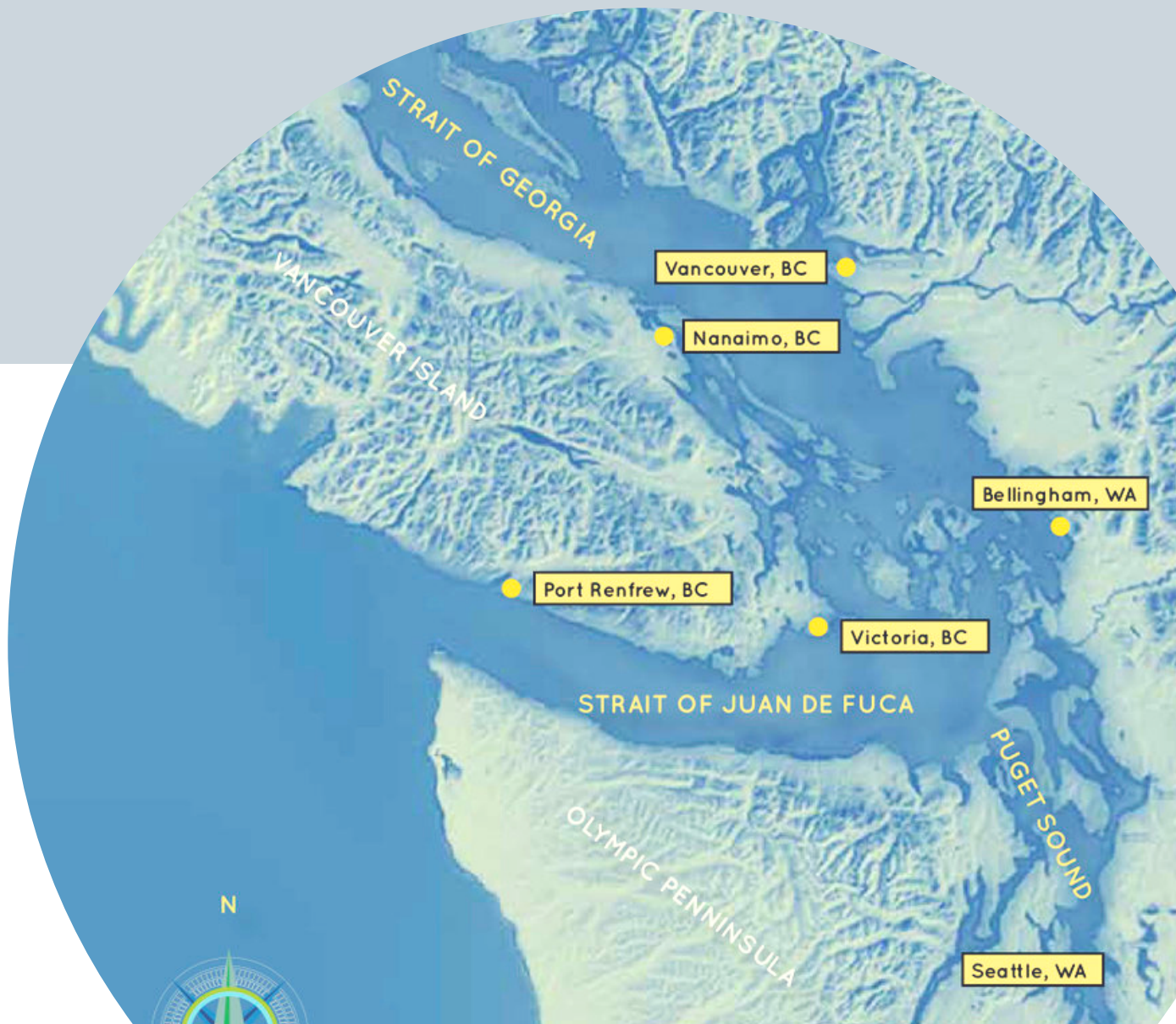


# SALISH SEA SURVEY






## Final Report

Prepared for: The SeaDoc Society, UC Davis School of Veterinary Medicine  
Prepared by: Dr. David J. Trimbach, Oregon State University  
May 2019



# TABLE OF CONTENTS

---

Executive Summary.....	1
 Introduction.....	2-3
 Methods.....	4
 Findings.....	5-10
 Discussion.....	11
References.....	12-14
Appendix A. Survey Questions.....	15
Appendix B. Survey Research Statement.....	16
Appendix C. Additional Survey Information.....	17
Appendix D. Complete Demographic Profile.....	18-21
 Appendix E. Additional Findings.....	22-26
Acknowledgments.....	27

Please cite as: *David J. Trimbach. Salish Sea Survey. Prepared for The SeaDoc Society. May 2019.*

Cover Image: The SeaDoc Society's *Explore the Salish Sea: A Nature Guide for Kids*. All photographs are the author's.

# EXECUTIVE SUMMARY

---

The Salish Sea is a transboundary inland sea that is recognized as a single integrated ecosystem, consisting of the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound. The Salish Sea faces innumerable environmental challenges. In order to better address, communicate, and understand these challenges, the SeaDoc Society has requested more information about British Columbia (BC) and Washington (WA) residents' knowledge of the Salish Sea, with an emphasis on the toponym (place name). **In short, what do people call and know about this shared body of water?**

Geographic literacy and toponymy (study of place names), are well understood within interdisciplinary research, particularly as place knowledge and names relate to meanings, identities, behaviors, and greater senses of place. This study seeks to understand the geographic literacy among BC and WA residents with an emphasis on toponyms.

A web-hosted survey was implemented through Qualtrics from January-March 2019. The survey was conducted with 2405 (n) BC and WA residents via stratified sampling. The geographic literacy among residents that share the transboundary Salish Sea is low, lacking, and varies by place of residence (BC vs. WA). Place of residence is strongly associated with and predictive of responses. Participants selected "Salish Sea" as a response less than others and lack familiarity with this place name more broadly. This variation illustrates regional differences and disconnects in Salish Sea descriptions, visualizations (e.g.: maps), and understandings. As such, this variation in geographic knowledge and geospatial recognition should be addressed and integrated into the work of the SeaDoc Society and assessed in the future to gauge geographic literacy change with an emphasis on the Salish Sea.

## Implications

- Recognize the strong association between place of residence (BC and WA) and geographic literacy (e.g.: knowledge and recognition of the Salish Sea).
- Recognize that place of residence matters and can inform how residents understand, visualize (mentally map), identify with, and/or engage the Salish Sea.
- Recognize that place name variation matters and may inform how research, planning, recovery, outreach, and/or education is communicated to or received by BC and WA residents, including regional decision-makers.
- Better inform how the Salish Sea is integrated and articulated into the SeaDoc Society's (and its partners') ongoing efforts in both BC and WA.

# INTRODUCTION

## Place Names

---

Do place names matter? Place names are integral aspects of place and human-place relationships. Place names denote meaning, reflecting often competing or shared memories, heritage, histories, languages, politics, and cultural narratives (Cresswell 2015; Boillat et al. 2013; Helleland 2012; Madden 2018; Thornton 1997; Yung et al. 2003). Place names illustrate place-making and contribute to senses of place, that inform an individual's place attachment, dependence, identity, meaning, and behaviors (Cresswell 2015; Masterson et al. 2017). Place names are subject to change and reflect wider social dynamics, such as conflict, migration, or settlement. Prior research suggests that place names inform how individuals identify with and feel about a location (Helleland 2012), which can inform or complicate management, policy, and stewardship (Schreyer 2016; Yung et al. 2003). Thornton (1997) states that, "place names are powerful linguistic symbols that evoke a wide range of poignant associations, both mental and physical," and force individuals, "to think 'with' the landscape and not just 'about' it," (pp. 21-22). Sense of place, including place name attachment and identity, is positively associated with ecosystem recovery, human wellbeing, quality of life, and pro-environmental behaviors (Biedenweg 2016; Breslow 2014; Junot et al. 2018; Masterson et al. 2017; Wartmann and Purves 2018). As such, **this study can inform our current understanding of WA and BC residents' geographic literacy and senses of place with an emphasis on the shared Salish Sea.**

## Toponym: Salish Sea

The Salish Sea is a toponym with a recent history. Dr. Bert Webber, a natural scientist at Western Washington University, led the effort to designate the transboundary sea under a unified name. Inspired to address increasing environmental degradation, highlight that the inland marine waters of WA and BC are a single integrated estuarine ecosystem, and acknowledge the indigenous peoples who have lived with the sea since time immemorial, Dr. Webber sought to name this body of water the Salish Sea. After nearly two decades of work, between 2009-2010, Coast Salish Indigenous Peoples from BC and WA, the Geographical Names Board of Canada, U.S. Board on Geographic Names, Province of British Columbia Geographic Names Office, and Washington State Board on Geographic Names, approved "Salish Sea" as the official designated name for the transboundary inland sea (Murphyao and Black 2015; Webber 2018). While the Salish Sea was approved, the name and naming process have been subject to critique, including by scholars who challenge non-indigenous and settler colonial government roles over place (re-)naming of indigenous lands (Murphyao and Black 2015; Tucker and Rose-Redwood 2015). Such scholars note that indigenous place names for the body of water like *Whulj* and *Sqelateses* also exist and emphasize that "Salish" is a non-indigenous construct (Murphyao and Black 2015; Tucker and Rose-Redwood 2015).



# INTRODUCTION

## Salish Sea Survey

---

What is in a name? This project assesses the geographic literacy of BC and WA residents by gauging their knowledge of, familiarity with, and geospatial recognition of the Salish Sea as a toponym. The Salish Sea is a relatively new place name (2009-2010) used to define the transboundary inland sea that extends from Olympia, WA in the south to the Campbell River, BC in the north, and west to Neah Bay and includes the large cities of Seattle and Vancouver to the east. The Salish Sea exists simultaneously with other place names used to define the marine waters of BC and WA, reflecting potential challenges to regional research, planning, education, and outreach.

This survey builds upon interdisciplinary social science research on geographic literacy and toponymy. Geographic literacy, including of toponyms, highlights BC and WA residents' knowledge, recognition, familiarity, and usage of the Salish Sea, among other place names. By understanding place names, this project also reflects BC and WA residents' shared and/or competing place meanings, identities, and broader senses of place.

**The primary objective of this study is to provide a base of knowledge of BC and WA resident geographic literacy with an emphasis on place names (e.g.: Salish Sea).**

This study is also intended to be replicable with the intention of tracking geographic literacy (e.g.: place names) change and to inform the SeaDoc Society's ongoing efforts.

## Geographic Literacy and Knowledge

This project integrates norms and best practices associated with geographic literacy studies (Bascom 2011; Council on Foreign Relations and National Geographic Society 2016; Dikmenli 2014; Kozak et al. 2013, 2015; Roper Public Affairs 2006; Turner and Leydon 2012). Geographic literacy refers to, "the ability to understand, process, and utilize spatial data," and includes: (1) geographic knowledge or the ability to recognize or memorize the toponyms and characteristics of geographic locations at various scales; and (2) geospatial recognition or the ability to identify or locate specific geographic locations and characteristics on a map (Turner and Leydon 2012, p. 54). Geographic literacy enables people to, "better understand how people, places, and events connect," (Turner and Leydon 2012, p. 54). Geographic literacy can also be used as a tool to assess perceptions or feelings about the natural environment and real-world problems (Dikmenli 2014). Geographic literacy is considered integral to making place-dependent decisions (Edelson 2014). This study integrates geographic literacy questions that emphasize place names and characteristics. To the author's knowledge, this is the first solely body of water-focused geographic literacy study, which lends itself to further research.

# METHODS



A binational (Canada-United States) online survey of 2405 adults aged 18 and older who currently reside in either BC and WA was conducted between January-March 2019. Respondents were drawn from the Qualtrics' online research panel, an opt-in panel consisting of individuals who have been recruited to join and participate in online surveys. Respondents are offered incentives for their participation. Qualtrics uses industry-standard techniques to qualify participants and to ensure that their demographic characteristics are valid and meet specific project criteria (e.g.: demographic strata for sampling).

Stratified sampling was used to solicit respondents via Qualtrics. Stratified sampling is a form of sampling that emphasizes targeted respondent strata or criteria. Targeted strata included sex and age. Strata were proportionate to the population composition of both regions. This was conducted to allow greater generalizability between sample and population. A sample size of 2400 (goal n; actual n=2405) out of approximately 12.4 million residents (combined) was identified because the sample would have an estimated margin of error of +/- 2% at the 95% confidence level.

## DATA

Using Qualtrics' research panel, 2405 (n) responses were collected from BC (50%) and WA (50%). Stratified sampling emphasized area of residence (BC/WA), sex, and age. Other potential criteria were considered; however, due to project limitations (e.g.: cost, feasibility), country-based variations in how these notions are operationalized and measured (e.g.: origins vs. race/ethnicity), and known criteria associated with geographic literacy (Bascom 2011; Roper Public Affairs 2006), the sampling strata were limited. Additionally, similar studies primarily focus on young adults (high school or university age), limiting generalizability. Respondents were instructed to answer all questions and any erroneous responses were cleaned or omitted from the dataset prior to analysis. No missing data was recorded. Some percentages may not add up to 100%, as they are rounded. Results are not weighted.

## ANALYSIS

For closed-ended questions, descriptive statistical analysis was conducted, highlighting frequencies and associations. As categorical variables were collected, Pearson chi-square analysis of independence ( $\chi^2$ ), was conducted comparing BC and WA residents (Field 2013). Pearson chi-square results reflect significant associations. Effect size (association strength) of these associations was also conducted using Cramer's V (V) (Kotrlík et al. 2011). Multinomial logistic regression (Field 2013) was also conducted in order to illustrate whether or not place of residence (among other variables) is a significant predictor of responses (e.g.: geographic literacy) (see Appendix E). Similar work relies on descriptive statistics (e.g.: frequencies), thus this study provides an additional layer of analysis. A non-rigorous qualitative content analysis (QCA) was conducted with the open-ended question; however, this is solely for illustrative purposes.

# FINDINGS

## Demographic Profile

For the purpose of this report, the demographic profile of BC and WA respondents are combined (n=2405). This is done for pertinency, as the primary objective of this study is to compare responses between BC and WA residents.

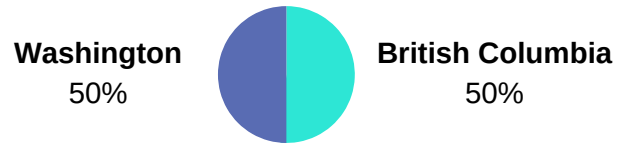


Figure 1. Place of Residence

Detailed demographics are presented in Appendix D and non-place of residence summarized Pearson chi-square analyses with effect sizes are outlined in Appendix E. More advanced analyses could be conducted in the future. Percentages are rounded. Responses included equal percentages of BC and WA residents (Figure 1). Sex was also nearly equal between female and male respondents (other was <1%) (Figure 2). Age group representation, education, and years of residence varied and reflected a diverse sample of participants (Figure 3-5). Note that place of residence (BC, WA), sex, and age were the sampling strata for this survey to ensure generalizability (Singleton and Straits 2005).

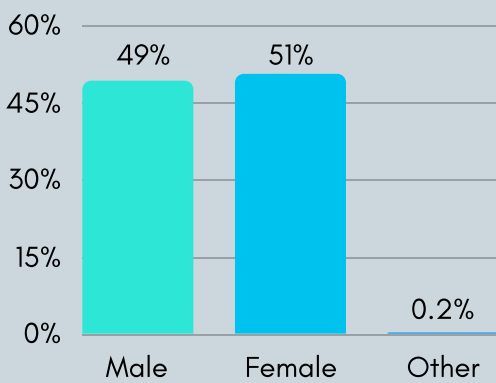


Figure 2. Sex (Combined)

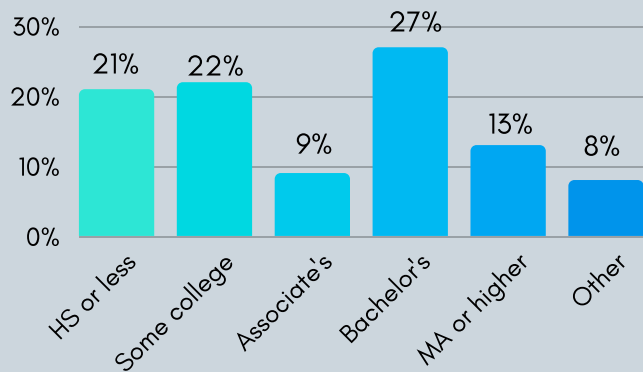


Figure 3. Level of Education (Combined)

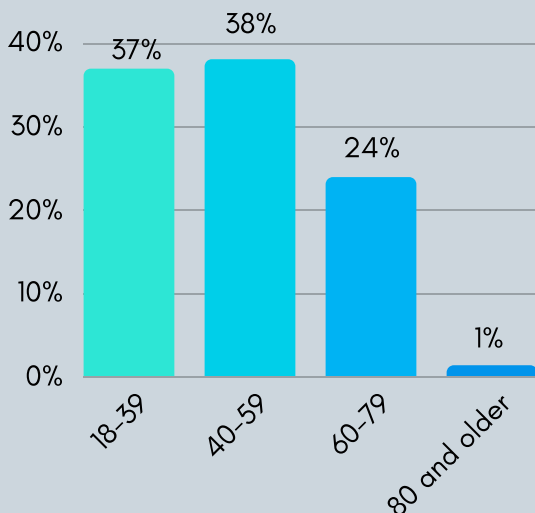


Figure 4. Age Group (Combined)

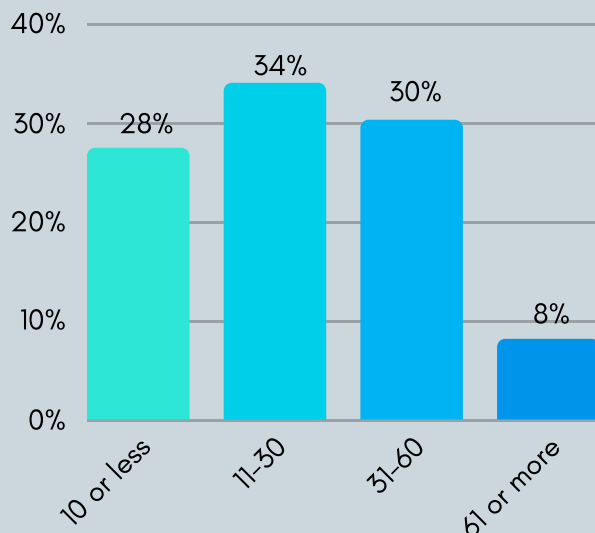


Figure 5. Years of Residence (Combined)

# FINDINGS

## Name that Place (Q1)

When asked to identify the place name of a written description of the Salish Sea (location), WA and BC residents' responses differed significantly. Over 50% of WA residents responded with "Puget Sound" (Figure 6), while BC residents responded with greater variation (Figure 7). 27% of BC residents, the largest percentage, selected the "Pacific Ocean" (Figure 7). "Salish Sea" was a marginal response for both WA (5%) and BC (14%) residents; although BC residents had a higher percentage, illustrating potential regional geographic literacy differences.

Based on the survey responses, there was a significant and strong association between place of residence and place name response to the written description of the Salish Sea,  $\chi^2(5, n=2405) = 907.69$ ,  $p < .001$ ,  $V = .61$ . This association illustrates that place of residence mattered when it came to how participants identified and/or defined the Salish Sea when articulated or described in written form.



Q1: Which of the following names best describes the body of water that is located between Olympia, Washington in the south to the Campbell River (on Vancouver Island), British Columbia in the north, and west to Neah Bay (on the Olympic Peninsula) and includes the large cities of Seattle and Vancouver to the east?

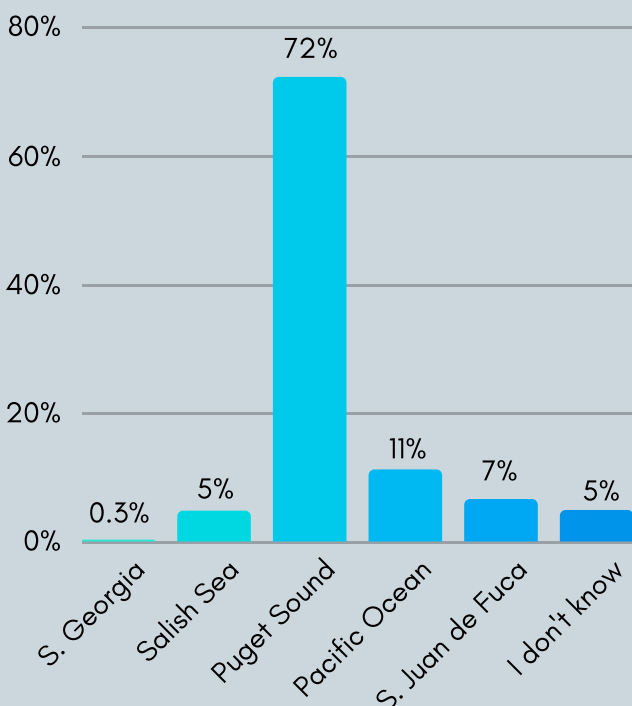


Figure 6. WA Residents

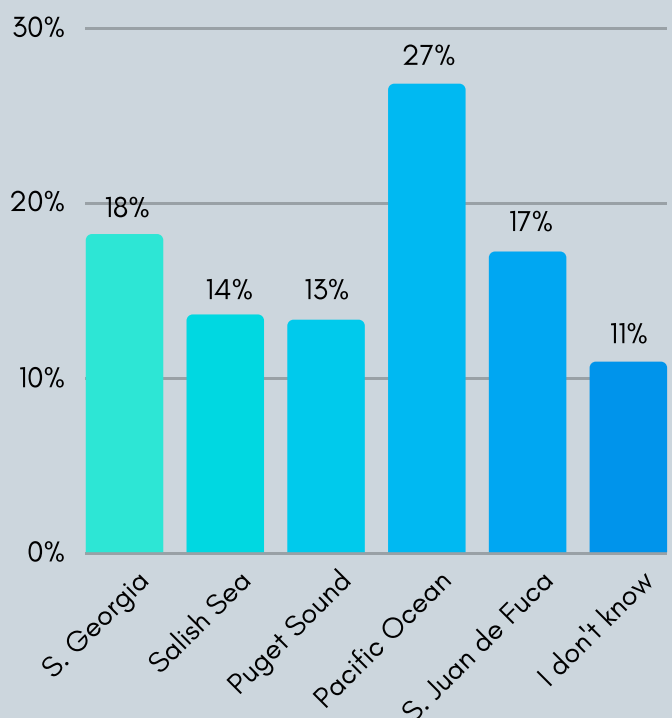


Figure 7. BC Residents

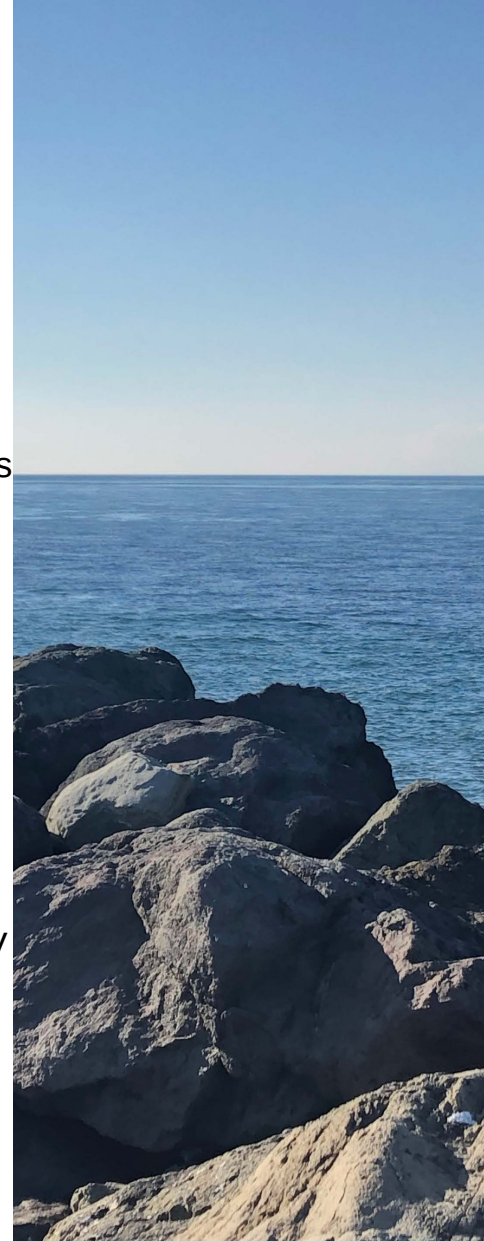


# FINDINGS

## Define that Place (Q2)

When asked to define the place outlined in the aforementioned written description of the Salish Sea (Q1), based on characteristics that define various bodies of water, BC and WA residents' responses differed significantly. While both groups responded similarly with "Saltwater Sea" and "The Ocean" (Figures 8-9), the response patterns differed. Over 50% of WA residents selected "Saltwater Sea" (Figure 8), while over 50% of BC residents chose "The Ocean" (Figure 9).

Based on the survey responses, there was a significant and moderate association between place of residence and place description of the Salish Sea,  $\chi^2(4, n=2405) = 306.44, p < .001, V = .36$ . While this association illustrates that most residents had a similar understanding of what defined the body of water (saltwater vs. freshwater; natural vs. artificial), place of residence mattered when it came to how participants defined the body of water.



Q2: Which of the following descriptions best defines the body of water outlined in the previous question (Question #1)?

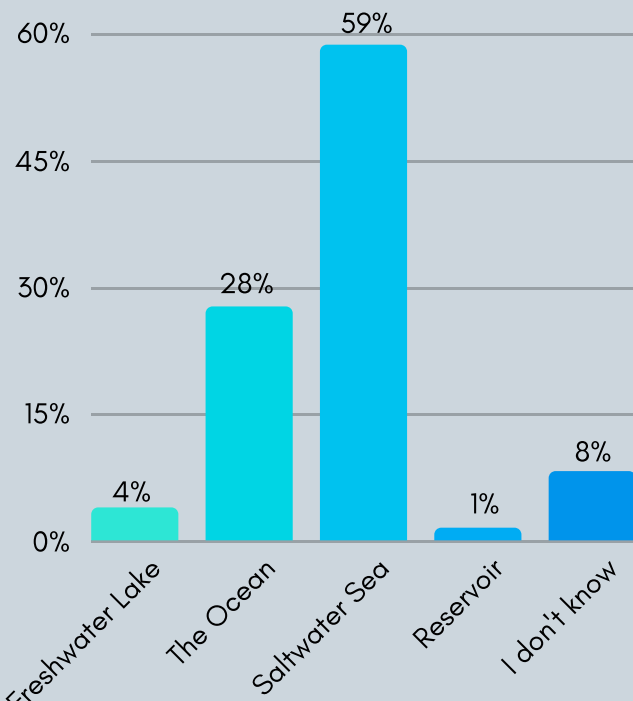


Figure 8. WA Residents

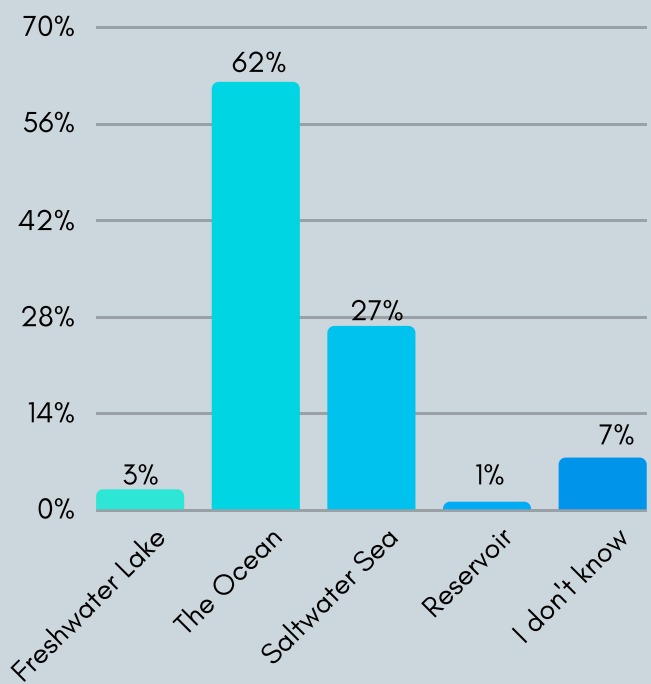


Figure 9. BC Residents

# FINDINGS

## Visualize that Place (Q3)

When asked to identify the body of water (Q3) illustrated on a map (Image 1) by name, BC and WA residents' responses differed significantly. Over 50% of WA residents identified the body of water as "Puget Sound" (Figure 10). 36% of BC residents, the largest percentage, selected the "Strait of Georgia" (Figure 11). "Salish Sea" was marginally selected by WA (9%) and BC (15%) residents.

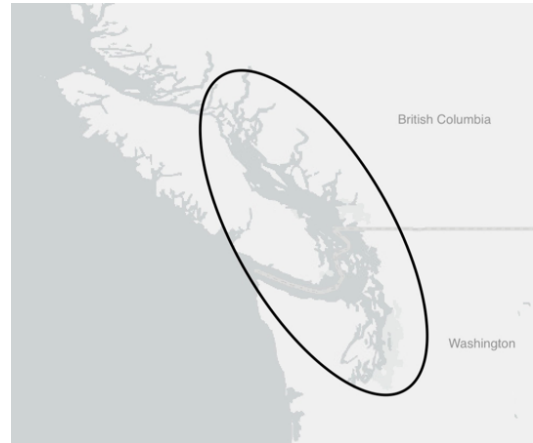


Image 1. Q3 Map of Salish Sea

Based on the survey responses, there was a significant and strong association between place of residence and place name identification when prompted with a map,  $\chi^2(5, n=2405) = 863.84, p < .001, V = .60$ . This association demonstrates variation in how residents visualized or mentally mapped the region's bodies of water. This association also highlights that place of residence mattered when it came to how participants identified water bodies on a map.

Q3: Identify the outlined body of water on the map (Image 1).

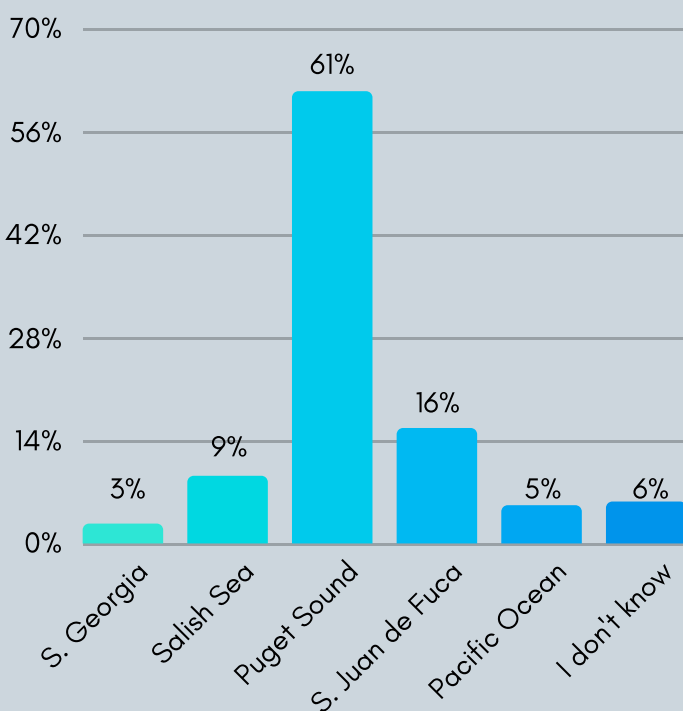


Figure 10. WA Residents

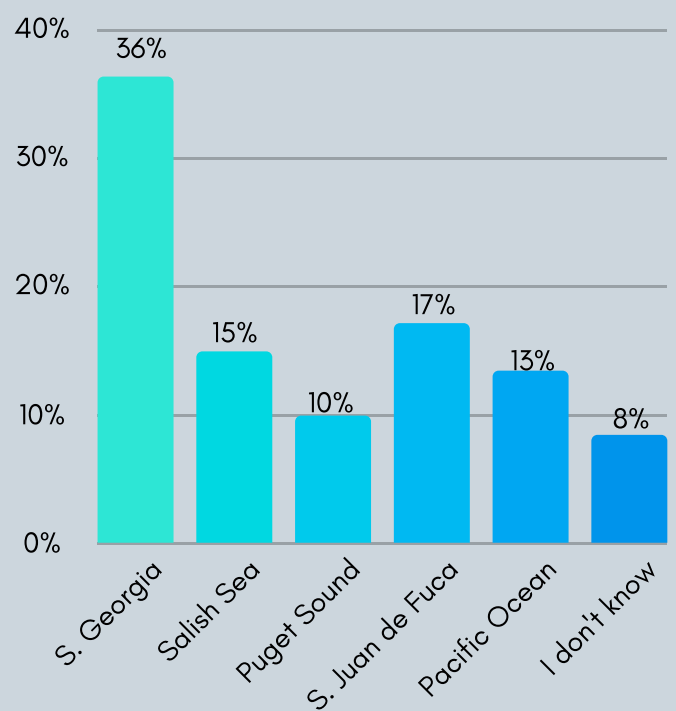


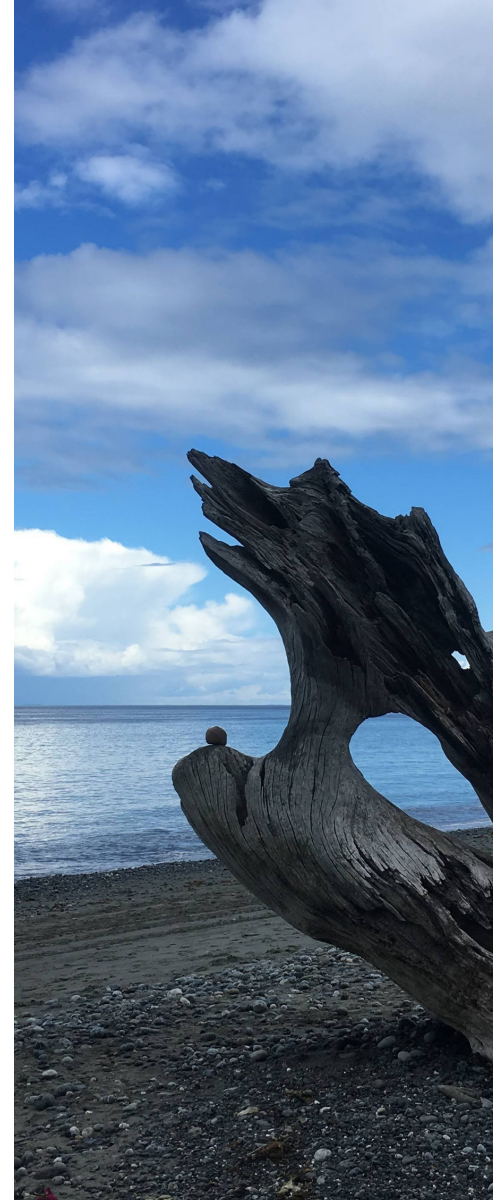
Figure 11. BC Residents

# FINDINGS

## Recognize that Place (Q4)

When asked whether or not the Salish Sea was a familiar or recognizable place name (Q4), BC and WA residents' responses differed significantly. Over 50% of WA residents stated that they had not heard of the Salish Sea prior to taking the survey (Figure 12). Responses among BC residents were more balanced between "No" and "Yes", both slightly below 50% (Figure 13).

Based on the survey responses, there was a significant, yet weak association between place of residence and recognition or familiarity of the name Salish Sea,  $\chi^2(2, n=2405) = 62.86, p < .001, V = .16$ . The association illustrates that place of residence mattered when it came to Salish Sea place name familiarity; however, given that the association was weak, the results illustrate a lack of place name familiarity was common among participating residents of both WA and BC.



Q4: Prior to this survey, had you ever heard of the Salish Sea?

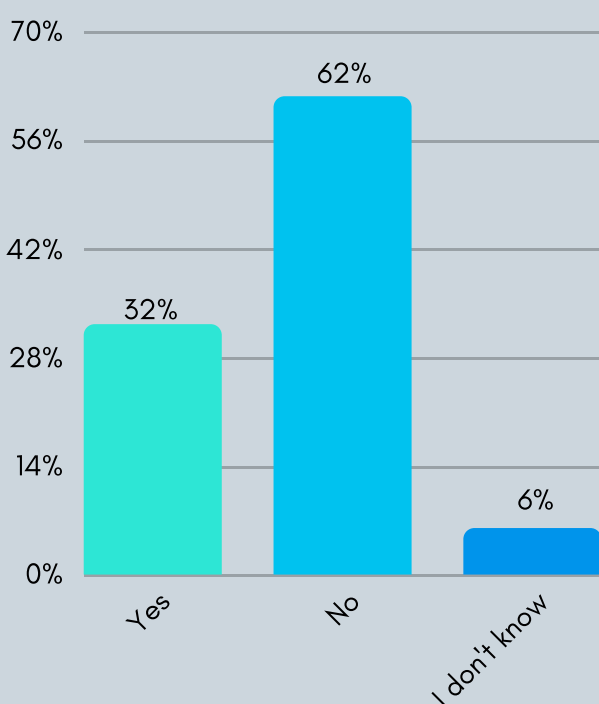


Figure 12. WA Residents

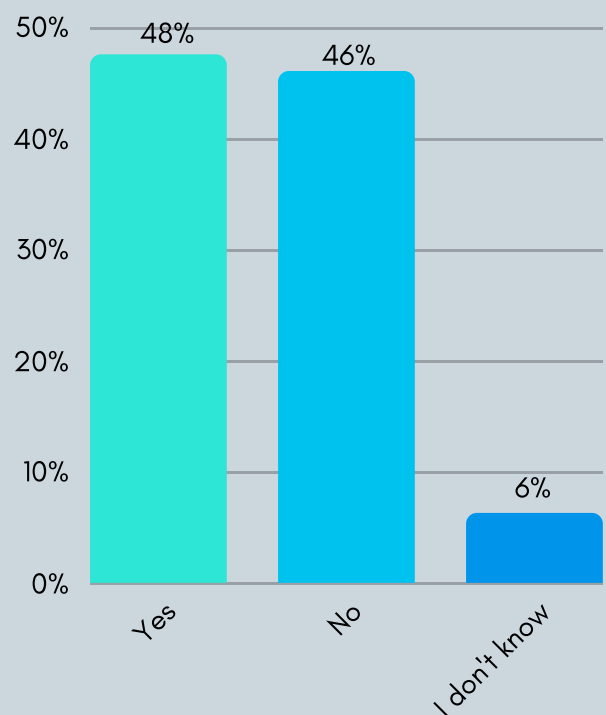


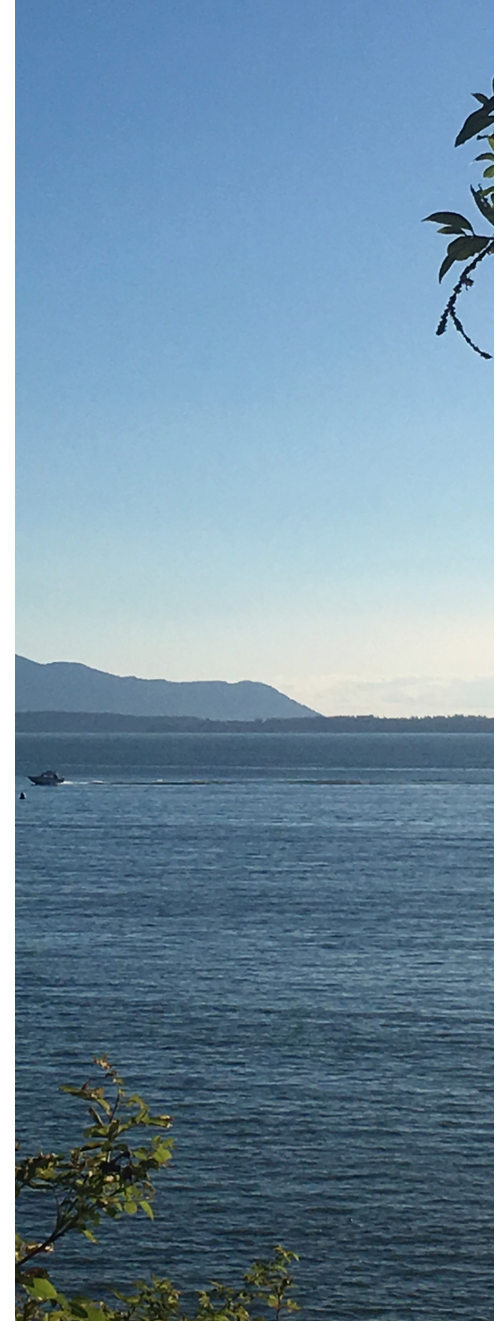
Figure 13. BC Residents

# FINDINGS

## Place Meanings (Q5)

When asked via an open-ended question what the Salish Sea means to the participant, responses illustrated both similarities and differences between BC and WA residents (n=2405) (Figure 14-15). This question was not intended for any robust or rigorous analysis, but for illustrative purposes. The responses at first glance reflected place of residence and some of the aforementioned findings (Q1-Q4).

Based on a preliminary evaluation for the responses, some respondents illustrated a lack of recognition or familiarity with the Salish Sea (e.g.: meanings articulated as "I don't know" or "nothing") and regional distinctions or affiliated places (e.g.: meanings associated with "Washington," "Puget Sound," or "Vancouver") (Figure 14-15). Additionally, some respondents described or noted the indigenous peoples of the region, illustrating some sense of what "Salish Sea" is referencing as a place name (e.g.: "First Nations" or "native") (Figure 15).



Q5: In your own words, what does the Salish Sea mean to you?

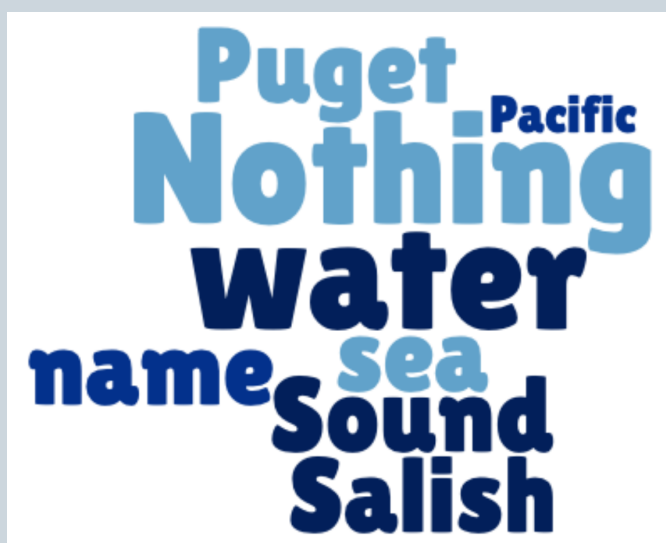


Figure 14. WA Residents

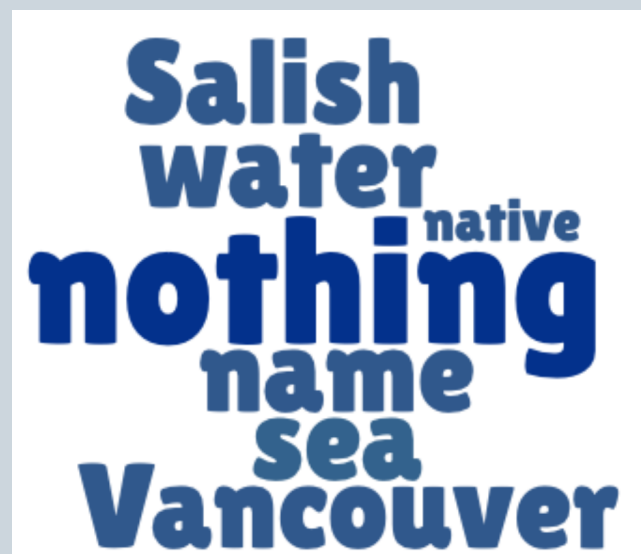


Figure 15. BC Residents



# DISCUSSION

---

**What do people call and know about the transboundary inland sea, that is officially recognized as the Salish Sea?** The Salish Sea remains a relatively unfamiliar toponym, particularly among WA residents. BC and WA residents do not share a consistent place name and description for the Salish Sea. While WA residents overwhelmingly refer to the Salish Sea as Puget Sound; BC residents maintain a wider variation of toponyms. BC and WA residents appear to share an understanding as to what comprises the waterbody, but tend to use different descriptions. The findings illustrate an inconsistent, low, and/or lack of geographic literacy among BC and WA residents when it comes to the Salish Sea toponym. Such findings reflect perhaps the newness of the Salish Sea as a toponym, strong senses of place associated with other place names, localisms, and variations or inconsistencies in how government agencies, geographic education systems, non-governmental organizations (NGOs), media, and/or researchers describe the Salish Sea to the public in written or visual (e.g.: map) form.

**What do these findings mean for the SeaDoc Society's efforts?** Inconsistent toponyms may equate to inconsistent, divergent, or conflicting geographic literacies and senses of place (e.g.: identities, meanings, attachments). Since the Salish Sea remains a relatively unfamiliar toponym, there does not seem to be a unifying place name that communities can understand, recognize, connect, foster meaning, and/or identify. Place names are powerful symbols of a location and its characteristics, that can evoke specific types of place-oriented feelings, decisions, or behaviors, including management, policy, or stewardship (Helleland 2012; Yung et al. 2002). The findings suggest more targeted efforts in education, communication, outreach, and research to improve geographic literacy and foster a shared place name among BC and WA residents by the SeaDoc Society and its partners.

## Recommendations and Next Steps

Recommendations to improve geographic literacy include: (1) targeted SeaDoc Society communications, education, outreach, and research (e.g.: Salish Sea-focused plan); (2) collaborations with partners such as educational institutions, public agencies, NGOs, museums, parks, and media; (3) use of online media (e.g.: learning tools, quizzes, interactive materials, maps); (4) encouragement of experiential learning; and (5) survey replication to track change (Bascom 2011; Dikmenli 2014; Hunter 2016; Turner and Leydon 2012). Additionally, emphasizing interactions (e.g.: social-natural, people-place), interconnections (e.g.: social-spatial-scalar), and real-world implications (e.g.: decisions) of geographic knowledge is considered integral to geographic literacy (Edelson 2014).

# REFERENCES

---

- Bascom, J. 2011. Geographic Literacy and Moral Formation among University Students. *Review of International Geographical Education*. 1 (2): 93-112.
- Biedenweg, K. 2016. A Comparative Study of Human Wellbeing Indicators Across Three Puget Sound Regions. *Society & Natural Resources*. 30 (3): 362-376.
- Boillat, S., Serrano, E., Rist, S., and Berkes, F. 2013. The Importance of Place Names in the Search for Ecosystem-Like Concepts in Indigenous Societies: An Example from the Bolivian Andes. *Environmental Management*. 51: 663-678.
- Breslow, S. J. 2014. A Complex Tool for a Complex Problem: Political Ecology in the Service of Ecosystem Recovery. *Coastal Management*. 42: 308-331.
- Council on Foreign Relations and National Geographic. 2016. *What College-Aged Students Know About the World: A Survey on Global Literacy*. New York: Council on Foreign Relations.
- Cresswell, T. 2015. *Place: an introduction*. Chichester, UK: John Wiley & Sons Ltd.
- Dikmenli, Y. 2014. Geographic literacy perception scale (GLPS) validity and reliability study. *Mevlana International Journal of Education*. 4 (1): 1-15.
- Edelson, D. C. 2014. Geo-Literacy [National Geographic Society online article]. Available at: <https://www.nationalgeographic.org/news/geo-literacy-preparation-far-reaching-decisions/>. Accessed April 1, 2019.
- Field, A. 2013. *Discovering Statistics Using IBM SPSS Statistics*. Los Angeles: Sage.
- Helleland, B. 2012. Place Names and Identities. *Oslo Studies in Language*. 4 (2): 95-116.
- Hunter, N. 2016. *Assessing Sense of Place and Geo-literacy Indicators as Learning Outcomes of an International Teacher Professional Development Program [Dissertation]*. Portland: Portland State University.

# REFERENCES

---

Hyun, W-Y and Ditton, R. B. 2006. Using Multinomial Logistic Regression Analysis to Understand Anglers Willingness to Substitute Other Fishing Locations. *Proceedings of the 2006 Northeastern Recreation Research Symposium*. 14: 248-255.

Junot, A., Paquet, Y., Fenouillet, F. 2018. Place attachment influence on human well-being and general pro-environment behaviors. *Journal of Theoretical Social Psychology*. 2: 49-57.

Kozak, S. L., Dobson, J. E., Wood, J. S., Wells, W. R., and Haynes, D. 2013. *The American Geographical Society's Geographic Knowledge and Values Survey: Report of Results for the United States*. Brooklyn, NY: The American Geographical Society.

Kozak, S. L., Dobson, J. E., Wood, J. S. 2015. Geography's American constituency: results from the AGS geographic knowledge and values survey. *International Research in Geographical and Environmental Education*. 24 (3): 201-222.

Kotrlik, J. W., Williams, H. A., and Jabor, M. K. 2011. Reporting and Interpreting Effect Size in Quantitative Agricultural Education Research. *Journal of Agricultural Education*. 52 (1): 132-142.

Madden, D. J. 2018. Pushed off the map: toponymy and the politics of place in New York City. *Urban Studies*. 55: 1599-1614.

Masterson, V. A., R. C. Stedman, J. Enqvist, M. Tengö, M. Giusti, D. Wahl, and U. Svedin. 2017. The contribution of sense of place to social-ecological systems research: a review and research agenda. *Ecology and Society*. 22 (1): 49.

Murphyao, A. and Black, K. 2015. Unsettling Settler Belonging: (Re)naming and Territory Making in the Pacific Northwest. *American Review of Canadian Studies*. 45 (3): 315-331.

Pollock, P. H. and Edwards, B. C. 2018. *An R Companion to Political Analysis*. Thousand Oaks, CA: CQ Press.

# REFERENCES

---

Roper Public Affairs. 2006. National Geographic-Roper Public Affairs: 2006 Geographic Literacy Study. New York: GfK NOP.

Schreyer, C. 2016. Taku River Tlingit Genres of Place as Performatives of Stewardship. *Journal of Linguistic Anthropology*. 26 (1): 4-25.

Singleton, R. A. and Straits, B. C. 2005. *Approaches to Social Research*. Oxford: Oxford University Press.

Sperandei, S. 2014. Understanding logistic regression analysis. *Biochemia Medica*. 24 (1): 12–8.

Thornton, T. 1997. Anthropological Studies of Native American Place Naming. *American Indian Quarterly*. 21 (2): 209-228.

Tucker, B. and Rose-Redwood, R. 2015. Decolonizing the map? Toponymic politics and the rescaling of the Salish Sea. *The Canadian Geographer*. 59 (2): 194-206.

Turner, S. and Leydon, J. 2012. Improving Geographic Literacy among First-Year Undergraduate Students: Testing the Effectiveness of Online Quizzes. *Journal of Geography*. 111: 54-66.

Wartman, F. M. and Purves, R. S. 2018. Investigating sense of place as a cultural ecosystem service in different landscapes through the lens of language. *Landscape and Urban Planning*. 175: 169-183.

Webber, B. 2018. How the Salish Sea got its name [website, hosted by The SeaDoc Society]. Available at: <https://www.seadocsociety.org/how-the-salish-sea-got-its-name>. Accessed April 1, 2019.

Yung, L., Freimund, W. A., and Belsky, J. M. 2003. The Politics of Place: Understanding Meaning, Common Ground, and Political Difference on the Rocky Mountain Front. *Forest Science*. 49 (6): 855-866.



# APPENDIX A.

## Survey Questions

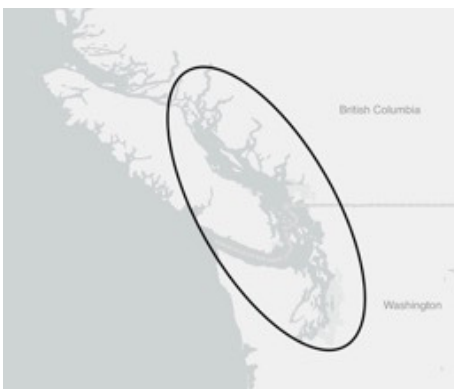
---

### **Demographic Questions (all closed-ended):**

1. Age (years, in age-based groups, e.g.: 18-19, 20-24)
2. Sex (M/F/Other, please explain)
3. Ethnicity/Race (WA) or Ethnic/Cultural Origins (BC) (census categories)
4. State (WA) or Province of Residence (BC)
5. Length of Residence (years, in groups, e.g.: 11-30 years)
6. Level of Education (merged US and Canada census categories)
7. Regional District (BC) or County (WA) of Residence

### **Survey Questions (all closed-ended with the exception of #5):**

1. Which of the following names best describes the body of water that is located between Olympia, Washington in the south to the Campbell River (on Vancouver Island), British Columbia in the north, and west to Neah Bay (on the Olympic Peninsula) and includes the large cities of Seattle and Vancouver to the east? Choose the best response below:  
Responses: Georgia Basin, Pacific Ocean, Puget Sound, Salish Sea, I don't know
2. Which of the following descriptions best defines the body of water outlined in the previous question (Question #1)? Choose the best response below:  
Responses: A large fresh water lake, A large inland salt water sea, A large artificial reservoir, The ocean, I don't know
3. Identify the outlined body of water on the map [map was larger on actual survey].



Choose the best response below:

Responses: Georgia Basin, Pacific Ocean, Puget Sound, Salish Sea, I don't know

4. Prior to this survey, had you ever heard of the Salish Sea?

Responses: Yes, No, I don't know

5. In your own words, what does the Salish Sea mean to you?

Responses: open-ended response; not for analysis

# APPENDIX B.

## Survey Research Statement

---

### **Survey Research Statement and Introduction:**

Greetings! The SeaDoc Society, a program of the UC Davis School of Veterinary Medicine, invites you to participate in this short survey. The survey is being conducted by the Department of Fisheries and Wildlife at Oregon State University.

The survey focuses on British Columbia and Washington residents' knowledge of regional place names and geography. The survey consists of place name and geography questions and demographic questions. The survey should take approximately 5-10 minutes to complete.

All responses will be recorded anonymously. Due to the content and focus of this survey, you will only be permitted to respond to each question one time. You will also not have the ability to return to a previous question and/or response. As place names and geographic knowledge vary, we recognize that there may be more than one applicable response and that some responses may not reflect all potential names or locations, particularly at the local level. Please select the best available responses.

For more information and/or if you have any questions, please contact Dr. David J. Trimbach at [david.trimbach@oregonstate.edu](mailto:david.trimbach@oregonstate.edu). If you have any questions in connection with the protection of your personal data, please contact Oregon State University's Human Research Protection Program (HRPP) and Institution Board Review (IRB) at: [irb@oregonstate.edu](mailto:irb@oregonstate.edu).

# APPENDIX C.

## Additional Survey Information

---

### **Project Limitations:**

While the results of this project offer insights into WA and BC residents' geographic literacy, the project does have limitations. Noted limitations include: (1) the reliance on one method and approach; (2) reliance on a web-hosted survey that is subject to change; (3) inability for comparison to similar surveys; (4) recognition that more than one place name may be "valid" or "correct" given distinct local toponyms and the multiscalarity of place name application (e.g.: Salish Sea, Puget Sound, Commencement Bay); (5) emphasis on place of residence; (6) emphasis on categorical variables; (7) emphasis on sex and age strata via stratified sampling; and (8) reliance on only one language option for survey participants. Some limitations could be addressed in future survey iterations.

### **Additional Survey Information:**

An a priori power analysis tends to include 4 components: (1) alpha; (2) power; (3) n; and (4) effect size. Initial (a priori) effect size for this project was not feasible as no similar, comparable, or directly connected study, to the author's knowledge, had been conducted. This limited the ability to conduct a power analysis at that time. As noted, based on the author's knowledge, this is the first study of its kind to focus solely on bodies of water. This is a limitation, as comparable research stems from outside this context and region.

# APPENDIX D.

## Complete Demographic Profile (BC and WA)

---

This appendix outlines the demographic profiles of BC and WA respondents. Percentages are not rounded in this section for specificity. While sex and age were solicited as stratified sampling strata and are fairly representative of the population at large, it should be noted that equitable representation for all potential demographic attributes was not possible due to project foci and limitations, particularly as this project focuses primarily on place of residence. Differences in how US and Canadian censuses operationalize and measure demographics also contributed to excluding specific attributes in the analysis. Additionally, while there may be more (near-)representative samples for specific characteristics or groups, including for some ethnic/racial (US) and origin (Canada) groups, some groups are underrepresented, notably those of Asian origins (Canada) and Hispanic or Latino persons (US). Targeted oversampling of those groups may be necessary in the future if those are demographics of interest or pertinence. Some demographics could be analyzed further. Associations (Pearson chi-square), effect sizes (Cramer's V), and multinomial logistic regression (MLR) findings are outlined in summarized form in Appendix E.

### British Columbia

#### Sex (n=1209)

Female: 51.9%

Male: 47.9%

Other: <1%

#### Age (n=1209)

18-19: 1.7%

20-24: 7.9%

25-29: 8.3%

30-34: 7.9%

35-39: 8%

40-44: 8.9%

45-49: 10%

50-54: 10.2%

55-59: 9.3%

60-64: 8.4%

### Washington

#### Sex (n=1196)

Female: 49.2%

Male: 50.6%

Other: <1%

#### Age (n=1196)

18-19: 3.6%

20-24: 8.7%

25-29: 9.7%

30-34: 8.9%

35-39: 9.0%

40-44: 9.1%

45-49: 9.7%

50-54: 9.8%

55-59: 8.9%

60-64: 8.5%



# APPENDIX D.

---

## British Columbia

### Age continued (n=1209)

65-69: 9.2%  
70-74: 5.5%  
75-79: 3.1%  
80-84: 1.1%  
85-89: <1%  
90-94: 0%  
95-99: <1%

### Length of Residence (n=1209)

10 years or less: 23.5%  
11-30 years: 30.7%  
31-60 years: 35.3%  
61 or more years: 10.5%

### Ethnic or Cultural Origins (n=1209)

African: <1%  
Asian: 19.8%  
Caribbean: <1%  
European: 56.2%  
Latin, Central, or South American: 1.4%  
North American Aboriginal: 3.6%  
Oceania: <1%  
Other North American: 9.6%  
Other: 7.8%

## Washington

### Age continued (n=1196)

65-69: 5.4%  
70-74: 4.7%  
75-79: 2.8%  
80-84: 1%  
85-89: <1%  
90-94: 0%  
95-99: 0%

### Length of Residence (n=1196)

10 years or less: 31.5%  
11-30 years: 37.5%  
31-60 years: 25.2%  
61 or more years: 5.8%

### Ethnicity and Race (n=1196)

American Indian and Alaska Native: 1.6%  
Asian: 7.4%  
Black or African American: 3.1%  
Hispanic or Latino: 5%  
Native Hawaiian/Other Pacific Islander: <1%  
Other: 1%  
Two or More Races: 3.4%  
White: 77.6%

# APPENDIX D.

---

## British Columbia

### Level of Education (n=1209)

None: <1%  
Less than high school: <1%  
Some high school: 3.9%  
High school graduate: 18.4%  
Vocational training: 9.4%  
Some college, no degree: 20.3%  
Associate's degree: 8.3%  
Bachelor's degree: 26.5%  
Master's degree: 6.5%  
Professional degree: 2.8%  
Doctoral degree: 1.5%  
Other: 1.2%

### BC Regional District (n=1209)

Alberni-Clayoquot: 1.4%  
Bulkley-Nechako: <1%  
Capital: 6.9%  
Cariboo: 2.6%  
Central Coast: <1%  
Central Kootenay: <1%  
Central Okanagan: 5.5%  
Columbia-Shuswap: 1.3%  
Comox Valley: 1.9%  
Cowichan Valley: 1.9%  
East Kootenay: <1%  
Fraser-Fort George: <1%  
Fraser Valley: 11.7%  
Greater Vancouver: 43.8%  
Kitimat-Stikine: <1%  
Kootenay Boundary: 1.5%

## Washington

### Level of Education (n=1196)

None: <1%  
Less than high school: <1%  
Some high school: 3.3%  
High school graduate: 14.2%  
Vocational training: 4.1%  
Some college, no degree: 23.2%  
Associate's degree: 10.7%  
Bachelor's degree: 28.3%  
Master's degree: 11.1%  
Professional degree: 1.8%  
Doctoral degree: 2%  
Other: <1%

### WA County (n=1196)

Adams: <1%  
Asotin: <1%  
Benton: 2.5%  
Chelan: 1%  
Clallam: <1%  
Clark: 9.4%  
Columbia: <1%  
Cowlitz: 1.4%  
Douglas: <1%  
Ferry: <1%  
Franklin: <1%  
Garfield: <1%  
Grant: 1.3%  
Grays Harbor: 1.7%  
Island: <1%  
Jefferson: <1%

# APPENDIX D.

---

## **BC Regional District cont. (n=1209)**

Mount Waddington: <1%  
Nanaimo: 5.1%  
North Okanagan: 2.3%  
Northern Rockies: <1%  
Okanagan-Similkameen: 4.8%  
Peace River: <1%  
Powell River: <1%  
Skeena-Queen Charlotte: <1%  
Squamish-Lillooet: <1%  
Stikine: 0%  
Strathcona: <1%  
Sunshine Coast: 1.1%  
Thompson-Nicola: 2.3%

## **WA County continued (n=1196)**

King: 24.6%  
Kitsap: 4.3%  
Kittitas: <1%  
Klickitat: <1%  
Lewis: 1.8%  
Lincoln: 0%  
Mason: <1%  
Okanogan: <1%  
Pacific: <1%  
Pend Oreille: <1%  
Pierce: 11.7%  
San Juan: <1%  
Skagit: 1.2%  
Skamania: <1%  
Snohomish: 9.4%  
Spokane: 9.7%  
Stevens: <1%  
Thurston: 4%  
Wahkiakum: 0%  
Walla Walla: <1%  
Whatcom: 3.2%  
Whitman: <1%  
Yakima: 3.3%

# APPENDIX E.

## Additional Findings: Other Associations

---

Although place of residence is the primary focus of this project, associations were also addressed using Pearson chi-square ( $\chi^2$ ) and corresponding effect sizes ( $V$ ) for each question in relation to specific shared demographics, including: sex, age, level of education, and length of residence. Only a brief summary is included in this appendix for additional non-place-based insights. Overall, all 4 demographics (sex, age, education, length of residence) are associated with question responses (geographic literacy in relation to the Salish Sea) with variations in effect sizes (negligible-moderate). Comparatively, place of residence also appears to have the strongest significant association with geographic literacy and place name responses.

**Sex:** Sex is significantly associated (Q1-Q3:  $p < .001$ ; Q4:  $p < .05$ ) with responses to Q1-Q4 with weak effect sizes (negligible-weak), illustrating that females and males have different response patterns and geographic literacy when it comes to the Salish Sea, but these associations are weak. Males appear to be more geographically literate. This association between sex and geographic literacy has been noted in previous research (Bascom 2011; Roper Public Affairs 2006).

**Age:** Age is also significantly associated (Q1-Q4:  $p < .001$ ) with responses to Q1-Q4, although with moderate effect sizes, illustrating that responses to Q1-Q4 are associated to some degree with age. While there is variation, older respondents appear to be more geographically literate. This is particularly interesting as geographic literacy studies tend to focus on high school and/or college-aged populations (Bascom 2011; Turner and Leydon 2012), while this study encompasses a wider adult-age range.

**Level of Education:** Level of education is associated (Q1-Q4:  $p < .001$ ) with responses to Q1-Q4 with weak-moderate effect sizes, illustrating that responses to Q1-Q4 are associated to some degree with level of education, including informal and formal geographic education (Kozak et al. 2015). While there is variation, respondents with more education appear to be more geographically literate. This partly supports other findings related to geographic knowledge and literacy (Roper Public Affairs 2006).

**Length of Residence:** Length of residence is significantly associated with responses to Q1-Q4 (Q1-Q4:  $p < .001$ ) with weak-moderate effect sizes, illustrating that length of residence (in years) is associated with response patterns and geographic literacy when it comes to the Salish Sea. Long-term residents (in years) appear to be more geographically literate.

# APPENDIX E.

## Additional Findings: "Salish Sea" Respondents

Residents' responses reflected that most were unfamiliar with the Salish Sea (Q4). Residents were highly unlikely to respond with "Salish Sea" to questions soliciting place name identification (Q1), geospatial recognition (Q3), or "Yes" to the question gauging familiarity (Q4). While most respondents did not illustrate a shared geographic knowledge of the inland sea, a minority did. Just who were those respondents and what were their specific demographics? The "Salish Sea" respondents' demographics are outlined below and on the following page. The "Salish Sea" respondent results are rounded.

Overall, "Salish Sea" respondents included: (1) more BC than WA residents; (2) more male than female respondents; (3) varying ages, although 40-79 had the highest percentage of responses; (4) varying residency lengths, although 31-60 years had the highest percentage of responses; (5) and of varying levels of education, although respondents with Bachelor's degrees had the highest percentage of responses. These patterns are partly reflected in and support the already noted summarized results on the previous page of Appendix E.

### **Name that Place (Q1) (n=222)**

#### **Place of Residence**

WA: 26%

BC: 74%

#### **Sex**

Female: 37%

Male: 63%

Other: 0%

#### **Age (years)**

18-39: 25%

40-59: 31%

60-79: 40%

80 and older: 4%

#### **Length of Residence (years)**

10 or less: 20%

11-30: 28%

31-60: 38%

### **Length of Residence continued (years)**

61 or more: 14%

#### **Level of Education**

High school graduate or less: 12%

Some college, no degree: 24%

Associate's degree: 10%

Bachelor's degree: 28%

Master's degree or more: 17%

Other: 9%

### **Visualize that Place (Q3) (n=290)**

#### **Place of Residence**

WA: 38%

BC: 62%

#### **Sex**

Female: 40%

Male: 60%

Other: 0%

# APPENDIX E.

---

## Visualize that Place (Q3) (n=290)

### Age (years)

18-39: 29%  
40-59: 30%  
60-79: 38%  
80 and older: 3%

### Length of Residence (years)

10 or less: 19%  
11-30: 32%  
31-60: 36%  
61 or more: 13%

### Level of Education

High school graduate or less: 14%  
Some college, no degree: 20%  
Associate's degree: 8%  
Bachelor's degree: 34%  
Master's degree or more: 18%  
Other: 6%

## Recognize that Place (Q4) (n=962)

### Place of Residence

WA: 40%  
BC: 60%

### Sex

Female: 48%  
Male: 52%

## Recognize that Place (Q4) (n=962)

### Age (years)

18-39: 31%  
40-59: 36%  
60-79: 31%  
80 and older: 2%

### Length of Residence (years)

10 or less: 22%  
11-30: 32%  
31-60: 35%  
61 or more: 11%

### Education

High school graduate or less: 15%  
Some college, no degree: 21%  
Associate's degree: 9%  
Bachelor's degree: 30%  
Master's degree or more: 17%  
Other: 8%

# APPENDIX E.

## Additional Findings: Multinomial Logistic Regression

---

Building upon the place of residence-focused Pearson chi-square ( $\chi^2$ ) and corresponding effect sizes ( $V$ ), multinomial logistic regression (MLR) was also conducted to better understand what demographic factors (independent variables: place of residence, sex, age, level of education, and length of residence) may predict a particular outcome or response (dependent variable: question response associated with geographic literacy, with an emphasis on the Salish Sea). For example, whether or not a WA resident or a participant with a Bachelor's degree responds with "Salish Sea" or "Puget Sound" to a particular question. Hyun and Ditton (2006) note that MLR can identify dependent-independent variable relationships and can be a powerful tool to, "estimate the individual effects," of variables on one another (p. 251). A MLR combining shared demographic factors (place of residence, sex, age, education, and length of residence) was conducted and a summary is provided with an emphasis on place of residence. Given that the overarching focus is on the Salish Sea (regardless of frequencies) and its corresponding characteristics, "Salish Sea" was selected as the reference category for Q1 and Q3 and "I don't know" (due to low response and analysis purposes) as the reference category for Q2 and Q4. These variables were chosen largely for utility purposes as the responses can help foster the most intuitive and natural interpretation of data (Pollock and Edwards 2018; Sperandei 2014). The MLR findings indicate that all demographic factors were predictors for at least one question (e.g.: Q1 or Q2) and/or response (e.g.: "Puget Sound"), with variation (e.g.: specific levels of education or lengths of residence); however, place of residence is the most consistent factor that significantly predicted responses to the geographic literacy questions (Q1-Q4), including the only factor for Q2.

Q1: Place of residence of a respondent significantly predicted whether or not they responded with "Strait of Georgia" or "Salish Sea,"  $b = -3.17$ , Wald  $\chi^2 (1) = 27.52$ ,  $p < .001$ , with an odds ratio of 0.04. Place of residence of a respondent also significantly predicted whether or not they responded with "Puget Sound" or "Salish Sea,"  $b = 2.83$ , Wald  $\chi^2 (1) = 228.60$ ,  $p < .001$ , with an odds ratio of 16.94. Place of residence of a respondent did not significantly predict whether or not they responded with the other alternative responses (Strait of Juan de Fuca, Pacific Ocean, and I don't know) to Q1. Other factors that significantly predicted participants' responses included level of education ( $p < .05$ ) and age ( $p < .001$ ); although these varied by question response (e.g.: "Pacific Ocean") and demographic subgroup (e.g.: high school graduate).

# APPENDIX E.

## Additional Findings: Multinomial Logistic Regression

---

Q2: Place of residence of a respondent significantly predicted whether or not they responded with "The ocean" or "I don't know,"  $b = -0.80$ , Wald  $\chi^2 (1) = 23.16$ ,  $p < .001$ , with an odds ratio of 0.45. Place of residence of a respondent also significantly predicted whether or not they responded with "A large inland saltwater sea" or "I don't know,"  $b = 0.75$ , Wald  $\chi^2 (1) = 20.15$ ,  $p < .001$ , with an odds ratio of 2.12. Place of residence of a respondent did not significantly predict whether or not they responded with the other alternative responses (A freshwater lake and A large artificial reservoir) or "I don't know" to Q2. No other shared demographic factors were determined to be significant predictors of participants' responses for Q2.

Q3: Place of residence of a respondent significantly predicted whether or not they responded with all place name responses (e.g.: "Pacific Ocean") or the "Salish Sea." Place of residence of a respondent did not predict whether or not they responded with "I don't know" or the "Salish Sea." A respondent's place of residence significantly predicted whether or not they responded with the "Strait of Georgia" or "Salish Sea,"  $b = -2.02$ , Wald  $\chi^2 (1) = 79.78$ ,  $p < .001$ , with an odds ratio of 0.13. Place of residence of a respondent also significantly predicted whether or not they responded with "Puget Sound" or "Salish Sea,"  $b = 2.43$ , Wald  $\chi^2 (1) = 211.64$ ,  $p < .001$ , with an odds ratio of 11.37. Place of residence of a respondent also significantly predicted whether or not they responded with "Strait of Juan de Fuca" or "Salish Sea,"  $b = 0.65$ , Wald  $\chi^2 (1) = 14.37$ ,  $p < .001$ , with an odds ratio of 1.91. Place of residence of a respondent also significantly predicted whether or not they responded with the "Pacific Ocean" or "Salish Sea,"  $b = -0.48$ , Wald  $\chi^2 (1) = 5.12$ ,  $p < .05$ , with an odds ratio of 0.62. Other factors that significantly predicted participants' responses included level of education ( $p < .05$ ), sex ( $p < .001$ ), and length of residence ( $p < .05$ ,  $p < .01$ ); although these varied by question response (e.g.: "Pacific Ocean") and subgroup (e.g.: 10 years or less).

Q4: Place of residence of a respondent significantly predicted whether or not they responded with "Yes" or "I don't know,"  $b = -0.46$ , Wald  $\chi^2 (1) = 6.08$ ,  $p < .05$  with an odds ratio of 0.63. Place of residence of a respondent did not significantly predict whether or not they responded with "No" or "I don't know." Length of residence of a respondent was the only other significant factor for Q4 and significantly predicted whether or not they responded with "No" or "I don't know," but solely for 10 years or less and 11-30 years ( $p < .05$ ).



# ACKNOWLEDGMENTS

---

The author of this report would first like to acknowledge all of the indigenous peoples who have lived with and along the inland sea, referred to as *Whulj*, *Sqelateses*, and now formally the Salish Sea, since time immemorial. This ecologically rich region consists of indigenous lands and waters, whose place names, meanings, and human relationships have been challenged by those of colonial settler societies and cartographies.

The author of this report would also like to express sincere gratitude to Dr. Kelly Biedenweg and Dr. Sharmodeep Bhattacharyya at Oregon State University, Dr. Joe Gaydos at The SeaDoc Society, and Qualtrics staff for their collective support of this project.