td>
<td>Yes: 219 (96.5%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 8 (3.5%)</td>
<td></td>
</tr>
<tr>
<td>Pump-outs easy to find</td>
<td>194</td>
<td>Yes: 161 (83%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 33 (17%)</td>
<td></td>
</tr>
<tr>
<td>Pump-outs well-maintained</td>
<td>171</td>
<td>Yes: 145 (84.8%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 26 (15.2%)</td>
<td></td>
</tr>
<tr>
<td>Pump-outs accessible</td>
<td>189</td>
<td>Yes: 158 (83.6%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 31 (16.4%)</td>
<td></td>
</tr>
<tr>
<td>Turned away from a pump-out</td>
<td>251</td>
<td>Yes: 53 (21.1%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 198 (78.9%)</td>
<td></td>
</tr>
</tbody>
</table>
Mann Whitney U Mean Ranks test was used to further understand the relationship between selected variables and support for the NDZ and perceptions of NDZ effectiveness.

Respondents with higher support for the NDZ thought that DEM was a trustworthy agency ($U= 1223.5$, $n1=17$ $n2=189$, $p= 0.025$) and are satisfied with the work DEM does in Rhode Island in general ($U= 994.5$, $n1= 15$, $n2= 191$, $p= 0.006$). Additionally, boaters who support the NDZ do not think the policy limits their boating experience ($U = 1304.5$, $n1=223$, $n2=16$, $p= 0.013$), think all of RI water should remain an NDZ ($U= 2741$, $n1=34$, $n2=196$, $p= 0.021$), and believe they have the ability to influence coastal water quality ($U=557$, $n1=, n2=, p=0.019$) (Table 8).

Respondents who think the NDZ policy is effective also think DEM is a trustworthy agency ($U= 1093$, $n1 = 17$, $n2= 189$, $p= <0.02$) and are satisfied with their work in Rhode Island ($U=528$ $n1= 15$, $n2= 191$, $p= <0.05$). Additionally, boaters who think they can influence coastal water quality tend to find the NDZ policy effective ($U= 471.5$, $n1 = 8$, $n2= 219$, $p= 0.018$). Other factors that have a significant relationship with NDZ effectiveness are whether boaters think pump-out facilities are easy to find ($U= 1829$, $n1 = 33$, $n2= 161$, $p= 0.003$) and are well-maintained ($U= 151.5$, $n1 = 26$, $n2= 145$, $p= 0.014$).
Table 8: Relationship between selected variables and boater support for NDZ and perceptions of NDZ effectiveness. Results of Mann-Whitney tests.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Independent Variables:</th>
<th>Mean Ranks:</th>
<th>P- Value:</th>
<th>Mann-Whitney U:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boater Support for NDZ</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIDEM trustworthy</td>
<td>105.53</td>
<td>80.97</td>
<td><strong>0.025</strong>*</td>
<td>1223.5</td>
</tr>
<tr>
<td>RIDEM satisfaction</td>
<td>105.79</td>
<td>74.3</td>
<td><strong>0.006</strong>*</td>
<td>994.5</td>
</tr>
<tr>
<td>Compliance law necessary</td>
<td>126.65</td>
<td>98</td>
<td>0.094</td>
<td>925</td>
</tr>
<tr>
<td>NDZ limits boating experience</td>
<td>90.03</td>
<td>122.15</td>
<td><strong>0.013</strong>*</td>
<td>1304.5</td>
</tr>
<tr>
<td>All RI water should be NDZ</td>
<td>118.52</td>
<td>98.12</td>
<td><strong>0.021</strong>*</td>
<td>2741</td>
</tr>
<tr>
<td>Centrality of boating lifestyle</td>
<td>113.63</td>
<td>107.71</td>
<td>0.578</td>
<td>2285</td>
</tr>
<tr>
<td>Boater compliance</td>
<td>129.43</td>
<td>112.89</td>
<td>0.178</td>
<td>2230.5</td>
</tr>
<tr>
<td>Peer compliance</td>
<td>126.65</td>
<td>98</td>
<td>0.094</td>
<td>925</td>
</tr>
<tr>
<td>Perceived ability to influence coastal water quality</td>
<td>115.45</td>
<td>74.19</td>
<td><strong>0.019</strong>*</td>
<td>557.5</td>
</tr>
<tr>
<td>Pump-outs easy to find</td>
<td>99.87</td>
<td>85.94</td>
<td>0.076</td>
<td>2275</td>
</tr>
<tr>
<td>Pump-outs well maintained</td>
<td>87.32</td>
<td>78.63</td>
<td>0.247</td>
<td>1693</td>
</tr>
<tr>
<td>Pump-outs accessible</td>
<td>96.47</td>
<td>87.48</td>
<td>0.254</td>
<td>2216</td>
</tr>
<tr>
<td>Turned away from a pump-out</td>
<td>127.67</td>
<td>125.55</td>
<td>0.802</td>
<td>5158.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boater Perception of NDZ Effectiveness</th>
<th>YES</th>
<th>NO</th>
<th>P- Value:</th>
<th>Mann-Whitney U:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIDEM trustworthy</td>
<td>106.22</td>
<td>73.29</td>
<td><strong>0.02</strong>*</td>
<td>1093</td>
</tr>
<tr>
<td>RIDEM satisfaction</td>
<td>108.24</td>
<td>43.2</td>
<td><strong>0.00</strong>*</td>
<td>528</td>
</tr>
<tr>
<td>Compliance law necessary</td>
<td>127.16</td>
<td>85.75</td>
<td>0.059</td>
<td>802.5</td>
</tr>
<tr>
<td>NDZ limits boating experience</td>
<td>100.97</td>
<td>121.37</td>
<td>0.225</td>
<td>1479.5</td>
</tr>
<tr>
<td>All RI water should be NDZ</td>
<td>118.13</td>
<td>100.32</td>
<td>0.124</td>
<td>2816</td>
</tr>
<tr>
<td>Centrality of boating lifestyle</td>
<td>114.61</td>
<td>99.54</td>
<td>0.254</td>
<td>2089</td>
</tr>
<tr>
<td>Boater compliance</td>
<td>128.79</td>
<td>119.61</td>
<td>0.552</td>
<td>2378.5</td>
</tr>
<tr>
<td>Peer compliance</td>
<td>127.16</td>
<td>85.75</td>
<td>0.059</td>
<td>802.5</td>
</tr>
<tr>
<td>Perceived ability to influence coastal water quality</td>
<td>115.85</td>
<td>63.44</td>
<td><strong>0.018</strong>*</td>
<td>471.5</td>
</tr>
<tr>
<td>Pump-outs easy to find</td>
<td>102.64</td>
<td>72.42</td>
<td><strong>0.003</strong>*</td>
<td>1829</td>
</tr>
<tr>
<td>Pump-outs well maintained</td>
<td>89.68</td>
<td>65.48</td>
<td><strong>0.014</strong>*</td>
<td>151.5</td>
</tr>
<tr>
<td>Pump-outs accessible</td>
<td>98.05</td>
<td>79.45</td>
<td>0.065</td>
<td>1967</td>
</tr>
<tr>
<td>Turned away from a pump-out</td>
<td>111.11</td>
<td>129.98</td>
<td>0.073</td>
<td>4458</td>
</tr>
</tbody>
</table>

* Significant values at the p <0.05 level.
Chi Square tests were conducted to understand the relationship between **Compliance** and **Pump-out facility preference** with selected variables (Table 9).

Table 9: Relationship of selected variables with compliance and facility preference. Results of chi-square tests.

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Pearson Chi-Square:</th>
<th>P Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Do Not Comply</td>
<td>RIDEM trustworthy</td>
<td>2.16</td>
</tr>
<tr>
<td></td>
<td>RIDEM satisfaction</td>
<td>4.453</td>
</tr>
<tr>
<td>1 = Comply</td>
<td>Turned away from a pump-out</td>
<td>3.677</td>
</tr>
<tr>
<td></td>
<td>Compliance law necessary</td>
<td>1.822</td>
</tr>
<tr>
<td></td>
<td>NDZ limits boating experience</td>
<td>6.812</td>
</tr>
<tr>
<td></td>
<td>All RI water should be NDZ</td>
<td>0.209</td>
</tr>
<tr>
<td></td>
<td>Centrality of boating lifestyle</td>
<td>5.357</td>
</tr>
<tr>
<td></td>
<td>Peer compliance</td>
<td>1.822</td>
</tr>
<tr>
<td></td>
<td>Perceptions on ability to influence coastal water quality</td>
<td>0.629</td>
</tr>
<tr>
<td></td>
<td>Pump-outs Easy to Find</td>
<td>2.414</td>
</tr>
<tr>
<td></td>
<td>Pump-outs Well Maintained</td>
<td>0.625</td>
</tr>
<tr>
<td></td>
<td>Pump-outs accessible</td>
<td>3.394</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump-Out Facility Preference</th>
<th>Pearson Chi-Square:</th>
<th>P Value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Mobile (Pump-Out Boat)</td>
<td>RIDEM trustworthy</td>
<td>0.575</td>
</tr>
<tr>
<td>2 = Stationary (at a dock)</td>
<td>RIDEM satisfaction</td>
<td>0.401</td>
</tr>
<tr>
<td></td>
<td>Turned away from a pump-out</td>
<td>0.041</td>
</tr>
<tr>
<td></td>
<td>Compliance law necessary</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td>NDZ limits boating experience</td>
<td>0.599</td>
</tr>
<tr>
<td></td>
<td>All RI water should be NDZ</td>
<td>1.158</td>
</tr>
<tr>
<td></td>
<td>Centrality of boating lifestyle</td>
<td>1.667</td>
</tr>
<tr>
<td></td>
<td>Peer compliance</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td>Perceived ability to influence coastal water quality</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>Pump-outs easy to find</td>
<td>3.498</td>
</tr>
<tr>
<td></td>
<td>Pump-outs well maintained</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Pump-outs accessible</td>
<td>5.959</td>
</tr>
</tbody>
</table>

* Significant values at the p < 0.05 level.
The results of the Chi square tests show that respondent’s satisfaction with RIDEM is statistically related to compliance. Specifically, respondents who answered “Yes” to being satisfied with RIDEM’s work tend to comply with the RI NDZ policy ($n=180, p=0.035$) (Figure 17). Additionally, boaters who find their life is organized around their boating lifestyle (Figure 16) ($n=186, p=0.021$) and those who do not find the NDZ to limit their boating experience (Figure 19) ($n=208, p=0.009$) are more likely to comply with the RI NDZ program. Finally, respondents who generally find RI pump-out facilities accessible ($n=72, p=0.015$) prefer stationary dockside pump-out facilities (Figure 18).
Chi Square results of significant relationships:

Figure 17: Satisfaction with DEM and NDZ Compliance (N = 206)

Figure 16: Boating Life Priorities and Compliance (N = 235)
Figure 19: Perceived limits on boating experience and compliance (N=239)

Figure 18: Pump-out accessibility & Facility type (N=134)
DISCUSSION

Introduction

This study explored attitudes and compliance with environmental policy by analyzing the relationships among various factors related to a boaters’ decision to support or oppose the NDZ program in Rhode Island. It also identified factors that are related to boater compliance with the policy, and whether boaters find the NDZ policy effective. Findings of this study show that boaters generally feel positively about the RI NDZ program, and the majority of boaters report complying with no-discharge zone regulations. Several key factors related to boaters’ knowledge, policy support and compliance behaviors associated with the RI NDZ policy emerged from the study and are highlighted below.

Knowledge of the NDZ policy and program

Overall, respondents to this survey are highly knowledgeable in all areas pertaining to the NDZ and related policies. Survey questions asked for respondents to state their agreement level with how knowledgeable they are on topics of water quality, rules and regulations of boating, and environmental issues in RI. Additionally, respondents’ knowledge was quantified through assessment questions to confirm the validity of their stated knowledge. Based on the survey results, managers interested in improving the program may find it useful to direct their education and outreach efforts.
towards other areas of the program outside boaters’ knowledge of the NDZ’s existence and repercussions for non-compliance.

Of the respondents that chose to answer an open-ended question regarding their suggestions to improve upon the NDZ program (Figure 15), the most frequent thematic coded response involved a request for more information on pump-out locations, how to access them, and their operating hours. Findings also suggest that boaters generally want pump-outs that are conveniently located (Figure 12). Together, these findings indicate that outreach materials would be most useful to RI boaters if they contained geographic visualizations of pump-out locations throughout Rhode Island waters with contact and access information. Managers may consider utilizing an online resource (that can be frequently and easily updated like ArcGIS Online) to inform boaters of marine pump-out locations more accurately. This type of detailed information, also called procedural knowledge, has shown to be a strong correlate to recycling behaviors; and may also apply to other environmentally-related behaviors, like compliance (Schultz, 2002). Procedural knowledge focuses on the “where, when, and how” aspects of knowledge compared to impact knowledge which highlights an individual’s belief about an action (Schultz, 2002, pg. 69). In the context of the NDZ policy, procedural knowledge that details information on how a boater can comply with the regulation by specifically outlining geographic locations of pump-outs in an easily accessible platform is particularly useful. Brochures and printed material are not recommended, as they may quickly become obsolete when marinas and yacht clubs change ownership and/or facility names, adding barriers for boaters to comply with the NDZ policy.
When asked how boaters currently encounter information on pump-out facility locations (Figure 13), most answered, “word of mouth from other boaters” and “signage”; therefore, a targeted outreach effort through social media and email (the options chosen the least by respondents) may help to increase overall visibility of the program and continue its success. Studies show that increasing resource user education surrounding environmental regulations can positively influence behaviors, specifically when attitudes are already positively correlated, i.e., attitudes towards the NDZ policy (e.g., Gardner and Stern 1996). A similar study concerning recreational boaters in Florida found the level of respondents’ background knowledge on Right Whales and the existence of a 460-m distance rule to positively influence their intention to comply with Right Whale regulations (Montes et al., 2018). Essentially, boaters surveyed in (Montes et al., 2018), were more likely to comply with the environmental regulation if they were more knowledgeable about the resource intended for protection, Atlantic Right Whales. This study, combined with findings in this thesis, highlight the importance of continuing boater outreach and education efforts for the program’s success.

**Connection to the Responsible Agency**

Generally, RI boaters surveyed in this study have a positive opinion of the NDZ program, governing agency, and pump-out facility infrastructure. There was a statistically significant relationship between satisfaction with RIDEM as a regulatory and governing agency and boaters’ compliance with the regulation. Specifically, boaters who are satisfied with the work of RIDEM are more likely to comply with the NDZ policy and properly dispose of human waste from their vessels.
When asked if boaters found RIDEM a *trustworthy* agency, the result was overwhelmingly positive, and was related to whether they found the NDZ program itself to be effective and if they supported the NDZ policy. The findings of my study support the work of Marc Stern (2008), who conducted research on the connection between agency trust and compliance with environmentally protected areas. He found that trust with the enforcement agency was the key factor related to voluntary compliance - even when resource users did not necessarily agree with the imposed regulation.

The results of my study indicate that managers interested in sustaining the success of the Rhode Island NDZ policy should continue to foster a positive relationship with the boating community and pay particular attention to their overall approval of the RIDEM as an agency. Stern (2008) shows that “social distance”, “turnover in management”, and “lack of receptiveness to local input” are the three factors that show the most negative influence on trust between resource users and enforcing agencies. Although Stern’s study was not conducted in Rhode Island, his findings could apply here to support a positive relationship between boaters and RIDEM. Consequently, RIDEM should consider keeping an active presence in the RI recreational boater world by engaging the local public, establishing long-term relationships with the community, and implementing a system to receive programmatic feedback. Additional studies, like this thesis research, that consider the NDZ program from the boaters’ perspective will ensure the continued strength of the relationship between these two entities.
Environmental Behavior Theory & Boater Compliance

Several factors from the literature on environmental behaviors were related to boaters’ compliance with the RI NDZ policy. Findings in this study showed that respondents who consider boating essential to their lifestyle are more likely to comply with the NDZ program. Boating requires a substantial time and financial commitment for necessary certifications, safety training, boat maintenance and upkeep; and boaters in this survey indicated spending a considerable amount of time on their boat (average 35 days in a year). This massive commitment is sometimes referred to as a high degree of activity involvement, and is often measured as centrality to lifestyle (Kim, Scott, & Crompton, 1997), or the degree to which an activity influences other aspects of an individual’s life (Beardmore, 2015). The centrality of boating to lifestyle variable is considered an individual precursor variable that may relate to behavior indirectly by affecting behavioral, normative, or control beliefs (Fishbein & Ajzen, 2011). In this study, it is likely that the centrality of boating to lifestyle indirectly relates to boater compliance with the NDZ by affecting subjective norms surrounding boating culture. Most boaters in this survey agreed that most of their life is organized around boating and boat-related activities, indicating a high level of centrality to lifestyle. Centrality to lifestyle has been used as a variable to study environmental concern (e.g., Fedler 2007, Beardmore 2015) and compliance (e.g., Montes et al. 2018) in recreational boaters. Findings in this thesis are supported by a study on boater perceptions of environmental issues in Wisconsin lakes which showed that boater centrality to lifestyle was directly correlated with the level of concern for environmental issues (Beardmore, 2015). This information is particularly useful in the context of Rhode Island boaters’ compliance with the NDZ.
because it will allow managers to focus outreach efforts to specific events and locations frequented by those who immerse themselves in the boating lifestyle. It may also be beneficial to promote boating activities in RI to sustain and potentially increase NDZ compliance. This could be achieved through low-cost and accessible community events to pique interest in boating-adjacent recreational activities. Some examples include fishing lessons, swimming lessons, nautical navigation lessons, and opportunities to expand social networking with other boaters.

Boaters’ perception of the NDZ in terms of limiting their boating experience was an important factor related to respondent compliance with the NDZ policy. Here, the variable “NDZ limits boating experience” is considered a positive attitudinal variable that is correlated with compliance. Specifically, boaters in this study who think complying with the NDZ does not limit their overall boating experience are more likely to comply. This finding complements the importance of boating to lifestyle variable because it also shows an association between compliance and positive boating experience.

The three factors found to relate to NDZ compliance in this study (RIDEM satisfaction, NDZ limits to boating experience, and centrality of boating to lifestyle) are all attitudinal factors. Other variables in the TPB, like perceived behavioral control were not significant at the 0.05 level yet should be highlighted as they show an overall trend toward significance. The variable Pump-outs accessible (P=0.065) is an example of perceived behavioral control over a behavior. In this context, boaters who believe pump-outs in Rhode Island are generally accessible, and think they can easily access one if needed, have a high level of perceived behavioral control, or belief of deliberate control
over a behavior (Fishbein & Ajzen, 2011) because pump-out access is perceived as something they can control.

Studies that relate perceived behavioral control specifically to compliance are limited; however, many studies connect perceived behavioral control and the theory of planned behavior to responsible environmental behaviors (REB). A study investigating tourists’ REBs in a scenic mountain area of China showed that perceived behavioral control positively affected respondents’ REBs as well as their behavioral intentions (REBI) (Wang, Zhang, Yu, & Hu, 2018), similar to the findings in this thesis.

Interestingly, another variable in this study, the act of boaters being turned away from a pump-out facility in the past, was not shown to be a significant influence of boaters’ compliance behavior. Often times, if users have a negative past experience associated with a behavior, they are less likely to repeat that behavior in the future (Ajzen, 1991). Essentially, when boaters are turned away from a pump-out they intend to use, it may be perceived as an inconvenience, and in turn make them less likely to search for a pump-out and comply with the NDZ in the future. While this finding is somewhat surprising, based on environmental behavior theory, there may be a few explanations. In this study, few (21%) boaters reported being turned away from a pump-out (n=53) and almost 80% have never been turned away (n=198). It is likely that the few boaters who have been turned away have not been turned away often enough for them to deem NDZ compliance an inconvenience. Also, other factors, like centrality of boating lifestyle and satisfaction with RIDEM, that were shown to have a relationship with boater compliance likely deterred boaters from altering their behavior based on their negative pump-out experience.
Overall, attitudes were the most frequent set of TPB variables shown to relate to NDZ compliance in this study, while the relationship was less strong between subjective norms and perceived behavioral control factors and compliance. These findings indicate that managers should continue to promote the simplicity of compliance with NDZ regulations. Emails with links to a quick video to show pump-out procedures, how to find a pump-out and docking procedures will help solidify the idea that compliance with the program will not hinder boater experience. One respondent in this survey suggested a simple barcode sticker be placed on or near each pump-out facility that would allow a boater with a smart phone to access an instructional video. Implementing these simple visual aids will influence attitudes toward compliance behavior by reminding boaters that the NDZ does not limit their experience.
Management Implications

Some recommendations related to the RI NDZ program emerged during this study:

I. *Managers should consider increasing outreach efforts by focusing on email, social media, & brochures*, areas where respondents notably did not encounter information on the NDZ program.

II. *RI DEM should continue to foster positive relationships with RI boaters*. RIDEM staff can increase presence at marinas and facilities where pump-outs are located. Increased visibility will continue the successful trusting relationship between the RI boaters and the state environmental agency. This can be implemented by utilizing summer staff and interns as well as enforcement staff who may answer questions about the program and enhance approachability.

III. *RI DEM can emphasize to boaters how the policy does not disrupt their boating experience*. “Pumping out is easy!” Incorporate instructional videos into outreach emails, RIDEM website, and other media communications. Update RIDEM website frequently with user-friendly interactive maps to effectively communicate operating pump-out facility locations.

IV. *Marina staff can talk more about the NDZ policy*. Many boaters indicated they had learned of the NDZ designation in RI through word of mouth through other boaters and indicated the same strategy when finding pump-out facilities in new locations. Encouraging marina staff to interact with boaters and hand out informational guides will help to increase communication and visibility of the program within the boating community.
V. *Pump-out boats.* While the majority of boaters surveyed in this study prefer dockside pump-out facilities, 30% prefer mobile pump-out boats. RI DEM currently has a revolving loan fund set up for the purchase of new pump-out boats. An increase in incentivized funding for private pump-out boat owners may help offset costs and encourage an increase in pump-out presence throughout RI waters. The success of the Block Island NDZ designation, the first in the nation, was implemented utilizing mobile pump-outs and still operates them today. Increasing the pump-out boat presence in Bristol, and Prudence Island, specifically Potters Cove, may help ease some boaters concerns about access.

VI. *Cater efforts towards boating lifestyle.* Respondents to this survey indicated the importance of boating to their lifestyle with their stated knowledge of boating laws and regulations, frequency of days spent on the water, and their indicated level of boating as their most enjoyable activity. Since centrality of boating lifestyle is shown to have a significant relationship with boaters’ compliance with the NDZ policy, it may be helpful to advertise program requirements at local boat shows, marine outfitters and retail shops, marinas, and yacht clubs, and other areas frequented by avid mariners. Also, providing information to RI boaters on the significant increase in boating opportunities, improved water quality, fishing locations, and swimmable areas since the RI NDZ designation will help to incentivize compliance by highlighting ways in which the program will improve upon their important lifestyle.
Limitations & Opportunities for Further Study

While the findings in this study provide beneficial insights into the RI NDZ policy and pump-out infrastructure from the boaters’ point of view, there are some limitations that should be acknowledged.

The scope of this study was somewhat limited given the recruitment process for the online survey. Only mailing addresses were accessible from the RIDEM registered boater database. This meant our study had to recruit for an online survey using a physical postcard sent to recipient’s home addresses. Unfortunately, this added a step for participants who had to access the survey by typing the provided link into their web browser, likely deterring some boaters. A possible solution for future studies would involve access to Rhode Island registered boaters’ email addresses. This could ease the survey recruitment process and likely result in a larger sample size and increase external validity (Robson, 2002).

This study relied on accessing boaters’ information remotely and did not include any in-person site visits. In the future, pump-out facility visits would greatly complement in-person interviews with boaters, including transient boaters visiting RI waters. This would enhance the overall scope of the study and give more insight into visiting boater behaviors, attitudes and knowledge on the RI NDZ policy which may vary from the registered RI boaters in this study.
This study used two environmental behavior theory models to derive variables that could potentially relate to attitudes and behaviors associated with the RI NDZ program and pump-out infrastructure. The statistical analyses used in this study were not predictive, so the findings highlight correlations among the variables. Future studies could build upon my analyses using techniques, like Structural Equation Modeling (SEM), to describe causal relationships among the variables.

It is important to note that methods for analysis in this thesis involved re-coding some data (e.g., feelings of neutrality) as “missing” to facilitate certain analyses, like the Mann-Whitney U test. Re-coding variables in this way likely discounted responses from some participants, like those who expressed neutrality toward some survey questions. Coding neutral responses as missing variables was particularly beneficial in this study to measure compliance with the NDZ. The original survey question addressed boaters’ frequency of sewage discharge. In the case of NDZ compliance - any discharge of sewage (at any frequency) is considered illegal – therefore, re-coding to dichotomous variables made the most sense; as either “comply” or “does not comply”.

This study asked respondents for their stated indication of compliance with the NDZ policy by asking whether they ever discharge (treated or untreated) sewage from their boat into Rhode Island coastal waters. Further studies that rely on direct observation of compliance or stated intention to comply would complement this work to explore any bias in conclusions regarding boater behavior. Additionally, supplementary studies on the RI NDZ policy and infrastructure could involve a willingness to pay (WTP) economic analysis to further gauge the appropriate pump-out cost. Some findings from this study indicate boaters consider a price higher than what they typically pay to be “fair”. Table 3.
CONCLUSION

Compliance with the RI NDZ policy is necessary to ensure recreational, as well as economic opportunities continue to flourish within our state’s waters. In recent years, improved water quality throughout Rhode Island has allowed state officials to increase the areas available to swimmers and fishers. This study provides useful insights to continue the success of the NDZ program and support improved water quality conditions in the future. This study was the first in Rhode Island to assess the NDZ and related infrastructure from the boaters’ point of view by evaluating the factors that relate to compliance, support, and perceived effectiveness of the policy.

Findings from this thesis are encouraging and find that RI boaters generally comply with the NDZ, support the designation, and find it effective. This thesis also highlights the important role that RI DEM plays in the success of the program, through trust and support of the agency. These insights can provide the agency with a better idea of how to focus efforts when conducting programmatic outreach and education, as well as how to better utilize strategies to sustain compliance.

Overall, this thesis has added to the literature on NDZs, pump-out facilities, as well as the human dimensions related to compliance, support, and perceived effectiveness. Management suggestions provide feedback for RI DEM, marina owners and employees, and any other related program administrators.
APPENDIX

APPENDIX A.

Survey instrument

Start of Block: Part I: The following questions concern information about you and your vessel.

Q1.1 Welcome to my survey on recreational boating and water quality!
   The purpose of this survey is to better understand boaters' attitudes towards the Rhode Island No Discharge Zone (NDZ) Policy.

**There are 5 parts to this survey:**
   Part 1: You will answer questions about yourself and your vessel.
   Part 2: You will answer specific knowledge questions about the RI NDZ policy.
   Part 3: You will be asked about your behaviors and attitudes related to the RI NDZ policy.
   Part 4: You will describe your experiences with pump-out facilities in Rhode Island waters.
   Part 5: You will answer a few questions about yourself.

Thank you for participating in this survey about recreational boating and water quality. It should take about 20 minutes to complete.

Click the arrow below to be taken to the consent form.
Q1.2 Study Consent Form You are being asked to take part in a research study. The purpose of the research study is to understand Rhode Island boaters’ behaviors regarding marine pump-outs and the No Discharge Zone policy. Please read the following before agreeing to be in the study. If you agree to be in this study, it will take you approximately 15 minutes to complete this survey. Questions will be asked about your boating behaviors and your preferences regarding marine pump-outs. There are no known risks, benefits, or compensation. You must be at least 18 years of age to participate in this study.

Your responses will be strictly anonymous. The responses may be used in a University of Rhode Island Graduate Thesis. The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or the University of Rhode Island (URI). Your decision will not result in any loss of benefits to which you are otherwise entitled. You have the right not to answer any single question, as well as to withdraw completely from the survey at any point during the process.

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have questions about the study, at any time feel free to contact me at 401-447-4078 or at lfarnsworth@uri.edu or my advisor, Dr. Tracey Dalton at dalton@uri.edu.

Additionally, you may contact the URI Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Rhode Island IRB may be reached by phone at (401) 874-4328 or by e-mail at researchintegrity@etal.uri.edu You may also contact the URI Vice President for Research and Economic Development by phone at (401) 874-4576.

If you would like to keep a copy of this document for your records, please print or save this page now. You may also contact the researcher to request a copy.

By clicking below to be taken to the survey, you indicate that you have read and understood the above, are 18 years or older, and volunteer to participate in this study.

- Start the Survey (1)
- I do not wish to participate in this survey. (2)
Q1.3

Here are some terms used throughout the survey:

**Rhode Island waters** include those waters within approximately 3 miles of RI’s shore, including Narragansett Bay and waters surrounding Block Island.

The term **No Discharge Zone (NDZ)** refers to a designated area in the ocean where a boater cannot dump sewage waste.

The term **marine pump-out** refers to a stationary structure that is fixed to a dock or a pump-out vessel that can be used to remove sewage from the holding tank on a boat.
Q1.4 **Part I**: The following questions concern information about you and your vessel.

Q1.5 Do you have at least one boat registered in Rhode Island for recreational purposes?

- [ ] Yes (1)
- [ ] No (2)

*Skip To: End of Survey If Do you have at least one boat registered in Rhode Island for recreational purposes? = No
*Skip To: Q1.6 If Do you have at least one boat registered in Rhode Island for recreational purposes? = Yes

Q1.6 Do you have *more* than one boat registered in Rhode Island for recreational purposes?

- ▼ No. I have 1 total (1) ... Yes, I have more than three (4)

---

Page Break
Q1.7 Does your vessel contain a Marine Sanitation Device (MSD) (i.e. toilet)?

- Yes  (1)
- No  (2)
- I don't know  (3)

Skip To: Q1.8 If Does your vessel contain a Marine Sanitation Device (MSD) (i.e. toilet)? = Yes
Skip To: Q1.10 If Does your vessel contain a Marine Sanitation Device (MSD) (i.e. toilet)? = No

Q1.8 What type of Marine Sanitation Device (MSD) is on your boat?

- Type I: Flow-through treatment devices that commonly use a machine to grind solids and disinfect for the treatment of sewage  (1)
- Type II: Flow-through treatment devices that may employ biological treatment and disinfection for the treatment of sewage  (2)
- Type III: Typically a holding tank where sewage is stored until it can be discharged shore-side or at sea  (3)
- I don't know  (4)
- I don't have one  (5)
Q1.9 Important: For the rest of the survey please focus on the vessel with an MSD that you use most often.

Q1.10 What is the length of this vessel in feet?

________________________________________________________________

Q1.11 How would you classify this vessel?

- Sailboat (1)
- Powerboat (2)
- Houseboat (3)
- Other (4) ________________________________________________

Q1.12 Where is this vessel kept during boating season?

- Mooring (1)
- Dock (2)
- Marina (3)
- Trailer (4)
- Other (Please Specify) (5) __________________________________
Q1.13 Which Rhode Island town is this vessel kept in?

Q1.14 On a typical boating trip, how many passengers, if any, do you take out at a time?

▼ 0 (14) ... More than 10 (11)

Q1.15 How often do you stay overnight on this vessel?

- Never (1)
- A handful of times per year (6)
- As much as I possibly can (3)
- I live on my boat (4)
Q1.16 Does your MSD comply with No Discharge Zone (NDZ) policies?

- Yes (1)
- No (2)
- I don't know (3)

Q1.17 During the past 12 months, about how many days in total were you out on this boat?

Q1.18 When you are boating on this vessel in Rhode Island, which areas of Rhode Island do you visit (check all that apply):

- Northern Bay (Providence & Cranston) (1)
- Greenwich Bay (Warwick & East Greenwich) (2)
- Mid Bay (Barrington, Bristol, Warren, Prudence Island) (3)
- Southern Bay (Newport, Jamestown, South Kingstown, Narragansett) (4)
- Southern Coast (Salt Ponds, RI Sound & Block Island) (5)
- Sakonnet River (Little Compton, Tiverton) (6)
Q1.19 When you are boating on this vessel in Rhode Island, which area of Rhode Island do you frequent the most (choose one):

- Northern Bay (Providence & Cranston) (1)
- Greenwich Bay (Warwick & East Greenwich) (2)
- Mid Bay (Barrington, Bristol, Warren, Prudence Island) (3)
- Southern Bay (Newport, Jamestown, South Kingstown, Narragansett) (4)
- Southern Coast (Salt Ponds, RI Sound & Block Island) (5)
- Sakonnet River (Little Compton, Tiverton) (6)

Q1.20 How much of your time boating on this vessel do you spend outside of RI waters?

- Never (1)
- Sometimes (3)
- All of the time (5)
Q1.21 Have you ever been employed in a marine related field?

- Yes (1)
- No (2)

Q1.22 If yes, what is or was your occupation?

________________________________________________________________

Q1.23 Is or was your occupation based in Rhode Island?

- Yes (1)
- No (4)

Q1.24 Have any of your immediate family members been employed in a marine related field?

- Yes (1)
- No (2)

Q1.25 If yes, what was their occupation?

________________________________________________________________
Q1.26 Please answer the following questions about your own feelings towards boating.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (20)</th>
<th>Somewhat disagree (21)</th>
<th>Neither agree nor disagree (22)</th>
<th>Somewhat agree (23)</th>
<th>Strongly agree (24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boating and boat-related activities are one of the most enjoyable things I do. (1)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Boating is very important to me. (2)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>I think boating says a lot about who I am. (3)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>I find that a lot of my life is organized around boating and boat-related activities. (4)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

Page Break
End of Block: Part I: The following questions concern information about you and your vessel.

Start of Block: Part II:

**Q2.1 Part II:** The following questions concern your *knowledge* of No Discharge Zones in Rhode Island.

Q2.2 I consider myself knowledgeable about...

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (40)</th>
<th>Somewhat disagree (41)</th>
<th>Neither agree nor disagree (42)</th>
<th>Somewhat agree (43)</th>
<th>Strongly agree (44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The RI NDZ policy. (6)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>RI water quality issues. (7)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Rules and regulations of boating within coastal waters. (8)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Environmental issues in RI. (9)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

Q2.3

What does this symbol indicate?

- o You are currently in an NDZ (1)
- o Fuel dock (2)
- o Pumpout service provided here (3)
- o I don't know (4)
Q2.4 Which one of the following organizations is primarily responsible for regular compliance inspections of the RI pump-out stations?

- RI Coastal Resources Management Council (CRMC) (1)
- RI Department of Environmental Management (DEM) (2)
- The town in which the pump-out is located (3)
- Marina where the pump-out is located (4)

Q2.5 Have you ever encountered information on the RI pump-out facilities and locations from any of the following options? Check all that apply.

- Signage (1)
- Brochures (2)
- Emails (3)
- Social Media (4)
- Word of Mouth from other boaters (6)
- Other: __________________________________________________________
- No. I have never encountered any information. (7)
Q2.6 My Vessel is Not In compliance with NDZ requirements:

☐ Agree (1)
☐ Disagree (2)
☐ Not Sure (3)

Q2.7 Did you know what an NDZ was before this survey?

☐ Yes (1)
☐ No (2)
☐ I thought it meant something else: (3)

Q2.8 How were you informed of the RI NDZ policy?

☐ Signage (1)
☐ Brochures (2)
☐ Social Media (3)
☐ Emails (5)
☐ Word of Mouth from other boaters (6)
☐ Other: (4) _____________________________

☐ I never knew anything about the NDZ policy before this survey. (7)
Q2.9 There is a penalty for disobeying the NDZ policy.

- Yes (1)
- No (2)
- Unsure (6)

End of Block: Part II:

Start of Block: Part III

Q3.1 Part III: These Questions concern your behaviors and attitudes with the Rhode Island designation of a No Discharge Zone (NDZ).

Remember that an NDZ is a designated area in the ocean where a boater cannot dump sewage waste.

Q3.2 I do not support the NDZ policy in Rhode Island.

- Strongly disagree (7)
- Somewhat disagree (8)
- Neither agree nor disagree (9)
- Somewhat agree (10)
- Strongly agree (11)
Q3.3 I think...
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree (39)</th>
<th>Somewhat disagree (40)</th>
<th>Neither agree nor disagree (41)</th>
<th>Somewhat agree (42)</th>
<th>Strongly agree (43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complying with state and federal law is always necessary. (1)</td>
<td></td>
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</tr>
<tr>
<td>Other boaters in RI waters comply with the RI NDZ policy. (2)</td>
<td></td>
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<tr>
<td>Following the NDZ policy in Rhode Island limits my boating experience. (3)</td>
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<tr>
<td>All Rhode Island waters should be designated as a no-discharge zone (NDZ). (4)</td>
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<tr>
<td>RIDEM is a trustworthy agency. (5)</td>
<td></td>
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</tr>
<tr>
<td>Overall, I am satisfied with the work DEM has done for Rhode Island in general. (7)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The NDZ policy is effective (8)</td>
<td></td>
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</tr>
</tbody>
</table>
Q3.4 Please rank your level of motivation for complying with the RI NDZ policy. (Drag the statement with the highest influence in your decision to the top)

_____ I want to do what my family thinks I should do (1)
_____ I want to do what my friends think I should do (2)
_____ I want to do what other boaters think I should do (3)
_____ I want to do what members of my boating club or group think I should do (4)
Q3.5 In terms of coastal water quality in Rhode island, I think...
| Coastal water quality (in general) in Rhode Island is good. (1) | Strongly disagree (9) | Somewhat disagree (10) | Neither agree nor disagree (11) | Somewhat agree (12) | Strongly agree (13) |
| Coastal water quality in Rhode Island is important (2) | | | | | |
| Coastal water quality near Providence is poor (3) | | | | | |
| Coastal water quality near Newport is poor (4) | | | | | |
| Coastal water quality in Rhode Island greatly influences the abundance and health of RI shellfish. (5) | | | | | |
| Coastal water quality in Rhode Island greatly influences other marine recreational activities. (6) | | | | | |
| I have the ability to influence the health of coastal waters in Rhode Island (7) | | | | | |
My actions are too small to influence the health of Rhode Island’s coastal waters (8)
Coastal water quality near Block Island is pristine (9)

End of Block: Part III

Start of Block: Part IV:

Q4.1 **Part IV**: The following questions relate to your experience with Pump-out facilities in Rhode Island.

Q4.2 Which type of pump-out facility do you use most often?

- Mobile (Pump-out boat) (1)
- Stationary (at a dock) (2)
- I use them both the same amount. (3)
- I don't use any (4)

Q4.3 Have you ever been turned away from a pump-out facility that you wanted to use?

- Yes (4)
- No (5)
Display This Question:
If Have you ever been turned away from a pump-out facility that you wanted to use? = Yes

Q4.4 If yes, why were you turned away?
________________________________________________________________

Q4.5 How often do you release treated waste into the water from your boat within 3 miles of RI shore?

- Never (1)
- Almost never (4)
- Occasionally (5)
- Almost every time I release waste (3)
- Every time I release waste (2)

Q4.6 How often do you release untreated waste into the water from your boat within 3 miles of RI shore?

- Never (1)
- Almost never (2)
- Occasionally (3)
- Almost every time I release waste (4)
- Every time I release waste (5)
Q4.7 How frequently do you need to pump-out your vessel?

- Daily (1)
- Weekly (2)
- Bi-Weekly (3)
- Monthly (4)
- Every other Month (5)
- Once, at the end of the boating season (7)
- Other: ________________________________
- I Never pump-out my vessel. (8)

Q4.8 If you are boating in a new or different RI location, how do you find a pump-out? (Check all that apply)

- Signage (1)
- Brochures (5)
- Social Media (6)
- Emails (7)
- Word of mouth from other boaters (8)
- I use a VHF radio to find a pump-out (3)
- Other: (specify below) (4)
- I never need to find a pump-out in a new location (9)
Q4.9 Where is your preferred pump-out location in Rhode Island? Please include town and/or marina where possible.

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________

Q4.10 Why do you prefer the pump-out that you described in the previous question?
________________________________________________________________
________________________________________________________________

Q4.11 What price do you normally pay for a pump-out? (Enter in USD)

○ $ (7) ________________________________________________

Q4.12 Which type of pump-out facility do you prefer to use?

○ Mobile (Pump-out boat) (1)

○ Stationary (at a dock) (2)

○ I have no preference (5)

Display This Question:

If Which type of pump-out facility do you prefer to use? = Mobile (Pump-out boat)
And Which type of pump-out facility do you prefer to use? = Stationary (at a dock)
Q4.13 Why do you prefer this type of pump-out facility over the other?

_________________________________________________________________________________
Q4.14 I think...

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree (6)</th>
<th>Somewhat disagree (7)</th>
<th>Neither agree nor disagree (8)</th>
<th>Somewhat agree (9)</th>
<th>Strongly agree (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The average cost of a pump-out is fair (average cost for 25-gallon pump-out in RI is $5). (1)</td>
<td></td>
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</tr>
<tr>
<td>It is easy to find a pump-out in RI when I need one. (2)</td>
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</tr>
<tr>
<td>There are not enough pump-out facilities located in RI. (3)</td>
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</tr>
<tr>
<td>Boaters should be fined for discharging sewage into the water. (4)</td>
<td></td>
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<tr>
<td>Rhode Island pump-outs seem well maintained. (5)</td>
<td></td>
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</tr>
<tr>
<td>While boating, I can easily access a pump-out site. (6)</td>
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</tbody>
</table>

End of Block: Part IV:

Start of Block: Part V:
Q5.1 **Part V:** For the following questions, please provide information on yourself. Remember that all responses will be kept confidential, anonymous and all final results will be based on grouped data.

Q5.2 What is your age?
   
   
Q5.3 What is your gender?
   
   
Q5.4 What is the highest level of school that you have completed? (Check one)
   
   - Less than High School (1)
   - Some High School (2)
   - Completed High School or GED, (3)
   - Some College (4)
   - Associates Degree (5)
   - Bachelors Degree (6)
   - Graduate or Advanced Degree (7)
Q5.5 What is your annual household income before taxes (check one)?

- Less than $30,000, (1)
- $30,000 to $39,999, (2)
- $40,000 to $59,999, (3)
- $60,000 to $74,999, (4)
- $75,000 to $99,999, (5)
- $100,000 to $149,999, (6)
- $150,000 to $199,999, (7)
- $200,000 to $249,999 (8)
- $250,000 + (9)

Q5.6 What is your occupation?

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________

Q5.7 Which city or town is your primary residence located?

- Zip Code : (25) ________________________________________________
Q5.8 Do you have any suggestions for ways to improve the Rhode Island NDZ policy or the marine pump-out program?

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
End of Block: Part V:
BIBLIOGRAPHY


Lyons, R. (2008). An implementation evaluation of the No Discharge Area Program in Casco Bay, Maine. Tufts University,


