

ECONOMIC IMPACTS OF SEWAGE PUMPOUT SYSTEMS

30 JUNE 2023

Prepared for:



California State Parks Division of Boating and Waterways



San Francisco Estuary Partnership

Prepared by:

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Funding was provided by a Clean Vessel Act grant, administered by California State Parks Division of Boating and Waterways and funded by the U.S. Fish and Wildlife Service, Sport Fish Restoration and Boating Trust Fund.

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RDN Project Number 323

30 June 2023

EXECUTIVE SUMMARY

This report presents a study of the economic impacts that publicly available sewage pumpout systems have on California marina revenues and the demand for other marina services. While much is known about the environmental benefits of sewage pumpouts, little is known about their economic impacts, which may explain why there is currently a shortage of sewage pumpouts in California. This study was conducted by Robert D. Niehaus, Inc (RDN), a consulting firm based in Santa Barbara, on behalf of the California State Parks Division of Boating and Waterways (DBW) and the San Francisco Estuary Partnership (SFEP).

This study was conducted in two stages. The first stage consisted of interviews with 24 marina operators in different boating regions of California, including eight marinas that already have publicly available sewage pumpouts and 16 marinas that do not. These interviews focused on understanding marina operators' assessments of the costs and benefits of operating sewage pumpouts. The findings from these interviews were also used to inform the study's second stage, which consisted of a 12-question online survey of California boaters regarding their usage of sewage pumpouts. Thanks to the coordinated outreach of the SFEP, the California State Parks and the California Coastal Commission's Boating Clean and Green Program, and the Bay Foundation, the survey received a total of 629 responses over the 28 September to 2 November 2022 survey period.

Overall, the interviews with marina operators revealed that the cost of installing and maintaining sewage pumpouts greatly exceeds the direct revenue that could be earned from charging boaters usage fees. In fact, only one of the eight marinas that have a sewage pumpout currently charges usage fees; the rest offer their pumpouts as a free service. However, these marina operators generally believe that their pumpouts indirectly generate revenue from users who purchase other marina services during their visits to use a sewage pumpout. The 16 marina operators that do not have a sewage pumpout system cited a variety of reasons for not having one. The most common reasons are (1) lack of demand, especially when a nearby marina already has a pumpout, and (2) lack of available space at the marina.

RDN combined the findings of the 24 marina operator interviews and the 629 survey responses from California boaters to analyze the impacts of sewage pumpout systems on boaters' demand for marina services and their commensurate impact on marina revenues. The results indicate that sewage pumpout systems tend to increase the demand for slips at a marina. In dollar terms, marinas with a pumpout are estimated to earn an additional \$2,208 in revenue per guest slip per year as a result of having a pumpout. The analysis also shows that marinas earn significant revenue from ancillary spending associated with boaters visiting for the sole purpose of using a sewage pumpout. For a full-service marina that is near a major boating center and does not have a sewage pumpout, the results indicate that installing a sewage pumpout would increase the marina's revenue by an average of \$48,325 per year across all marina services. Overall, pumpout-specific visits generate an estimated \$14.5 million in annual revenue for marinas statewide.

These findings are an opportunity for DBW to increase the number and usage of sewage pumpouts in California through direct outreach to marinas about pumpouts' economic benefits. RDN recommends that DBW concentrate their outreach efforts on those marinas that are the most likely to benefit from installing a pumpout based on the marina's county, its proximity to other pumpouts, and what other services the marina provides.

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Even though there is a need for more sewage pumpouts in the state, the CVA grant funding is underutilized. Increased use of CVA grant funding could reduce the sewage pumpout deficit, so it is important for DBW to understand why many marinas are insufficiently incentivized to install sewage pumpout systems.

While much is known about the environmental benefits of sewage pumpouts, little is known about their economic impacts. The installation and operation of publicly accessible pumpouts have both potential direct economic costs (installation and maintenance) and benefits (usage fees) for a marina. Additionally, sewage pumpouts have potential indirect benefits, such as bringing more boating traffic to a marina and increasing the demand for other marina and marina-adjacent services, such as food and fuel.

Because little is known about the economic impacts of sewage pumpout systems, a marina's decision to install a sewage pumpout is based on imperfect information. The key objectives of this study are to identify and quantify the economic impacts that publicly available sewage pumpout systems have on marina revenue and the demand for other marina services.

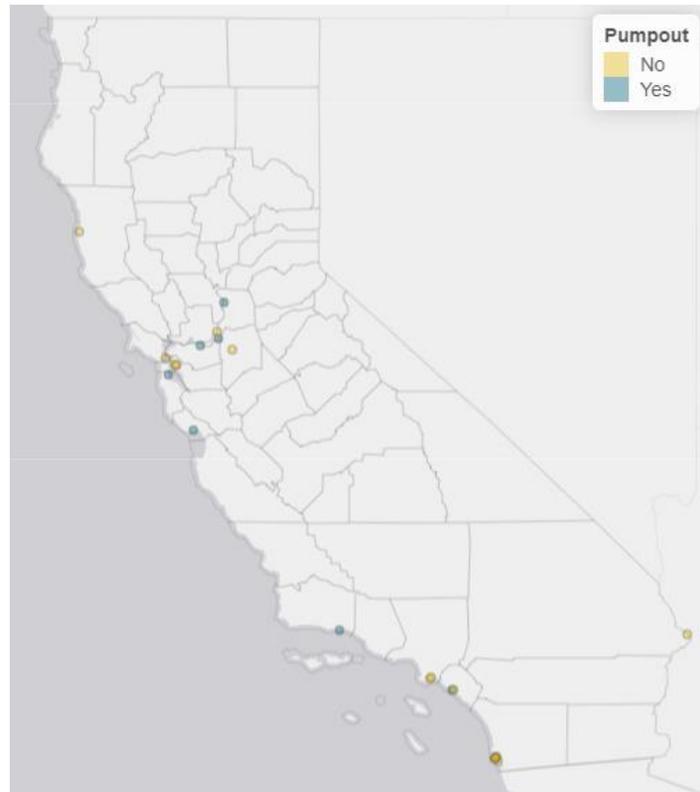
DBW partnered with the San Francisco Estuary Partnership (SFEP) and contracted Robert D. Niehaus, Inc. (RDN) to conduct this study. SFEP was established in 1998 as a collaboration of local, state, and federal agencies, NGOs, academia, and business leaders working to protect and restore the San Francisco Bay-Delta Estuary (Estuary). For more than two decades, SFEP's CVA Program has been working in the 11 counties adjacent to the Estuary to promote clean boating and environmental stewardship to boaters and marinas. RDN (established 1983) is an economic consulting firm, specializing in regional and resource economic analysis and market research for public and private agencies and utilities.

To assess the economic impacts of sewage pumpouts, we first conducted interviews with marina operators (Chapter 2). Next, we surveyed California boaters about their usage of sewage pumpouts (Chapter 3). Finally, we used the interview and survey results to analyze the economic impacts of sewage pumpouts on marinas (Chapter 4). Chapter 5 summarizes our key findings. Chapter 6 presents our recommendations.

2. MARINA OPERATOR INTERVIEWS

RDN conducted a series of 24 interviews with marina operators across California, the results of which are presented in Section 2. Eight interviews were conducted with marinas that have sewage pumpouts and 16 interviews were conducted with marinas that do not have pumpouts. The main purpose of the interviews with marina operators was to inform the questions to ask in the boater survey, which is discussed in the next section. Figure 2 maps the locations of interviewed marinas, broken down by whether they have a pumpout. Note the opacity of the points has been reduced such that darker areas are overlapping points, i.e., neighboring marinas.

Figure 2. Location of Marinas Interviewed for this Study, by Pumpout Status



2.1 Marinas with Sewage Pumpouts

RDN interviewed marina operators with sewage pumpouts to understand their perspectives on sewage pumpout systems and the costs and benefits of operating them. We used the insights from these interviews to help craft survey questions for California boaters about their usage of sewage pumpouts. Our interview questions for the marinas included:

1. What type of sewage pumpout system do you have?
2. What was your initial motivation for installing a sewage pumpout system?
3. Can you tell us a bit about your overall experience with the sewage pumpout system?
4. What types of boaters are most frequently using the sewage pumpout system?
5. Do you charge for pumpout services?
6. What are your average annual costs for maintaining the sewage pumpout system?

7. Do you think your slip prices are higher than they would be otherwise because of sewage pumpout system access?
8. Why do you think some marinas do not have sewage pumpout systems?
9. Is there anything you would change about your sewage pumpout system?

SFEP provided RDN with contact information for marinas with sewage pumpout systems throughout California, which are grouped into four geographic regions: the Delta, San Francisco Bay Area, Monterey, and Southern California. We conducted interviews with eight of these marina operators between 21 July and 3 August 2022, which are listed in Table 1.

Table 1. Marinas¹ with Sewage Pumpouts Interviewed for this Study

Marina	Region
Delta Bay Marina*	Delta
Sacramento City Marina	Delta
Brisbane Marina*	San Francisco Bay Area
Pittsburg Marina	San Francisco Bay Area
Santa Cruz Harbor*	Monterey
Newport Harbor	Southern California
Santa Barbara Harbor*	Southern California
Sun Harbor*	Southern California

* Marina has received DBW funding for their sewage pumpout system.

All of the marina operators that RDN interviewed indicated that they have at least one stationary pumpout system. Some also have a mobile pumpout system. Marina operators reported that their sewage pumpout systems are most commonly used by larger pleasure crafts (greater than 30 feet), liveaboards, and transient boaters. In addition, some marina operators stated that boaters sometimes visit their marina solely to use the sewage pumpout system. One marina operator estimated that five to ten percent of all sewage pumpout usage was from visitors that came solely to use the pumpout system.

Six of the eight marina operators we interviewed were aware of the initial motivation that spurred their marina to install a sewage pumpout system. For five out of six of these marinas, the motivation was to be certified as a “Clean Marina”² or otherwise adhere to environmental best practices. One marina operator indicated that they installed a sewage pumpout in response to requests from boaters.

2.2 Sewage Pumpout Finances

It is important to note that none of the marina operators interviewed for this study viewed their sewage pumpout as a direct source of revenue. In fact, when asked to speculate why some marinas do not have a pumpout system, interviewees generally agreed that sewage pumpouts cost more to install and maintain than they could possibly bring in with usage fees. As mentioned in Section 1, marinas can apply for grants through DBW to finance 75 percent of the cost to install a sewage pumpout system. However, this means the marinas still must pay roughly \$5,000 for their portion of the installation.³ Additionally, marina

¹ A list of other services provided by each marina can be found at the links presented in Table A1 in the Appendix.

² The Clean Marina certification is a national voluntary compliance program developed by the National Marine Environmental Education Foundation. It is administered by the marine industry in California.

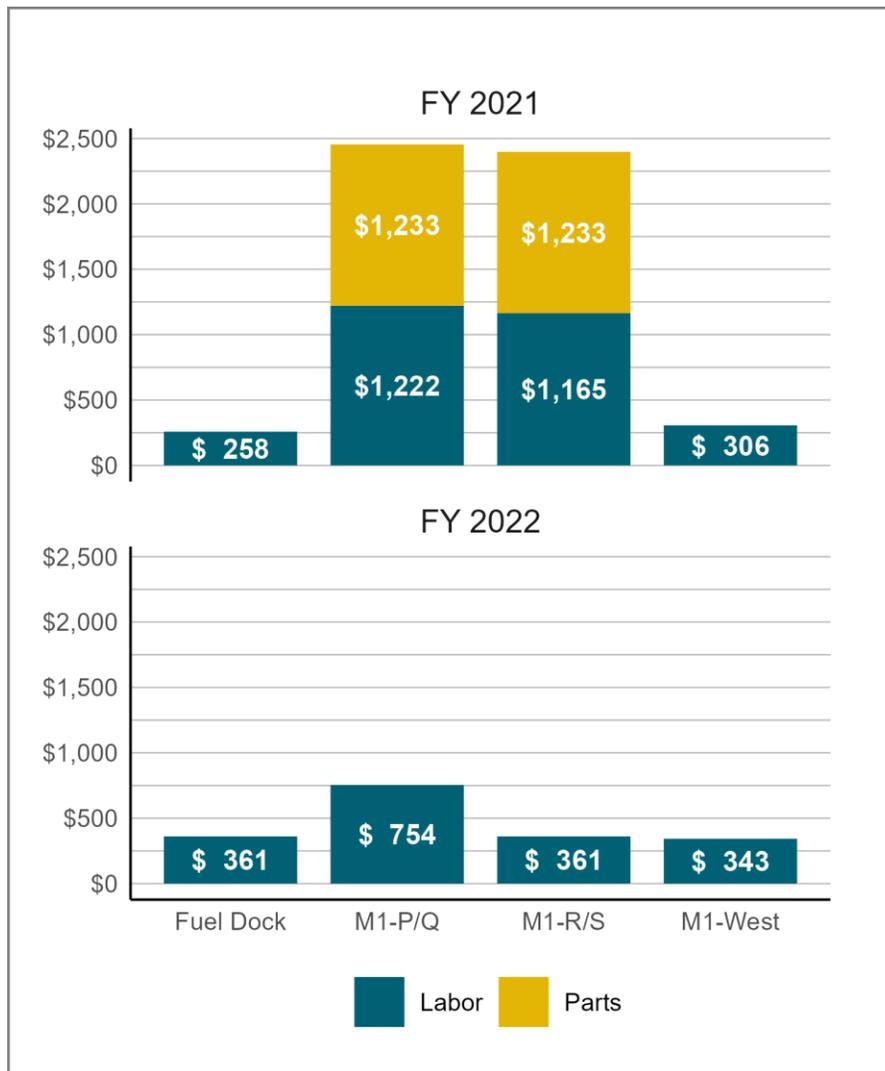
³ Marinas that have received DBW funding for their sewage pumpout system can charge no more than \$5 per use of the system.

operators stated that installing a sewage pumpout system often requires capital projects, such as first installing a sewer line and connecting it to the main sewer line, which add complexity and cost.

The cost of a sewage pumpout system to a marina also extends beyond the initial purchase and installation. Sewage pumpout systems need regular maintenance, which requires labor and parts. DBW administers a separate reimbursement-based Operation and Maintenance Grant (O&M Grant) program that covers up to 75 percent of the eligible costs of pumpout parts and labor to maintain an existing pumpout. However, seven out of the eight marinas interviewed for this study said that they do not track their sewage pumpout maintenance expenses, and SFEP reported that this grant funding is rarely used. Five of those marinas also declined to estimate how much they spend on maintenance, while two marinas each estimated that they spend about \$1,000 each year to maintain their sewage pumpout systems.

Of the eight marina operators interviewed, only Santa Barbara Harbor said that they track their sewage pumpout maintenance costs. Santa Barbara Harbor shared these costs with RDN for the last two fiscal years (2021 and 2022), broken down by parts and labor for each of their four pumpout systems. These costs are summarized in Figure 3. Total maintenance costs for FY 2021 were \$5,416, for an average of \$1,354 per pumpout. Maintenance costs were lower in FY 2022, totaling \$1,819, or \$455 per pumpout.

Figure 3. Pumpout Maintenance Costs, Santa Barbara Harbor, 2021-2022



The information provided by Santa Barbara Harbor demonstrates that pumpout maintenance costs can vary considerably from year to year. However, these costs are generally small compared to a marina’s other service and operational costs. This is evident in the fact that only one of eight marinas RDN interviewed said they readily track their pumpout maintenance expenses. Marinas could potentially offset the cost of their sewage pumpout systems by charging boaters to use them, but only one out of the eight marinas we interviewed does so. That marina also indicated that the cost to maintain their pumpout system exceeds the revenue they generate through usage fees. All of the other marinas view their sewage pumpout system as a public service, like a restroom, and they accept the associated maintenance costs as part of the general costs of operating a marina.

Though none of the marinas we interviewed directly profit from their sewage pumpout systems, several operators said that their pumpout systems provide indirect economic benefits. For example, one of the marina operators estimated that the rental price of a long-term slip could be priced 10-12 percent higher in a marina with a pumpout than in a marina without a pumpout, all else equal. In addition, the presence of a sewage pumpout system may factor into a transient boater’s decision to visit one marina versus

another. Further, some marinas reported that they receive visits from transient boaters that typically do not frequent the marina but come for the sole purpose of using the sewage pumpout. These transient visits and pumpout-specific visits often result in the boater purchasing goods and services at the marina.

2.3 Marinas without Sewage Pumpouts

RDN initially interviewed eight marina operators who were known to have at least one sewage pumpout system. Some of these operators speculated that the marinas that do not have sewage pumpouts may be reluctant to install one due to their cost. To confirm this, RDN conducted a second series of interviews that specifically targeted marina operators that do not have sewage pumpouts.

Focusing on counties with a shortage of sewage pumpouts per DBW's 2020 Vessel Waste Disposal Plan (red counties in Figure 1), RDN used data from BoatHarbors.com (2023) to compile a list of marinas that do not currently have a sewage pumpout. In total, RDN attempted to contact 64 of these marinas between 6 and 12 January 2023, of which we successfully interviewed 16 that do not have a sewage pumpout system. These marinas are listed in Table 2.

Table 2. Marinas without Sewage Pumpouts Interviewed for this Study

Marina	County
5th Avenue Marina	Alameda
Oakland Yacht Club	Alameda
Cerritos Yacht Anchorage	Los Angeles
Island Yacht Anchorage	Los Angeles
Dolphin Isle Marina and RV Park	Mendocino
Villa Cove Marina	Orange
Black Meadow Landing	San Bernardino
Bay Club Marina	San Diego
Coronado Yacht Club	San Diego
Half Moon Anchorage	San Diego
Marina Cortez	San Diego
Shelter Cove Marina	San Diego
Shelter Island Marina	San Diego
Ayala Cove Anchorage	San Francisco
Snug Harbor RV Park and Marina	San Joaquin
Stockton Sailing Club	San Joaquin

We asked marina operators without pumpouts the following three questions:

1. Why don't you have a sewage pumpout?
2. Are you aware of the grant funding available through DBW to help offset the cost of a sewage pumpout?
3. Does this grant funding make you more willing to install a sewage pumpout?

In response to the first question, marina operators provided several reasons why they do not have a sewage pumpout. We categorized the primary reason cited by each operator as follows (with the corresponding number of marinas):

- There is a public pumpout nearby that boaters use (6 marinas)
- There is not enough space for a pumpout at the marina (3 marinas)
- There is not enough demand for a sewage pumpout (3 marinas)
- Their boaters are satisfied using a private company to pump out their sewage (2 marinas)
- The cost of a sewage pumpout is too high (2 marinas)

The most common reason for not having a pumpout, as cited by marina operators, is the belief that there is already a public pumpout available nearby that satisfies their boaters' needs. These marinas do not believe it is worth the time and expense to install a pumpout at their marina when there is a neighboring pumpout available. The next two most common reasons, with three responses each, are that the marina either had no space for a pumpout or that there was no demand for a pumpout.

The last two reasons, each cited by two marinas, are that (1) their boaters use a private company to conduct mobile pumpouts and the marina and boaters are satisfied with this arrangement and (2) that the cost of installing and maintaining a pumpout is prohibitively expensive. It is notable that only two of the 16 (12.5 percent) marina operators we interviewed cited cost as the primary reason that they do not have a sewage pumpout.

Regarding their awareness of DBW's grant programs, only six of these 16 (37.5 percent) marina operators confirmed that they were aware of the programs. Eight (50 percent) of the marina operators indicated that they were not aware of the grants. The remaining two marina operators were either unsure or misunderstood the eligibility requirements. For example, one marina operator said they were aware of grant funding but thought it was only available to public marinas, even though funding is available for private marinas so long as the pumpout is accessible to the public (DBW, 2023b).

For the eight marina operators who were unaware of the grants available through DBW, RDN asked them if being reimbursed for up to 75 percent of the cost of installing a sewage pumpout would impact their decision not to install one. Four of these marina operators said that it would not impact their decision, whereas the other four said it may impact their decision and were interested in learning more about the grant. Thus, only four of the 16 (25 percent) marina operators that we interviewed indicated that the cost savings afforded by the grant would potentially sway them to install a sewage pumpout at their marina.

3. BOATER SURVEY

RDN conducted a statewide online survey of California boaters to better understand and measure the potential indirect economic benefits of sewage pumpouts. The survey was hosted on the survey platform Survey Monkey and was active between 28 September and 2 November 2022. RDN made a promotional flyer (Figure A1 in the Appendix) for the survey and SFEP coordinated with The California State Parks, the California Coastal Commission's Boating Clean and Green Program, and the Bay Foundation⁴ (TBF) to distribute the promotional flyer and survey information. The Boating Clean and Green Program sent an email to 5,000 California boaters and TBF sent an email to 2,460 boaters to inform them of the survey.

DBW set the target number of survey responses for this study at 400 responses, based on the findings of the [2022 Boater Sewage Disposal Survey Report](#), which determined that a sample size of 384 provided an acceptable margin of error with a 95 percent confidence level based on the number of registered vessels in California. The survey received a total of 629 responses, or 157 percent of the study's target. The number of responses varied by question because all questions were optional and some questions were only asked conditionally based on the response to previous questions. The survey questions were as follows:

1. What kind of sewage pumpout system do you use with your boat?
2. Do you own/rent a slip?
3. [If respondent owns or rents a slip per Question 2] Do you live aboard your boat?
4. [If respondent rents a slip per Question 2] How much do you pay monthly for your slip?
5. Is there a sewage pumpout system at your home marina (the marina you most frequently visit)?
6. How important is it to you that your home marina has a sewage pumpout or mobile system available, so that you don't have to go elsewhere for pumpout services?
7. There are many reasons why one might prefer a certain marina. Which features are most important to you? Please rank the following features in order from most important (1) to least important (5).
 - Accessibility from home
 - Vessel repair, supply, and support
 - Quality of boating destinations and anchorages in the area
 - Marina amenities such as restaurants or shopping
 - Presence of sewage pumpout services
8. Do you ever visit a marina different from your home marina as a transient boater?
9. [If yes to Question 8] How important is it to you that the marina you visit as a transient boater has a sewage pumpout system available?
10. [If yes to Question 8] Please indicate how much you approximately spend on other services on an average visit to another marina as a transient boater.
11. How often do you visit a marina other than your home marina for the sole purpose of using a sewage pumpout per year?
12. [If respondent answers with >0 trips per Question 11] Please indicate how much you approximately spend on other services on an average trip to a marina to use the sewage pumpout system.

⁴The Bay Foundation is a non-profit environmental organization founded in 1990 with a mission to restore and enhance Santa Monica Bay and its watershed.

The Appendix to this report contains a copy of the survey instrument for reference. The following sections summarize the results for each survey question, which are grouped into three categories: (1) General Pumpout Questions, (2) Transient Boater Questions, and (3) Pumpout-Specific Questions.

3.1 General Pumpout Questions

Figure 4 presents the responses for the first question of the survey: “**What kind of sewage pumpout system do you use with your boat?**” Out of 623 total responses, 136 respondents (21.8 percent) reported not using a sewage pumpout system at all. These respondents were prompted to exit the survey because the remaining questions were only relevant to boaters who use a sewage pumpout system. The remaining 78.2 percent of respondents use some sort of sewage pumpout system.

Almost half (49.4 percent) of all respondents indicated that they use a stationary pumpout system. Stationary pumpout systems were also the most common type of sewage pumpout systems for the marinas interviewed in Section 2, all of whom had at least one stationary pumpout system. The remaining respondents indicated that they primarily use either a mobile pumpout system (14.4 percent), a port-a-potty (9.0 percent), or an in-slip unit (5.3 percent).

Figure 4. Q1: What kind of sewage pumpout system do you use with your boat?

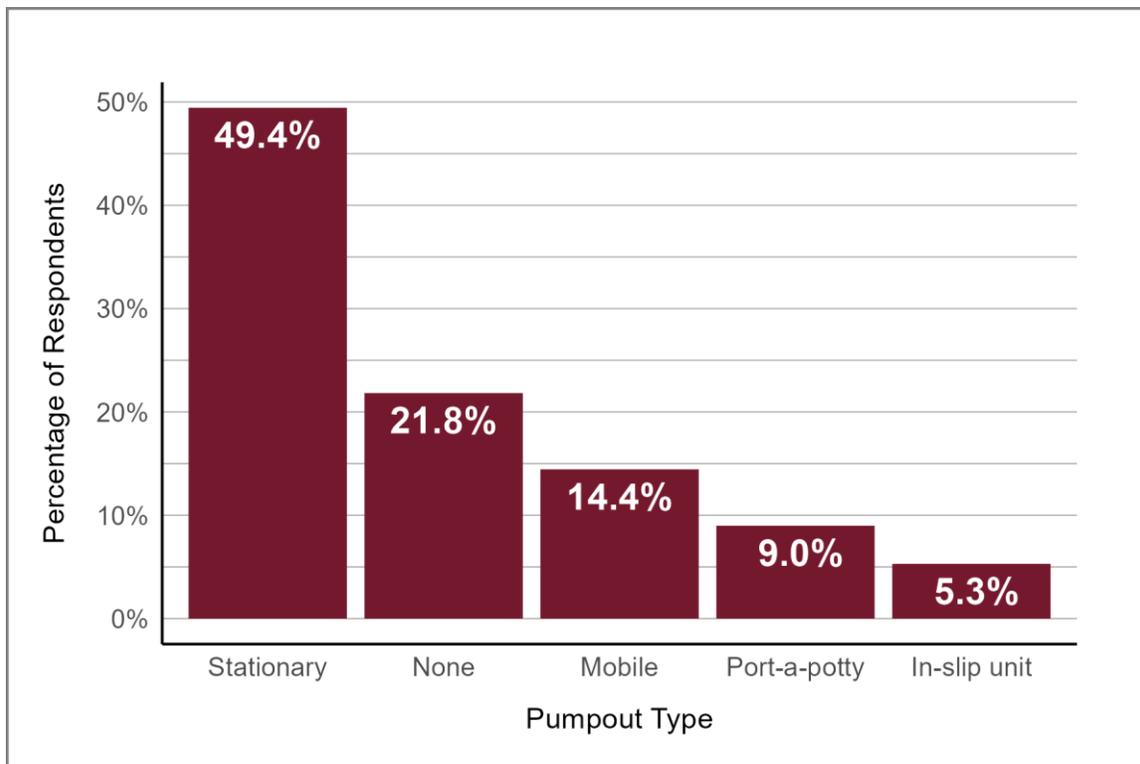
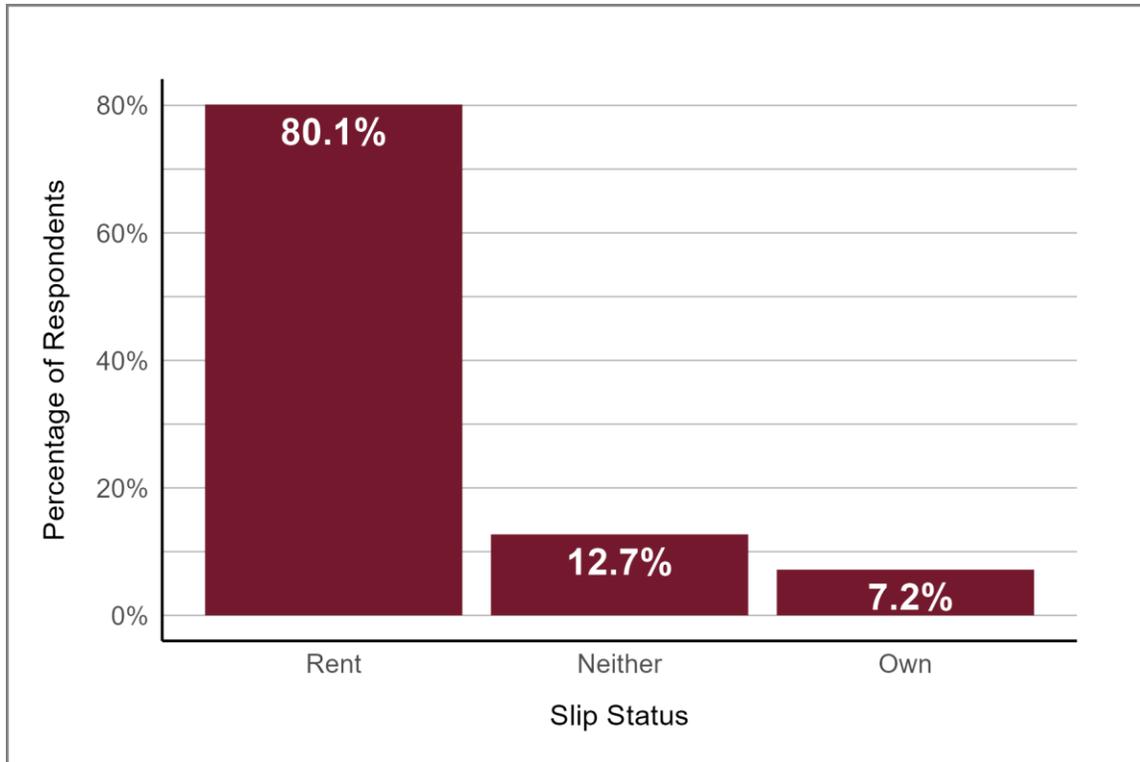


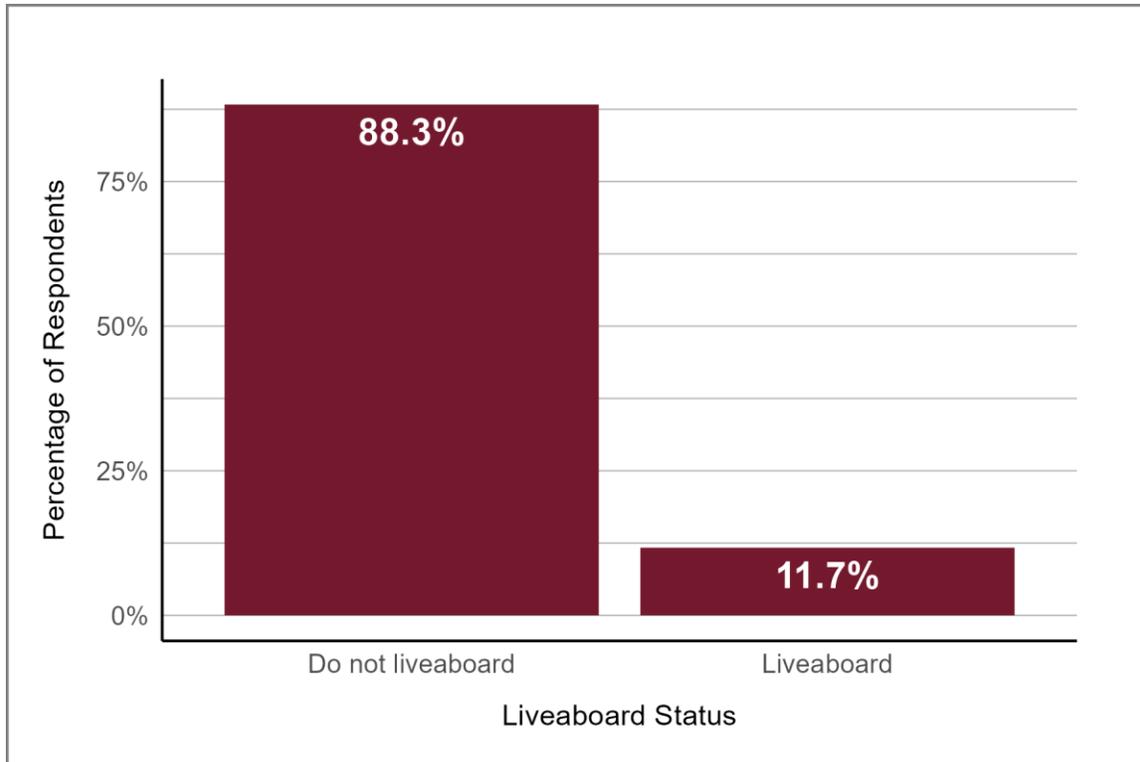
Figure 5 presents responses to the question: “Do you own/rent a slip?” A total of 391 of the 488 respondents (80.1 percent) rent their slip and 35 respondents (7.2 percent) own their slip. The remaining 62 respondents (12.7 percent) do not keep their boat in a slip.

Figure 5. Q2: Do you own/rent a slip?



Respondents who rent or own a slip at a marina were subsequently asked, “Do you live aboard your boat?” Figure 6 charts the results. Only 51 of the 436 question respondents (11.7 percent) said they live aboard their boat. The remaining 385 respondents (88.3 percent) do not live aboard their boat.

Figure 6. Q3: Do you live aboard your boat?



Respondents who indicated that they rent their slip in Question 2 were asked **how much they pay monthly for their slip** (Figure 7). Of the 317 respondents who reported their monthly slip rent, the median cost is \$550 per month and the average is \$677 per month. The average is higher than the median because the slip costs are right-skewed (there is a longer tail on the right side of the histogram). Three respondents pay over \$4,000 per month to rent their slip.

Figure 7. Q4: How much do you pay monthly for your slip?

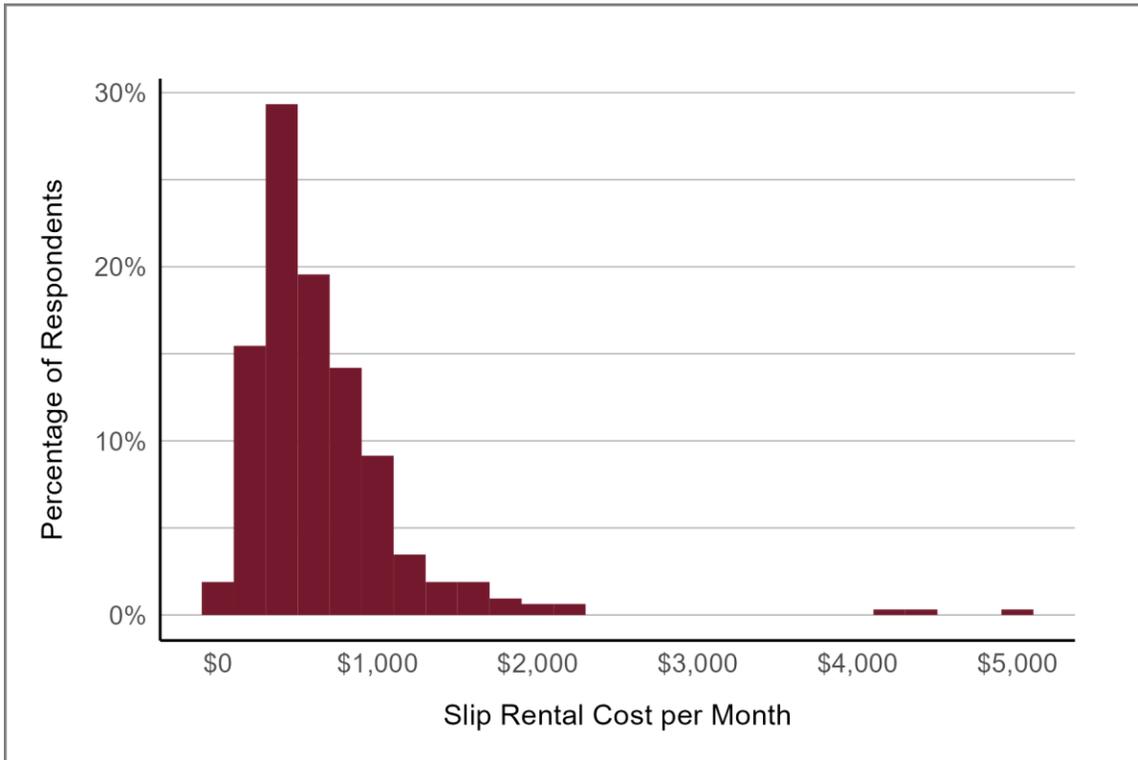
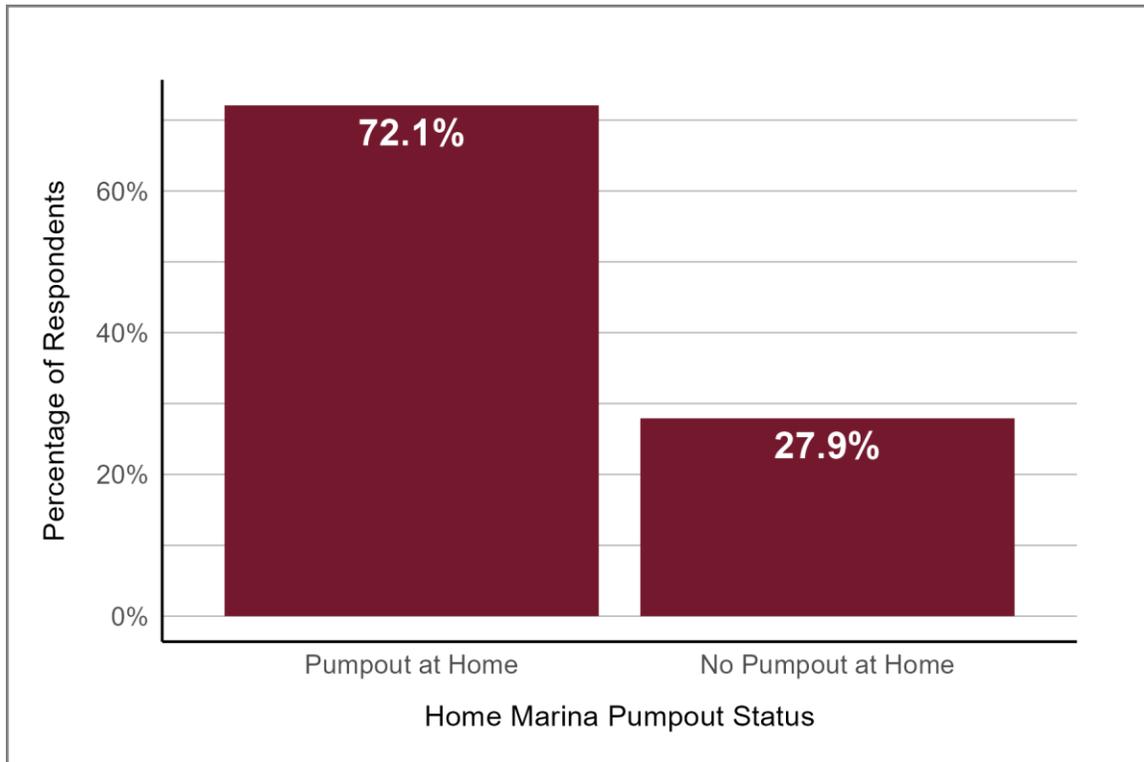


Figure 8 presents responses to the question: “**Is there a sewage pumpout system at your home marina (the marina you most frequently visit)?**” Out of the 437 boaters that provided a response to this question, 315 (72.1 percent) have a pumpout at their home marina. The remaining 122 boaters (27.9 percent) do not have a pumpout at their home marina.

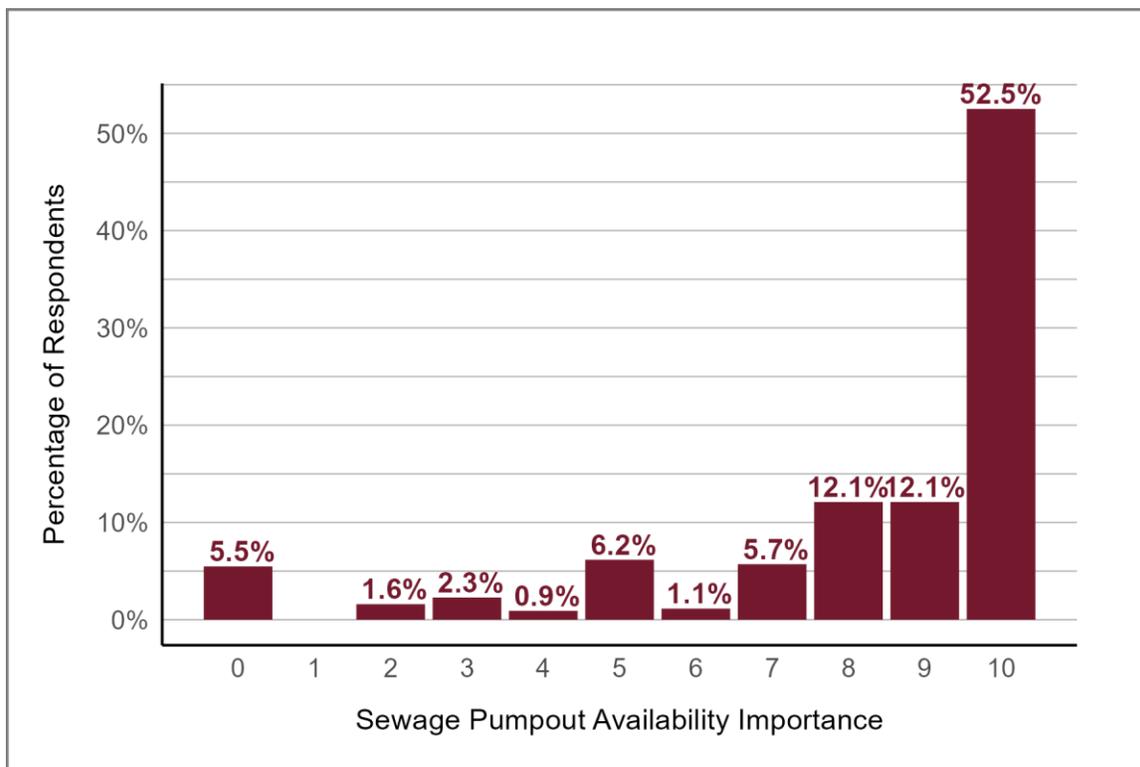
Figure 8. Q5: Is there a sewage pumpout system at your home marina?



The sixth question of the survey asked: “**How important is it to you that your home marina has a sewage pumpout or mobile system available, so that you don’t have to go elsewhere for pumpout services?**” Boaters were asked to respond to the question on a scale of 0-10, with 0 being “not important” and 10 being “critically important.”

Figure 9 demonstrates that sewage pumpouts are important for most boaters. Over half (52.5 percent) of the 438 respondents to this question say that it is critically important (10 out of 10) that their home marina has a sewage pumpout system. Over three quarters (76.7 percent) of respondents ranked the importance of a sewage pumpout system at their home marina as an 8 out of 10 or higher. Only 5.5 percent of respondents said that having a pumpout at their home marina is not important at all (0 out of 10).

Figure 9. Q6: How important is it to you that your home marina has a sewage pumpout or mobile system available?

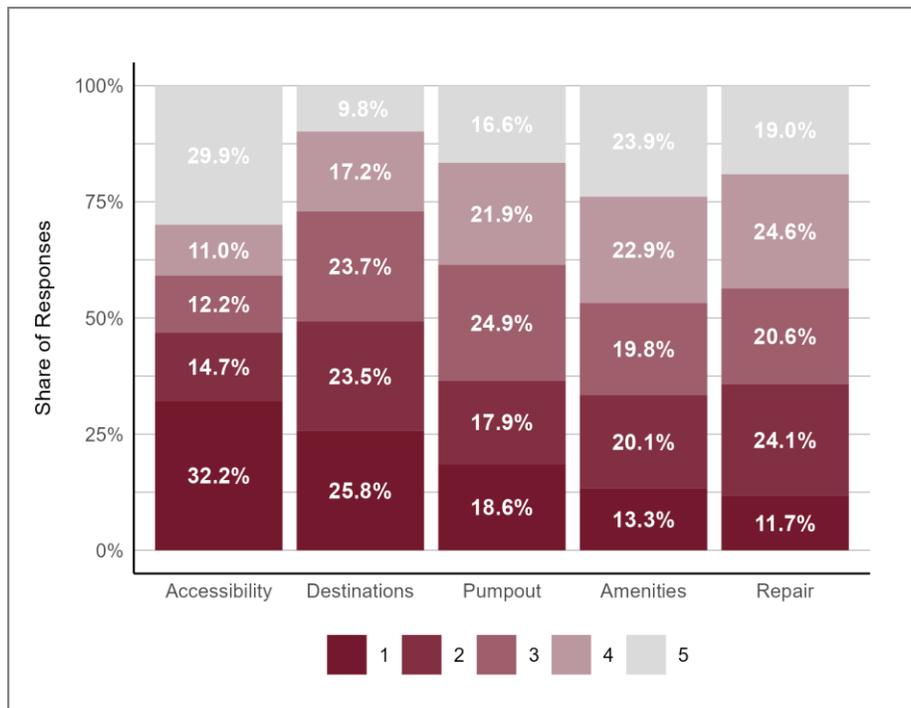


Boaters were also prompted to **rank the following marina features from most important (1) to least important (5)**:

- Accessibility from home (Accessibility)
- Vessel repair, supply, and support (Repair)
- Quality of boating destinations and anchorages in the area (Destinations)
- Marina amenities such as restaurants or shopping (Amenities)
- Presence of sewage pumpout services (Pumpout)

Figure 10 visualizes the proportion of respondents who ranked each feature from one to five. Assuming an equal difference in the level of importance between each rank, the average rank for each marina feature from most important to least important is as follows: Destinations (2.62), Accessibility (2.92), Pumpout (3.00), Repair (3.15), Amenities (3.24).

Figure 10. Q7: Please rank the following features in order from most important (1) to least important (5).

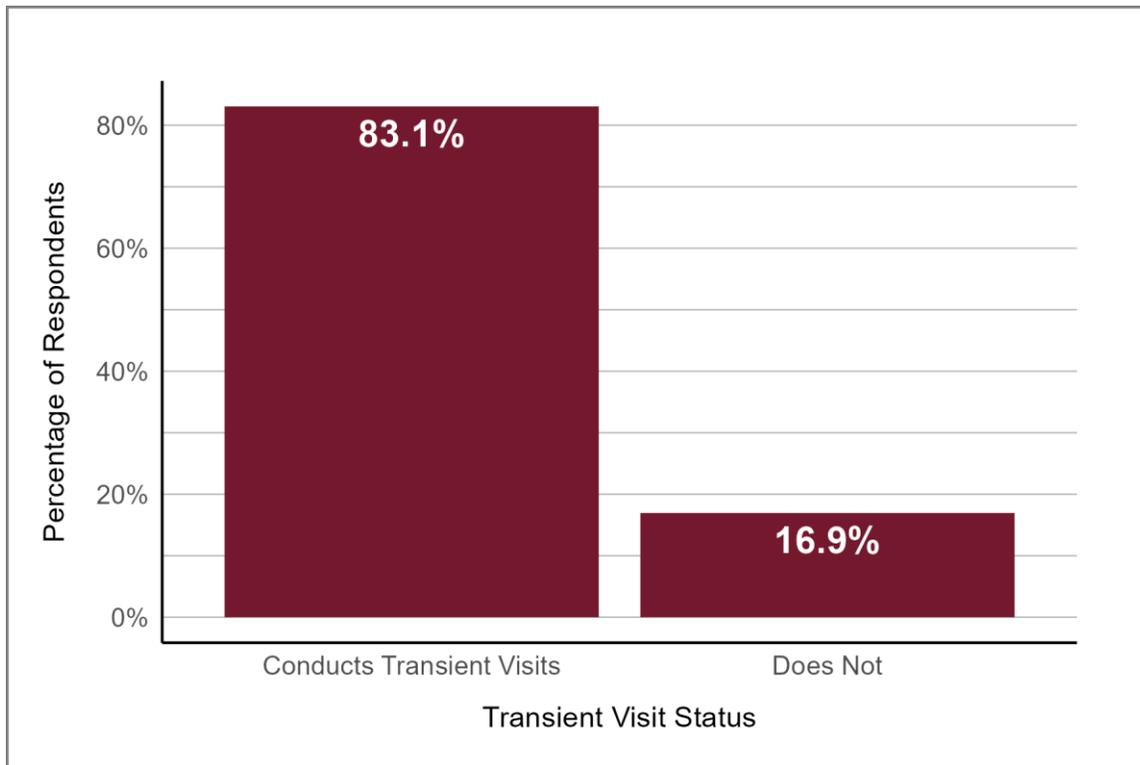


A marina’s accessibility from home was most frequently cited as the most important feature of a marina. However, a marina’s accessibility was also a polarizing feature, as it was also the feature most frequently ranked as a marina’s least important feature. This suggests that there are two distinct groups of boaters: those who prefer to stay close to home and those who are willing to travel further away from their home because of other marina features. Because of this polarization in the ranking of Accessibility, Destinations (which had the second largest number of respondents that ranked it as the most important feature) has a higher average rank. The presence of a sewage pumpout system had the third highest number of respondents (18.6 percent) who ranked it as the most important marina feature. It also has the third highest average rank. In both formulations, pumpouts rank more important than Repair and Amenities, but less important than Accessibility and Destinations.

3.2 Transient Boater Questions

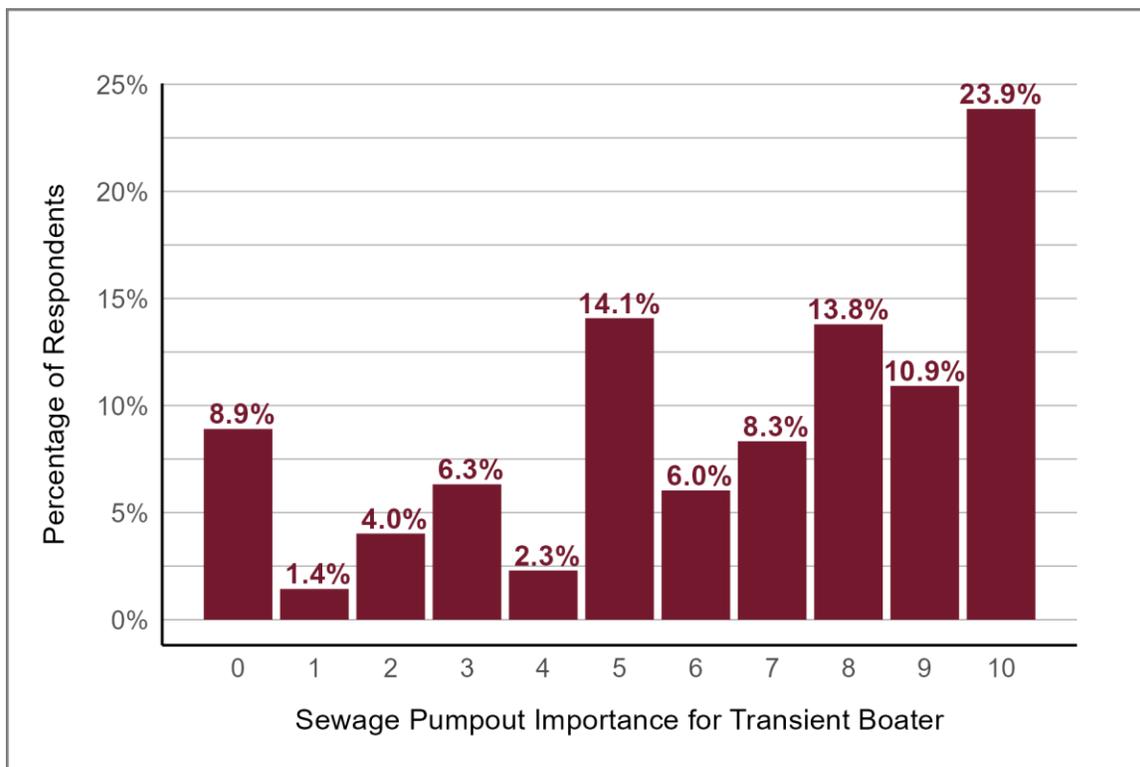
Transient boaters are non-local visitors that stay overnight at a marina. Marinas frequently rent out some slips at a nightly rate for transient boaters and typically cap the number of nights a vessel can berth as a transient. The next three questions were asked to assess the usage and importance of sewage pumpout systems for transient boaters specifically. Figure 11 presents responses to the question: **“Do you ever visit a marina different from your home marina as a transient boater?”** Out of 425 respondents to this question, 353 (83.1 percent) reported visiting a marina as a transient boater. The remaining 72 boaters (16.9 percent) do not visit marinas as a transient boater.

Figure 11. Q8: Do you ever visit a marina different from your home marina as a transient boater?



Respondents who indicated that they visit marinas as transient boaters were also asked two follow-up questions. First, respondents were asked: “**How important is it to you that the marina you visit as a transient boater has a sewage pumpout system available?**” Respondents were prompted to rate the importance of a sewage pumpout on a scale of 0 to 10, with 0 being “not important” and 10 being “critically important.” Figure 12 charts the distribution of responses by level of importance. Approximately 48.6 percent of transient boaters (196 respondents) ranked the presence of a pumpout as an 8 out of 10 or higher. In contrast, recall that 76.7 percent of all boaters ranked the presence of a pumpout at their home marina as an 8 out of 10 or higher (see Figure 9). The contrast in results for Figure 9 and Figure 12 suggests that boaters feel it is more important to have access to a sewage pumpout at their home marina than having access to a sewage pumpout at the other marinas they visit as a transient boater.

Figure 12. Q9: How important is it to you that the marina you visit as a transient boater has a sewage pumpout system available?



Respondents who reported visiting marinas as transient boaters were asked to estimate how much they typically spend on marina services during such a trip. Table 3 summarizes these costs by category of spending. Fuel and Restaurants are the most common services that transient boaters spend money on, with an average of \$207 and \$180 per trip, respectively. In addition, transient boaters spend an average of \$94 on groceries, \$71 on supplies, and \$12 on other goods and services during a typical trip. Based on respondent comments, the most common type of spending in the “Other” category is slip fees. The average boater’s total spending per transient visit across all categories is approximately \$564.

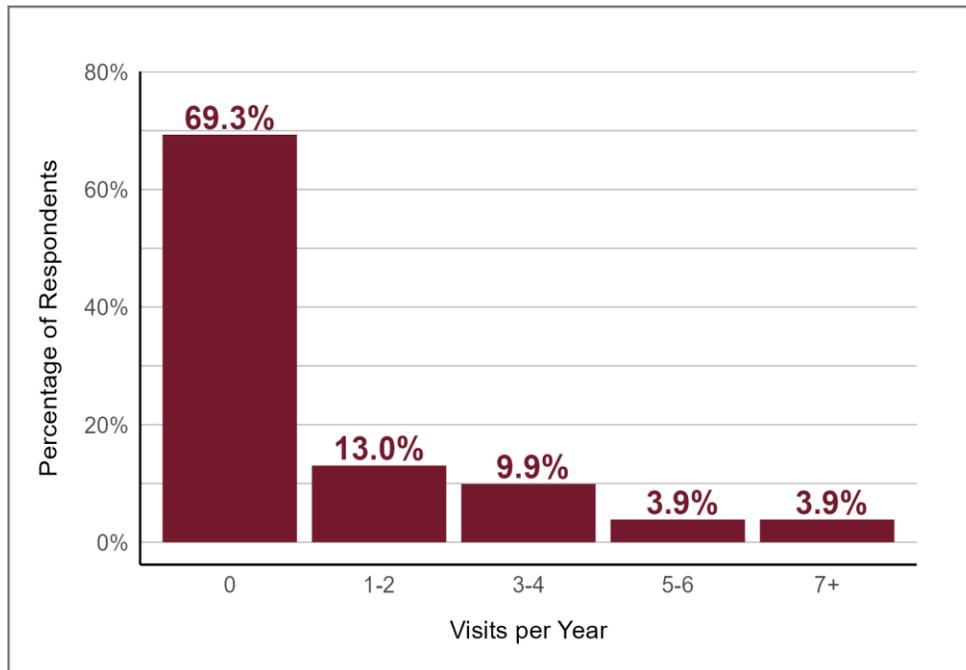
Table 3. Q10: Please indicate how much you approximately spend on other services on an average visit to another marina as a transient boater:

Marina	Min	Median	Mean	Max
Fuel	\$ -	\$ 75	\$ 207	\$ 5,000
Restaurants	\$ -	\$ 100	\$ 180	\$ 5,000
Groceries	\$ -	\$ 50	\$ 94	\$ 5,009
Supplies	\$ -	\$ 20	\$ 71	\$ 2,500
Other	\$ -	\$ -	\$ 12	\$ 500

3.3 Pumpout-Specific Visit Questions

Finally, two questions were asked of respondents concerning visits made to marinas specifically to use a sewage pumpout system. Figure 13 presents responses to the question: “**How often do you visit a marina other than your home marina for the sole purpose of using a sewage pumpout per year?**” A total of 287 respondents (69.3 percent) do not conduct any pumpout-specific marina visits. Of the remaining 127 respondents, 54 boaters (13.0 percent of total) make one to two of these visits per year, 41 boaters (9.9 percent) make three to four of these visits per year, 16 boaters (3.9 percent) make five to six of these visits per year, and 16 boaters (3.9 percent) make seven or more of these visits annually.

Figure 13. Q11: How often do you visit a marina other than your home marina for the sole purpose of using a sewage pumpout per year?



Respondents that make at least one visit to a marina each year specifically to use a sewage pumpout were subsequently asked about their spending habits during these trips. Table 4 presents summary statistics for spending during these pumpout-specific visits. Overall, reported spending levels were lower for pumpout-specific visits than for visits by transient boaters, which is intuitive as most trips to use a pumpout are likely to be day trips. Boaters who visit a marina specifically to use the sewage pumpout reported spending an average of \$201 per visit, including \$111 of fuel, \$44 on restaurants, \$26 on groceries, \$16 on supplies, and \$4 on other miscellaneous goods and services.

Table 4. Spending for Pumpout-Specific Visits

Marina	Min	Median	Mean	Max
Fuel	\$ -	\$ 25	\$ 111	\$ 2,600
Restaurants	\$ -	\$ -	\$ 44	\$ 200
Groceries	\$ -	\$ -	\$ 26	\$ 300
Supplies	\$ -	\$ -	\$ 16	\$ 300
Other	\$ -	\$ -	\$ 4	\$ 300

4. ECONOMIC ANALYSIS

In this section we analyze the marina operator interview and boater survey data to estimate the indirect economic impacts of sewage pumpouts based on (a) marina selection, (b) spending from transient visits, and (c) spending from marina visits to use a pumpout.

4.1 Selection of Home Marina

To investigate whether the presence of pumpouts influences boaters' choice of home marina, we consider the outcome of interest whether their current home marina has a pumpout (Q5). It is reasonable to assume that boaters have self-selected their home marina based on their individual preferences. Thus, for boaters who have a sewage pumpout at their home marina, the presence of the pumpout may be an important factor in their choice of marina. Similarly, boaters whose home marinas do not have a sewage pumpout may think it is less important for their home marina to have one. This intuition is indeed supported by the survey data.

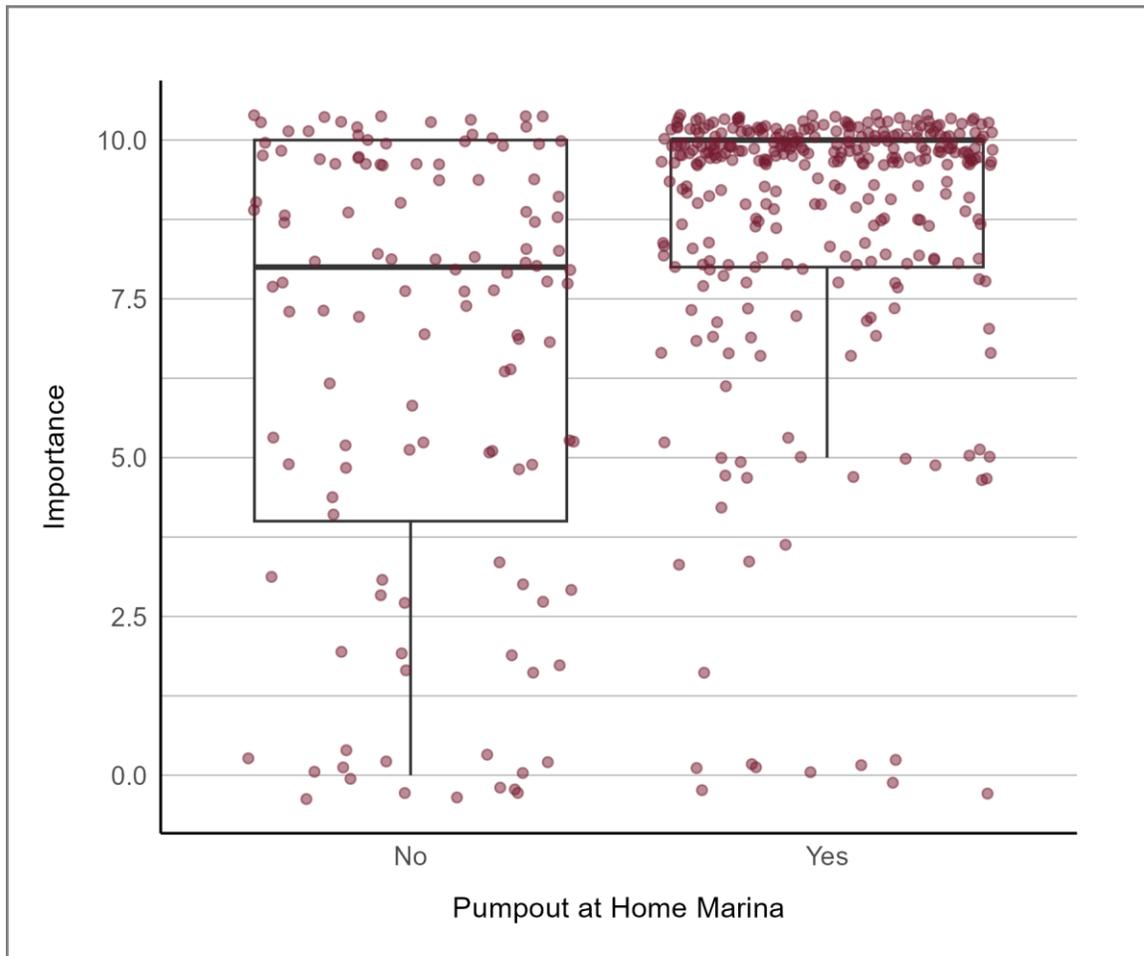
Table 5 summarizes boaters' average level of importance that they assigned to their home marina having a stationary or mobile sewage pumpout available. Each respondent was prompted to rate the level of importance of a pumpout relative to other factors from 'Not At All Important' (0) to 'Critically Important' (10). Overall, the average rating for the importance of having a pumpout is 8.2 out of 10 (SD=2.77). Boaters whose home marina has a pumpout system tended to rate the importance of their home marina having a pumpout higher (Mean=8.85, SD=2.14) than those whose home marina does not have a pumpout (Mean=6.55, SD=3.46).

Table 5. Pumpout Importance by Group

Pumpout at Home	Standard		Mean n	Group n
	Mean	Deviation (SD)		
No	6.55	3.46	121	122
Yes	8.85	2.14	315	315
Total	8.22	2.77	438	629

Figure 14 visualizes the distribution and clustering of these ratings among boaters with and without a pumpout at their home marina. The red dots represent individual responses. This plot “jitters” the points along the axes so it is easier visualize the distribution of individual responses. The opacity of the dots has been reduced such that darker sections indicate overlapping dots. The boxplot represents the interquartile range, or all responses between the 25th and 75th percentile, with the dark bar in the middle representing the median. Observations outside of the whiskers (lines coming out of the boxes) are outliers.

Figure 14. Pumpout Importance by Group



A point-biserial correlation (a correlation in which one of the variables has two possible responses) shows that having a home marina with a pumpout is significantly correlated with the boater’s ranking of the importance of having a pumpout at their home marina ($r_{\text{pbi}}=0.37$; $p<.001$). The correlation coefficient of 0.37 indicates a moderate effect size. The relationship is statistically significant at the 0.1% level, meaning that there is less than a 0.1% probability that this result is due to random variations.

Additional statistical testing can show whether the mean difference between the two groups is indeed significant. Since the data is heterogenous and not normally distributed, the most appropriate statistical tests are the Mann Whitney U-Test and the Welch T-Test.⁵ The null hypothesis of both tests is that there

⁵ The Mann Whitney U-Test and the Welch T-Test are statistical tests that are used to compare the central tendencies (mean or median) between two groups.

is no significant difference between the average importance rating of boaters that have a pumpout at their home marina and those that do not, while the alternative hypothesis is that there is a significant difference.

The first row of Table 6 presents results for the Mann Whitney U-Test. The p-value ($p < 0.001$) indicates that the differences between the two groups are indeed statistically significant and the effect size (0.36) indicates a moderately strong relationship. The second row of Table 6 shows the results for the Welch T-Test. Again, the p-value ($p < 0.001$) is statistically significant and the effect size is large (0.80), which further supports the conclusion that the level of importance that boaters assign to having a pumpout at their home marina varies depending on whether their home marina has a pumpout or not.

Table 6. Mann Whitney U and Welch T-Test Results

Pumpout at Home	Group 1	Group 2	p	p Adjusted	Effect Size	Magnitude
Mann Whitney U-Test	No	Yes	<0.001	<0.001	0.36	moderate
Welch T-Test	No	Yes	<0.001	<0.001	0.80	large

To further test this hypothesis, we fit a logistic regression where boaters' rating of the importance of having a pumpout at their home marina is used to predict the likelihood that their home marina has one. Table 7 presents the model results, in which pumpout importance is statistically significant at the 0.1% level.

Table 7. Effect of Pumpout Importance on Pumpout Presence

Predictors	Odds Ratios	Std. Error	Confidence		p
			Interval (CI)	Statistic	
(Intercept)	0.28	0.09	0.14-0.53	-3.760	<0.001
Pumpout Importance	1.33	0.05	1.23-1.44	6.930	<0.001
Observations: 436					
R ² Tjur: 0.138					

These results follow intuition and common sense, but they have important ramifications for assessing the economic benefit to marinas of having a pumpout. Boaters are not randomly assigned to a marina—they choose their home marina based on a host of factors. Based on the survey results, we can conclude that boaters are, to some extent, choosing a home marina with a pumpout because having a pumpout is important to them. This implies that having a sewage pumpout increases demand for slips in a marina among boaters for whom having access to a sewage pumpout is important. It follows that a marina could benefit from installing a sewage pumpout if the pumpout causes higher slip occupancy rates and/or if boaters are willing to pay higher slip rates.

It could also be the case that the extent to which a boater thinks a pumpout is important increases once their home marina installs one. While a marina may resist installing a pumpout because they do not observe a demand for one, once installed, the survey results suggest that it could bring more boaters to the marina who will use it.

Among all boaters surveyed who use a sewage pumpout, regardless of their importance rating, the probability that their home marina has a pumpout is approximately 21.8 percent. But the odds ratio for the importance rating indicates that for every one-unit increase in the importance rating (e.g., from 0 to 1, 1 to 2, etc.), the odds that the boater's home marina has a pumpout increase 1.33 times, or 33 percent.

We can also use the model coefficients to predict the probability that a boater's home marina has a pumpout given the boater's rating of the importance of having a pumpout. Table 8 presents the predicted probability that a boater's home marina has a pumpout based on the boater's rating of the importance of having one.

Table 8. Odds Ratio and Predicted Probability of Having a Pumpout at Home Marina

Importance Rating	Odds Ratio (Pumpout Present/ Not Present)	Predicted Probability that Home Marina has Pumpout	Total Respondents	% of Respondents	
				No Pumpout at Home Marina	Yes Pumpout at Home Marina
0	0.28	22%	24	63%	38%
1	0.37	27%	0	-	-
2	0.49	33%	7	86%	14%
3	0.65	39%	10	80%	20%
4	0.86	46%	4	50%	50%
5	1.14	53%	27	44%	56%
6	1.51	60%	5	80%	20%
7	2.00	67%	25	32%	68%
8	2.66	73%	53	36%	64%
9	3.52	78%	53	25%	75%
10	4.67	82%	230	15%	85%

For each importance rating, Table 8 shows the odds ratio and predicted probability of a pumpout being present. The last three columns indicate how many survey respondents selected the importance rating and the proportion that indicated whether or not their home marina has a pumpout. Odds ratios are converted to probabilities by dividing the odds ratio by the odds ratio plus one ($OR \div [OR + 1]$).

The predicted probability that the boater's home marina has a pumpout increases with the level of importance they ascribe to a pumpout. Table 8 shows that once the importance rating reaches a rating of '5', the odds that a marina has a pumpout are greater than the odds of it not having a pumpout. At an importance rating of '8' or higher, which the majority (336 out of 438) of respondents selected, the probability that one's home marina has a pumpout is greater than 70 percent.

We find further evidence for the importance of pumpouts in how survey respondents ranked the relative importance of five major marina features. Table 9 compares boaters' average importance ratings in Question 6 with their ranking of marina features in Question 7. Unsurprisingly, those who rated the importance of pumpouts as a '4' or lower on a 1-10 scale also ranked the importance of pumpouts lower relative to other marina features like accessibility and desirability of the destination. Conversely, those who rated the importance of pumpouts as a '5' or higher on a 1-10 scale also ranked having a pumpout higher than other marina features. Regardless of how boaters ranked the importance of pumpouts, however, all boaters generally agreed in ranking the desirability of a destination as the top factor in their choice of home marina.

Table 9. Pumpout Importance Rating (1-10 Scale) by Rank of Five Marina Features

Pumpout Importance Rated 4 or Lower		Pumpout Importance Rated 5 or Higher	
Feature	Average Rank	Feature	Average Rank
Destinations	2.69	Destinations	2.61
Accessibility	2.71	Pumpout	2.93
Amenities	2.98	Accessibility	2.94
Repair	3.26	Repair	3.15
Pumpout	3.45	Amenities	3.27

Boaters' rankings of marina features are not only in line with their ratings of the importance of pumpouts, but also the presence of a pumpout at their home marina. Table 10 shows boaters' overall average rank of five marina features from most important (1) to least important (5). It additionally includes a breakdown of the average ranking for each feature for boaters with and without pumpouts at their home marina.

Table 10. Pumpout Importance by Feature Ranking

Pumpout at Home	Accessibility		Repairs		Destinations		Amenities		Pumpout	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N/A	3.50	1.91	2.25	1.89	2.75	0.96	3.25	0.96	3.25	1.71
No	3.00	1.72	3.09	1.25	2.48	1.27	3.18	1.39	3.10	1.32
Yes	2.88	1.63	3.19	1.31	2.67	1.31	3.26	1.36	2.96	1.35
Total	2.92	1.66	3.15	1.30	2.62	1.30	3.24	1.37	3.00	1.35

For those boaters who do not have a pumpout at their home marina, their average ranking of marina features from most important to least important are (1) Destinations, (2) Accessibility, (3) Repair Services, (4) Pumpout, and (5) Amenities. The average ranking of marina features by boaters who have a pumpout at their home marina are: (1) Destinations, (2) Accessibility, (3) Pumpout, (4) Repair Services, and (5) Amenities. Again, those with pumpout services at their home marina tend to rank pumpouts as a more important feature than those that do not have a pumpout present.

Overall, the data shows a strong relationship between how survey respondents' rated the importance of having a pumpout at their home marina and how they ranked having a pumpout relative to other marina features. These results indicate that the presence of a pumpout is a significant factor for boaters deciding which marinas to select as their home marina. A majority of survey respondents indicate that their home marina has pumpouts and, overall, most respondents see access to pumpouts as very important. Given that even boaters whose home marinas do not have pumpouts still believe pumpouts are important suggests that many of these boaters would prefer if their marina had a pumpout. These boaters may be prevented from changing their home marina due to lack of other suitable options with pumpouts but would switch if another marina of comparable value to the boater installed one. We can also reasonably conclude that many of these boaters would use a pumpout if it was installed at their home marina, which would lead to increased boater satisfaction and potentially more spending at the marina.

4.2 Transient Spending

The next section of the boater survey concerned the opinions and spending patterns of transient boaters. If a transient boater views a sewage pumpout system as a “critically important” feature of a marina, the boater is likely to choose a marina that has a sewage pumpout system over a marina that does not have a pumpout, given the option. It follows that any other spending on marina services by this transient boater would not occur without the presence of the sewage pumpout.

However, a transient boater’s choice of marina may be based on several factors, in which case their spending cannot be wholly attributed to the presence of a sewage pumpout. To account for the impact of non-pumpout related factors on transient boaters’ choice of marina, we divide respondents into nine groups according to (a) their ratings (0-4, 5-7, or 8-10) of the importance of a pumpout on a transient marina visit and (b) their rankings (1st, 2nd, or Other) of the importance of having a pumpout relative to other marina amenities. Table 11 presents summary statistics for each group of respondents.

We argue that the 9.2 percent of transient boaters who comprise the first row—those that consider pumpouts in the “critically important” range and rank pumpouts as the most important marina feature—will choose to visit a marina that has a sewage pumpout over one that does not, given the option. Therefore, we estimate that at least 9.2 percent of all transient boater visits, and thus the spending on marina services during these visits, can be attributed to the presence of a pumpout system. This is likely a lower bound on the share of transient boater spending attributable to sewage pumpout systems because pumpouts also factor into the selection of marina for other groups’ trips. However, this provides a conservative estimate for spending attributable to pumpouts when transient boaters are able to choose between visiting marinas with and without pumpouts.

Table 11. Groups of Transient Boater Responses

Importance	Pumpout		n	Percentage
	Ranking	Spending		
8-10	1st	\$ 460	32	9.2%
8-10	2nd	\$ 471	29	8.4%
8-10	Other	\$ 621	108	31.2%
5-7	1st	\$ 441	10	2.9%
5-7	2nd	\$ 406	18	5.2%
5-7	Other	\$ 404	71	20.5%
0-4	1st	\$ 1,440	12	3.5%
0-4	2nd	\$ 367	12	3.5%
0-4	Other	\$ 670	54	15.6%

During the interview portion of the study, we asked marina operators about the length of stay for transient boaters and the occupancy rates for guest slips. The average length of stay for transient boaters for the four marinas that were able to provide a response was three nights, with most slips being occupied for extended weekend visits. Two marinas provided occupancy rates for their guest slips, which average 57.0 percent throughout the year.

Taking a conservative approach and estimating that there will be one three-night transient visitor per guest slip per week (an occupancy rate of 42.9 percent), there would be 52 transient visits per year per guest

slip. Applying the estimated share of visits attributable to a pumpout from above, we estimate that approximately 4.8 transient visits per guest slip per year are wholly attributable to the presence of a pumpout. Transient boaters in this group spend approximately \$460 per trip (Table 11). Multiplying the number of pumpout-driven transient visits per year by total spending per visit, we estimate that sewage pumpout systems attract an additional \$2,208 in marina spending per guest slip per year, given that a marina has other goods and services available for purchase.

Assuming these transient boaters are able to choose between marinas that do or do not have sewage pumpouts, then the marinas that do not have a sewage pumpout would not receive these visits. Therefore, a marina available to transient boaters that does not currently have a sewage pumpout could reasonably expect an additional \$2,208 in boater spending annually for each guest slip. As more neighboring marinas install sewage pumpouts, however, the marginal benefit of installing a sewage pumpout declines. This is illustrated by the fact that, if all marinas in an area had a pumpout, the presence of a pumpout would no longer be a deciding factor for boaters deciding which regional marina to visit.

4.3 Pumpout-Specific Visit Spending

Many survey respondents indicated they visit marinas for the sole purpose of using sewage pumpout systems, so any spending made during these visits can be directly attributed to the presence of the pumpout. In this section, we first estimate average spending that occurs during pumpout-specific visits and then apply the estimate to county-level vessel registration data, relying on data from both the survey from this study and from the [2022 Boater Sewage Disposal Survey Report](#).

Table 12 presents marina spending attributable to pumpout systems on a per 100 vessels basis. Only boats that have a head with a holding tank are able to use sewage pumpout systems, so Table 12 is only applicable to the set of California vessels that have a head with a holding tank. Each row of the table represents a group of boaters, based on their number of annual pumpout-specific visits. We note that 68.8 percent of respondents said they do not make any pumpout-specific marina visits (“None” row in Table 12), though they do use sewage pumpouts generally. However, if a respondent indicated that they do not use a sewage pumpout in any capacity in the first survey question, they were automatically opted out of the rest of the survey.

Boaters who do not use sewage pumpouts fall into two categories: (a) boaters who do not have a head with a holding tank aboard their boat, or (b) boaters who have a head with a holding tank but do not use sewage pumpout systems. In the next stage of the analysis, we apply the results from Table 12 to vessels that have a head with a holding tank. Therefore, we need to adjust the results to account for the group of boaters who have a head aboard their boat but do not use sewage pumpout systems and thus do not make any pumpout-specific marina visits either.

It is unknown how many of the 136 survey respondents (see Figure 4) that do not use pumpout systems have a head aboard their boat. However, according to the [2022 Boater Sewage Disposal Survey Report](#), 28.5 percent of boaters that have a head and holding tank choose not to utilize a pumpout system. Assuming the same is true for our survey respondents, then approximately 39 respondents have a head aboard their boat but do not use sewage pumpouts (28.5 percent of the 136 respondents with no sewage pumpout use). These boaters are listed in Table 12 as “No Pumpout Use-Have Head.”

We estimate revenue from pumpout-specific trips per 100 vessels as an illustrative example. As such, the fourth column of Table 12, “Boats in Group,” represents approximately how many boats are in each group.

The next column, “Trips per Year,” represents the estimated average number of visits boaters in each group makes for the principal purpose of using the sewage pumpout. For the group of boaters that report making seven or more pumpout-specific visits per year, we conservatively assume they make only seven trips (the lowest possible value).

Recall that Table 4 presented survey respondents’ average spending during pumpout-specific visits, which totaled \$200.91 across all categories. Therefore, for each group in Table 12, we multiply \$200.91 by “Trips per Year” to estimate the annual average spending per boat attributable to pumpout-specific visits (“Avg Spend per Boat”). Finally, we multiply “Boats in Group” by “Avg Spend per Boat” to estimate the “Total Marina Revenue” shown in the final column. Adding the estimated revenue across all boater groups, we estimate that total marina spending attributable to boaters’ pumpout-specific visits is approximately \$16,023 for every 100 boats, or \$160.23 per boat per year.

Table 12. Annual Pumpout-Specific Visit Spending per 100 Boats with a Head

Visits per Year Group	Survey Responses	Percent of Responses	Boats in Group	Trips per Year	Avg Spend per Boat	Total Marina Revenue
1-2	54	10.2%	10.2	1.5	\$ 301	\$ 3,074
3-4	41	7.7%	7.7	3.5	\$ 703	\$ 5,415
5-6	16	3.0%	3.0	5.5	\$ 1,105	\$ 3,315
7+	16	3.0%	3.0	7.0	\$ 1,406	\$ 4,219
None	366	68.8%	68.8	0.0	\$ -	\$ -
No Pumpout Use-Have Head	39	7.3%	7.3	0.0	\$ -	\$ -
Total	532	100%	100			\$ 16,023

We can multiply the annual pumpout-specific spending per boat by the total number of registered vessels that have a head with a holding tank to estimate the total spending on pumpout-specific visits each year. Vessel registrations do not track whether a vessel has a head with a holding tank. However, they do track vessel length, which is highly correlated with having a head with a holding tank. According to SFEP, boats under 25 feet are significantly less likely to have a head with a holding tank than vessels that are 25 feet or longer. To account for this, SFEP provided RDN with data on total registered recreational vessels (California Department of Motor Vehicles, 2018)⁶, grouped by vessel length. We combine these data with findings from the [2022 Boater Sewage Disposal Survey Report](#), which show that the proportion of vessels that have a head with holding tank varies by both vessel length and region (Inland or Coastal).

Table 13 summarizes the survey data from the [2022 Boater Sewage Disposal Survey Report](#). Overall, 88.0 percent of vessels surveyed that are 25 feet or longer have a head with a holding tank compared to just 9.6 percent of vessels under 25 feet. Coastal vessels are also more likely to have a head with a holding tank than inland vessels. No smaller inland vessels reported having a head with a holding tank, whereas 13.5 percent of smaller coastal vessels do. Similarly, 88.5 percent of larger coastal vessels have a head with a holding tank compared to 81.0 percent of larger inland vessels.

⁶This is the most recent data that SFEP was able to provide.

Table 13. Share of Vessels with a Head by Length and Region

Length	Region	Respondents	Has Head with Holding Tank
< 25 feet	Coastal	52	13.5%
< 25 feet	Inland	21	0.0%
>= 25 feet	Coastal	330	88.5%
>= 25 feet	Inland	21	81.0%

Note: Inland Region Group includes the Central Valley and Sierra regions; Coastal Region Group includes the Central Coast, Greater San Francisco Bay Area, Los Angeles, Northern California, and Southern California regions.

Source: DBW, 2020.

Combining the annual estimated spending per boat for pumpout-specific visits with the vessel registration data from SFEP and the survey data from [DBW \(2020\)](#), we can estimate the impact of installing a sewage pumpout on a marina’s revenue. Table 14 presents the results at the county level. Note Table 14 excludes counties that were defined as having “little to no boating infrastructure” in [DBW \(2020\)](#). It also excluded San Bernardino County because it had no publicly available pumpouts at the time of the study.

The second and third columns of Table 14 present the total number of registered recreational vessels in each county (California Department of Motor Vehicles, 2018), broken down by vessel length. The third and fourth columns scale these totals based on the estimated share of vessels that have a head with a holding tank and whether the county is coastal or inland (see Table 13).⁷ Column five presents the sum of all vessels that are estimated to have a head with a holding tank. This total represents the number of boats in the county that could potentially use a sewage pumpout.

Previously, we estimated that each vessel spends an average of \$160.23 at a marina each year during pumpout-specific visits. Therefore, we can estimate county-level spending associated with pumpout-specific visits by multiplying the total number of vessels with a head with holding tank in each county (Table 14, Column 6) by the average pumpout-visit spending per vessel. The seventh column of Table 14 presents county-wide revenue associated with pumpout-specific visits. We estimate that total pumpout-specific visit spending by boaters statewide is approximately \$14.5 million per year.

Assuming the current levels of pumpout-specific spending in each county are held constant, the share of the pumpout-specific revenue that a marina could capture by installing one depends on how many other pumpouts are in the marina’s area. A marina will tend to capture more revenue if there are fewer publicly available sewage pumpouts in the region. The second to last column of Table 14 presents the current number of publicly available sewage pumpouts in each county according to [DBW \(2020\)](#).

If we assume that pumpout-specific visit spending is spread evenly across all marinas in a county, we can estimate the average marginal revenue earned from a new sewage pumpout by dividing county-wide spending by the number of pumpouts plus one, i.e., how many pumpouts there will be if one of the marinas installs a new sewage pumpout. We conduct this calculation in the final column of Table 14.

The expected marginal revenues vary by county, ranging from \$4,727 for Mariposa County to \$125,060 for Santa Cruz County. Figure 15 presents a map of these expected annual marginal revenues by county.

⁷ Counties were defined as Coastal if they border the coast, irrespective of their classification in the [2022 Boater Sewage Disposal Survey Report](#).

The county-average marginal revenue earned by a marina that installs a pumpout is approximately \$48,325, assuming no other new pumpouts are installed.

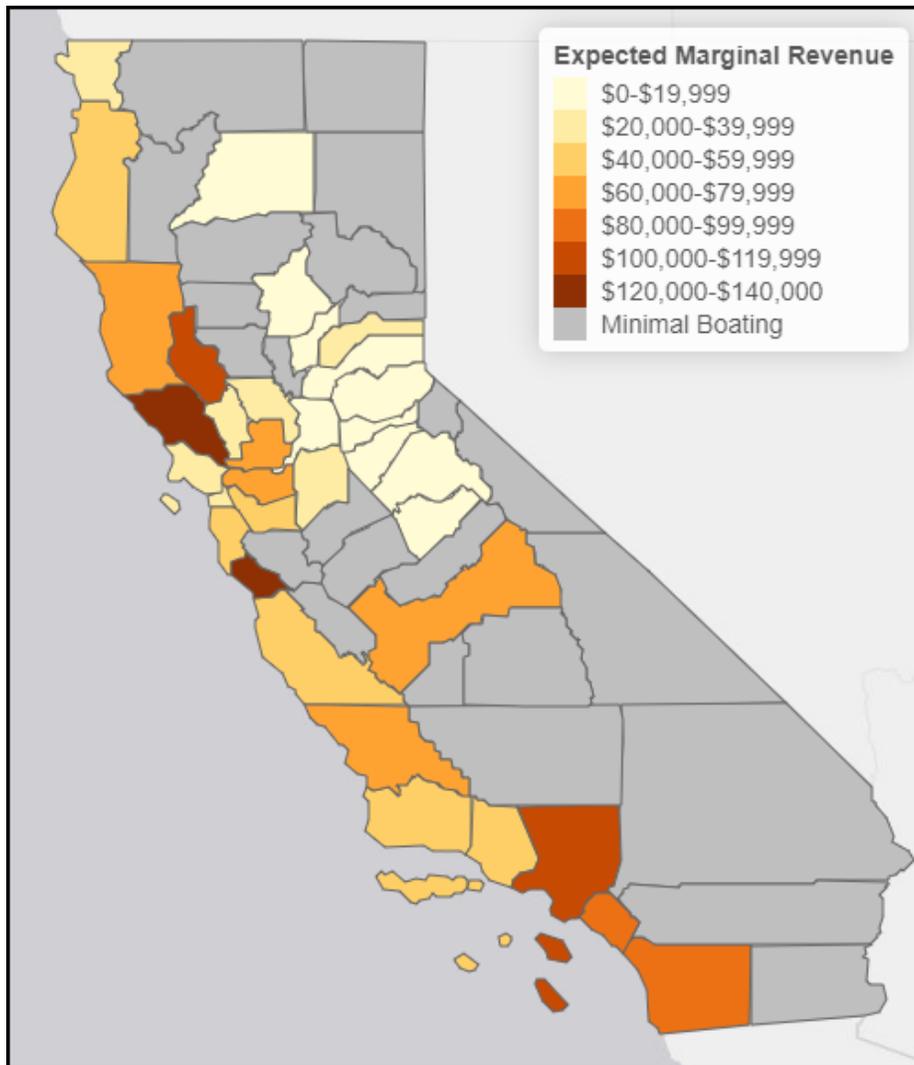
If total pumpout-specific visit spending remains constant, then the average revenue per pumpout falls as more pumpouts are installed. For example, if each county installed one more pumpout, then the county-average marginal revenue earned from a second marina installing a new pumpout would be \$39,637. Even if every county had 10 more pumpouts installed, however, the county-average expected marginal revenue would still be \$19,714. This is because the average revenue per pumpout declines at a decreasing rate as the number of pumpouts increases.

An important caveat to this analysis is that marinas that are far away from major boating centers are unlikely to capture boater spending attributable to pumpout-specific visits. The marinas most likely to benefit from installing a sewage pumpout are those that do not currently have a pumpout but are located in counties with high marginal revenues (per Table 14) and are close to major boating centers.

Table 14. County-Level Analysis of Spending During Pumpout-Specific Visits

County	Total Registered Recreational Vessels		Registered Vessels Estimated to Have Head with Holding Tank			Annual Revenue from Pumpout-Specific Visits	Public Pumpouts	Expected Annual Marginal Revenue
	< 25'	≥ 25'	< 25'	≥ 25'	Total			
Alameda	19,826	2,227	2,669	1,971	4,640	\$ 743,467	12	\$ 57,190
Amador	3,071	129	-	104	104	\$ 16,664	1	\$ 8,332
Butte	15,603	852	-	690	690	\$ 110,559	6	\$ 15,794
Calaveras	5,563	264	-	214	214	\$ 34,289	1	\$ 17,145
Contra Costa	30,649	2,968	4,126	2,626	6,752	\$ 1,081,873	17	\$ 60,104
Del Norte	1,521	53	205	47	252	\$ 40,378	1	\$ 20,189
El Dorado	13,145	753	-	610	610	\$ 97,740	4	\$ 19,548
Fresno	20,147	1,115	-	903	903	\$ 144,688	1	\$ 72,344
Humboldt	7,502	444	1,010	393	1,403	\$ 224,803	3	\$ 56,201
Lake	8,752	361	1,178	319	1,497	\$ 239,864	1	\$ 119,932
Los Angeles	90,295	7,891	12,155	6,982	19,137	\$ 3,066,322	27	\$ 109,511
Marin	6,502	1,594	875	1,410	2,285	\$ 366,126	10	\$ 33,284
Mariposa	1,374	73	-	59	59	\$ 9,454	1	\$ 4,727
Mendocino	4,526	290	609	257	866	\$ 138,759	1	\$ 69,380
Monterey	6,784	571	913	505	1,418	\$ 227,206	3	\$ 56,802
Napa	4,879	346	657	306	963	\$ 154,301	5	\$ 25,717
Nevada	8,906	410	-	332	332	\$ 53,196	1	\$ 26,598
Orange	52,783	4,879	7,105	4,317	11,422	\$ 1,830,147	18	\$ 96,324
Placer	18,992	897	-	726	726	\$ 116,327	5	\$ 19,388
Sacramento	40,856	2,178	-	1,763	1,763	\$ 282,485	14	\$ 18,832
San Diego	56,052	5,125	7,545	4,535	12,080	\$ 1,935,578	22	\$ 84,156
San Francisco	3,580	1,076	482	952	1,434	\$ 229,770	6	\$ 32,824
San Joaquin	23,797	1,370	-	1,109	1,109	\$ 177,695	5	\$ 29,616
San Luis Obispo	11,646	666	1,568	589	2,157	\$ 345,616	4	\$ 69,123
San Mateo	10,199	1,332	1,373	1,179	2,552	\$ 408,907	7	\$ 51,113
Santa Barbara	8,217	861	1,106	762	1,868	\$ 299,310	5	\$ 49,885
Santa Cruz	6,595	761	888	673	1,561	\$ 250,119	1	\$ 125,060
Shasta	17,885	1,352	-	1,094	1,094	\$ 175,292	11	\$ 14,608
Solano	13,733	1,014	1,849	897	2,746	\$ 439,992	6	\$ 62,856
Sonoma	16,666	940	2,244	832	3,076	\$ 492,867	3	\$ 123,217
Tuolumne	4,750	197	-	159	159	\$ 25,477	2	\$ 8,492
Ventura	18,411	1,628	2,478	1,441	3,919	\$ 627,941	11	\$ 52,328
Yolo	5,685	322	-	261	261	\$ 41,820	1	\$ 20,910
Yuba	4,635	178	-	144	144	\$ 23,073	1	\$ 11,537
California	563,527	45,117	51,035	39,161	90,196	\$ 14,452,105	217	\$ 48,325

Figure 15. Annual Marginal Revenue Expected for Marina Installing a Sewage Pumpout, by County



5. KEY FINDINGS

The following are the key findings of the study:

- Sewage pumpouts have direct costs that often exceed the direct revenue that could be earned from charging usage fees. Most marinas offer their sewage pumpout systems free of charge; however, marinas pay on the order of \$1,000 per pumpout per year to maintain them.
- For marinas that do not have sewage pumpout systems, the primary reasons cited by marina operators are usually that neighboring marinas already have a pumpout or that there is no space at the marina to install a pumpout. Less than half of the marina operators we interviewed that do not have a sewage pumpout are aware of the grant funding available through DBW. Of those who were not aware, only half said they would consider installing a pumpout after being informed about the details of the grant. Thus, of the 16 marina operators without pumpouts that we interviewed, only four (25 percent) expressed any interest in installing a sewage pumpout, even with a grant.
- Sewage pumpouts are an important marina feature for boaters. Over half of boaters who use sewage pumpouts (over one-third of all boaters) surveyed said that it is “critically important” that their home marina has a sewage pumpout. Econometric analysis in Section 4.1 supports the claim that the presence of a sewage pumpout at a marina increases the demand for slips at that marina.
- Sewage pumpouts are an important marina feature for a subset of transient boaters. We estimate that marinas with a pumpout receive an additional \$2,208 in revenue per guest slip per year as a result of having a pumpout.
- Many boaters visit marinas primarily for the purpose of using a sewage pumpout. These visitors often spend money at the marina during their visit. We estimate these visits account for roughly \$14.5 million in annual revenue for marinas statewide.
- The additional revenue expected to be earned by a marina that installs a pumpout varies by location and the extent to which other publicly accessible sewage pumpouts already exist in the area. For a marina that is near a major boating center and does not have a sewage pumpout, we estimate that installing a sewage pumpout would increase the marina’s annual revenue by an average of \$48,325 across all marina services.

6. RECOMMENDATIONS

This study finds that the economic benefit to marinas of installing a sewage pumpout varies by location and the extent to which pumpouts are already installed at neighboring marinas. Relative to a broad-based general outreach effort, this finding suggests that DBW could narrow the deficit of 71 pumpouts identified in the [2020 California Vessel Waste Disposal Plan](#) (DBW, 2020) by instead concentrating outreach efforts on marinas that are most likely to benefit from installing a publicly accessible sewage pumpout. RDN proposes that DBW rank marinas on a set of criteria that capture the extent to which each marina would benefit from sewage pumpout installation, as measured by this study's predicted increases in marina revenues attributable to a sewage pumpout.

The first criterion for selected targeting is the marina's county. Only the 15 counties that had a pumpout deficit in the [2020 California Vessel Waste Disposal Plan](#) (DBW, 2020) should be considered. In Section 4.3, we also demonstrate that the expected economic impacts of sewage pumpout installation vary by county. Marinas could be given a score based on the county-level expected revenues estimates presented in Table 14.

The second criterion for ranking marinas for outreach efforts would be the presence of other marina services. Only marinas that provide other services can benefit from the ancillary spending associated with sewage pumpout use. Therefore, a marina should receive a higher score if they provide services such as access to fuel, restaurants, groceries, supplies, and/or guest slips.

The third criterion would be a score that measures each marina's proximity to other publicly available sewage pumpout systems. Marinas that are farther away from other publicly available pumpouts are more likely to have increased visitation stemming from the presence of a sewage pumpout. Using geospatial analysis, marinas with a greater distance to the nearest publicly available pumpout could be given a higher score than marinas that are closer to pumpouts.

The final step would be to normalize and weight the three scores discussed above. DBW could then concentrate on directly reaching out to the marinas with the highest overall scores, including presenting them with the results of this study and offering information and assistance regarding the grant funding available for installing and maintaining a sewage pumpout. As discussed in Section 2.3, there are a multitude of reasons that marinas do not install sewage pumpout systems. Given time and resource constraints, DBW's outreach efforts should concentrate on marinas that have the greatest incentive to install a sewage pumpout and, once installed, are most likely to be used by boaters.

7. REFERENCES

- BoatHarbors.com, 2023. *California Marinas by California Counties*. January.
- California Department of Motor Vehicles, 2018. *Total Vessel Registrations by County*. August. Sacramento, CA.
- California Division of Boating and Waterways, 2020. *California Vessel Waste Disposal Plan*. February. Sacramento, CA.
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- California Division of Boating and Waterways, 2023b. *Pumpout/Dump Station Installation*. January. Sacramento, CA. https://dbw.parks.ca.gov/?page_id=29090.
- San Francisco Estuary Partnership, 2022. *Boater Sewage Disposal Survey Report*. February. San Francisco, CA.

8. APPENDIX

Table A1. Links to Marina Services

Marina	Services Available
SB Harbor	http://www.dbw.ca.gov/BoatingFacilities/Details/119
Newport Beach Harbor	http://www.dbw.ca.gov/BoatingFacilities/Details/1131
Brisbane Harbor	http://www.dbw.ca.gov/BoatingFacilities/Details/497
Pittsburg Marina	http://www.dbw.ca.gov/BoatingFacilities/Details/454
Sacramento City Marina	http://www.dbw.ca.gov/BoatingFacilities/Details/632
Sun Harbor Marina	http://www.dbw.ca.gov/BoatingFacilities/Details/248
Delta Bay Marina	http://www.dbw.ca.gov/BoatingFacilities/Details/951
Santa Cruz Harbor	http://www.dbw.ca.gov/BoatingFacilities/Details/51

Figure A1. Promotional Flyer



**Are you a California Boater?
Let your voice be heard!**

**Sewage Pumpout
Survey**

Please scan the code or visit the link below to complete this anonymous survey (2 minutes max) about the importance of sewage pumpout systems to boaters and help us improve our programs to better serve the boating community!



<https://www.research.net/r/sewagepumpoutsurvey>

Funding was provided by a Clean Vessel Act grant, administered by California State Parks Division of Boating and Waterways and funded by the U.S. Fish and Wildlife Service, Sport Fish Restoration and Boating Trust Fund.

Figure A2. Survey Interface, Q1

ABAG Marina Pumpout Boater Survey

1. What kind of sewage pumpout system do you use with your boat?

- Stationary pumpout
- In-slip unit
- Mobile pumpout
- Port-a-potty
- I do not use any of these systems

Figure A3. Survey Interface, Q2

ABAG Marina Pumpout Boater Survey

2. Do you own/rent a slip?

- Own
- Rent
- Neither

Figure A4. Survey Interface, Q3-Q6

ABAG Marina Pumpout Boater Survey

3. Do you live aboard your boat?

Yes
 No

4. How much do you pay monthly for your slip? (Please enter a whole number.)

5. Is there a sewage pumpout system at your home marina (the marina you most frequently visit)?

Yes
 No

6. How important is it to you that your home marina has a sewage pumpout or mobile service available?

Not At All												Critically
Important	0	1	2	3	4	5	6	7	8	9	10	Important
	<input type="radio"/>											

Figure A5. Survey Interface, Q7

ABAG Marina Pumpout Boater Survey

7. Which features are most important to you? Please rank the following features in order from most important (1) to least important (5).

- ☰ Accessibility from home
- ☰ Vessel repair, supply, and support
- ☰ Quality of boating destinations and anchorages in the area
- ☰ Marina amenities such as restaurants or shopping
- ☰ Presence of sewage pumpout services

Figure A8. Survey Interface, Q11

ABAG Marina Pumpout Boater Survey

11. How often do you visit a marina other than your home marina for the sole purpose of using a sewage pumpout per year?

1-2

3-4

5-6

7+

I never visit a marina just to use the sewage pumpout system

Figure A9. Survey Interface, Q12

ABAG Marina Pumpout Boater Survey

12. When you visit a marina specifically to use the sewage pumpout system, approximately how much do you spend on other services on an average trip?

Fuel \$	<input type="text"/>
Restaurants \$	<input type="text"/>
Groceries \$	<input type="text"/>
Supplies (boat, fishing, etc.) \$	<input type="text"/>
Other, specify \$	<input type="text"/>