

# Identifying the Desirability & Feasibility of a Passenger Ferry Across the Northwest Arm

**ENVS/SUST 3502**

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## Executive Summary

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Dalhousie University's population is growing and with this growth comes increased demand for sustainable transportation options. Although, the Dalhousie Green Guide provides sustainable transportation alternatives for the Dalhousie community, these options favour those who live on the Halifax peninsula and not those who live on the mainland across from the Northwest Arm.

As a result, this study was undertaken to determine the desirability and feasibility of a passenger ferry in the Northwest Arm. It focused primarily on the Dalhousie Community, which is comprised of the students, staff, faculty and administration of Dalhousie University. This ferry initiative has the potential to contribute to the overall sustainability of the university by creating an environmentally superior transportation option for those living across the Northwest Arm. This area is difficult to access and as a result, has not previously been incorporated into Dalhousie's sustainable transportation plan.

After conducting an exhaustive search for relevant literature, it was established that a questionnaire and a face-to-face interview needed to take place to gain a better understanding of the topic. The questionnaire was created on Opinio and distributed online to 44 academic departments at Dalhousie. The questionnaire provided the opportunity to gather data regarding the desirability of the Dalhousie community for a ferry that crosses the Northwest Arm. In cooperation with NDP MLA Michele Raymond, a face-to-face interview was conducted to gain a better understanding of the feasibility of a ferry that runs across the Northwest Arm. This interview proved very beneficial because Michele Raymond had previously conducted a pilot project with a small passenger ferry crossing the Northwest Arm.

The results showed overwhelming support for ferry service in the Northwest Arm by those who would use the ferry for leisure purposes rather than commuting. Furthermore, the majority of respondents were students who lived on the Halifax peninsula, over half of which use motor vehicles to commute to and from the campus. This shows that future researchers should use a research tool that can reach a greater number of people that live on the mainland and therefore have greater potential to use the ferry service for daily commuting purposes. The study concludes with recommendations for further research. This includes continuing research on this topic, as it has been noted that research should be expanded to the greater Halifax community to ensure the possibility of greater feasibility of this service, and benefits to a wider range of stakeholders.

## **Acknowledgements**

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This project would not have been possible without them.



## Introduction

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### Background

With increasing global population and migration of people to cities, there is greater pressure for urban governments to provide sustainable methods of public transportation for commuters (M. Raymond, personal communication, February 13, 2012). Although it is evident that this is a global phenomenon, this report focuses on the unique coastal city of Halifax. Halifax's downtown core is located on a peninsula, which is surrounded by water, making even more susceptible to traffic congestion (M. Raymond, personal communication, February 13, 2013). With large bodies of water in and around the city, there is ample opportunity for the increased utilization of waterways as transportation corridors. While there has been ferry service in the Halifax Harbour since 1752, there has not been ferry service in the Northwest Arm since the 1970's (Mosher, 2004). Consequently, there is the potential to incorporate a similar, but smaller, ferry service across the Northwest Arm (Halifax Regional Municipality, 2013). This service could provide the opportunity for the city to improve its transportation network and reduce congestion in the Halifax's downtown core (M. Raymond, personal communication, February 13, 2013).

### Rationale

An ideal place to begin researching the implementation of ferry service in the Northwest Arm is Dalhousie University, as it is a vital part of the Halifax community (Dalhousie University, 2013). Dalhousie has adopted a sustainability policy that incorporates the fundamentals of sustainable transportation. This refers to any method of transportation with low impact on the environment (Nova Scotia Department of Energy, 2008). Dalhousie has shown its commitment to sustainable practices through several measures; not only is it a signatory to the Presidents Climate Change and the Talloires Declaration, but it has been a leader in sustainability through the creation of its College of Sustainability and Office of Sustainability (T. Wright, personal communication, January 15, 2013).

### Literature Review

Water transportation has the potential to provide reliable, environmentally superior service for passengers in urban settings (Park & Nam, 2005). Although cities can benefit from ferry systems, economically and socially, ferry transportation is rarely considered in comprehensive transportation planning (Weisbrod & Lawson, 2003). A study by Thompson, Burroughs & Smythe (2006) shows a renewed interest in ferry transportation, especially in the United States. This interest is due to the movement of people to coastal areas, which increases pressure on urban transportation systems.

Major cities, such as San Francisco, have plans to expand ferry transportation in order to reduce problematic congestion (Thompson et al, 2006). The implementation of ferries is beneficial because they have lower startup costs than other transportation infrastructure. Ferries have greater route flexibility than other public transportation methods and offer a less risky investment for municipal governments (Thompson et al, 2006). There is no need to build roads, as waterways already exist, and any additional infrastructure costs will come from the

construction of terminals. Finally, since ferries are often located in aesthetically pleasing areas, they have the ability to attract tourists, which brings in more income and helps to reduce ticket prices. Offering several options for use of the ferry (regular passengers as well as tourism), combined with minimal infrastructure investment, is what lowers the investment risk for municipal governments. That said, to attract riders ferries must work in conjunction with other public transportation methods and have terminals that are near walkable areas (Thompson et al, 2006).

In their 2003 study, Weisbrod & Larson investigated models of ferry systems and the ways in which they might benefit surrounding cities. They traveled to nine ferry systems located in the United States and made the following conclusions based on their observations and review of relevant literature. The systems should:

- be integrated into transportation planning
- be seamlessly integrated with land-side connections
- be designed to maximize the economic development potential of their landings and terminals
- be designed to have their environmental benefits maximized and their adverse environmental effects minimized
- be designed to maximize safety and security
- be designed, when possible, to carry freight

If these key planning aspects are incorporated into a ferry service the implementation of such a service can offer a unique form of transport in urban areas. This would provide a pleasurable experience for riders and reduce air pollutants and traffic congestion (Weisbrod & Lawson, 2003).

### ***Case Study: The Little Blue Ferries of False Creek, Canada***

Ferry service operating on False Creek, a small inlet in Vancouver between Granville Island and the old Boater's Village Marina, began in 1982 with two electric boats. The idea of regular ferry service expanded with a ferry dock, built in 1983 at the Aquatic centre (Granville Island Ferries, 2012). Presently, the fleet consists of twelve vessels of which, four are "supermini-ferries" that hold twenty passengers each (See Figure 1). This ferry service has been operating for thirty years and has transported fifteen million passengers to date. Prices range from \$1.75 for shorter trips to \$5.50 for longer trips, with hours of operation generally falling between 7:00 am and 9:00 pm. Routes have different hours of operation depending on where the ferry is traveling. These ferries have become a crucial part of the public transportation network in Vancouver. (Granville Island Ferries, 2012)



Figure 1: Granville Island Ferry. (Info Vancouver, 2013).

This case study is indicative that small ferry service can be an integral part of a city's public transportation infrastructure. Vessels of a similar size would function well in the Northwest Arm.

### *Previous Pilot Project in Halifax*

As a defining feature of the neighborhood, the Armdale Rotary links mainland Halifax to the peninsula (See Figure 2). The Rotary experiences high volumes of congestion, as it serves as a hub to connect a variety of different neighborhoods in the area (Mosher, 2004). The majority of residents in District 17, which incorporates the Armdale Region, support the implementation of ferry service across the Northwest Arm (M. Raymond, personal communication, February 13, 2013). With urban development increasing outside the urban core, the current traffic situation will only worsen; residents are, therefore, pushing for what their community needs (Mosher, 2004).

In October 2001, NDP MLA Michele Raymond conducted a trial service for a passenger ferry crossing the Northwest Arm. This two-week project had strong support from members of the community. This was reflected through the variety of riders and the petition to continue service. When Michele Raymond first approached council with the proposition, council was uninterested, so she operated the trial service with help from a local charter boat operator. It cost \$2 per crossing and the ferry ran on weekdays from the Dingle to the wharf on Oakland Road. It operated from 7:30 to 9:15am and 4:15 to 6:00pm and had on demand service to Jubilee Road. During the first week of the trial period, 89 commuters a day avoided traveling through the Rotary as a result of the trial ferry service. (M. Raymond, personal communication, February 13, 2013)

This was not the first time a ferry service operated in the Northwest Arm. Joseph Purcell established a ferry in 1853, that travelled from Purcell's Cove to Point Pleasant Park (Mosher, 2004). This service continued until the 1970s. At the height of the Purcell Ferry, four vessels were used in the operation, transporting 20,000 passengers a year (Mosher, 2004). Reasons to reintroduce ferry service in the Northwest Arm all stem from the fact that the city centre is difficult to access by motor vehicle, as it is located on a peninsula and is surrounded by water (see Figure 2). Additionally, there is expensive and restricted parking within the downtown core making it difficult and costly to commute. (M. Raymond, personal communication, February 13, 2013).



Figure 2: Armdale Rotary, (Armdale Rotary, 2013)

With cooperation from the Ecology Action Centre, and strong support from the community, a repeat trial commenced in 2002. Unfortunately, cancellations diminished rider confidence and the trial did not run for the entire two-week period. The ferry operator lived in Eastern Passage and during times of inclement weather was unable to make the trip with the boat. (M. Raymond, personal communication, February 13, 2013)

One section in the report by Michele Raymond focuses on opportunities that would surface should a ferry service run in the Northwest Arm. The extensive list of the opportunities includes:

- Reduced vehicles in the peninsula
- Reduced greenhouse gases
- Increased active transportation
- Increased sense of community
- Mental health benefits of exercise
- Opportunity for cyclists to ride downtown while missing the busy routes with no bike lanes
- Increased recreational opportunities
- Reduced parking costs and time it took to find parking (M. Raymond, personal communication, February 13, 2013)

A list of challenges was also included, offering information that can be utilized in our research project. The challenges included: getting permission from council for use of public wharves, finding a suitable ferry operator and crew, the absence of a floating dock at Oakland Road, the need for nighttime lighting, and the lack of public parking on the peninsula side of the Northwest Arm. (M. Raymond, personal communication, February 13, 2013)



## ***Dalhousie University's Sustainability Initiative***

The Dalhousie Campus Green Guide, published by the College of Sustainability, describes Dalhousie University's sustainability goals and initiatives. Included in this guide is the university's official sustainability statement. This stresses the importance of the university's sustainability efforts and how they impact the Dalhousie community on a campus wide level (Dalhousie University, 2013a). Currently, sustainable transportation initiatives highlighted in the Campus Green Guide heavily focus on the idea of burning calories instead of oil. This is in lieu of reducing health and environmental impacts associated with a fossil fuel-dependent transportation network. Some of the effects of fossil fuel centered transportation include smog, water contamination, and increase in cardiovascular diseases. Suggested ways for the Dalhousie community to decrease fossil fuel use include the rideshare program, utilizing the Metro U-Pass, and biking (Dalhousie University, 2013a).

The majority of the sustainable transportation initiatives in the Campus Green Guide are directed towards biking. The Campus Green Guide provides locations and contact information for local bike shops, places to get your bike repaired, and plenty of information about the campus bike centre (Dalhousie University, 2013b). However, this is only beneficial for members of Dalhousie University that live near campus or in downtown Halifax. There is no mention in the Campus Green Guide of sustainable transportation options for people who live outside of the downtown core (Dalhousie University, 2013a). As mentioned above, Dalhousie University's sustainability statement encompasses communities near and far, but it is evident that the university's transportation initiatives do not reflect this.

## **Research Methods**

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### **Desirability**

The population of interest for the desirability component of the study was the Dalhousie community, which included faculty, students, staff and administration. To reach this population, a list of 44 academic departments was compiled with the corresponding e-mail (see Appendix V pg 71) (P. Sylvestre, personal communication, n.d.). The survey was sent electronically to the administrator for each department who then sent it to their contact lists. Dispersing the survey through each academic department allowed for responses from individuals with a diversity of backgrounds. It was anticipated that the survey would reach the majority of the university population, as each department had been contacted to distribute the questionnaire.

A questionnaire was chosen as the primary data collection tool, as a major advantage of using this tool was its ability to generate a substantial amount of data quickly and inexpensively (Palys & Atchison, 2008). It was expected that those interested in a ferry service would be more likely to complete the questionnaire, as there is more incentive for them to do so. Therefore, in order to reach the large heterogeneous sample, an electronic questionnaire was developed. The questionnaire was created on the Office of Sustainability's Opinio account, which is an electronic survey software (T. Wright, personal communication, February 12, 2013). It was then

distributed to the Dalhousie community via e-mail. This was beneficial since our target population encompassed all of Dalhousie University's faculty, students, staff, and administration. The Questionnaire was made available for one week, taking respondents five to ten minutes to complete. The tool was developed in a simple manner for respondents. The questionnaire was structured with fourteen questions that aimed to gauge the level of desirability for a commuting passenger ferry from our study population.

The study was designed with a combination of qualitative and quantitative questions, which started broad and simple and progressively became more specific. This eased respondents into the subject matter. The questionnaire was compiled of closed and structured questions, leaving less variability in answers as well as less room for the confusion of respondents (Palys & Atchison, 2008). At the end of the questionnaire our team email was provided for respondents who wished to contact us with questions or comments. This allowed for interesting feedback and collaboration with respondents.

The key information that the questionnaire gathered included, the interest in the ferry, the geographic location the interest came from (i.e. where do the people that are interested live), the demographic most interested in the ferry (i.e. faculty, students, staff or administration), and the preferred ticket cost for the ferry crossing. A copy of the questionnaire can be found Appendix I.

## Feasibility

In order to assess the feasibility of implementing a ferry service, we analyzed case studies. These studies discussed the use of ferries as part of urban transit systems in various Canadian cities and around the world. Although some of the cases were not geographically close to Halifax, they provided useful information for this research project. Additionally, a face-to-face interview was conducted with NDP MLA Michele Raymond. She has conducted previous research in regards to implementing a small passenger ferry in the Northwest Arm, and has facilitated two pilot projects. An interview was arranged to discuss her experience with the project and the feasibility of having a ferry in the Northwest Arm. Interview can be found in Appendix III.

The face-to-face interview was selected for the feasibility section of the study because it allowed for more complex, in depth, open-ended questions to be asked. This enhanced the quality of data gathered, as this method allowed the respondent to ask for clarification on the interview questions (Palys & Atchison, 2008). It also provided the opportunity for the respondent to offer any extra information that could be beneficial to the study (T. Wright, personal communications, February 5, 2013). Michele Raymond's familiarity with the project allowed her to provide concrete data regarding the feasibility of the ferry. As she was knowledgeable about the subject matter she had the ability to contribute significantly to the study.

The interview was conducted on March 22, 2013 at Province House. Prior to the interview, the interviewer ensured familiarity with relevant background information through the literary review process and also provided Raymond with a copy of the interview questions. Audio of the interview was recorded for efficiency purposes and the data collected from the interview was transcribed and analyzed.

### **Data Analysis**

The data collected through the questionnaire and interview was analyzed to determine the desirability and feasibility of the potential Northwest Arm ferry. As the research team deciphered a systematic way to obtain information from the data. The key concepts within the study were decided, such as who was interested, the ideal cost of a ferry trip, and how often and when the ferry would be used.

The electronic survey software, Opinio, was used for the questionnaire and completed results were returned in an electronic format. The university's Opinio server stored the results and basic tabulations were made available. As multiple types of structured questions were used in the questionnaire, such as single response, categorical response, rating scale, and ranking scale, different methods of analysis were used (T. Wright, personal communication, February 12, 2013). Descriptive statistics were used with a combination of all three categories: distribution of variables, central tendency of distribution, variability and dispersion (Palys & Atchison, 2008). Charts, graphs and tables were also utilized to effectively display the data obtained from the study.

For the face-to-face interview, the data was collected while the interview was in progress. It was easier to analyze this data, as specific questions were created prior to the interview. Since the interview focused on the feasibility of the project, the questions and answers were generally straightforward and did not require a deep analysis (Palys & Atchison, 2008).

### **Delimitations of the Study**

There were several delimitations placed on the research project, the main limit was that of whom the study focused on. The population for this research was the Dalhousie community, as it is a campus-based project and it allows for a narrow and more manageable scope. However, this did not offer an accurate representation of the desirability throughout Halifax, but simply the Dalhousie Community. Another delimitation was the amount of time we decided to have the online questionnaire accessible for. This limited the amount of respondents for the survey.

### **Limitations of the Study**

A significant limitation encountered in the research process was the lack of useful and relevant literature on ferries. In addition, there was very limited access to case studies of similar projects, and literature on past ferries in the Northwest Arm. A comprehensive and exhaustive search was performed of the literature and few academic peer-reviewed sources were found. As a result, the majority of our research was derived from grey literature. A limitation that stemmed from the questionnaire as a research method was, the fact that it can be distributed

to the departments and to their contact lists, but the number of people that complete the questionnaire was beyond our control. It was up to the individuals receiving the questionnaire to complete it, so it was unclear going into the study as to the quantity of results that we had received. Another limitation placed on the research project was the time frame. As it was a course project and the entirety of the project had to be completed in approximately 5-7 weeks. This left minimal time for alterations and the exploration of newly discovered avenues.

## Results

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### Desirability

The questionnaire to decipher the desirability of the ferry was completed by 207 respondents from the Dalhousie community. From this return, 67% of respondents were students and approximately 20% were faculty. The second question in our survey was demographical, as it was critical to determine which side of the Northwest Arm respondents resided, in order to determine the interest of those on mainland Halifax versus the peninsula (see Figure 3). The majority of the respondents lived on the Halifax peninsula versus the mainland or other areas in the Halifax Regional Municipality. 122 of the respondents live on the peninsula, whereas only 63 of the respondents live on the mainland.

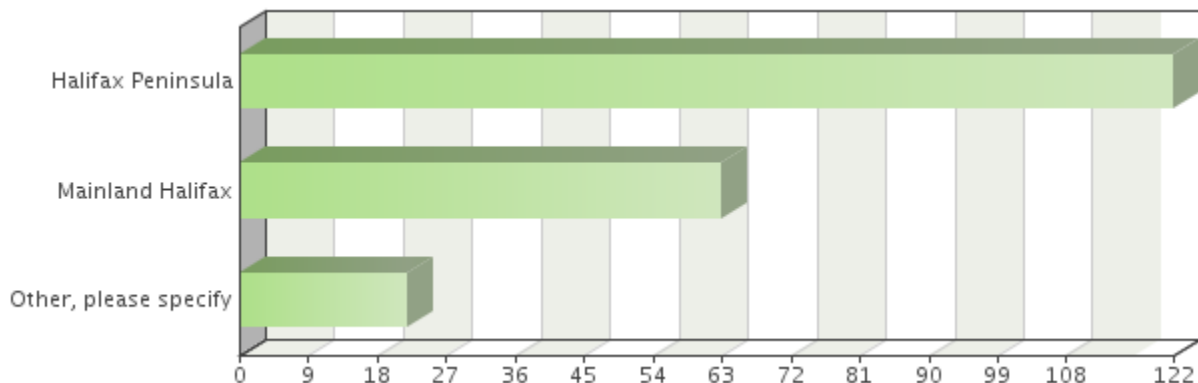


Figure 3: Which area of the Halifax Regional Municipality do you live in?

As the research project deals with transportation and the university, it was important to ask what modes of transportation were most often used to travel to campus. 41% of respondents walk and/or jog to campus, with the use of Metro transit being the second most common at 24%. By using Opinio we were able to view the answers in various ways. Feedback was viewed as a summary of the completed survey, as well as a summary of the data associated with each individual question. This allowed us to see that 44% of those who answered as a student walk and/or jog to school and 12% use a motor vehicle. Out of those who answered as faculty, only 31% walk and/or jog, and 41% use a motor vehicle. Figure 4 shows the frequency of answers to question 3 by students, and Figure 5 shows the frequency of answers to question 3 by faculty



who completed the survey.

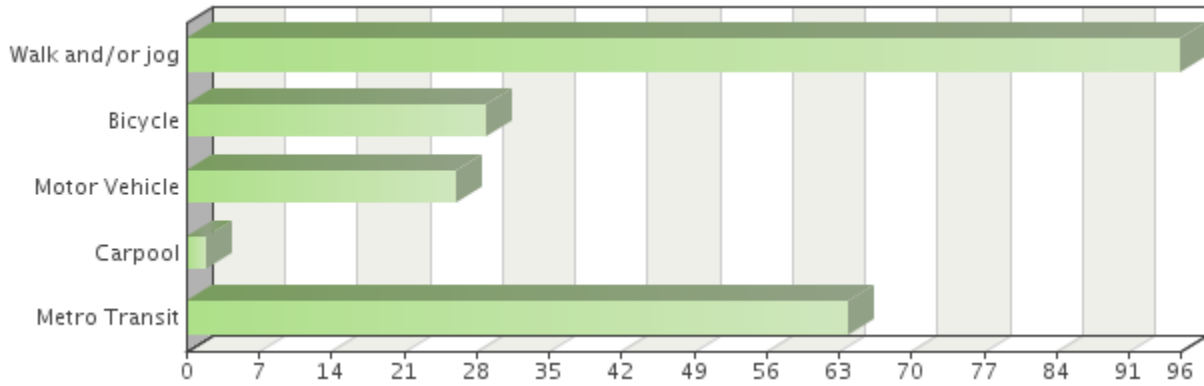


Figure 4: Please select which mode(s) of transportation you use most often to get to campus. Select all that apply. (Student)

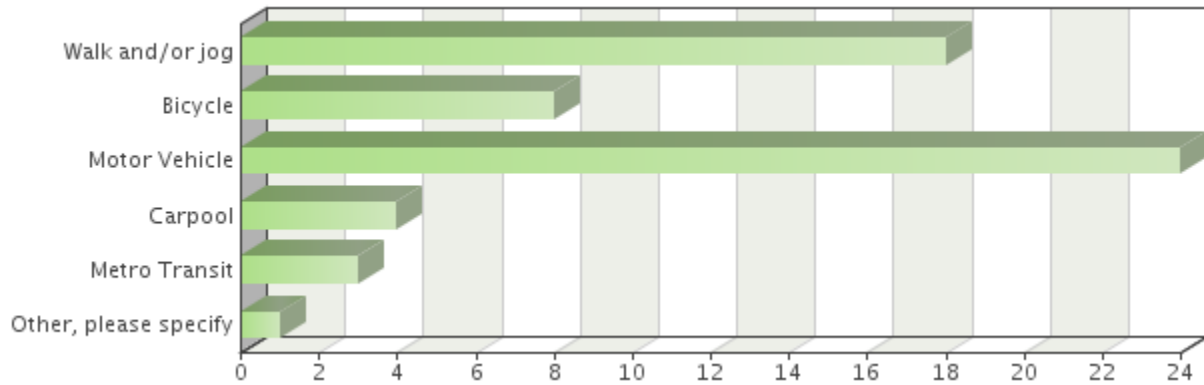


Figure 5: Please select which mode(s) of transportation you use most often to get to campus. Select all that apply. (Faculty)

It was also important to understand how those who live on the mainland travel to campus, as the ferry in the Northwest Arm would ideally be used by them. Almost half of the respondents, 48%, use a motor vehicle as their predominant mode of transportation, with Metro Transit following at 40% (see Figure 6).

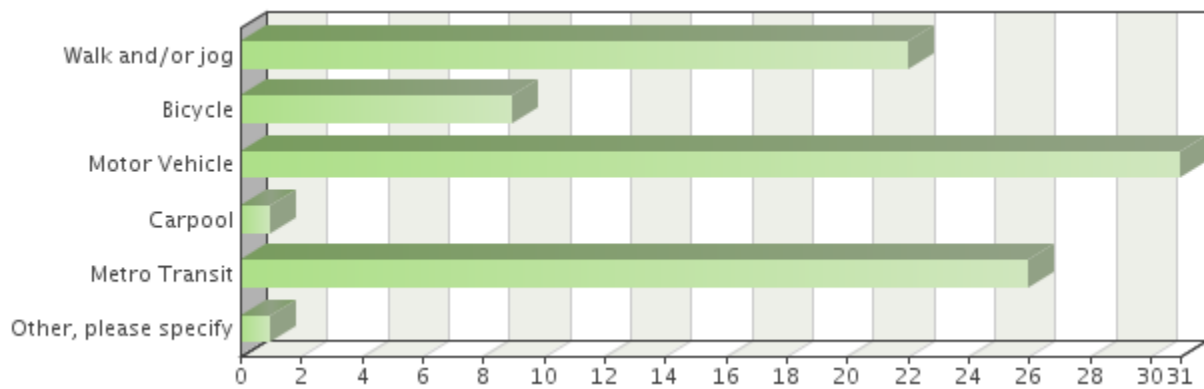


Figure 6: Please select which mode(s) of transportation you use most often to get to campus. Select all that apply. (Respondents living on mainland Halifax)

Through the questions based around the use of a ferry on the Northwest Arm, we found that general interest was high, as only 25% said they would not be interested in taking a ferry. 12% said they would be interested in taking the ferry, but only in specific seasons, which was expanded on further with the questions regarding how likely people would be to take the ferry in each season. Out of the four seasons summer had the highest frequency of people being very likely to take the ferry, with 43% choosing this option (Figure 7). Winter had the lowest frequency of people choosing 'not likely' to use the ferry, with 50% choosing this option.

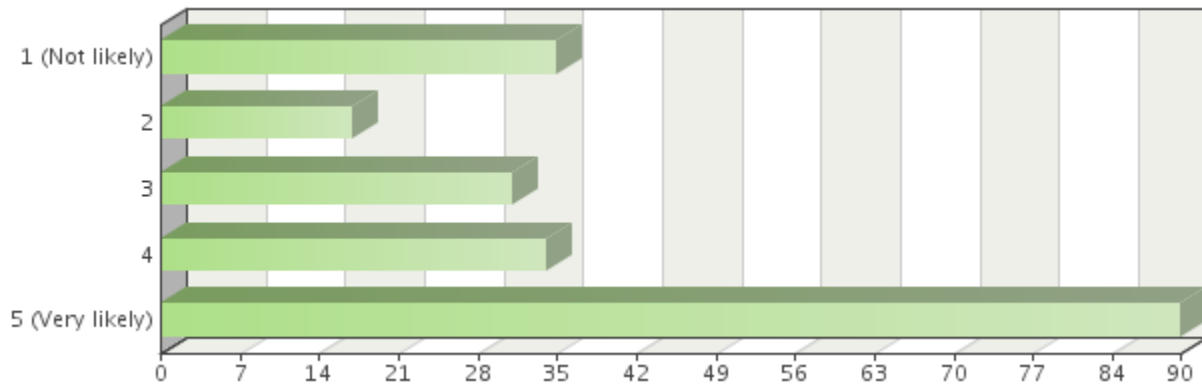


Figure 7: Please rate how likely you would be to take the ferry in the summer.

The project focuses on the Dalhousie community, therefore, we were interested to see if people would use the ferry for purposes other than commuting to and from the university. The responses confirmed significant interest with 66% selecting they would use the ferry for other purposes. When gauging the frequency people would use the ferry service results showed most people would only use the service once or twice a year, however this frequency was not substantially higher than the other choices (see Figure 8).

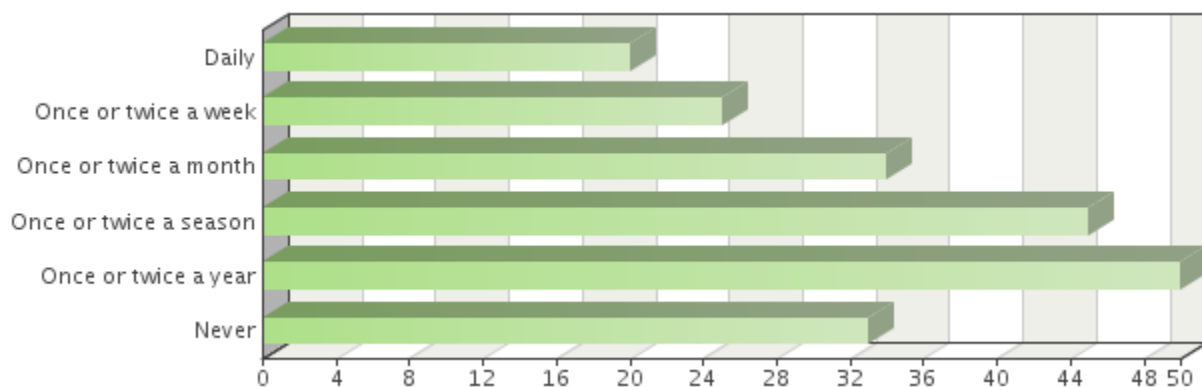


Figure 8: How often would you use a passenger ferry in the Northwest Arm, assuming it operated in all seasons?

Results depicting the times of day people would use the ferry service revealed that very few people would use the ferry in the hours between midnight and 6:00am, and most people would use the ferry between 10:01am and 8:00pm. 32% of those who responded chose the option for

10:01am-3:00pm, and 38% chose the option for 3:01pm-8:00pm. This question, however, was also left unanswered by 41 of the respondents. In addition, our group was interested in the price people would be willing to pay for a one way crossing and over 70% of the respondents chose between \$1.01 and \$3 for a one-way crossing.

To gather information on what would deter people from using the ferry, a question was provided listing several options, including an option for respondents to specify other reasons (see Figure 9). Over half of the respondents replied that they have no need to take a ferry across the Northwest Arm, and another 31% specified they do not live near the Northwest Arm. Other responses given included, “long wait,” “the ease of using the road,” “time from point A to point B”, “it’s a silly idea.” “Build a bridge if there is a transportation issue.” “It is also very shallow,” “I would not take the ferry if it emitted pollutants into the NW Arm,” “location of crossing,” “inconvenient times or low frequency,” “there is no need.” “It takes hardly any time to get to the other side either driving, biking, or walking,” “don’t want higher taxes,” “need for car on the peninsula,” “if there was no place to park my vehicle I couldn’t take it,” “the government would never pay for this.” “There are no main roads around the end of the arm and it would not be a practical solution to improving traffic flow” and “bad weather.” Although some of these answers can be addressed with our research, others are important to keep in mind if a ferry were to be implemented.

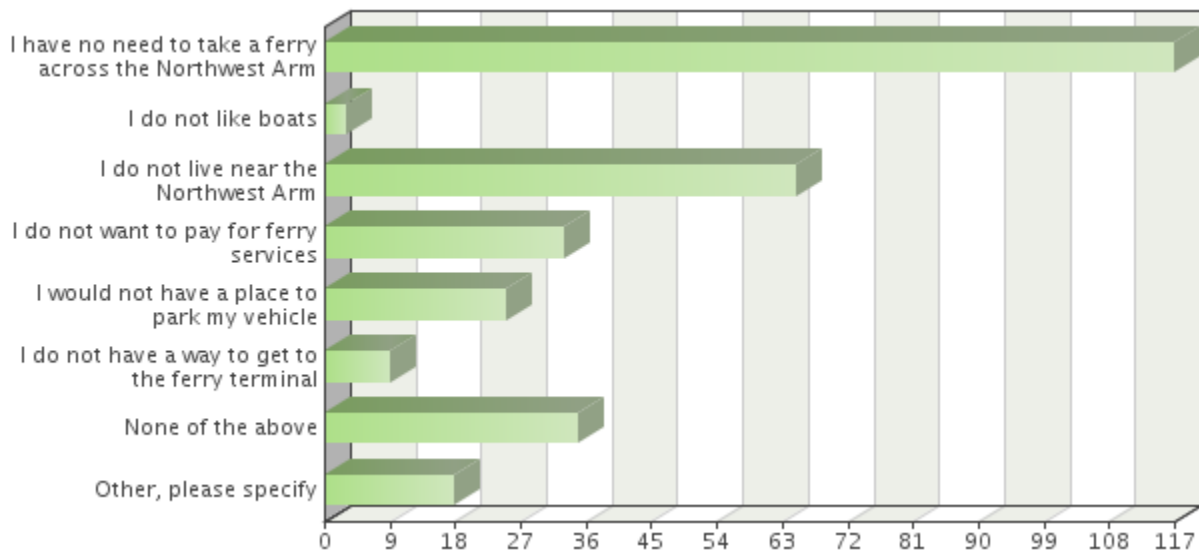


Figure 9: What would prevent you from taking the ferry? Select all that apply.

### Feasibility

The results for the feasibility of the proposed ferry were derived from a face-to-face interview, which provided information regarding the various costs and steps that are required for its implementation and management. Results from the interview included costs associated with the implementation and operation of a ferry (Appendix III), the steps required to facilitate such a project, as well as challenges that may arise.

The previous piloted ferry had a capacity of 26 people and took two minutes to cross

from the Dingle to the wharf at the bottom of Oakland road. An arbitrary fare of \$2.00 per crossing was established, and the first trial period was for two weeks. Both trials had minimal overhead costs, with advertisement for the service limited to radio announcements and foam board signs at the access points (M. Raymond, personal communications, March 22, 2013). Derived from the interview, costs that would be affiliated with the implementation of a permanent ferry in the Northwest Arm include, an insured and licensed charter boat operator with crew, signage, advertisements, shelters and lightings at the stops, floats at the public wharf, as well as the improvement and maintenance of the public infrastructure connected to the wharf. When comparing the costs affiliated with road improvements to the implementation of a ferry, improving roads come at a high cost and are only 'band aid fixes' whereas the implementation of a ferry service comes at a smaller cost and addresses the root issues by minimizing the amount of vehicles on the peninsula.

Results from the previous pilot projects determined that 100 vehicles were being removed from the peninsula every morning, which is equivalent to 200 trips on and off the peninsula. Observations from previous studies indicate that the route should be direct, as a third stop would disrupt service. Further observations from the interview with Raymond have led to the realization that a reliable operator is needed for ridership confidence; there needs to be motivation and an incentive to lead to guaranteed service (M. Raymond, personal communication, March 22, 2013).

## **Discussion**

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### **Overview of Significant Findings**

From the results it is clear that there is a desire for a passenger ferry within the Dalhousie community. Receiving 207 completed surveys was unanticipated, as our group assumed the amount of respondents would be much smaller. Receiving this many responses provided our group with a much larger amount of data which assisted in gauging if a ferry would be desirable.

As mentioned, 67% of respondents were students. Initially our group thought more faculty and administration members would reply to the questionnaire under the assumption that more faculty members live on mainland Halifax rather than students. This assumption also relates to the area in which respondents live; the majority live on the Halifax peninsula, but our group had assumed those interested in a ferry would live on the mainland. This made it difficult to understand how much the ferry service would be used since the majority of the people who completed the questionnaire would not be taking the ferry to and from campus from the mainland. Through our research we were able to connect with Dan Bayefsky who was interning at the Office of Sustainability and working on a similar project. He provided us with data that depicted the predicted commuter demand area for a ferry service (Appendix VI). Although our results do not directly reflect the data provided, since the majority of our respondents reside on the Halifax peninsula side, the demand area is similar to what was found in the previous pilot projects conducted by Michele Raymond.

A question was included regarding if people would be interested in using the ferry for



purposes other than commuting to and from the university, which 66% said they would be. It is important to note this interest because it may not be people affiliated with the university who would most often use the ferry service, or at least use the ferry for purposes unrelated to the university.

In regards to the respondents who live on the mainland, the information gathered shows that almost half use a motor vehicle to commute to and from campus. This is important to note because the ferry aims to reduce vehicle traffic travelling on and off of the peninsula. Assuming that each of the respondents who live on the mainland drive a separate vehicle from each other and were to take the ferry to campus, this would remove 31 cars from crossing onto the peninsula. This is already a large number and is solely derived from the amount of people who completed the questionnaire, which reflects the potential of this project.

When inquiring the time of day people would be most likely to take the ferry, 41 people chose to leave this question unanswered, which could have had a large impact on the data collected. Out of those who did answer, 10:01am-3:00pm and 3:01pm-8:00pm were chosen more frequently than other time slots. This was unexpected, as our group had assumed that the most frequently chosen times would have coincided with the beginning and end of typical work days, once again in assumption that faculty members were to make up the majority of the respondents. As the majority was in fact students, it would make more sense that the ferry would be used most often from 10:01am-8:00pm if this was in combination with taking the ferry to campus. However, as 66% of respondents said they would use the ferry for other purposes, less than 10% said they would use the ferry daily, and only 12% said they would use the ferry once or twice a week, it is difficult to determine why these time slots were selected most frequently.

### Considerations in Light of Existing Research

Although the data shows there is strong support from the Dalhousie community, there is not enough to substantiate a full ferry service and further research must be completed. In light of existing research studies, a ferry would serve as a link for the two sides of the arm, positively contributing to the mitigation of traffic congestion that occurs as a result of the few access points to the peninsula.

Major cities elsewhere have plans to incorporate ferry services into the transportation systems in order to reduce congestion and some already have, indicating that such a service can indeed be feasible (Granville Island Ferries, 2012). The data obtained regarding the pilot projects conducted by Michelle Raymond provided a useful guide of what ferry service could be like if it were to be implemented once again (M. Raymond, personal communication, February 13, 2013). In addition to decreasing traffic congestion, ferry service encourages active transportation, reduces greenhouse gases, increases recreational opportunities and would inspire community partnership through Dalhousie's sustainable transportation initiatives (M. Raymond, personal communication, February 13, 2013).

Dalhousie's Green Guide offers information on the university's transportation initiatives, which primarily focuses on cycling (Dalhousie University, 2013). There is also focus on transportation within the peninsula and downtown core rather than on those who commute

from outside the core. This provides room for Dalhousie to focus on the incorporation of a ferry, as a transportation option and promoting its use instead of the use of vehicles. As our research shows, almost half of the respondents living on the Halifax mainland who completed our questionnaire use a motor vehicle to commute to the university, which leaves a lot of room for improvement.

## **Conclusion**

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### **Major Contribution of the Study**

This study begins to fill the literature gap regarding implementation of a passenger ferry in the Northwest Arm of Halifax. The results from our questionnaire indicate that there is a desire within the Dalhousie Community for a passenger ferry across the Northwest Arm. The ferry would be used primarily for commuting purposes, as respondents showed an interest in using the ferry for purposes other than commuting to the university. Although there is strong support from the Dalhousie community for a passenger ferry, there is not enough to substantiate a full ferry service at this time. Further research is required that includes the broader Halifax population, incorporating other universities, hospitals and other businesses.

In terms of feasibility, the interview with Michele Raymond provided information on the costs associated with the implementation of a ferry, in addition to other useful information learned from the previous pilot project. When comparing road improvements to the implementation of a ferry, improving roads comes at a much higher cost, and does not deal with the underlying traffic problem. There are too many vehicles traveling on and off the peninsula, and residents need a way to cross the Northwest Arm quickly and efficiently. Ferry service may provide an effective means of transportation across the arm.

Our research on the desirability and feasibility of a passenger ferry across the Northwest Arm, contributes to Dalhousie's efforts to improve the overall sustainability of the university. In addition, the benefits of a ferry service would be visible on a wider scale, and have the potential to affect the greater Halifax community. By decreasing congestion from cars travelling on and off the peninsula, all stakeholders would benefit. This presents the opportunity for an improvement in the Halifax community. The implementation of a ferry service comes at a smaller cost than road construction and lessens the amount of vehicles on the peninsula. The previous piloted ferry had a capacity of twenty-six people, and the crossing took two minutes. An estimated one hundred cars were eliminated from the peninsula daily, which is equivalent to two hundred trips.

### **Recommendations for Action**

A passenger ferry in the Northwest Arm should take full advantage of environmental benefits stemming from fewer cars on the peninsula, while ensuring adverse environmental effects are kept at a minimum. Safety and security should be a top concern and the ferry must be accessible to anyone who wishes to use it. Passengers must be able to bring bicycles, strollers, or skateboards. We recommend that the route be direct, as a third stop would disrupt service

for regular commuters. As well, a reliable operator is required for ridership confidence and overall success of the ferry.

### Further Research

At Dalhousie, it would be beneficial to create an archive of information on this subject. This report, as well as the research by Dan Bayefsky, should be kept in an easily accessible online location for others to access. Delimitations of our study were setting the scope of the project solely to the Dalhousie community; future desirability studies should incorporate the larger Halifax community. It is important that future research also focus on the feasibility of implementing a passenger ferry in the Northwest Arm. More research regarding location of permanent terminals is necessary. Collaboration with the municipal government and Metro Transit is necessary for proper planning and appropriate implementation of such a service. It is imperative that this project be pursued with further research. Ongoing public participation should be encouraged.

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## Appendices

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### Appendix I: Sample Questionnaire

#### Northwest Arm Ferry Questionnaire

As researchers from Dr. Tarah Wright's ENVS/SUST 3502 research class, we are distributing this questionnaire to determine the Dalhousie Community's desirability for a ferry across the Northwest Arm. The following questionnaire will gather information for the study. The information gathered will be used for the purpose of this study only and results from the questionnaire will be kept anonymous and confidential. If you have any further questions, please do not hesitate to contact us at [nwferry@gmail.com](mailto:nwferry@gmail.com) Thank you for your time.

1. Which of the following best describes your position in the Dalhousie community?

- Student
- Faculty
- Staff
- Administration
- Other

2. Which area of the Halifax Regional Municipality do you live in?

- Halifax Peninsula
- Mainland Halifax
- Other, please specify

3. Please select which mode(s) of transportation you use most often to get to campus. Select all that apply.

- Walk and/or jog
- Skate/Longboard
- Bicycle
- Motor Vehicle
- Motorcycle/scooter
- Carpool
- Metro Transit
- Other, please specify

4. Would you be interested in taking a ferry across the Northwest Arm?

- Yes
- No
- Maybe
- Only during specific seasons

5. Would you use a ferry for purposes other than commuting to and from the University?

- Yes
- No
- N/A

6. How often would you use a passenger ferry in the Northwest Arm, assuming it operated in all seasons?

- Daily
- Once or twice a week
- Once or twice a month
- Once or twice a season
- Once or twice a year
- Never

7. Please rate how likely you would be to take the ferry in the spring:

- 1 2 3 4 5  
Not likely      Very likely

8. Please rate how likely you would be to take the ferry in the summer:

- 1 2 3 4 5  
Not likely      Very likely

9. Please rate how likely you would be to take the ferry in the fall:

- 1 2 3 4 5  
Not likely      Very likely

10. Please rate how likely you would be to take the ferry in the winter:

- 1 2 3 4 5  
Not likely      Very likely

11. Which times would you be using the ferry? Select all the apply.

- 12:01 am-6:00 am
- 6:01 am-10:00 am
- 10:01 am-3:00 pm
- 3:01 pm-8:00 pm
- 8:01 pm-12:00 pm



12. What would prevent you from taking the ferry? Select all that apply.

- I have no need to take a ferry across the Northwest Arm
- I do not like boats
- I do not live near the Northwest Arm
- I do not want to pay for ferry services
- I would not have a place to park my vehicle
- I do not have a way to get to the ferry terminal
- None of the above
- Other, please specify

13. What would you be willing to pay for a one way ferry crossing?

- <\$1
- \$1.01-\$2
- \$2.01-\$3
- \$3.01-\$4
- \$4.01+

14. Would any of the following be accompanying you on the ferry? Please check all the apply.

- Dog(s)
- Bicycle
- Skateboard/Longboard
- Child(ren) <12 years old
- Wheelchair
- Walker shopping cart
- None of the above
- Other, please specify

15. If you are interested in a proposed ferry across the Northwest arm, or know someone else who may be, please contact us at [nwferry@gmail.com](mailto:nwferry@gmail.com)

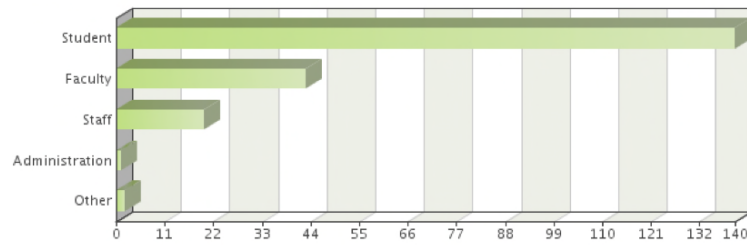
Save

Finish

## Appendix II: Aggregate Questionnaire Data

### Question 1

Which of the following best describes your position in the Dalhousie community?

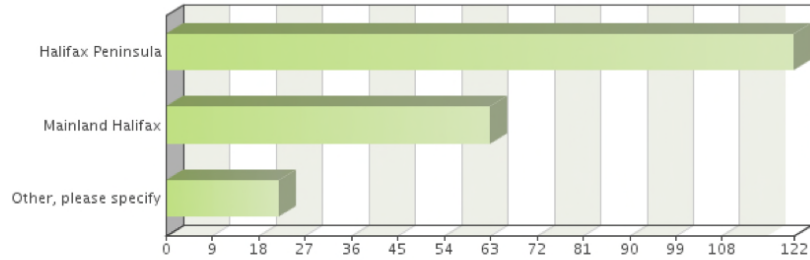


Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
Student	140	67.63%	67.96%
Faculty	43	20.77%	20.87%
Staff	20	9.66%	9.71%
Administration	1	0.48%	0.49%
Other	2	0.97%	0.97%
Sum:	206	99.52%	100%
Not answered:	1	0.48%	-
<b>Total answered: 206</b>			

## Question 2

Which area of the Halifax Regional Municipality do you live in?

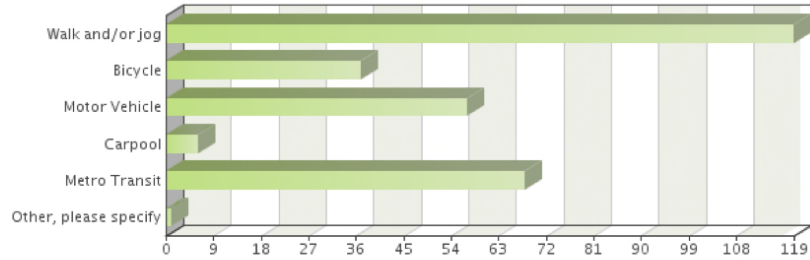


Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
Halifax Peninsula	122	58.94%	58.94%
Mainland Halifax	63	30.43%	30.43%
Other, please specify	22	10.63%	10.63%
Sum:	207	100%	100%
Not answered:	0	0%	-
<b>Total answered: 207</b>			

### Question 3

Please select which mode(s) of transportation you use most often to get to campus. Select all that apply.



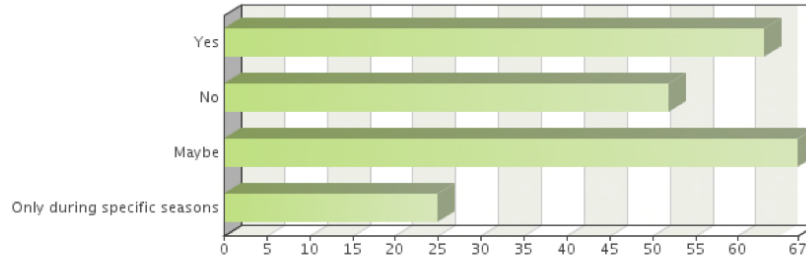
Frequency table

Choices	Absolute frequency	Relative frequency by choice	Relative frequency	Adjusted relative frequency
Walk and/or jog	119	41.32%	57.49%	57.49%
Bicycle	37	12.85%	17.87%	17.87%
Motor Vehicle	57	19.79%	27.54%	27.54%
Carpool	6	2.08%	2.9%	2.9%
Metro Transit	68	23.61%	32.85%	32.85%
Other, please specify	1	0.35%	0.48%	0.48%
Sum:	288	100%	-	-
Not answered:	0	-	0%	-

**Total answered: 207**

### Question 4

Would you be interested in taking a ferry across the Northwest Arm?



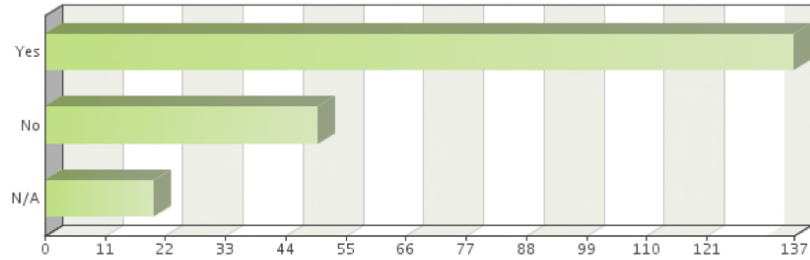
Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
Yes	63	30.43%	30.43%
No	52	25.12%	25.12%
Maybe	67	32.37%	32.37%
Only during specific seasons	25	12.08%	12.08%
Sum:	207	100%	100%
Not answered:	0	0%	-

**Total answered: 207**

### Question 5

Would you use a ferry for purposes other than commuting to and from the University?



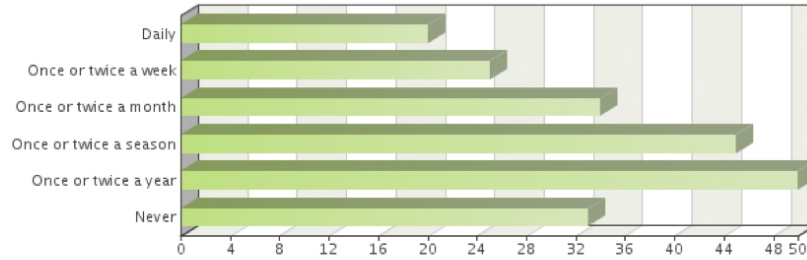
Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
Yes	137	66.18%	66.18%
No	50	24.15%	24.15%
N/A	20	9.66%	9.66%
Sum:	207	100%	100%
Not answered:	0	0%	-
<b>Total answered: 207</b>			



### Question 6

How often would you use a passenger ferry in the Northwest Arm, assuming it operated in all seasons?



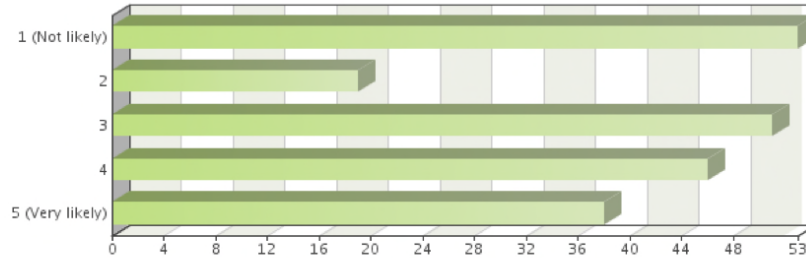
**Frequency table**

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
Daily	20	9.66%	9.66%
Once or twice a week	25	12.08%	12.08%
Once or twice a month	34	16.43%	16.43%
Once or twice a season	45	21.74%	21.74%
Once or twice a year	50	24.15%	24.15%
Never	33	15.94%	15.94%
Sum:	207	100%	100%
Not answered:	0	0%	-

**Total answered: 207**

### Question 7

Please rate how likely you would be to take the ferry in the spring:



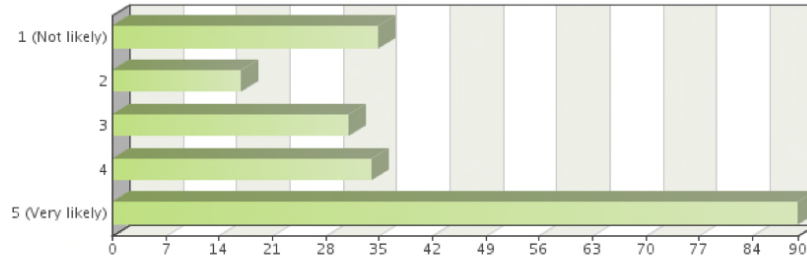
Frequency table

Levels	Absolute frequency	Relative frequency	Adjusted relative frequency
1 (Not likely)	53	25.6%	25.6%
2	19	9.18%	9.18%
3	51	24.64%	24.64%
4	46	22.22%	22.22%
5 (Very likely)	38	18.36%	18.36%
Sum:	207	100%	100%
Not answered:	0	0%	-

**Total answered: 207**

### Question 8

Please rate how likely you would be to take the ferry in the summer:

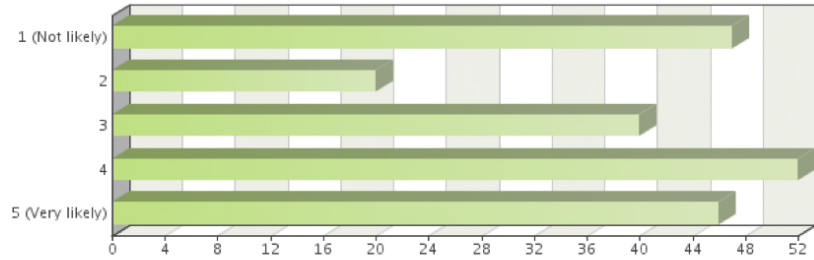


**Frequency table**

Levels	Absolute frequency	Relative frequency	Adjusted relative frequency
1 (Not likely)	35	16.91%	16.91%
2	17	8.21%	8.21%
3	31	14.98%	14.98%
4	34	16.43%	16.43%
5 (Very likely)	90	43.48%	43.48%
Sum:	207	100%	100%
Not answered:	0	0%	-
<b>Total answered: 207</b>			

### Question 9

Please rate how likely you would be to take the ferry in the fall:



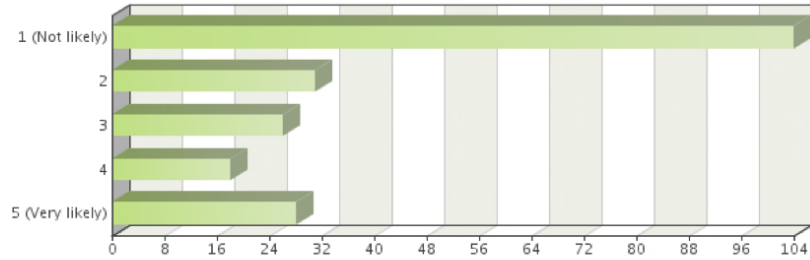
Frequency table

Levels	Absolute frequency	Relative frequency	Adjusted relative frequency
1 (Not likely)	47	22.71%	22.93%
2	20	9.66%	9.76%
3	40	19.32%	19.51%
4	52	25.12%	25.37%
5 (Very likely)	46	22.22%	22.44%
Sum:	205	99.03%	100%
Not answered:	2	0.97%	-

**Total answered: 205**

## Question 10

Please rate how likely you would be to take the ferry in the winter:

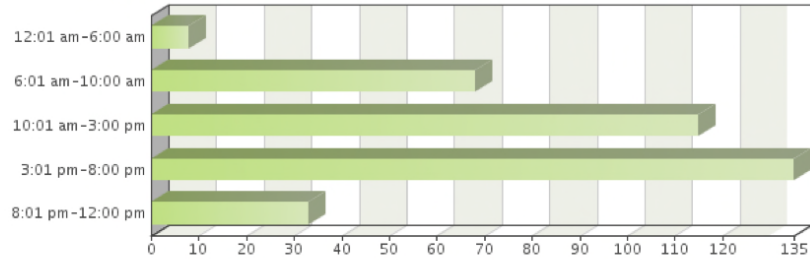


Frequency table

Levels	Absolute frequency	Relative frequency	Adjusted relative frequency
1 (Not likely)	104	50.24%	50.24%
2	31	14.98%	14.98%
3	26	12.56%	12.56%
4	18	8.7%	8.7%
5 (Very likely)	28	13.53%	13.53%
Sum:	207	100%	100%
Not answered:	0	0%	-
<b>Total answered: 207</b>			

### Question 11

Which times would you be using the ferry? Select all the apply.



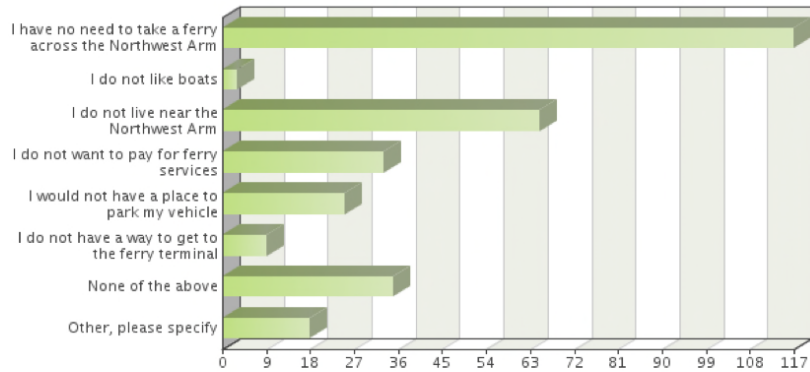
**Frequency table**

Choices	Absolute frequency	Relative frequency by choice	Relative frequency	Adjusted relative frequency
12:01 am-6:00 am	8	2.23%	3.86%	4.82%
6:01 am-10:00 am	68	18.94%	32.85%	40.96%
10:01 am-3:00 pm	115	32.03%	55.56%	69.28%
3:01 pm-8:00 pm	135	37.6%	65.22%	81.33%
8:01 pm-12:00 pm	33	9.19%	15.94%	19.88%
Sum:	359	100%	-	-
Not answered:	41	-	19.81%	-
<b>Total answered: 166</b>				



## Question 12

What would prevent you from taking the ferry? Select all that apply.



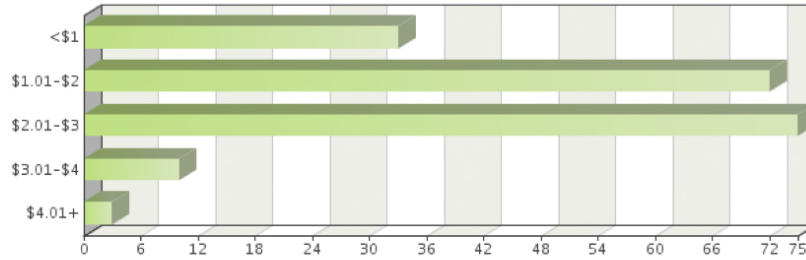
**Frequency table**

Choices	Absolute frequency	Relative frequency by choice	Relative frequency	Adjusted relative frequency
I have no need to take a ferry across the Northwest Arm	117	38.36%	56.52%	59.39%
I do not like boats	3	0.98%	1.45%	1.52%
I do not live near the Northwest Arm	65	21.31%	31.4%	32.99%
I do not want to pay for ferry services	33	10.82%	15.94%	16.75%
I would not have a place to park my vehicle	25	8.2%	12.08%	12.69%
I do not have a way to get to the ferry terminal	9	2.95%	4.35%	4.57%
None of the above	35	11.48%	16.91%	17.77%
Other, please specify	18	5.9%	8.7%	9.14%
Sum:	305	100%	-	-
Not answered:	10	-	4.83%	-

**Total answered: 197**

### Question 13

What would you be willing to pay for a one way ferry crossing?

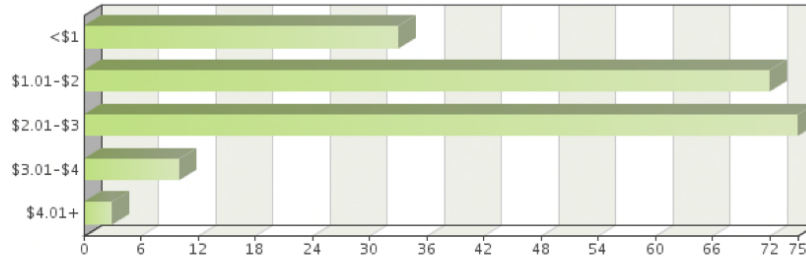


Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
<\$1	33	15.94%	17.1%
\$1.01-\$2	72	34.78%	37.31%
\$2.01-\$3	75	36.23%	38.86%
\$3.01-\$4	10	4.83%	5.18%
\$4.01+	3	1.45%	1.55%
Sum:	193	93.24%	100%
Not answered:	14	6.76%	-
<b>Total answered: 193</b>			

### Question 13

What would you be willing to pay for a one way ferry crossing?

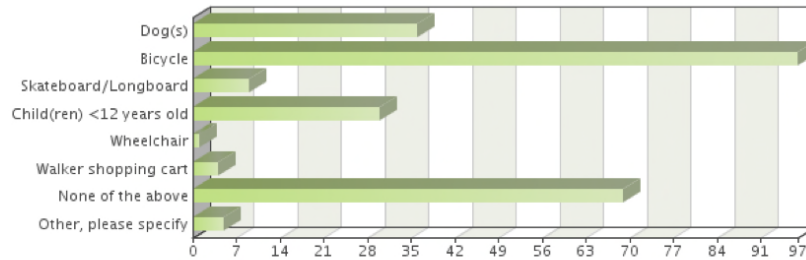


Frequency table

Choices	Absolute frequency	Relative frequency	Adjusted relative frequency
<\$1	33	15.94%	17.1%
\$1.01-\$2	72	34.78%	37.31%
\$2.01-\$3	75	36.23%	38.86%
\$3.01-\$4	10	4.83%	5.18%
\$4.01+	3	1.45%	1.55%
Sum:	193	93.24%	100%
Not answered:	14	6.76%	-
<b>Total answered: 193</b>			

## Question 14

Would any of the following be accompanying you on the ferry? Please check all the apply.



Frequency table

Choices	Absolute frequency	Relative frequency by choice	Relative frequency	Adjusted relative frequency
Dog(s)	36	14.34%	17.39%	19.15%
Bicycle	97	38.65%	46.86%	51.6%
Skateboard/Longboard	9	3.59%	4.35%	4.79%
Child(ren) <12 years old	30	11.95%	14.49%	15.96%
Wheelchair	1	0.4%	0.48%	0.53%
Walker shopping cart	4	1.59%	1.93%	2.13%
None of the above	69	27.49%	33.33%	36.7%
Other, please specify	5	1.99%	2.42%	2.66%
Sum:	251	100%	-	-
Not answered:	19	-	9.18%	-
<b>Total answered: 188</b>				

**Question 15**

If you are interested in a proposed ferry across the Northwest arm, or know someone else who may be, please contact us at [nwferry@gmail.com](mailto:nwferry@gmail.com)

## Appendix III: Aggregate Interview Data

Interview: Michele Raymond, NDP MLA

March 22<sup>nd</sup>, 2013 @ 4:30pm, Province House

1. Why did you initially become interested in the ferry project?

Traffic was building to get on the Peninsula. Halifax was built as a fortified city; it is basically walled off by water so it's tough to get to. Once there is traffic it gets crazy. It's hard to get on the peninsula, but it's even worse once you're on the peninsula (especially along the Quinpool road traffic block). People are blaming the Rotary, saying it was an inadequate valve to get onto the Peninsula, but it is actually the Peninsula itself. There are various ways to get cars onto the Peninsula, but it is still packed. More transit is necessary. The roads are not well adapted (suitable for cars, bus lanes and bikes) to a high occupancy use; they are narrow 18<sup>th</sup> century streets that cannot accommodate everyone. Dalhousie used to be the commissioners farm, and was established there, as it was the only land available. Getting onto the Peninsula is hard every day, Michele had to go to the Peninsula every day, it was time consuming and expensive, and environmentally lousy. She remembered well that there used to be a ferry that traversed the Northwest Arm for a couple hundred years, knowing that she went to address city council in 2000 about starting a publicly funded pilot project. When there was no interest, and the following year still presented a big challenge to get onto the Peninsula (Especially with the September onslaught, largely related to schools and universities, not just year round hospital traffic), Michele started her pilot project.

-The backhaul traffic, very surprising in her pilot project.

2. What steps did you take to establish your pilot project?

The first step was to try and get the city to do it, there was no interest, and it was a no-go. When there was no interest, she determined she would do the project herself. She began to sift through the yellow pages until she found a charter boat operator who was interested in doing the pilot. Without tying him up all the time they established the hours of operation, essentially rush hours, the hours surrounding school operation (the start/end of school, surrounding the 9:00 then again at 4:00 bracket). Next contacted the local counselor about the feasibility of using the local/ public wharf, which in itself was only one of several interesting interactions in Nova Scotia surrounding access to public property. One of the biggest barriers was the HRM assertion of massive liability insurance requirements. The way they dealt with it was by pointing out that the amount of insurance they were proposing was required to 'step' on the public wharf was five times what Lloyds of London required for taking people 20 miles out for off shore fishing. At that point HRM agreed that what every Lloyds had would be suitable. **The use of the public wharf was actually a very large barrier!** We then established routes; minimal advertising (a couple of sandwich boards and styrofoam) basically put them at the top of the Dingle road and Purcell's Cove road. Had contacted Metro transit to see if they were interested in being incorporated, but they were not. They required that a trial be a minimum of 18 months. Arbitrarily established a 2.00/crossing fare, with the boat taking 2 minutes to make the trip. The trial period was for 2 weeks, little advertising; it was at the point of access. Did an on board log of who were coming and what their means of access to



the ferry were and how they continued (travelling once they got off the ferry). By the 5<sup>th</sup> day they figured they were getting 100 cars off the peninsula every morning (so 100 cars off the peninsula, avoiding 200 trips). Surveyed people as to where they were going, had bicyclists, skateboarder's. The first year the route was from the Dingle to South Street (so a direct route to Dalhousie), but also with on call service at Jubilee (this was mainly used by people who worked at the QEII). It was a triangle route. They found there weren't that many people who used it and it took longer. One of the things that they did do was the adaptation of the wharves. The Dingle had a float on it during operation, Jubilee did not have a float but HRM did deliver a float for the trial that they had removed from somewhere else. There was no float at Oakland road (It was rigorous travel for people).

### 3. Why was the HRM Council opposed to the Ferry?

They weren't really opposed at that point; they didn't want to do it themselves. Then there was a sort of knee-jerk response, which was liability (as in we may actually have someone using the public wharf!).

### 4. What was your general feedback from the community?

Feedback was strongly off-peninsula driven. A bit of backhaul traffic began to develop with people going the other way for enjoyment. The feedback was OVERWHELMINGLY positive. A physician from the hospital started a petition. It made a difference in travel time, an individual's sense of being sustainable, and it was a large social exercise. The ferry had a capacity of 26 people. A comment from a user "**Although it was hard climbing the Oakland Street stairs at the start, by then end of the two weeks it wasn't**". People had a really lovely feeling about it, general camaraderie. If it rained they wore rain coats, weather was not a deterrent during the first year of the pilot. During the second trial, which was in conjunction with the EAC it was a different story. The second year had a different ferry charter (the operator from the first trial had other commitments). They got funding for an extended trial. This time they put out a proper call for proposals, not just calling people in the yellow pages. Someone based on the Dartmouth side got the contract. The difficulty was that there was a hurricane during that time, as well on a couple of occasions the operator just decided that he didn't want to come, without notice he would not show up. He was not the most reliable, therefore service became unreliable. The lack of reliability was absolutely fatal! They applied for funding for a third year through the municipal council on the peninsula side, looking to do a minimum 3-4 month trial (Budgeting for a 6 month). Was supposed to be proposed as a capital request for funding but was never brought forward. This would have allowed for paying an operator a guaranteed stipend which would have served as motivation for the operator, as opposed to previous years where it was only what the fare box brought in (toonies in a tin can). It would have allowed for a longer season- street lighting because daylight savings occurred near the end of the period, as well as a shelter of some sort. These were not expensive things but would have really facilitated it and given it a fighting chance. They also would have increased the hours.

Observation: Very few people actually drove to the ferry (no need for a parking lot at the access point), the catchment area/ area that the ferry serviced was accessible by walking and bike.

There was an adjunction from city council about “what if” people start driving to use the ferry and parking at the Dingle, *“I personally would have thought that the use of the Dingle would be a good thing”*.

Then in 2003 Michele was elected as an MLA, so that halted the pilot projects. Though interestingly enough, for the next few years when storms would stop the busses people were still calling her at home to ask if the ferry would be running even though the busses were cancelled. There was a real demand!

5. Can you tell us a bit about the costs affiliated with this project, and any financial considerations of implementing a permanent ferry in the NW arm?

- Requires an insured and licensed charter boat operator

-Factors (\$): Boat, signage, shelter, lighting, floats (plus new floats). There were various combinations to develop several possibilities/scenarios.

- Compared with the widening of Herring Cove road all the way to the City limits at 5 million and 1.5 million in improvements to the Armdale rotary. This 6.5 million wouldn't even address the issues around Quinpool road.

**-Observations:** On demand service to Jubilee road did disrupt the service to Oakland road. Cancellations due to poor weather because the insurance coverage from the city was provisional. Ridership confidence was low due to cancellations and lack of notification of whether or not the service was operating. The lack of notification/communication of cancellations was an issue, ideally there could be a connection to use the Metro transit call # , Gotime for updates). Announcements of cancellation were broadcasted on local radio stations, though using the metro transit # would have help to solve the problem. Operators felt a smaller boat would have been more beneficial due to lower fuel costs, more maneuverability, and less wear and tear. Boat should be about 20ft in length. There had to be a proper agreement with the operators (look at a pass system, per use fee, etc...).

6. Is there anything you would do differently and/or recommendations or advice for going forward with the proposed ferry?

- have to have reliable ferry operator (motivated and guaranteed). Fuel, crew, insurance, etc..

- Notification of hours of service/changes. Either integrates metro transit or other forms of social media.

-Land owner to the left of the Oakland wharf (the big ugly house) claimed water rights and built out into the arm. This constrained access to the wharf (believed that they went over their area, butting into the public wharf space).

- A lot has changed in the past decade, though a float is needed on the Oakland road wharf

- In the future be clear with anyone who brings up insurance for use of public infrastructure.

-Boat (if we allow pets, needs to have a dog, then dog free area. They have to be separate). There are ways to enhance the social experiences (i.e. offering hot beverages on board)

-Proper pilot project needs to be longer in duration and more hours.

-On call service (prolonging hours)

-Need birth/age in the NW Arm. This will increase the reliability of the operator as the boat will already be there and they won't have to travel by water to get there.

all FF  
page 11  
November 13, 2002  
**Attention: Councillor Linda Mosher**  
RE: NWA ferry, budget requests

**BACKGROUND**

The Northwest Arm ferry project is a study into the feasibility of a ferry service on the NWA as a means of mitigating chronic traffic congestion and parking shortages on the Halifax peninsula, by reducing vehicular traffic coming from the Ward 17 area to South End and downtown Halifax.

The ferry began as a two-week experiment in 2001. It was initiated by a member of the community, and ran for a total of 9 days, operated by a local charter-boat operator on his own risk, between the public wharfs at the foot of Oakland Road and the Dingle. The ferry ran only during weekday rush-hours.

The experiment garnered considerable public interest, and a community group was formed to pursue a more extended trial, which was conducted in October 2002 under the auspices of the Ecology Action Centre's Transportation Issues Committee. The ferry committee issued a Request for Proposals from interested charter-boat operators (as already Coast-Guard certified and carrying requisite insurance). An operator was selected, and ran for approximately three weeks, on his own risk.

A spate of storm-related cancellations, attributed to the low-lying float at the Dingle, caused ridership to fall off, and the operator gave notice of his intention to terminate the service contract after only 14 days of operation. During that time, the average number of passenger trips per day for rush hour service was 41.

Surveys of riders indicate an overwhelmingly positive response to the ferry, and it is worth noting that during one (unseasonably early) blizzard, there were several requests for ferry service as roads were impassable.

All of this leads to the conclusion that the feasibility study for the NWA ferry, initiated and supported by volunteers from the community, needs to be extended and broadened. The ferry has significant potential benefits for mass transit in Halifax, and is a solid complement to the #10 and #18 bus routes on the peninsula.

There has been no funding for the study up to this point, but some investment is needed in order to adequately assess the viability of ferry service across the Northwest Arm. This study would also provide important data for the Metro Transit Phase 2 strategy, which will be looking at transportation alternatives, excluding bus service. This in turn will feed into the HRM Healthy Growth Project.

The primary purpose of the ferry is to alleviate traffic problems, but it is also relevant to an ongoing effort to promote the recreational use of Fleming Park. Peninsula residents have expressed interest in the ferry as adding the Dingle to their recreational running/walking options. The canteen/washroom facility at the Dingle is currently being

rejuvenated, and the ferry would almost certainly attract patrons to the old concession, if HRM were to tender its operation out again.

**FUNDING NEEDS FOR NWA FERRY FEASIBILITY STUDY**  
to run from April 15—November 15, 2003, *in order of priority:*

ITEM	COST	COMMENTS
Honorarium for operator/ charter reduced by boat owner, deckhand, running expenses and for use of boat	\$35,000	note that this could be fare revenue-- negotiable
Directional signage to ferry	\$4000	replace existing home-made, unstable signs
Floating dock (1 xx" freeboard (depends on vessel used)	\$3000	possibly available in HRM stores
Contingencies (insurance upgrades, legal honorarium for contract preparation, report writing)	\$1500	
Promotion (ads, posters etc.)	\$1000	
Security lighting at Dingle	\$4000	would allow more extended hours for trial; can be tied to existing lighting at parking lot
Winter clearing of steps/paths	\$1000	may be necessary at ends of season; could extend trial
Berth (at Purcells Cove or in NWA)	\$2000	if vessel is based more than 1/2 hr running distance from NWA; may be available at HRM facilities (Horseshoe I or Saint Marys Boat Club)
<b>Total</b>	<b>\$51,500</b>	

*operating hours*

*7:15 9:15*

*3:30 6:30*

CAPITAL COSTS OF USED-BOAT DINGLE FERRY SERVICE

*Scenario II*



The notes & calculations are attached below as requested, though the format leaves a lot to be desired! If this is undecipherable, we can try the fax. Just let me know, - Marcus

NORTHWEST ARM FERRY Dock (assumed necessary for safety & liability) \$5,000

BACKGROUND INFORMATION and approach roads (estimated) \$10,000

DRAFT Shelters at docks (estimated) \$10,000

Security cameras & lighting at docks (estimated) \$10,000

CATCHMENT AREA 199,000

1996 population, Mainland South (Herring Cove-Leiblin Park-Armdale Rotary): 22,885

2026 projected population, Mainland South (Integrated Servicing Study) 29,000

1996 total commuters to Peninsula from Mainland South: 3735

1996 transit commuters to Peninsula from Mainland South: 790

1996 total commuters to Peninsula from Traffic Zones 61, 62, 63 & 65 (for Dingle): 3090

1996 total commuters to Peninsula from Traffic Zones 64 & 78 (for Purcell's Cove): 645

1996 population within 1 km walk of Dingle: 990

*NB additional developments*

#### DRAFT CAPITAL COSTS OF NEW-BOAT DINGLE FERRY SERVICE

##### Scenario I

1 New dock at foot of South Street (without public boat launch due to steep grade)

\$80,000

2 Rosborough RF-22 Seaskiff Custom Wheelhouse (22 ft. long; 8 ft. beam; 18 in. draft) \$57,000

(\$36,000 + \$16,000 outboard engine + \$5,000 options = \$57,000)

3 Improvements to Dingle Dock (assumed necessary for safety & liability) \$5,000 (detail)

4 Permanent signage at docks and approach roads (estimated) \$10,000

Wooden shelters at docks (estimated) \$10,000

*exists at Jubilee*

Security cameras & lighting at docks (estimated) \$10,000

*exists at Jubilee*

Total capital cost \$172,000

Capital investment per peak-hour rider, average ridership (\$172,000/30) \$5733

Capital investment per peak-hour rider, best p.m. ridership (\$172,000/50) \$3440

*} accords to 2 week pilot project*

#### CAPITAL COSTS OF USED-BOAT DINGLE FERRY SERVICE

##### Scenario II

New dock at foot of South Street (without public boat launch due to steep grade) \$80,000  
Used boat, approx. 20 feet long, approx. 8 foot beam, with inboard engine \$10,000  
Boat & engine refurbishment \$10,000  
Improvements to Dingle Dock (assumed necessary for safety & liability) \$5,000  
Permanent signage at docks and approach roads (estimated) \$10,000  
Wooden shelters at docks (estimated) \$10,000  
Security cameras & lighting at docks (estimated) \$10,000  
Total capital cost \$135,000  
Capital investment per peak-hour rider, average ridership (\$135,000/30) \$4,500  
Capital investment per peak-hour rider, best p.m. ridership (\$135,000/50) \$2,700

#### ESTIMATED CAPITAL COSTS OF SHORT-TERM ROAD IMPROVEMENTS FOR CATCHMENT AREA

Herring Cove Road widening to City Limits (Integrated Servicing Study, p. 75) \$5,000,000  
Estimated land acquisition costs for Herring Cove Rd. widening (@ 10%) \$500,000  
Total Herring Cove Road widening costs \$5,500,000  
Herring Cove Road widening costs per peak-hour car user ( $\$5,500,000 / (1390 \times 1.43)$ ) \$2767

Armdale Rotary improvements (estimated) \$1,500,000  
Armdale Rotary improvement cost/user benefiting Herring & Purcells Cove Rds. ( $\$1,500,000 \times 27\% / (5644 \times 1.43) = \$405,000 / 8070.92 = \$50$ )

Total road improvement costs/peak-hour car user ( $\$2767 + \$50$ ) \$2817

#### DRAFT DINGLE-OAKLAND RD/JUBILEE RD. PILOT PROJECT

Participants: New Dawn Charters (479-2900) - volunteer captain; fuel & deckhand at cost  
Michelle Raymond (477-7896) - initiation, scheduling, organization & promotion  
Peter Bigelow, HRM Recreation Services (490-6047) - free use of parking & docks  
Marcus Garnet, HRM Planning & Development Services (490-4481) - data and advice

Points served: Dingle Tower dock  
Oakland Road dock  
Jubilee Road dock (by request only)



7 weekdays

Tues. Oct. 9 to Friday Oct. 19,

except storm cancellations on Mon. Oct. 15 & Wed. Oct. 17

Schedule: On-demand shuttle, 4 hours per day, 2 hours in morning & evening peaks  
(7:30-9:30 AM; 4:15-6:15 PM)

Adjusted to 1.5 hours AM and 2.5 hours PM effective Thurs. Oct. 11

(7:30-9:00 AM; 3:30-6:00 PM)

Trip time: approx. 2 minutes, including docking

Fare: \$2 one-way

No transfers

No extra charge for bicycles and scooters

Average total riders per day: 60

Average total bikes/scooters per day: 8

Rider Origins: Kirk Road

Parkhill Road

Fleming Park

Sambro

Ketch Harbour

Rider destinations: Saint Marys University

Dalhousie University

St. Patrick's High School

Halifax Grammar School

Barrington Street

Summer Street (CBC)

Spring Garden Road (Tupper Building)

Revenue for 7 weekdays: \$880

Operating costs: \$315 for deckhand (\$7.50/hr @ 6 hours/day for 7 days)

Remainder used for fuel (@\$0.60/l), advertising (total \$21) & misc. Fuel consumption undisclosed. Captain volunteered his services. DRAFT

Equivalent charter price recovery with deadhead: 21%

(\$100/hr. @ 6 hours/day for 7 days)

Equivalent charter price recovery without deadhead: 31% (\$100/hr @ 4 hours/day for 7



Equivalent best-day charter price recovery without deadhead: 44%  
(\$100/hr @ 4 hours/day for 1 day with 89 riders @ \$2/rider)

Observations:

On-demand service to Jubilee Road disrupted the service to Oakland Road.

Cancellations had to be made in anticipation of bad weather because insurance coverage was provisional for the duration of the pilot project. Cancellations eroded users' confidence, especially because there was no obvious means for confirming whether the service was operating. Announcements were broadcast on local radio. Cooperation with Metro Transit to use the MetroInfo line would help solve the problem of notification.

The operators feel that a smaller boat would have been much more efficient, by providing lower fuel costs, less wear and tear due to suboptimal speeds, better maneuverability and shallower draft. They recommend a Rosborough-type boat around 20 feet in length. This is roughly half the size of the boat which was actually used. The new-boat and used-boat capital cost estimates above assume the use of a Rosborough-size boat.

NOTES

## Appendix IV: Ethics Form

**ENVIRONMENTAL SCIENCE PROGRAM  
FACULTY OF SCIENCE  
DALHOUSIE UNIVERSITY  
(version 2010)**

**APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS  
UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS**

### **GENERAL INFORMATION**

**1. Title of Project:** Northwest Arm Ferry Project

**2. Faculty Supervisor(s):** Tarah Wright, Department Environmental Science  
e-mail: Tarah.wright@dal.ca  
phone: 902.494.3683

**3. Student Investigator(s):**  
Alida O'Connor<sup>1</sup>, Claire VanLeeuwen<sup>1</sup>, Jocelyn Cormack<sup>1</sup>, Mackenzie Childs<sup>1</sup>, Alicia Fancey<sup>2</sup>  
Departments: Sustainability<sup>1</sup>/Environmental Science<sup>2</sup>  
e-mail: nwferry@gmail.com

**4. Level of Project:** Non-thesis Course Project [ ] Undergraduate [ x ] Graduate [ ]  
**Specify course and number:** 3502 ENVS/SUST Campus as a Living Lab

**5. a. Indicate the anticipated commencement date for this project:** March 8, 2013  
**b. Indicate the anticipated completion date for this project:** April 12, 2013

### **SUMMARY OF PROPOSED RESEARCH**

**1. Purpose and Rationale for Proposed Research:** *Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated*

The purpose of the project is to determine the feasibility and desirability of implementing a ferry in the Northwest Arm of the Dalhousie Community.

#### **2. Methodology/Procedures**

**a. Which of the following procedures will be used? Provide a copy of all materials to be used in this study.**

- [ ] Survey(s) or questionnaire(s) (mail-back)
- [ ] Survey(s) or questionnaire(s) (in person)
- [ x ] Computer-administered task(s) or survey(s)]
- [ x ] Interview(s) (in person)
- [ ] Interview(s) (by telephone)
- [ ] Focus group(s)
- [ x ] Audio taping

- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify \_\_\_\_\_

**b. Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.**

### **Questionnaire**

The population of interest for the study is the Dalhousie community, which we have defined as faculty, students, staff and administration. To reach the target population, a list of 44 academic departments with corresponding contact e-mails has been compiled. In order to reach this large heterogeneous sample, an electronic questionnaire will be developed. The questionnaire will be created using an electronic survey software called Opinio and distributed to the Dalhousie community via e-mail. The survey will be sent electronically to the administrator/office of each department who will then forward it to their contact lists. Results from those who decide to complete the survey will automatically be compiled in the Opinio software system. It is anticipated the survey will reach the majority of the university population using this method.

The key information the developed questionnaire seeks to gather includes the following: If there is interest within the population for a ferry, what geographic location shows the most interest in a ferry (i.e. where do the people that are interested live), what group within the Dalhousie community is most interested in a ferry (i.e. faculty, students, staff or administration), and how much are respondents willing to pay for a crossing.

### **Face to face interview**

The first step for the face-to-face interview will be to assemble a list of appropriate questions for the interview. Although the interview will not be limited to these questions, a basic list of question serve as a starting point for conversation. The subject for the interview has been contacted and she will be contacted again via email to confirm the time and place for the interview. The location of the interview will be both outside of her area of work and outside of Dalhousie Campus in order to eliminate any bias. Prior to the interview the interviewer(s) will ensure familiarity with relevant background information through the literary review process. The interview will be recorded for efficiency purposes and the data collected from the interview will be transcribed and analyzed.

### **3. Participants Involved in the Study: Indicate who will be recruited as potential participants in this study.**

Dalhousie Participants:

- Undergraduate students
- Graduate students
- Faculty and/or staff

Non-Dal Participants:

- Adolescents

- Adults
- Seniors
- Vulnerable population\* (e.g. Nursing Homes, Correctional Facilities)

\* Applicant will be required to submit ethics application to appropriate Dalhousie Research Ethics Board

**b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.**

The participants in this study will be staff, students, faculty or administration at Dalhousie University. The age will vary due to the large population we will be contacting and the gender of the participants is not specific.

**c. How many participants are expected to be involved in this study?** 100

#### 4. Recruitment Process and Study Location

**a. From what source(s) will the potential participants be recruited?**

- Dalhousie University undergraduate and/or graduate classes
- Other Dalhousie sources (specify): faculty, administration and staff of the university
- Local School Boards\*
- Halifax Community
- Agencies
- Businesses, Industries, Professions
- Health care settings\*
- Other, specify (e.g. mailing lists) \_\_\_\_\_ \* Applicant

may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.

**b. Identify who will recruit potential participants and describe the recruitment process. Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts in the appendices section).**

We will contact the administrative head of each department at Dalhousie University and ask them to send the link to the survey to each person on their mailing list. We will also contact Michele Raymond via email to arrange a face-to-face interview.

**5. Compensation of Participants: Will participants receive compensation (financial or otherwise) for participation?**

Yes  No  If Yes, provide details:

#### 6. Feedback to Participants

**Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.**

Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

## **POTENTIAL BENEFITS FROM THE STUDY**

### **1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.**

They will have the personal satisfaction of contributing to the overall sustainability initiative at Dalhousie University.

### **2. Identify and describe any known or anticipated benefits to society from this study.**

General society will benefit from this study, as it will provide information for the possible implementation of a ferry across the Northwest Arm. This may be useful for the general public, not just those affiliated with Dalhousie. Information gathered in this study will also contribute to the available literature regarding desirability and feasibility of a Northwest Arm ferry service.

## **POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY**

### **1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors and burdens.**

No known or anticipated risks Explain why no risks are anticipated:

Minimal risk \* Description of risks:

Greater than minimal risk\*\* Description of risks:

*\* This is the level of risk associated with everyday life. \*\* This level of risk will require ethics review by appropriate Dalhousie Research Ethics Board*

There are no anticipated risks because the survey is voluntary; there is no risk of feeling forced to complete it. It is also online so the respondent does not have to travel anywhere to complete it, which could potentially involve more risk.

### **2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.**

## **INFORMED CONSENT PROCESS**

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>;

### **1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?**

Information letter with written consent form; provide a copy

Information letter with verbal consent; provide a copy

Information/cover letter; provide a copy

Other (specify) Information blurb at the top of survey

### **2. If written consent cannot be obtained from the potential participants, provide a justification.**

**ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA**

**1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.**

Anonymity will be ensured, as a name will not be required to fill in the survey. The only information that may be considered as identifying information is the question asking where the respondent lives. However, the options for this question are very general and will not require specific information from the respondent.

**2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.**

We will be using Dalhousie’s Opinio survey software to create the survey. The gathered information will be secure through the account we are using.

**3. Indicate how long the data will be securely stored as well as the storage location over the duration of the study. Also indicate the method to be used for final disposition of the data.**

- Paper Records
- Confidential shredding after \_\_\_\_\_
- Data will be retained until completion of specific course.
- Audio/Video Recordings
- Erasing of audio/video tapes after \_\_\_\_\_
- Data will be retained until completion of specific course.
- Electronic
- Erasing of electronic data after \_\_\_\_\_
- Data will be retained until completion of specific course.
- Other \_\_\_\_\_

(Provide details on type, retention period and final disposition, if applicable)

**Specify storage location:** Opinio

**Appendices: ATTACHMENTS** Please **check** below all appendices that are attached as part of your application package:

- Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
- Information Letter and Consent Form(s).** Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
- Information/Cover Letter(s).** Used in studies involving surveys or questionnaires.
- Materials:** A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

**SIGNATURES OF RESEARCHERS** \_\_\_\_\_  
\_\_\_\_\_

Signature of Student Investigator(s) Date: Jocelyn Cormack, March 8, 2013

Signature of Student Investigator(s) Date: Alicia Fancey, March 8, 2013

Signature of Student Investigator(s) Date: Mackenzie Childs, March 8, 2013

Signature of Student Investigator(s) Date: Claire VanLeewan, March 8, 2013

Signature of Student Investigator(s) Date: Alida O'Connor, March 8, 2013

**FOR ENVIRONMENTAL SCIENCE PROGRAM USE ONLY:** Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

\_\_\_\_\_  
Date Signature

\_\_\_\_\_  
Date Signature

[Type the company name]

# Identifying the Desirability & Feasibility of a Passenger Ferry Across the Northwest Arm

ENVS/SUST 3502



## Project Definition

With an increase in global population and heavier migration of people to cities, there is increased pressure for urban centers to provide sustainable methods of public transportation for commuters. Evidence of this can be seen in the unique coastal city of Halifax, as the city continuously faces congestion created by choke points surrounding the peninsula. These choke points prohibit vehicular traffic from efficiently and effectively getting on and off the peninsula (Raymond, n.d.). With large water bodies in and around the city, there is ample opportunity for the increased utilization of waterways as transportation corridors. While there has been ferry service across the Halifax Harbour since 1752, there is also potential to incorporate a similar, but smaller, ferry service in the Northwest Arm (Halifax Regional Municipality, 2013) (see map Appendix A). This would provide an opportunity for the improvement of the city's transportation network by increasing public transit and reducing congestion. Although the impacts of this ferry would benefit the greater Halifax community this study will focus primarily on Dalhousie University.

Dalhousie University is the largest institution in Atlantic Canada and is a vital part of the Halifax community; therefore, it is an ideal place to begin researching the desirability and feasibility of a ferry. The university has adopted a sustainability policy that incorporates the fundamentals of sustainable transportation, which refers to any method of transportation with low impact on the environment (Nova Scotia Department of Energy, 2008). Dalhousie has shown its commitment to sustainable practices through several measures; it is not only a signatory to the Presidents Climate Change and the Talloires Declaration, but has been a leader in sustainability through the creation of its College of Sustainability and Office of Sustainability.

The focus of our study is to determine the desirability and feasibility of implementing a ferry in the Northwest Arm for the Dalhousie community. This study will look specifically at a small passenger ferry which would carry between 20 - 40 passengers. While this study focuses mainly on the desirability aspect, it will also gather data regarding the feasibility of the proposed service. The target population for desirability of the ferry will focus on the Dalhousie community which for this study will be comprised of the faculty, students, staff, and administration. In regards to feasibility, our target audience will be Michele Raymond who has already piloted a small passenger ferry in the Northwest Arm for the Halifax community (Raymond, n.d.). Through an interview process she will be able to provide critical information for the feasibility of this idea and information regarding her previous pilot project. As the previous project shows, there was strong support for a ferry service across the Northwest Arm. The proposed research project will aim to see if the Dalhousie community shares the same interest. The anticipated outcomes of this research will result in a clearer understanding of the desirability and the feasibility of the proposed ferry project.

## Background & Rationale

This study is important for two reasons. First, to contribute to the understanding of ferry service in the region as a form of urban transit and second to improve the transportation section of Dalhousie's sustainability initiative. There has been previous interest in ferry services across the Northwest Arm, which was clearly demonstrated by the community support for

Michele Raymond's pilot project. After the initial pilot, the community petitioned in support of making this project a permanent service (Raymond, n.d.). This study will explore current interest in revitalizing the ferry service and will contribute to the overall sustainability of Dalhousie University. After a thorough examination of the literature it is clear that there are few academic studies regarding ferry services in the Halifax Regional Municipality. As a result, this report will include a range of grey literature discussing ferry projects in other Canadian jurisdictions and countries. The following will outline how our study will contribute to the understanding of the desirability for ferry service across the Northwest Arm. Shaped by Dalhousie's sustainability policies, along with successful cases from abroad, this study aims to fill the void in sustainable transportation for the Dalhousie community.

### *Dalhousie University's Sustainability Initiative*

The Dalhousie Campus Green Guide, published by the College of Sustainability, describes Dalhousie University's sustainability goals and initiatives. Included in this guide is the university's official sustainability statement. This stresses the importance of the university's sustainability efforts and how they impact the Dalhousie community on a campus wide level. It is made clear in the five principles of sustainability that Dalhousie University commits to following (Dalhousie University, 2013).

Currently, sustainable transportation initiatives highlighted in the Campus Green Guide heavily focus on the idea of burning calories instead of oil. This is in lieu of reducing health and environmental impacts associated with a fossil fuel-dependent transportation network. Some of the effects of fossil fuel centered transportation include smog, water contamination, and increase in cardiovascular diseases. Suggested ways for the Dalhousie community to decrease fossil fuel use include the ride-share program, utilizing the Metro U-Pass, and biking (Dalhousie University, 2013).

In fact, the majority of the sustainable transportation initiatives in the Campus Green Guide are directed towards biking. The Campus Green Guide provides locations and contact information for local bike shops, places to get your bike repaired, and plenty of information about the campus bike centre. However, this is only beneficial for members of Dalhousie University that live near campus or in downtown Halifax. There is no mention in the Campus Green Guide of sustainable transportation options for people who live outside of the downtown core (Dalhousie University, 2013). As mentioned above, Dalhousie University's sustainability statement encompasses communities near and far, but it is evident that the university's transportation initiatives do not reflect this.

### *Infrastructure Issues resulting in Congestion*

As a defining feature of the neighborhood, the Armdale Rotary links Mainland Halifax to the peninsula. The Rotary experiences high volumes of congestion as it serves as a hub to connect a variety of different neighbourhoods in the area. Additionally, the current public transit is unreliable, leaving residents in the area dependent on motor vehicles. As such, the residents of District 17, which incorporates the Armdale Region, support the implementation of ferry service across the Northwest Arm. Following the previous pilot project, responses towards a ferry were favorable. With developments increasing in that region, the current traffic situation will only worsen; residents are therefore pushing for what their community needs (Metro

News, 2004).

### *Adapting to Congestion: Incorporating Water Transportation*

A study by Thompson, Burroughs & Smythe (2006) shows renewed interest in ferry transportation, especially in the United States. This interest has been reestablished due to the concentration of people to coastal areas which puts more pressure on current transportation systems. As a result, major cities such as San Francisco, have plans to greatly expand ferry transportation in order to reduce problematic congestion. In addition, the implementation of ferries is beneficial because they have lower startup costs than other transportation infrastructure as a result of the healthy market for used ferries.

Moreover, ferries have greater route flexibility than other public transportation methods offering a less risky investment for municipal governments. Finally, since ferries are often located in aesthetically pleasing areas they have the ability to attract tourists, which brings in more income to reduce ticket prices. That said, to attract riders ferries must work in conjunction with other public transportation and land in walkable area. (Thompson, Burroughs & Smythe, 2006)

### *Previous Pilot Project*

In October 2001, Michele Raymond (NDP MLA) conducted a trial service for a passenger ferry crossing the Northwest Arm. This was a two week project which received strong acceptance from members of the community. When she first approached council with the proposition they were not interested, so she operated the trial service with help from a local charter boat operator. It cost \$2 per crossing and the ferry ran on weekdays from the Dingle to the wharf on Oakland Road, from 7:30 to 9:15am and 4:15 to 6:00pm, with on demand service to Jubilee Road. During the first week of the trial period, 89 commuters a day avoided traveling through the Rotary by taking the ferry instead (Raymond, n.d.).

This was not the first time a ferry service operated in the Northwest Arm. Prior to the 2001/2 pilot test the last ferry was discontinued in the 1960s. Reasons to reintroduce ferry service in the Northwest Arm all extend from the fact that the city centre is difficult to access because it is surrounded by water. In addition, there is expensive yet restricted parking within the downtown core making it difficult and costly to commute. (Raymond, n.d.)

With cooperation from the Ecology Action Centre, and strong support from the community, a repeat trial commenced in 2002. Unfortunately, cancellations diminished rider confidence and the trial did not run for the entire two-week period. The ferry operator lived in Eastern Passage and during inclement weather was unable to make the trip with the boat. (Raymond, n.d.)

A section in this report focuses on opportunities that would surface should a ferry service run across the Northwest Arm. The extensive list of the opportunities includes:

- Reduced vehicles in the peninsula
- Reduced greenhouse gases (GHGs)
- Increased active transportation
- Increased sense of community

- Mental health benefits of exercise
- Opportunity for cyclists to ride downtown while missing the busy routes with no bike lanes
- Increased recreational opportunities
- Reduced parking costs and time it took to find parking (Raymond, n.d.).

A list of challenges was also included, offering information that can be utilized in our research project or in the recommendations section of the final report. The challenges listed were: getting permission from council for use of public wharfs, finding a suitable ferry operator and crew, the absence of a floating dock at Oakland Road, the need for nighttime lighting, and the lack of public parking on the peninsula side of the Northwest Arm. (Raymond, n.d.)

*Case Study: The Little Blue Ferries of False Creek*

Ferry service operating on False Creek, a small inlet in Vancouver (between Granville Island and the old Boater’s Village Marina) began in 1982 with two electric boats. The idea of regular ferry service expanded with a ferry dock, built in 1983 at the Aquatic centre (Granville Island Ferries, 2012). Presently, the fleet consists of twelve vessels. Of these twelve vessels, four are “supermini-ferries” that hold twenty passengers each. This ferry service has been operating for thirty years and has transported fifteen million passengers to date. Prices range from \$1.75 for shorter trips to \$5.50 for longer trips; with hours of operation generally falling between 7:00 am and 9:00 pm. Routes have different hours of operation depending on where the ferry is traveling. These ferries have become a crucial part of the public transportation network in Vancouver. (Granville Island Ferries, 2012)

This case study is indicative that small ferry service can be an integral part of a city’s public transportation infrastructure. We feel as though vessels of a similar size would function well in the Northwest Arm.



Figure 1: Granville Island Ferry. (Info Vancouver, 2013).

**Proposed Methods**  
*Describing Desirability*

**Research**  
*the sample:*

The population of interest for this study is the Dalhousie community, which includes faculty, students, staff and administration. To reach this population a list of 44 academic departments has been compiled with the corresponding e-mails for contact, see Appendix D (P. Sylvestre,

personal communication, n.d.). The survey will be sent electronically to the administrator for each department who will then send it to their contact lists. We anticipate that our survey will reach the majority of the university population, as each department will be contacted. Although not a huge return on our questionnaire is anticipated, this method will provide the opportunity to reach those interested in the project. The sample will be defined as those who return a completed questionnaire.

### *Describing the research tools/procedures for desirability*

For the research study, non-probabilistic sampling will be used to gather information. More specifically, convenience sampling will be the main research method, as it does not target a specific group, but simply those that respond. Convenience sampling requires that surveyed respondents be heterogeneous, solely in the sense that they are part of the Dalhousie population (Palys & Atchison, 2008). A questionnaire will be the tool of choice used in the convenience sampling. It is expected that those interested in a ferry service will be more likely to complete the questionnaire, as there is more incentive for them to do so. If we receive responses from those who are not interested, it will still remain convenience sampling because they are still involved with the topic of interest, which is the ferry. Another method of non-probabilistic sampling that will be used is snowball sampling, since there may be more people interested than are contacted, and thus would provide an opportunity to increase our sample.

### *Snowball sampling*

We hypothesize that the majority of interest for the ferry will be from those who currently commute to Dalhousie University through the Armdale Rotary from Mainland Halifax. As a result, the sample size for the study may be very small and difficult to reach. It would therefore be ideal that the questionnaire be completed by those interested and passed along to others in the Dalhousie Community who may share a similar interest. A snowball effect would allow us to reach a greater population than may have been reached through the initial distribution of the questionnaire.

That said, it has been recognized that this method could influence results since respondents are more likely to know others who are similar to themselves (Palys & Atchison, 2008). As an example, Dalhousie sociology professors may be more likely to know other sociology professors and create a narrow snowball. Dispersing the survey through each academic department will hopefully avoid this from occurring. The last question on the questionnaire provides the respondent with an opportunity to include their contact information if they know someone else who would be interested in the project. This will allow several people to begin a variety of different snowballs in various niche groups (Palys & Atchinson, 2008).

### *Questionnaire*

A questionnaire was chosen as the predominant research tool, a major advantage of using this tool is the ability to generate a substantial amount of data quickly and inexpensively (Palys & Atchison, 2008). In order to reach the large heterogeneous sample, an electronic questionnaire

will be developed. The questionnaire will be created using an electronic survey software called Opinio and distributed to the Dalhousie community via e-mail. This will be beneficial since our target population encompasses all of Dalhousie University's faculty, students, staff, and administration. The tool will be developed in a simple manner for respondents. The questions will begin broad and simple and progressively become more specific, easing respondents into the subject matter. The questionnaire will be compiled of closed and structured questions, leaving less variability in answers as well as less room for confusion for respondents (Palys & Atchison, 2008). The research population will be emailed the questionnaire and should take approximately five to ten minutes.

The key information that the questionnaire intends to gather includes: If there is interest in a ferry, what geographic location this interest comes from (i.e. where do the people that are interested live), what group is more interested in the ferry (i.e. faculty, students, staff or administration), and how much these respondents are willing to pay for a crossing. A copy of the questionnaire can be found Appendix B.

### *Describing the sample: Feasibility*

In order to assess feasibility of implementing a ferry service, we plan to analyze case studies regarding the use of ferries as part of urban transit systems in various cities around the world. Although some of the cases are not geographically close to Halifax, they still provide useful information. Additionally, we will meet with Michele Raymond who, as mentioned, has done previous research on the possibility of implementing a small passenger ferry in the Northwest Arm. An interview will be arranged to discuss her experience with the project and the feasibility of once again having a ferry across the Northwest Arm. Interview questions for the anticipated interview can be found in Appendix C.

Interviewing a member of the municipality, or someone who has information on costs of a ferry service would also be useful to speak with. This possibility would require further research to decide who to interview and if it would be possible.

## **Describing the research tools/procedures for feasibility**

### *Face-to-face interview*

The face-to-face interview was selected for the feasibility section of the study because it will allow more complex and in depth open-ended questions to be asked. This will enhance the quality of data gathered as the method will allow the respondent to ask for clarification on the interview questions (Palys & Atchison, 2008). It will also provide the opportunity for the respondent to offer any extra information that may be beneficial to the study. The subject, Michele Raymond, was selected for this interview because she has previously pilot tested a ferry on the Northwest Arm, and would be familiar with the feasibility of the project. She is therefore knowledgeable about the subject matter and has the ability to contribute significantly to the study.

The first step for the face to face interview will be to assemble a list of appropriate questions for the interview. Although the interview will not be limited to these questions, the base list can be found in Appendix C. Second, Michele Raymond will be contacted in order to set up an appropriate time and place for the interview. Included in our schedule is the ideal



week an interview would be scheduled, as she has indicated availability throughout March. The location of the interview will be both outside of her area of work and outside of the school. This will allow for a more equal power balance between the interviewer(s) and the interviewee, as “ethics problems arise when the power differential between the researcher and participant is considerable” (Palys & Atchison, 2008, p. 72). Prior to the interview the interviewer(s) will ensure familiarity with relevant background information through the literary review process. This will ensure the interview is as effective as possible. The interviewer(s) will then meet Michele Raymond at the designated time and place to conduct the interview. The interview will be recorded for efficiency purposes and the data collected from the interview will be transcribed and analyzed.

### *Data Analysis*

Through our questionnaire, accompanied by snowball sampling, and interviews, we will need to analyze the collected data to determine what information these methods have provided. As we cannot simply extract whatever information we desire, we need a systematic way to obtain information from the data (T. Wright, personal communication, February 19, 2013). The key concepts within the study need to be decided, for example who is interested, the ideal cost of a crossing, and how often and when the ferry would be used.

The electronic survey software, Opinio, will be used for the questionnaire and completed results will be returned in an electronic format. The university’s Opinio server will store the results and basic tabulations will be available. Then “data is exported for further tabulation using statistical software” (Dalhousie University: Information Technology Services, 2012). As multiple types of structured questions were used in the questionnaire, such as single response, categorical response, rating scale, and ranking scale, different methods of analysis must be used (T. Wright, personal communication, February 12, 2013). We will use descriptive statistics, with a combination of all three categories: distribution of variables, central tendency of distribution, variability and dispersion (Palys & Atchison, 2008). Potential forms of representation include frequency tables and pie charts to display our data.

As for the face-to-face interviews, the data will be collected while the interview is in progress. It will be easier to analyze this data as specific questions will have been created prior to individual interviews, if more than one occurs. Since the interviews will focus on the feasibility of the project the questions and answers should be fairly straightforward and will not require a deep analysis. (Palys & Atchison, 2008)

### **Delimitations and Limitations of the study**

Delimitations and limitations are bound to surface when conducting research projects and it is no different for the study of re-implementing a ferry across the Northwest Arm. One limitation that we have come across while searching for literature on the topic is that there may be a lack of useful and relevant literature on ferries in general, case studies of similar projects,

and specifically literature on the ferries that used to service the Northwest Arm. So far, after examination of literature there seems to be a lack of peer-reviewed sources on the topic. In regards to the questionnaire as a research method, it can be distributed to the departments and to their contact lists but the number of people that complete the questionnaire is not in our control. It is up to the people receiving the questionnaire to complete it, so it is unclear as to the results we will receive.

As for delimitations placed on the research project, the main limit is that of who the study is focused on. The Dalhousie community is the population for this research as it is a campus-based project and it allows for a narrow, easier to deal with scope. However, this does not offer an accurate representation of the desirability throughout Halifax, simply the Dalhousie Community. Another delimitation placed on the research project is the time frame. As it is a course project the entirety of it must be completed in approximately 5-7 weeks after the project proposal is submitted.

## Schedule

Dates	Goals	Responsibilities
Week 0 (February 18-24)	<ol style="list-style-type: none"> <li>1. Finalize questionnaire</li> <li>2. Submit Preliminary Proposal (Friday February 22nd, 2013)</li> </ol>	<ol style="list-style-type: none"> <li>1. All</li> <li>2. Mackenzie</li> </ol>
Week 1 (Reading Week)	<ol style="list-style-type: none"> <li>1. Find more relevant literature</li> <li>2. Contact Michele Raymond and set up interview time</li> </ol>	<ol style="list-style-type: none"> <li>1. All</li> <li>2. Claire</li> </ol>
Week 2 (March 4-10)	<ol style="list-style-type: none"> <li>1. Refine questionnaire</li> <li>2. Contact the list of departments to distribute the questionnaire to staff students, and faculty</li> <li>3. Meet and interview Michele Raymond</li> <li>4. Send out reminder email on Wednesday, March 6, 2013 to fill out survey</li> </ol>	<ol style="list-style-type: none"> <li>1. All</li> <li>2. Alicia and Jocelyn</li> <li>3. Claire</li> <li>4. Alicia and Jocelyn</li> </ol>
Week 3 (March 11- 17)	<ol style="list-style-type: none"> <li>1. Redistribute questionnaire</li> </ol>	<ol style="list-style-type: none"> <li>1. All</li> </ol>



	if necessary	
Week 4 (March 18-24)	1. Compile and analyze data 2. Start final report	1. All 2. All
Week 5 (March 25-31)	1. Design and Practice Pecha kucha 2. Submit Pecha kucha Slides (Sunday March 31st, 2013) 3. Work on final report	1. All 2. Alida 3. All
Week 6 (April 1-7)	1. Pecha kucha (Monday April 1st, 2013) 2. Finish final report	1. All 2. All
Week 7 (April 8- 14)	1. Final report editing 2. Submit final Report (Friday April 12th, 2013)	1. All 2. Mackenzie

## Budget

The survey will be created on Opinio which is a resource available to Dalhousie faculty and staff free of charge (T. Wright, personal communication, February 19, 2013). Since the surveys will be distributed electronically via e-mail, gathering data will not result in any financial cost.

## Deliverables

The deliverables that will result from this research project are:

- Report including: Recommendations on how to move forward, data collected from the questionnaire and interview, a copy of the questionnaire and interview questions, appropriate ethics forms, and map of Northwest Arm with potential ferry route.
- A Pechakucha presentation on the findings of the research project.

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# Appendices

## Appendix A: Labeled map of the NWA with the proposed route



**Map Legend**

Potential Ferry Route: - - - - -

Dalhousie University, Studley Campus:

*Appendix B: Questionnaire*

**The Desirability of a Commuter Ferry across the Northwest Arm**

The researchers for this study are third-year environmental sustainability/science students in Dr. Tarah Wright’s ENVS/SUST 3502 research class. This questionnaire will provide information for a study being conducted as part of a research project and the information will be used for this class only. Please note that the results of this questionnaire will be kept anonymous and confidential. If you have any further questions, please do not hesitate to contact us at [nwferry@gmail.com](mailto:nwferry@gmail.com). Thank-you, in advance, for your time.

1. Which of the following best describes your position in the Dalhousie community? (circle one)
  - a. Student
  - b. Faculty
  - c. Administration
  - d. Staff
  - e. Other

2. Which area of Halifax Regional Municipality do you live in? (circle one)
  - a. Halifax Peninsula  
Please specify which geographic neighbourhood \_\_\_\_\_
  - b. Northwest Arm  
Please specify which geographic neighbourhood \_\_\_\_\_
  - c. Other please specify \_\_\_\_\_

3. Please indicate with a check mark how often you currently use each mode of transportation. If you commute by any other method that is not on the list, please add it in the empty row provided.

	Daily	Couple times a week	Couple times a month	Couple times a year	Never
Walk and/or jog					
Skate-/Long-board					
Bicycle					

Motor vehicle					
Motorcycle/scooter					
Carpool					
Take Metro transit					

4. Would you be interested in implementing a passenger ferry in the Northwest Arm? (circle one)
- a. Yes
  - b. No
  - c. Maybe
  - d. Only if it was seasonal
5. Would you use a ferry for purposed other than commuting to and from the University? (circle one)
- a. Yes
  - b. No
  - c. N/A
6. How often would you use a passenger ferry in the Northwest Arm, assuming it operated all seasons? (circle one)
- a. Daily
  - b. Once or twice a week
  - c. Once or twice a month
  - d. Once or twice a season
  - e. Once or twice a year
  - f. Never
7. For each season, please rate how likely you would be to take the ferry at least once: (1 being not likely and 5 very likely)

	Not Likely			Very Likely		
Spring	1	2	3	4	5	
Summer	1	2	3	4	5	
Fall	1	2	3	4	5	
Winter	1	2	3	4	5	

8. How many days a week would you use the ferry? (circle one)
- a. 2-3 days a week
  - b. 4-6 days a week
  - c. daily
  - d. not at all
9. Which times would you use the ferry (please circle all that apply)?
- a. 12am-6am
  - b. 6:01am-10am
  - c. 10:01am-3pm
  - d. 3:01pm-8pm
  - e. 8:01pm-11:59pm
10. What would stop you from taking the ferry? (circle all that apply)
- a. I have no need to take a ferry across the arm
  - b. I don't like boats
  - c. I don't live near that area
  - d. I don't live near that area
  - e. I don't want to pay to take the ferry
  - f. I would not have a place to park my vehicle
  - g. I don't have time in my commute to incorporate a ferry crossing
  - h. I don't have any way to get to the ferry crossing
  - i. Other reasons not on the list
- Please specify \_\_\_\_\_
11. What do you think would be a reasonable amount to pay for a one-way trip? (circle one)
- a. <\$1
  - b. \$1.01-2
  - c. \$2.01-3
  - d. \$3.01-4
  - e. \$4.01+
12. Would any of the following be accompanying you on the ferry? (circle all that apply)
- a. Dog(s)
  - b. Bicycle
  - c. Skateboard/Longboard
  - d. Child(ren)<12 years old
  - e. Wheelchair
  - f. Walker Shopping cart
  - g. Other (please specify) \_\_\_\_\_
  - h. N/A

13. If you are interested in a proposed ferry for the Northwest arm, or know someone else who may be, please provide an email address for further information.
- 

### *Appendix C: Sample interview questions for Michele Raymond*

#### **Sample interview questions (Michele Raymond)**

1. How did you initially become interested in the ferry project?
2. What steps did you take to set up your pilot ferry project?
3. Why was the HRM council opposed to the ferry?
4. What was your general feedback from the community?
5. Can you tell us a bit about the costs affiliated with this project?
6. Can you provide additional information on the cost of implementing a permanent ferry in the Northwest Arm?
7. What were the greatest challenges you faced?
8. Is there anything you would do differently and/or recommendations or advice for going forward with the proposed ferry?

## Appendix D: Spreadsheet of department emails

#	Department	Department e-mail	Link to Contact us page
1	Biochemistry and Molecular Biology	<a href="mailto:Chris.MacNeil@dal.ca">Chris.MacNeil@dal.ca</a>	<a href="http://www.biochem.dal.ca/contact.php">http://www.biochem.dal.ca/contact.php</a>
2	Biology	<a href="mailto:biology@dal.ca">biology@dal.ca</a>	<a href="http://biology.dal.ca/Contact%20Us/index.htm">http://biology.dal.ca/Contact%20Us/index.htm</a>
3	Chemistry	<a href="mailto:chemistry@dal.ca">chemistry@dal.ca</a>	<a href="http://chemistry.dal.ca/Contact_Us/">http://chemistry.dal.ca/Contact_Us/</a>
4	Earth Sciences	<a href="mailto:earth.sciences@dal.ca">earth.sciences@dal.ca</a>	<a href="http://earthsciences.dal.ca/aboutus/aboutus.html">http://earthsciences.dal.ca/aboutus/aboutus.html</a>
5	Environmental Science programs	<a href="mailto:environment@dal.ca">environment@dal.ca</a>	<a href="http://environmental.science.dal.ca/Contact%20Us/">http://environmental.science.dal.ca/Contact%20Us/</a>
6	Mathematics and Statistics	<a href="mailto:queena@mathstat.dal.ca">queena@mathstat.dal.ca</a>	<a href="http://www.mscs.dal.ca/contact.html">http://www.mscs.dal.ca/contact.html</a>
7	Microbiology and Immunology	<a href="mailto:Mary.Ellen.Doolittle@Dal.Ca">Mary.Ellen.Doolittle@Dal.Ca</a>	<a href="http://microbiology.medicine.dal.ca/contact.htm">http://microbiology.medicine.dal.ca/contact.htm</a>
8	Oceanography	<a href="mailto:oceanography@dal.ca">oceanography@dal.ca</a>	<a href="http://oceanography.dal.ca/contact/index.html">http://oceanography.dal.ca/contact/index.html</a>
9	Physics and Atmospheric Sciences	<a href="mailto:physics@dal.ca">physics@dal.ca</a>	<a href="http://www.dal.ca/faculty/science/physics/about/contact.html">http://www.dal.ca/faculty/science/physics/about/contact.html</a>
10	Psychology	<a href="mailto:psychology@dal.ca">psychology@dal.ca</a>	<a href="http://psychology.dal.ca/Contact%20Us/">http://psychology.dal.ca/Contact%20Us/</a>
11	School of Architecture	<a href="mailto:arch.office@dal.ca">arch.office@dal.ca</a>	<a href="http://architectureandplanning.dal.ca/contacts/index.shtml">http://architectureandplanning.dal.ca/contacts/index.shtml</a>
12	School of Planning	<a href="mailto:plan.office@dal.ca">plan.office@dal.ca</a>	<a href="http://architectureandplanning.dal.ca/planning/direct/index.shtml">http://architectureandplanning.dal.ca/planning/direct/index.shtml</a>
13	Classics	<a href="mailto:claswww@dal.ca">claswww@dal.ca</a>	<a href="http://www.dal.ca/faculty/arts/classics/about/contact.html">http://www.dal.ca/faculty/arts/classics/about/contact.html</a>
14	English	<a href="mailto:englwww@dal.ca">englwww@dal.ca</a>	<a href="http://english.dal.ca/Contact%20Us/">http://english.dal.ca/Contact%20Us/</a>
15	French	<a href="mailto:french@dal.ca">french@dal.ca</a>	<a href="http://french.dal.ca/contact%20us/">http://french.dal.ca/contact%20us/</a>
16	German	<a href="mailto:German@dal.ca">German@dal.ca</a>	<a href="http://german.dal.ca/Contact%20Us/">http://german.dal.ca/Contact%20Us/</a>
17	History	<a href="mailto:history@dal.ca">history@dal.ca</a>	<a href="http://history.dal.ca/Contact%20Us/">http://history.dal.ca/Contact%20Us/</a>
18	International Development Studies	<a href="mailto:ids@dal.ca">ids@dal.ca</a>	<a href="http://internationaldevelopmentstudies.artsandsocialsciences.dal.ca/Contact%20Us/">http://internationaldevelopmentstudies.artsandsocialsciences.dal.ca/Contact%20Us/</a>
19	Music	<a href="mailto:Music@Dal.ca">Music@Dal.ca</a>	<a href="http://music.dal.ca/Contact%20Us/">http://music.dal.ca/Contact%20Us/</a>
20	Philosophy	<a href="mailto:dalphil@dal.ca">dalphil@dal.ca</a>	<a href="http://philosophy.dal.ca/Contact%20Us/">http://philosophy.dal.ca/Contact%20Us/</a>
21	Political Science	<a href="mailto:psadmin@dal.ca">psadmin@dal.ca</a>	<a href="http://www.dal.ca/faculty/arts/politicalscience/departments.html">http://www.dal.ca/faculty/arts/politicalscience/departments.html</a>
22	Religious Studies	<a href="mailto:Donna.Edwards@Dal.Ca">Donna.Edwards@Dal.Ca</a>	<a href="http://religiousstudies.dal.ca/Contact_Us/">http://religiousstudies.dal.ca/Contact_Us/</a>
23	Russian Studies	<a href="mailto:rusn@dal.ca">rusn@dal.ca</a>	<a href="http://russianstudies.dal.ca/Contact%20Us/">http://russianstudies.dal.ca/Contact%20Us/</a>
24	Sociology and Social Anthropology	<a href="mailto:leola.lefebvre@dal.ca">leola.lefebvre@dal.ca</a>	<a href="http://sociologyandsocialanthropology.dal.ca/About%20Us/">http://sociologyandsocialanthropology.dal.ca/About%20Us/</a>
25	Spanish and Latin American Studies	<a href="mailto:pam.noseworthy@dal.ca">pam.noseworthy@dal.ca</a>	<a href="http://www.dal.ca/faculty/arts/spanish/about/contact.html">http://www.dal.ca/faculty/arts/spanish/about/contact.html</a>
26	Theatre	<a href="mailto:theatre@dal.ca">theatre@dal.ca</a>	<a href="http://theatre.dal.ca/">http://theatre.dal.ca/</a>
27	Computer Science	<a href="mailto:inquiries@cs.dal.ca">inquiries@cs.dal.ca</a>	<a href="https://www.cs.dal.ca/contact">https://www.cs.dal.ca/contact</a>
28	Civil Engineering	<a href="mailto:civil.resource@dal.ca">civil.resource@dal.ca</a>	<a href="http://civil.engineering.dal.ca/Contact_Us.php">http://civil.engineering.dal.ca/Contact_Us.php</a>
29	Mineral Resource Engineering	<a href="mailto:care@dal.ca">care@dal.ca</a>	<a href="http://mineral.resource.engineering.dal.ca/Contact%20Us/">http://mineral.resource.engineering.dal.ca/Contact%20Us/</a>
30	Biological/ENV Engineering	<a href="mailto:Bio.Engineering@dal.ca">Bio.Engineering@dal.ca</a>	<a href="http://biologicalengineering.dal.ca/">http://biologicalengineering.dal.ca/</a>
31	Chemical Engineering	<a href="mailto:chemeng@dal.ca">chemeng@dal.ca</a>	<a href="http://chemicalengineering.dal.ca/Contact%20Us/">http://chemicalengineering.dal.ca/Contact%20Us/</a>
32	Food Science	<a href="mailto:food.science@dal.ca">food.science@dal.ca</a>	<a href="http://foodscience.engineering.dal.ca/Contact%20Us/">http://foodscience.engineering.dal.ca/Contact%20Us/</a>
33	Material Program	<a href="mailto:mateng@dal.ca">mateng@dal.ca</a>	<a href="http://materials.engineering.dal.ca/Contact%20Us/">http://materials.engineering.dal.ca/Contact%20Us/</a>
34	Industrial Engineering	<a href="mailto:industrial.engineering@dal.ca">industrial.engineering@dal.ca</a>	<a href="http://industrialengineering.dal.ca/">http://industrialengineering.dal.ca/</a>
35	Mechanical Engineering	<a href="mailto:mechanical.engineering@dal.ca">mechanical.engineering@dal.ca</a>	<a href="http://me.dal.ca/Contact_Us.php">http://me.dal.ca/Contact_Us.php</a>
36	Internetworking/ Mathematics	<a href="mailto:Claire.Chisholm@dal.ca">Claire.Chisholm@dal.ca</a>	<a href="http://www.engmath.dal.ca/contact">http://www.engmath.dal.ca/contact</a>
37	Electrical/Computer	<a href="mailto:ece.admin@dal.ca">ece.admin@dal.ca</a>	<a href="http://electricalandcomputerengineering.dal.ca/Contact%20Us/">http://electricalandcomputerengineering.dal.ca/Contact%20Us/</a>
38	Commerce	<a href="mailto:bcomadvising@dal.ca">bcomadvising@dal.ca</a>	<a href="http://bcomm.management.dal.ca/Contact_Us/">http://bcomm.management.dal.ca/Contact_Us/</a>
39	Information Management	<a href="mailto:deborah.mccoll@dal.ca">deborah.mccoll@dal.ca</a>	
40	Business Administration	<a href="mailto:Viola.Caume@Dal.Ca">Viola.Caume@Dal.Ca</a>	<a href="http://www.dal.ca/faculty/management/rsb/about/contact-">http://www.dal.ca/faculty/management/rsb/about/contact-</a>



			<a href="#">us.html</a>
41	Marine Affairs	<a href="mailto:marine.affairs@dal.ca">marine.affairs@dal.ca</a>	<a href="http://marineaffairsprogram.dal.ca/Contact_Us/">http://marineaffairsprogram.dal.ca/Contact_Us/</a>
42	Public Administration	<a href="mailto:dalmpa@dal.ca">dalmpa@dal.ca</a>	<a href="http://spa.management.dal.ca/Contact%20Us/">http://spa.management.dal.ca/Contact%20Us/</a>
43	SRES	<a href="mailto:sres@dal.ca">sres@dal.ca</a>	<a href="http://sres.management.dal.ca/Contact_Us/">http://sres.management.dal.ca/Contact_Us/</a>
44	Economics	<a href="mailto:Economics@dal.ca">Economics@dal.ca</a>	<a href="http://economics.dal.ca/Contact_Us/">http://economics.dal.ca/Contact_Us/</a>

*Appendix E: Template for email that will be distributed*

To: \_\_\_\_\_ department

We are contacting you as research students of Dr. Tarah Wright's ENVS/SUST 3502 class to ask if you can distribute the following questionnaire to the department contact list. It will need to be sent out two times to ensure we maximize respondent rates. We will send you a reminder email in a week to redistribute the email. This questionnaire has been sent to each department within the university so we can reach a wide population for our study. This questionnaire will provide information for a study being conducted as part of a research project and the information will be used for this class only. Please note that the results of this questionnaire will be kept anonymous. If you have any further questions, please do not hesitate to contact us.

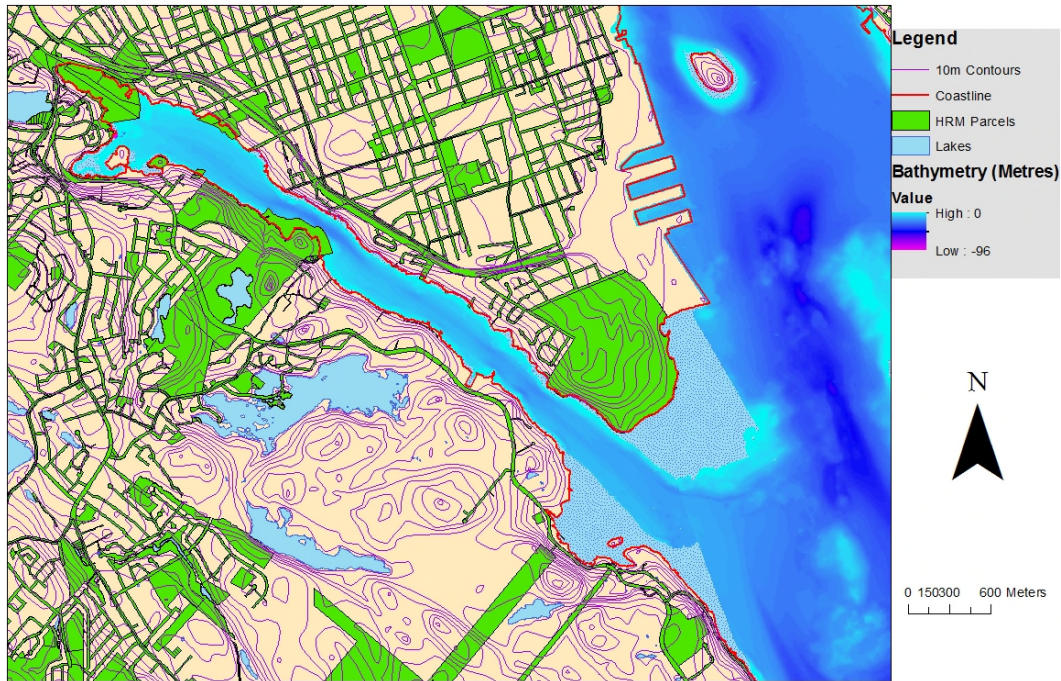
Thank-you, in advance, for your time.

3502 Ferry Research Group

Alicia, Alida, Claire, Jocelyn and Mackenzie

## Appendix VI: Additional Information from Dan Bayefsky

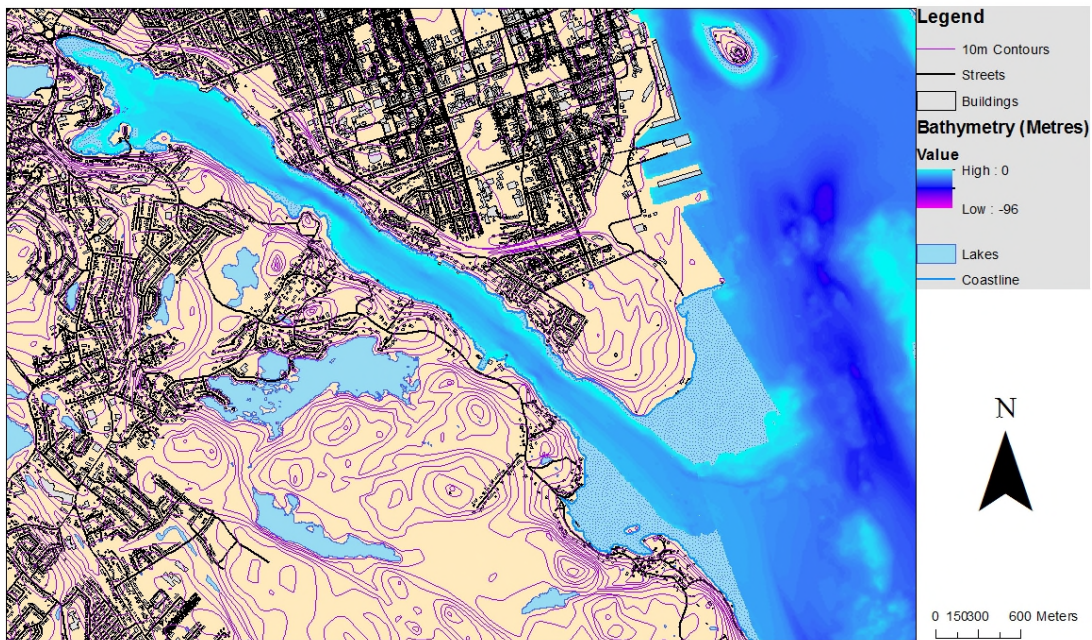
Northwest Arm and Surrounding Area: Topography, Bathymetry, and Public Lands  
Dalhousie Office of Sustainability: For the Northwest Arm Ferry Study



Sources: Dalhousie GIS Centre and NSDNR

Date: 2/12/2013

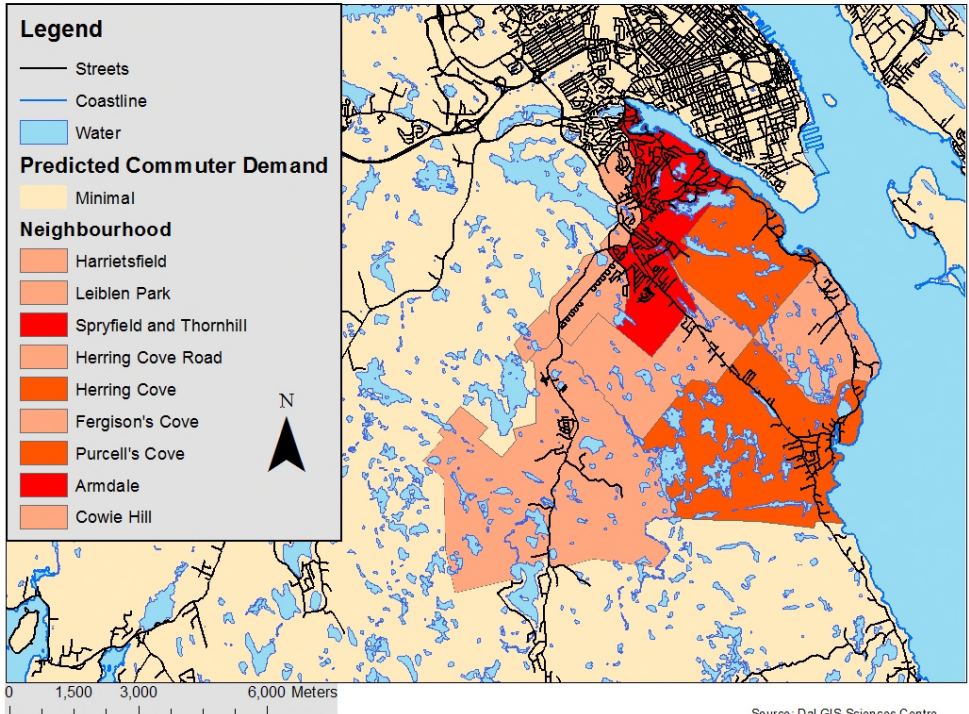
Northwest Arm and Surrounding Area: Topography and Bathymetry



Sources: Dalhousie GIS Centre and NSDNR

Date: 2/12/2013

Northwest Arm Ferry: Predicted Commuter Demand  
For the Dalhousie Office of Sustainability



Source: Dal GIS Sciences Centre  
Date: 2/13/2013 Time: 10:10:55 AM