**The Evergreen State College**

**Graduate Program on the Environment**

### Thesis Prospectus

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**STUDENT AGREEMENT:**

**SIGNATURE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**FACULTY READER APPROVAL:**

**SIGNATURE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**MES DIRECTOR APPROVAL:**

**SIGNATURE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **Provide the working title of your thesis[[1]](#endnote-1).**

North Puget Sound gray whale (*Eschrichtius robustus*) habitat dispersal patterns in relationship to vessel traffic during the COVID-19 shutdowns

1. **In 250 words or less, summarize the key background information needed to understand your research problem and question.**

Late winter/early spring marks the beginning of the Gray Whale (*Eschrichtius robustus*) migration period from southern California to their summer feeding grounds in Alaska (Calambokidis et al., 2000). North Puget Sound (NPS) gray whales, also known as the Sounders, Puget Sound Regulars, or Saratoga Grays, are a part of the larger Eastern North Pacific gray whale population (Calambokidis et al., 2004). Starting (generally) in March, this dozen or so whales differ from the rest of their group in the way that they diverge from the standard migration route to come inland and feed on ghost shrimp in the tidal flats off Whidbey Island until late June/early July when they continue their swim northward (Calambokidis et al., 2000).

The spring of 2020 can serve as a natural experiment for investigating the relationship between gray whale habitat dispersal to that of vessel traffic in the Northern Puget Sound. The mandatory shut downs in response to the COVID-19 pandemic that took place in March thru May 2020 coincided with the arrival of the “Sounders” gray whales to the Northern Puget Sound ghost shrimp feeding grounds (Calambokidis et al., 2000). This shut-down stopped much of marine vessel traffic almost overnight. This unprecedented event provided a unique opportunity in which to observe the foraging patterns of the North Puget Sound gray whales in response to the suddenly quiet marine environment.

1. **State your research question(s).**

Were habitat ranges of the resident Gray Whales (also known as the Sounders) in Puget Sound affected in a measurable way by the sudden, and temporary, reduction in vessel traffic due to the COVID-19 mandatory shutdowns that took place during the months of March through May 2020?

1. **Situate your research problem within the relevant literature. What is the theoretical and/or practical framework of your research problem?**

Theoretical framework:

Increased vessel traffic can have negative impacts on gray whales. Unlike other cetaceans inhabiting Puget Sound, Southern Resident Killer Whales for example, gray whales do not have dorsal fins, bold coloring, nor do they move particularly fast (Calambokidis et al., 2000). We can only speculate that gray whales are harder to spot at the surface of the water by boaters due to their mottled and muted coloring, and lack of dorsal fin (Calambokidis et al., 2004). These natural traits of gray whales make them susceptible to ship strikes. For example, Northern Puget Sound gray whale CRC-22 (also known as Earnhart) was struck by a boat while traveling with two other whales in April of 2017 (Calambokidis et al., 2019).

As the population of Washington State grows, so does the amount of vessel traffic on the water. The relationship between vessel traffic and marine mammals in the Puget Sound has been cited throughout the literature for decades (Sackinger et al., 1988). However, the effects of a quiet and calm environment and its impact on marine inhabitants of Puget Sound has not. Basically, there’s never been a large-scale study covering a time period during which the majority of vessel traffic was stopped. The stay-at-home order by Governor Inslee provided a unique opportunity to study how gray whales may respond to a suddenly vessel free environment (Inslee, 2020).

Practical framework:

Gray whales make one of the longest annual migrations of any whale, second only to the humpback, traveling about 10,000 miles roundtrip from their overwintering grounds in southern California, up the pacific coast to the summer feeding grounds of southern Alaska (Calambokidis et al., 2004). This lengthy migration puts gray whales into contact with recreational and industrial/commerical vessels for much of their migration (Dunham et al., 2001). We need to know whether or not vessel traffic impacts their behavior, and if so by how much, if we hope to adequately protect these populations of migrating whales into the future (Sackinger et al., 1988).

The Eastern North Pacific gray whales (the larger population to which the Sounders belong) was delisted under the federal Endangered Species Act in 1994 (Calambokidis et al., 2000). This success came after decades of commercial whaling decimated populations of gray whales (along with many other cetaceans) in the Pacific Ocean to just two main populations: Eastern and Western North Pacific. The ‘delisting’ of a species is a great accomplishment, as it implies that a population has recovered enough to be deemed sustainable into the future (Sackinger et al., 1988). However, an unusual mortality event (UME) of gray whales took place during 2019-2020 that was responsible for 34 deaths in Washington State waters in 2019, and another 12 in 2020 (Calambokidis et al., 2019). The total number of whales stranded from California to Alaska puts those numbers at 123 deaths in 2018 and 77 deaths in 2019, respectively (Calambokidis et al., 2019).

Preliminary findings of necropsy’s conducted on a small number of the stranded whales found several to be severely emaciated. However, the findings were not consistent for all whales, and the reasons for the UME are still largely unknown (Calambokidis et al., 2019).

Research into whether or not vessel traffic leads to habitat dispersal of gray whales could help answer the larger question of why gray whales are starving (Torres at al., 2018). Should the results of my research find vessel disturbance is a larger problem than was previously identified, additional protections may need to be put in place in the form of changing policies. Conversely, should my findings show little to no correlation between vessel traffic and habitat patterns of the North Puget Sound gray whales, scientists will need to explore other reasons for the deaths. Regardless of the findings, more research into the behavior and overall habitat distribution will be needed as the North Puget Sound gray whales are a much smaller population of the larger Eastern North Pacific population, and thus may respond differently to vessel disturbances (Calambokidis et al., 2015).

1. **Explain the significance of this research problem. Why is this research important? What are the potential contributions of your work? How might your work advance scholarship?**

Marine vessel traffic, and its negative consequences on our marine neighbors—mainly whales—has been a topic hotly debated in Washington State’s natural resource policy agencies for many years (Calambokidis et al., 2000). The creation of the Governor’s Southern Resident Killer Whale Task Force in 2018 reignited many heated debates as to how much vessel traffic disrupts whale behavior. Unfortunately, the conversations reached a standstill and no policy decisions were made regarding how to best control boating traffic in Puget Sound; the economic impacts of reduced vessel traffic had the potential to be extreme.

Fast forward to 2020: COVID-19 has, in essence, thrust us into a large-scale natural experiment. In short, the COVID-19 pandemic has provided researchers with an opportunity to examine the sudden quiet environment that would never have happened otherwise; nothing but an event this extreme could have reduced the traffic from the marine industry AND recreational boaters almost overnight.

This suddenly quieter and less bustling environment provided an excellent chance to investigate how much impact, if any, a heavily trafficked marine environment can have on its inhabitants.

This inquiry can have ramifications for policy decisions made for Washington State waters. Should the data show a statistically significant response in behavior of the whales due to the low boat traffic levels the results could set the stage for marine protected areas, reduction in vessel noise hours, or other forms of new policies (Sullivan, 2017). In contrast, should the data show no marked change in behavior due to the low levels of boating activity, scientists could then focus on other reasons for the decline in our resident whale populations (Sullivan, 2017). In either case, this research could prompt further study; however, COVID-19 provided a unique opportunity to study how much of an affect, if any, we humans have on our marine neighbors.

1. **Summarize your study design[[2]](#endnote-2). If applicable, identify the key variables in your study. What is their relationship to each other? For example, which variables are you considering as independent (explanatory) and dependent (response)?**

I plan to study the effect of vessel traffic on North Puget Sound gray whales. The independent variable will be the level vessel traffic in the marine environment, and the dependent variable will be the movements of Gray Whales in and around Puget Sound.

Independent: Number of individual boats in Puget Sound in and around Whidbey Island during spring of 2019

Dependent: Gray Whale habitat distribution in and around Whidbey Island during the spring of 2019

Analysis: Use GIS and Excel to determine if there is any correlation in response of habitat distribution of Gray Whales and vessel traffic during spring of 2019 with the purpose of establishing a baseline to which to compare the 2020 data.

Independent: Number of individual boats in Puget Sound in and around Whidbey Island during spring of 2020 during stay-at-home orders in response to COVID-19 pandemic.

Dependent: Gray Whale habitat distribution in and around Whidbey Island during the spring of 2019 during stay-at-home orders in response to COVID-19 pandemic.

Analysis: Use GIS and Excel to determine if there is any correlation in response of habitat distribution of Gray Whales and vessel traffic between spring of 2019 and spring of 2020.

1. **Describe the data that will be the foundation of your thesis. Will you use existing data, or gather new data (or both)? Describe the process of acquiring or collecting data[[3]](#endnote-3).**

I will be using existing data sets for my thesis; however, I will be pulling them together and using ArcGIS to map and examine them in new ways.

I have been in contact with John Calambokidis from Cascadia Research Collective about the North Puget Sound gray whale data he has been collecting for the past 20 years. I will know by the middle of November if he is willing/able to share the whale location data and activity reports from 2019 and 2020 with me. If so, I’ll use this data to map the sightings from 2019 to create a baseline of habitat distribution in which to compare the 2020 data to.

To acquire and examine the vessel activity data, I will be working with Mike Ruth to establish the most appropriate vessel tracking data set. I will use Boat Watch, Ship Finder, or other similar vessel tracking software to establish baseline vessel traffic in 2019 and compare that to vessel traffic of 2020.

1. **Summarize your methods of data analysis. If applicable, discuss specific techniques that you will use to understand the relationships between variables (e.g., interview coding, cost-benefit analysis, specific statistical analyses, spatial analysis) and the steps and tools (e.g., lab equipment, software) that you will take to complete your analyses.**

The primary method of analysis for my thesis will be spatial analysis. I’ll be using ArcGIS software installed on my personal computer to map the North Puget Sound gray whale data from Cascadia Research Collective. The purpose of this spatial analysis will be to identify potential patterns or high-density distributions for the entire Sounders group that I can visually represent through the use of a heat map, or other appropriate density representation. Additionally, the ArcGIS software will allow me to create a visual representation of fluctuating vessel traffic in Puget Sound. Through mapping the gray whale habitat distribution, and overlaying that data with areas of vessel traffic I’ll be able to identify any potential patterns or correlations between the two data sets.

For the project and methods section, I’ll be analyzing two sets of data over two years. First, I’ll create a baseline of data from which to work with using spring 2019 whale sightings and vessel activity reports. Next, I plan to re-create this analysis with spring 2020 whale sightings and vessel activity to compare for year-over-year patterns or correlations.

Lastly, I plan to create a simple linear regression model in excel to determine statistically significant patterns that may be identified through the specific given timeframe. This analysis would be done with the purpose of comparing the independent variable (vessels) to the dependent variable (number of whales) For example:

|  |  |  |
| --- | --- | --- |
|  | #whales spotted | # vessels present |
| Location #1 |  |  |
| Location #2 |  |  |

1. **Address the ethical issues[[4]](#endnote-4) raised by your thesis work. Include issues such as risks to anyone involved in the research, as well as specific people or groups that might benefit from or be harmed by your thesis work, perhaps depending on your results. List any specific reviews you must complete first (e.g., Human Subjects Review or Animal Use Protocol Form).**

Potential ethical issues arise depending on the findings of my research. For example, should my research results indicate little to no relationship between Gray Whale behavior and vessel traffic—would policies that are in place currently to protect marine mammals from ship strikes and vessel noise be phased out over time? There is already substantial push back from fisheries and other private commercial operations such as whale watching cruises, that the current laws protecting marine mammals are too restrictive as they stand (Scordino et al., 2018). On the other hand, environmentalists and scientists counter that the laws currently in place do not go far enough to protect the mammals.

I will be candid and admit that I like marine mammals and I believe in the policies in place do protect them. I will try to eliminate bias as much as possible in my body of work, however the idea that I could in some small way contribute to a reduction in protections of the marine environment is definitely an ethical dilemma for me.

Obviously, I will benefit from the completion of my thesis—from graduating with a Master’s Degree to someday soon hopefully starting a job in the field of my choosing, I have much invested and at stake in completing this project. Aside from the personal benefits of completing this thesis, the researcher(s) I’m partnering with could potentially benefit from my work as it is their data that I plan on utilizing in my research design.

Currently, there are no specific reviews I will need to complete for my thesis. I am not using human subjects, nor am I planning on collecting data in a way that would require an Animal Use Protocol form.

1. **List specific research permits[[5]](#endnote-5) or permissions you need to obtain before you begin collecting data (e.g. landowner permissions, agency permits).**

There are no specific permits I need to obtain for my research. However, I’m currently waiting for permission to use data from Gray Whale researcher and Cascadia Research founder, John Calambokidis. His data shows the location points of the resident Gray Whale population in Puget Sound over several decades—although for the purpose of my thesis I’m only interested in utilizing the last two years. I expect to hear back from him no later than the end of the quarter as to whether or not I am able to use the data he has collected, and what, if any, restrictions or conditions may apply. As a backup (should I not be given permission to use this specific set of data) I plan to approach and work with Mike Ruth to obtain a publicly available data set instead; most likely in the form of citizen science reports from iNaturalist or similar reporting apps.

1. **Reflect on how your positionality as a researcher could affect your results and how you will account for this in the research process[[6]](#endnote-6).**

I am a volunteer with SR3, a non-profit that often collaborates with Cascadia Research Collective. For example, one of the members of the board of SR3 put me in contact with John Calambokidis—who will ultimately provide the gray whale data for my research. Additionally, I’m employed by a natural resource agency for Washington State that actively funds conservation projects of nearshore habitat areas of Puget Sound. Lastly, I have a lifelong passion and love for the ocean and its inhabitants. For example, I’ve hosted outreach events in response to plastic pollution in the oceans, attended protests in response to what I perceive to be poor management and enforcement of marine policies, and volunteered with wildlife emergency response non-profits. All of this experience is in addition to the fact that I am a white, straight, cis, middle class female residing in affluent Washington State affects how I approach my thesis and how I interact with the data. I have an enormous amount of privilege, and it is my responsibility to use it in the best way I can.

One of the key reasons I chose to do a spatial analysis for my thesis was to eliminate as much bias as possible. Spatial patterns, or lack of, are easy to recognize through the use of features like heatmaps, population density graphics, and other designs in ArcGIS. Additionally, I haven’t collected the data I plan to use for my thesis myself. By using data from another source, I have inadvertently taken steps to eliminate any bias that happens during the collection process—which could affect my analysis from the start. Obviously, some bias is inherent in any piece of work, but I am aware of my privilege and positionality and how it could affect my research. I have taken, and will continue to take steps, in order to minimize my influence on this project.

1. **Provide at least a rough estimate of the costs associated with conducting your research.  Provide details about each budget item so that the breakdown of the final cost is clear.**

As I plan to use secondary data, both of which will be available for free, I expect the cost associated with my research to be minimal. I have been awarded a grant through the CARES act which allowed me to purchase a computer more compatible with ArcGIS software, and additionally afforded me access to Microsoft Office products. The suite of Microsoft Office products will allow me to write, analyze, and store the data needed to complete my thesis. If there are any unforeseen costs, I expect they will be minimal due to the fact that COVID-19 precautions have forced all meetings to be online, and I already own the software needed to do the work and analysis (ArcGIS, word, excel, etc.).

1. **Provide a detailed working outline of your thesis.**
2. Introduction
	1. North Puget Sound gray whale
		1. What makes this subgroup of the Eastern North Pacific gray whales unique
		2. Current research efforts and monitoring
	2. COVID-19 mandatory shut down
		1. Governor Inslee’s stay-at-home executive order
		2. timeline
3. Literature Review
	1. Gray Whales
		1. Species description
		2. Taxonomy and evolution
		3. Distribution and abundance
		4. Life history
		5. Social structure and familial bonds
		6. Behavior
		7. Feeding
	2. Vessel traffic impacts on Puget Sound cetaceans
		1. Ship strikes
		2. Stranding and entanglements
		3. Foraging behavior
		4. Whale watching industry impacts
		5. Other threats
	3. Unusual mortality event 2019-2020
		1. Background
		2. Ongoing research
		3. Results and lessons learned
	4. Review of vessel traffic distribution
		1. What is AIS?
		2. How and why vessel traffic is monitored in Puget Sound
		3. Implications for marine mammal protections
		4. Growing population: implications for marine mammal behavior and distribution
4. Methods
	1. North Puget Sound gray whale data collection 2019 & 2020
	2. Vessel traffic data collection 2019 & 2020
5. Data analysis
	1. Habitat dispersal map of North Puget Sound gray whales for spring 2019 & 2020
	2. Vessel traffic density for spring 2019 & 2020
	3. Density/heat map of areas of gray whale sightings and heavily trafficked areas for vessels
	4. Comparison analysis between variables
6. Results
	1. Review of methods
		1. Data collected by Cascadia Research Collective
		2. Data collected by Boat Watch, Boat Finder, etc.
	2. Year over year analysis of patterns or correlations
7. Discussion
	1. Summary of findings
	2. Challenges or lessons learned
	3. Significance of findings
	4. Future research
8. Conclusion
	1. Correlation vs. causation
	2. Significance of COVID-19 shut downs for future research endeavors.

 Acknowledgements

Bibliography

Appendices

1. **Provide a specific work plan and a timeline for each of the major tasks in the work plan. Be as realistic as you can, even though you will probably need to alter this schedule as you complete the tasks. Remember that faculty readers take time to return your drafts and that the final polishing and formatting of your thesis for binding will take longer than you ever imagined.**

 October 2020:

* Draft thesis prospectus due
* Request for reader
* Begin literature review
* Continue to refine thesis prospectus

 November 2020:

* Continue literature review
* Continue revisions for thesis prospectus

 December 2020:

* Final thesis prospectus due
* Poster session (?) due
* Thesis to MES director for approval
* Continue literature review over winter break

 January 2021:

* Edit literature review
* Begin methods
* Begin introduction
* Begin analysis

 February 2021:

* Revise methods
* Revise analysis

 March 2021:

* Finish analysis
* Edit literature review & methods
* Begin discussion section & conclusion
* Attach various maps and appendices

 April 2021:

* Edit, edit, edit!
* Formatting
* Draft thesis to reader

 May 2021:

* Format thesis
* Thesis presentations
* Final thesis to reader
1. **Who, beyond your MES faculty reader, will support your thesis? Indicate support both within and outside of Evergreen. Be specific about who they are and in what capacity they will support your thesis. If you are working with an outside agency or expert, be specific about their expectations for your data analysis or publication of results.**

In addition to my MES faculty reader, I will be working most closely with Mike Ruth for ArcGIS expertise in designing my methods and analysis. Given Mike Ruth’s expertise in GIS and data extrapolation I hope to collaborate with him to ensure my maps accurately show the data I’ve been entrusted with using. While there are no expectations for publication of results, since I am receiving data from John Calambokidis, Cascadia Research Collective, I will be sharing the results of my thesis when finished with him and his agency.

1. **List the 3-5 most important references you have used to identify the specific questions and context of your topic, help with issues of research design and analysis, and/or provide a basis for interpretation. For each annotated reference, explain how your project specifically connects to the source by extending, challenging, or responding to the conclusions, methods, or implications. For any other sources cited in this document provide a complete bibliographic citation.**

Calambokidis, J., Steiger, G. H., Curtice, C., Harrison, J., Ferguson, M. C., Becker, E., DeAngelis, M., & Van Parijs, S. M. (2015). 4. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. Aquatic Mammals, 41(1), 39–53. <https://doi.org/10.1578/AM.41.1.2015.39>

I plan to use the Calambokidis paper to showcase the different policies and governmental levers that exist to protect Cetaceans. While, my research will not rely heavily in this paper I think it’s important to acknowledge that it is widely accepted that human activities can and often do have negative impacts on our marine neighbors.

This paper will be useful to showcase some of the ways in which people can attempt to mitigate their effects on Cetaceans. In addition to this paper I hope to find others that will speak about, in a general introductory sense, the purpose of BIA’s, Marine Protected Areas, and other types of marine preserves.

Should my research find that there is a direct correlation between Gray Whale behavior and vessel noise, the creation and management of Biologically Important Areas could serve as a type of solution for conservation in the future. However, should my research find that there is no correlation—it may still be worth mentioning that BIA’s and other marine protected areas exist and the reasoning behind them.

Dunham, J. S., & Duffus, D. A. (2001). Foraging patterns of gray whales in central Clayoquot Sound, British Columbia, Canada. *Marine Ecology Progress Series*, *223*, 299–310. https://doi.org/10.3354/meps223299

The Dunham and Duffus paper will be useful to explore the type of behavior called ‘prey-switching’ in which Gray Whales will seasonally, and sometimes irregularly, change their foraging behaviors, and habitat ranges, to fit the type of prey they are seeking. While this paper is a bit older than some of the others, I would rely on it mostly to showcase this unique behavior and explore some of the various prey items of Gray Whales. The methods and observations in this paper may serve as an interesting foil to any discrepancies I may find analyzing my own sets of data. However, I will mainly draw on the information in this paper to serve as an introduction and background to my own research question.

Sackinger, W. M., Jeffries, M. O., & University of Alaska Fairbanks (Eds.). (1988). Port and ocean engineering under Arctic conditions. Geophysical Institute, University of Alaska Fairbanks.

To be honest I’m going to need to spend a lot more time with the Sackinger et. al paper. However, there is some great information in here in regards to acoustics. While this paper is the oldest I’ve found so far, and the results of the experiments were inconclusive, it will still be worth exploring due to the many descriptions and explanations of sound mechanics used in the experiments. The methods of testing different decibels of sound in different ways to mimic industrial noise is not only interesting, but will provide me with an excellent jumping off point to help my reader (and myself) gain a basic grasp on underwater acoustics and the reasons why they can affect whales.

Sullivan, F. A. (2017). Fine Scale Foraging Behavior of Gray Whales in Relation to Prey Fields and Vessel Disturbance Along the Oregon Coast. Oregon State University.

This is a master’s thesis from a student attending Oregon State University. Although the data collected is off the coast of Oregon, the author is exploring the same questions I am—albeit in a different way. For example, this study is examining if vessel traffic has any measurable effect on Gray Whale foraging behavior or alters what type of prey Gray Whales seek out.

I found the results section of this paper particularly interesting and hope to utilize some of this research in my own thesis. Basically, the researcher found that Gray Whales will tolerate, and in some cases seem completely unaffected by vessel noise and traffic, as long as the prey abundance is high. Basically, they can stand a noisy environment as long as there is enough food available for it to be worth it.

Torres, L. G., Nieukirk, S. L., Lemos, L., & Chandler, T. E. (2018). Drone Up! Quantifying Whale Behavior From a New Perspective Improves Observational Capacity. Frontiers in Marine Science, 5. https://doi.org/10.3389/fmars.2018.00319

Unmanned aerial systems, more commonly referred to as drones, are becoming more popular as a safer, cheaper, and less invasive alternative to monitoring whale behavior from than air—as opposed to the traditional flight or helicopter surveillance. Some of the data I’m expecting to analyze will be from aerial photos of Gray Whales in the Puget Sound. These photos not only identify individuals, but can be used to asses body condition and overall health of an animal. I’m planning to use this paper to showcase how this new method of monitoring can be arguably more effective AND less invasive while also still maintaining accuracy. Knowing this is a newer field of study I thought it worth the time to explain how and why drones are becoming more common in marine monitoring and the type of information they can relay to researchers.

1. You are not locked into this title; its purpose is to help you identify the main point or topic of your thesis at an early stage. [↑](#endnote-ref-1)
2. You might discuss selection of case studies, sampling methods, experimental design, and/or specific hypotheses you will test. You should also address any specialized knowledge or skills that are necessary to complete the research. [↑](#endnote-ref-2)
3. If you are planning to use existing data, explain the specific source, contact information, arrangement with collaborating agencies, and expectations about use of data and final products of your research. If you are planning to gather new data, describe specific methods, time, place, and equipment that will be required. [↑](#endnote-ref-3)
4. If you’re not sure where to start, consult a ‘Code of Ethics’ or other similar document from an academic society in an applicable field of study. [↑](#endnote-ref-4)
5. If you are collecting ANY samples or data, even observational data, on public lands (city, county, state and/or federal) it is your responsibility to find out the permit requirements BEFORE you collect data. Conducting research with tribal members/on tribal lands will have different and additional requirements. [↑](#endnote-ref-5)
6. Your *positionality as a researcher* refers to the fact that one’s “…beliefs, values systems, and moral stances are as fundamentally present and inseparable from the research process as [one]’s physical, virtual, or metaphorical presence when facilitating, participating and/or leading the research project…” (The Weingarten Blog 2017).

Bibliography:

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Dunham, J. S., & Duffus, D. A. (2001). Foraging patterns of gray whales in central Clayoquot Sound, British Columbia, Canada. *Marine Ecology Progress Series*, *223*, 299–310. <https://doi.org/10.3354/meps223299>

Inslee, Jay. (2020). Proclamation by the Governor 20-05. Proclamation 20-05. <https://www.governor.wa.gov/sites/default/files/proclamations/20-05%20Coronavirus%20%28final%29.pdf>

Sackinger, W. M., Jeffries, M. O., & University of Alaska Fairbanks (Eds.). (1988). Port and ocean engineering under Arctic conditions. Geophysical Institute, University of Alaska Fairbanks.

Sullivan, F. A. (2017). Fine Scale Foraging Behavior of Gray Whales in Relation to Prey Fields and Vessel Disturbance Along the Oregon Coast. Oregon State University.

Torres, L. G., Nieukirk, S. L., Lemos, L., & Chandler, T. E. (2018). Drone Up! Quantifying Whale Behavior From a New Perspective Improves Observational Capacity. Frontiers in Marine Science, 5. <https://doi.org/10.3389/fmars.2018.00319> [↑](#endnote-ref-6)