2021 SOUNDWATCH PROGRAM ANNUAL CONTRACT REPORT

Project Title: Soundwatch Public Outreach/Boater Education Project.

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Contract Number: **1305M138DNFFP0011 Tasks C.2.2.2a & C.6.2**

Contract Date: Extension year of multi-year contract: August 30, 2019 - August 31, 2023

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Abstract

The goal of this project was to provide on-the-water stewardship, public outreach and boater education services by The Whale Museum's Soundwatch Boater Education Program during the 2021 killer whale watching season and to provide a data update to the **RA-133F-12-CQ-0057** and **1305M138DNFFP0011.** Soundwatch Public Outreach/Boater Education Project Final Project Report characterizing general trends in vessel-based whale watching activities associated with Southern Resident Killer Whales in the Haro Strait Region of Washington State and Southern Vancouver Island, British Columbia, Canada.

Executive Summary

The goal of the Soundwatch Program is to reduce vessel disturbance to killer whales and other marine wildlife through educating recreational boaters on regional guidelines and regulations, to provide systematic monitoring of vessel activities around all cetaceans within the program area, and to present a data update to the 2020 report on whale watching trends in the Haro Strait region to inform future management strategies. The program area includes the north central Salish Sea: the boundary waters of the Canadian Gulf and San Juan Islands, located in northwestern Washington State and southwestern British Columbia in the Puget Sound/Georgia Basin. The Salish Sea includes Puget Sound and the Straits of Georgia and Juan de Fuca.

The objectives of this 2021 project were to: provide boater education services through public outreach and on-the-water stewardship activities, to monitor vessel activity within 0.5 mile radius of whales, specifically killer whales (*Orcinus orcas)* with a priority to Southern Resident killer whales (SRKWs) from May-September*, collect data on vessel activities, and conduct analysis on vessel activities in the Central Salish Sea around killer whales and other marine wildlife.

SRKWs have been closely monitored for several decades. Their population peaked at 97 whales in the 1990s and then declined to 79 whales in 2001. NMFS listed the Southern Resident killer whale distinct population segment (DPS) as endangered under the ESA on November 18, 2005 (70 FR 69903). As of November 2021, there were 73 Southern Resident killer whales (Center for Whale Research).

In May 2011, the National Oceanic Atmospheric Administration (NOAA) Fisheries implemented new vessel regulations around all killer whales in the inland waters of Washington State. The regulation included two prohibitions: a prohibition on approaching killer whales within 200 yards and a prohibition on positioning a vessel within 400 yards of the path of killer whales. In addition, Washington State updated the Revised Code of Washington (RCW 77.15.740) on SRKWs in 2012 to match the Federal 200 yard and 400 yard in-the-path approach distances for inland waters. In July 2018, Canada passed vessel regulations for killer whale populations in British Columbia and the Pacific Ocean. The new Canadian regulations stated all vessels should operate 200 meters away from all killer whales.

Vessel regulations were again updated at the beginning of the 2019 season with Washington State revising regulations (RCW 77.15.740) to increase vessel approach distances to 300 and 400 yards and requiring vessel to maintain less than 7 knots within a half mile of SRKWs in Washington State waters. This update was put forward as a recommendation by the Orca

Recovery Task Force, which was established by Washington State Governor Jay Inslee in March 2018, and was signed May 8th becoming effective July 28, 2019. Similarly, Canada established Interim Sanctuary Zones (ISZs) and increased vessel approach distances from 200 meters to 400 meters of all killer whales through a Transport Canada interim order effective June 1, 2019 – October 31, 2020. The interim order was renewed for the 2020 season, with a few changes. The ISZs were in effect from June 1, 2020– November 31, 2020, whereas the 400 meter approach distance measure was in place until May 31, 2020, effectively making it a year-round requirement. This order was again renewed in April 2021, with the same time periods for ISZs and the 400 meter approach distance (Transport Canada 2021).

In addition to the Canadian interim order, most commercial whale watching companies signed the "Sustainable Whale Watchers Agreement", permitting authorized companies to approach Bigg's Transient killer whales to 200 meters if they did not approach Southern Resident killer whales.

These actions played a direct role in the education and research efforts of Soundwatch and will be referenced throughout this report.

Washington Department of Fish and Wildlife certified the Commercial Whale Watching License Program (CWWLP) on December 7, 2021. The CWWLP establishes rules for commercial viewing of Southern Resident killer whales and requires commercial whale watching businesses including motorized, sailing, and sea kayak operations to obtain a license in order to conduct operations within the inland waters of Washington State. CWWLP rules permit commercial viewing of Southern Residents during the time periods of 10:00am-12:00pm and 3:00pm-5:00pm from July 1 through September 30 (CITE).

The 2021 Soundwatch data collection consisted of: counts of vessels within one half-mile of any cetacean by type, location and activity ("vessel counts"), cetacean behavior data: identification, number of animals/groups, location, travel direction and behavior states, vessel contact information ("recreational contacts") as well as EcoTour (commercial) and private recreational vessel compliance with voluntary guidelines and/or regulations ("vessel incidents"). A brief summary of whale presence in the Central Salish Sea is given in this report. The entirety of Soundwatch data on cetacean identification, number of animals/groups, location, travel direction and selected behaviors is incorporated into The Whale Museum's long-term Whale Sightings' database. Soundwatch data specific to SRKWs is compiled into the Museum's annual Orca Master NOAA Contract Report. All Soundwatch data is available through The Whale Museum's data sets or upon request. As in 2020, Soundwatch suspended the on-water volunteer program in an effort to reduce unnecessary exposure of the Soundwatch crew to the COVID-19 virus.

Data analyzed for this annual update report reflects data collected by The Whale Museum's Soundwatch Boater Education Program in 2021 and includes vessel incidents, behaviors that are inconsistent with current guideline and regulations, definitions related to the Be Whale Wise guidelines and the U.S. Federal, Washington State and Canadian vessel regulations. This update report depicts general trends in vessel-based whale watching activities associated with SRKWs in the Haro Strait region of Washington State and British Columbia, Canada.

This updated report on the disposition of funds from Contract Number ***RA-133F-12-CQ-0057*** *&* *Amendment* **1305M138DNFFP0011,** ***Tasks*** **C.2.2.2a & C.6.2**, *entitled Soundwatch Public*

Outreach/Boater Education Project, fulfills reporting requirements under the NOAA Administrative Terms and Conditions of the contract.

Note: Included as an additional appendix to this report are copies of the Soundwatch Program 2021 data sets in MS Excel.

Project Goal:

The goal of the Soundwatch Public Outreach/Boater Education Project was to implement The Whale Museum's Soundwatch Boater Education Program during the 2021 whale watching season and provide data analysis updates to the 2020 report on whale watching trends in the Haro Strait region.

Project Objectives:

The objectives of this project were to:

1) Provide boater education services through public outreach and on-the-water stewardship activities during the 2021 whale watch season
2) Collect data on vessel activities during the 2021 whale watch season, especially relative to the 2011 U.S. Federal, 2019 Washington State vessel regulations and 2021 Transport Canada Interim Order
3) Conduct analysis on current whale watch activities including continued evaluation of 2011 U.S. Federal vessel regulations
4) Provide 2021 data updates to the 2020 Soundwatch Public Outreach/Boater Education Project Report

Project Deliverables:

The contract listed several deliverables including:

1305M138DNFFP0011

C.2.2.2a The vendor shall provide a written report summarizing the Soundwatch program activities, patterns of vessel activities around the whales, and compliance with guidelines and regulations. Data will be compiled into an annual data set following standardized protocols to allow for comparison between years which include the following information:

11) Total Vessel Incidents by percentage
12) Annual Vessel Incident Summary by incident and vessel type
13) Top 5 Vessel Incidents by vessel type
14) Geographic distribution of Vessel Incidents

C.6.2 Deliverables: For each task or subtask deliverables shall be provided in the form of reports and data to the NWFSC by 15 February for draft reports and data and final reports and data will be due 1 March of each year of the contract for data collected in the previous year.
RA-133F-12-CQ-0057

Task 6.2A: Conduct estimated 50 days on-the-water education and monitoring activities during the months of May through September 2019.

C.6.2A.1 Deliverables for Soundwatch Education and Monitoring Program. Sub-Task 6.2.1.1: Summary of Soundwatch Activities, Patterns of Vessel Activities Around Whales, and Compliance with Regulations and Guidelines.

1) Whale Watching Trends in the Boundary Waters of Haro Strait May-September in numbers of visitors to Lime Kiln Point and number of active vessels from U.S. and Canada.
2) Growth of Commercial (EcoTour) Whale Watching in the Boundary Waters of Haro Strait May-September in number of vessels.
3) Commercial (EcoTour) Whale Watch Platforms in the Boundary Waters of Haro Strait May-September in numbers of vessels.
4) Average Number of Vessels with killer whales Per Month May-September in numbers of vessels.
5) Annual Average Numbers of Vessels with killer whales at Different Times of Day, May-September in number of vessels.
6) Annual Vessel Type Averages and Maximum Vessel Type Numbers of Vessels.
7) Mean Annual Daily Average of Number of EcoTour (Commercial) and Private recreational boats with Whales in Haro Strait Region May-September with Standard Deviation in number of vessels.
8) Annual Distribution of Vessels within ½ Mile Radius of Whales May-September in percentages.
9) Distribution of EcoTour (Commercial) Whale Watch within ½ Mile Radius of Whales in percentages.
10) Distribution of Private recreational vessels within ½ Mile Radius of Whales in percentages.
11) Total Vessel Incidents by percentage.
12) Annual Vessel Incident Summary by incident and vessel type.
13) Top 5 Vessel Incidents by vessel type.
14) Geographic distribution of Vessel Incidents.

Sub-Task 6.2.1.2: Summary Copy of Vessel Data in Electronic Form.

Task 6.3: Description of vessel activities around Southern Resident killer whales.

C.6.3. A Seasonal and Yearly Trends in Vessel Activities Around Whales.

C.6.3.1 Deliverables for Description of Vessel Activities around Southern Resident killer whales.

Sub-Task 6.3.1.1: Vessel Trends in Proximity to Southern Resident killer whales.

1) Whale Watching Trends in the Boundary Waters of Haro Strait May-September in numbers of visitors to Lime Kiln Point and number of active vessels from U.S. and Canada.
2) Growth of EcoTour (Commercial) Whale Watching in the Boundary Waters of Haro Strait May-September in number of vessels.
3) EcoTour (Commercial) Whale Watch Platforms in the Boundary Waters of Haro Strait by percentage of vessel type.

4) Average Number of Vessels Accompanying killer whales per Month May-September in number of vessels.
5) Annual Average Numbers of Vessels with killer whales at Different Times of Day May-September in number of boats.
6) Annual Vessel Type Averages and Maximum Vessel Type Numbers of Vessels with killer whales in Boundary Waters of Haro Strait May-September in number of vessels and by types of vessels.
7) Mean Annual Daily Average of Number of EcoTour (Commercial) and Private recreational vessels with whales in Haro Strait Region May-September with Standard Deviation in number of boats.
8) Annual Distribution of Vessels within ½ Mile Radius of whales May-September in percentages by vessel type and activity type.
9) Distribution of EcoTour (Commercial) Whale Watch within ½ Mile Radius of whales in percentages.
10) Distribution of Private recreational vessels within ½ Mile Radius of whales in percentages.

Sub-Task 6.3.1.2: Shore-based kayak education and monitoring program.

Methods

Soundwatch Operations

Soundwatch Boater Education Program reduces vessel disturbance to killer whales and other marine wildlife through educating boaters on regional guidelines and regulations as well as providing systematic monitoring of vessel activities around cetaceans. Soundwatch promotes responsible marine stewardship through the development, distribution, implementation, annual evaluation, and adjustment of guidelines and regulations for marine wildlife viewing by residents, visitors, and commercial users. Soundwatch educates boaters on the current guidelines and regulations before they leave the shore; reinforces the learning experience on-the-water where disturbances take place; and provides a scientific platform to collect observational data on vessel activities around cetaceans. Soundwatch data consist of: 1) counts of vessels within 0.8 km (one half mile) of any cetacean by type, location and activity (vessel counts); 2) cetacean identification, location, travel direction and behavior states (cetacean behavior); 3) vessel contact information (vessel contacts); 4) commercial and recreational vessel compliance with voluntary guidelines and/or regulations (vessel incidents); 5) general non-target species (species sightings). Vessel counts and cetacean behavior states are recorded every 30 minutes on the hour and half-hour. In the event that Soundwatch arrives on scene between the hour and half-hour marks, an initial assessment is recorded and data collect resumes as normal on the prescribed hour/half hour marks. Vessel contacts, vessel incidents, and species sightings are recorded as they occur. This annual long-term data is primarily used to help evaluate effectiveness of current regulations and guidelines and to determine need for adjusting regulations and/or guidelines (Seely *et al*. 2017).

The Whale Museum's Soundwatch Boater Education Program has developed standardized procedures for the training of new and seasonal staff with data collection, data entry, and

analysis. Soundwatch data collection procedures are designed to follow protocols using regionally established data parameters for SRKWs. Soundwatch staff and paid seasonal vessel drivers are required to undergo on and off-the-water training using standardized instruction. Training protocol states that vessel drivers observe vessel and cetacean interactions and dictate all data observations to interns and volunteers who record the driver's observations onto data collection forms and help hand off educational materials to recreational boaters. Range finding tools such as laser range finders, electronic radar, and chart plotters as well as high-power binoculars are used to gauge distances. In all cases, drivers are instructed to make conservative estimates when determining distance and recording range encroachment. If an observed vessel's distance to a whale is too difficult to ascertain, the driver did not record it; only vessels observed well within the regulatory or guideline approach distances to whales were recorded as vessel incidents.

Soundwatch has collected data on vessel numbers, types and behaviors around SRKWs since 1998. These findings are provided to the whale watch industry, the public and regional managers. Vessel trend data has been used as the primary data source to inform SRKW recovery strategies in terms of vessel management decisions as well as aided in the creation and/or implementation of San Juan County, Washington State, U.S. and Canadian Federal vessel regulations for killer whales. The annual and long-term data has also been a valuable tool for the training of Soundwatch staff, commercial (EcoTour) vessel and kayak tour operators, and in planning for education and monitoring program efforts.

Summary of Soundwatch Activities

From May – September 2021, Soundwatch operated vessel patrols to educate and monitor boaters under National Marine Fisheries Service (NMFS) research issued permit number 21114. Soundwatch staff and volunteers totaled *124* days of effort, and *99* days on-the-water between May 16 and September 25, 2021, totaling *587* hours of effort on the water traveling *4,453* nautical miles trans-boundary throughout the Salish Sea (Figure 1). Whales were present on *86* days of these days, *48* days (*275* data counts) with Transient (aka Bigg's) killer whales, *16* days (*46* data counts) opportunistically with Humpback whales, *13* days (*91* data counts) directly monitoring Southern Residents, *7* days (*11* data counts) opportunistically with Minke whales, and *2* days (*10* data counts) opportunistically with gray whales. This effort totaled *490.0* hours on scene collecting data with marine mammals averaging *5.69* hours per day of on-the-water effort with whales (Figure 2). There were *8* days in which Soundwatch monitored multiple species of cetaceans. Over the summer seasons (typically May – October) since 1998, Soundwatch has totaled more than *13,670* observational and outreach hours with vessels and whales in the Salish Sea.

Soundwatch crew included: one full-time paid program coordinator, three seasonal part-time vessel drivers/educators and three full-time summer interns. Over the season, *2091* hours of volunteer time were spent participating on Soundwatch vessel patrols, distributing educational materials, vessel maintenance, "Dock Talks", assisting with data entry and photo archiving. Soundwatch staff, the seasonal vessel drivers, and program interns totaled *250* hours of off-the-water outreach and education during "Dock Talk' events. Additional off the water training and a thorough knowledge of all data was required before permitted activities were allowed.

The on-the-water crew operated with a minimum of two and a maximum of four crew members. Equipment utilized in 2021 consisted of a *17'* American Eagle rigid hulled vessel, *R/V Raydiance* and a 19' Safe Boat rigid hulled vessel, *R/V L-98 Luna*, operated as a secondary vessel. Funding for this secondary vessel was provided by the National Fish and Wildlife Foundation's Killer Whale Conservation and Research Grant. Both vessels were fully equipped with safety equipment, VHF radios, and chart plotters. The radar unit on *R/V L-98 Luna* is utilized for accurate distance calculations of vessels and navigation on poor weather condition days. *R/V Raydiance* is not equipped with a radar, but does have a Raymarine GPS unit.

Soundwatch and Washington Department of Fish and Wildlife (WDFW) received a Section 6 ESA Grant that has helped provide funding through June 2022, enabling both programs to maintain vessels and operate on the water on a more consistent basis. Soundwatch received a WDFW Aquatic Lands Enhancement Account (ALEA) Grant to help provide funding through June 2023.

In 2020, the San Juan County Kayak Education Leadership Program (K.E.L.P.) requirement was temporarily lifted due to novel coronavirus COVID-19. EcoTour kayaking suspended operations until after the 2020 season began, at which point they resumed tours using only kayak guides who had previously been educated through K.E.L.P. In 2021, WDFW established the Commercial Whale Watching License Program (CWWLP), which required EcoTour kayak companies to participate in training in order to receive a license to conduct whale watching. The CWWLP rules will be discussed further in the Vessel Activity and Trends Around Whales section.

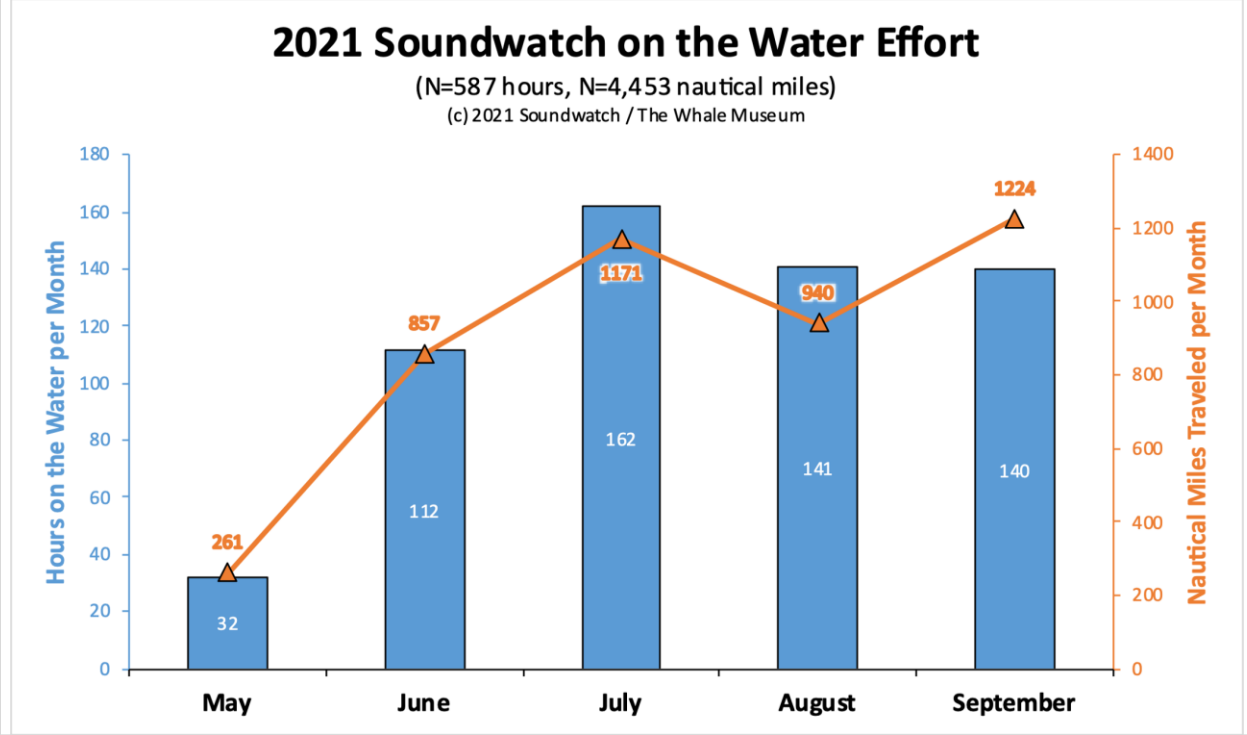

Figure 1: Distribution of Soundwatch vessel hours and miles by month for 2021.

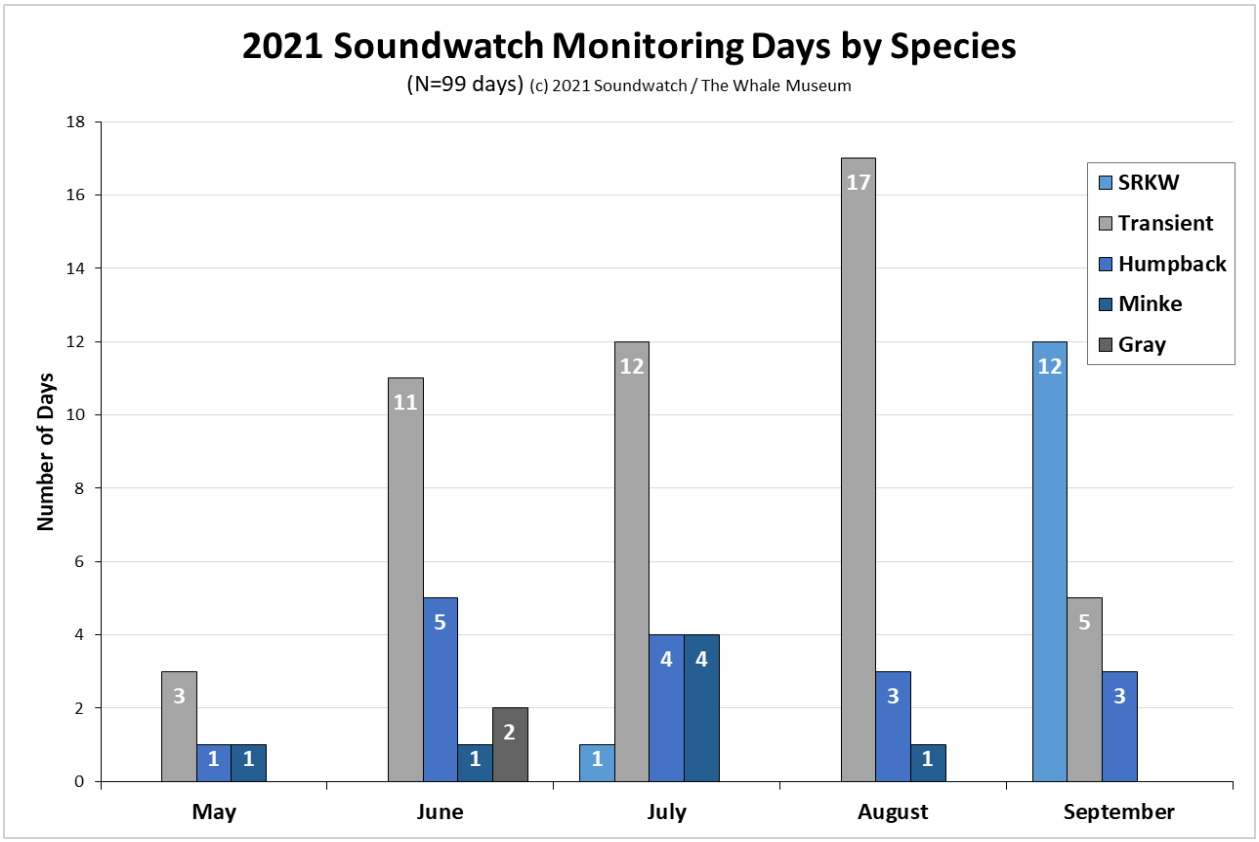

Figure 2: Distribution of Soundwatch monitoring days by species in the summer 2021 season.

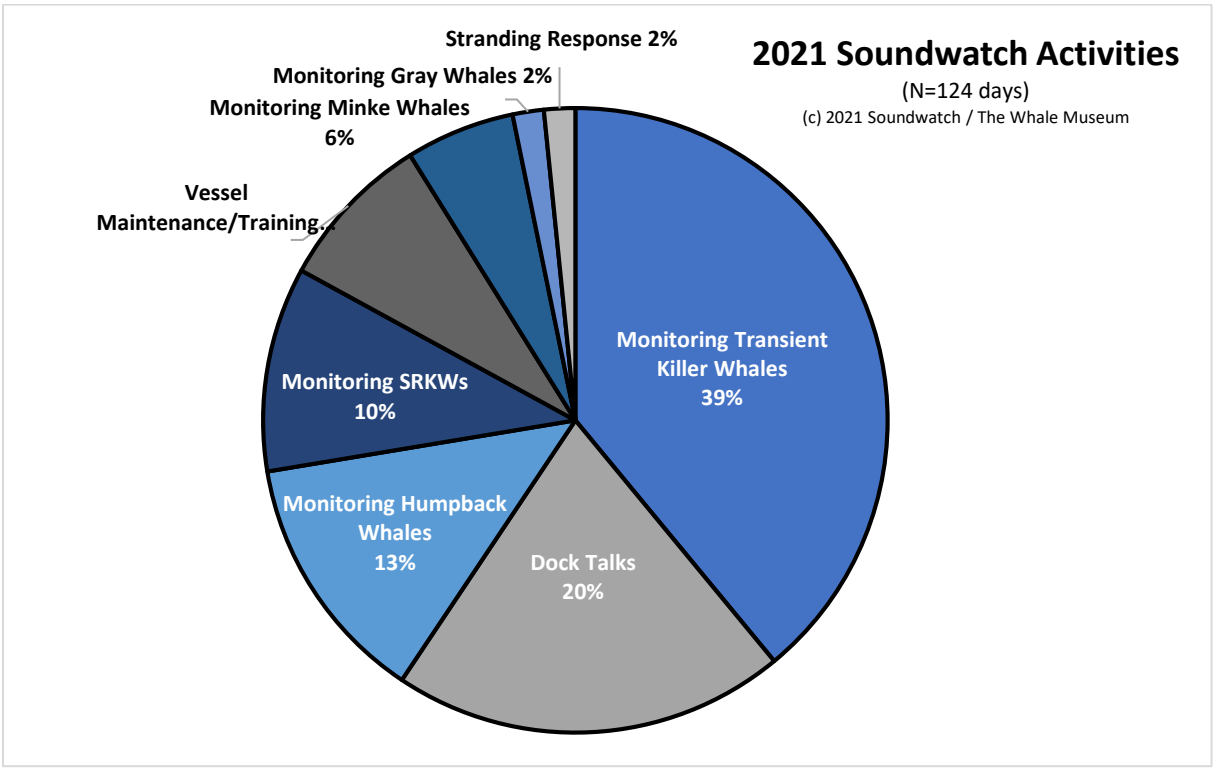

Figure 3: Distribution of Soundwatch activities during the 2021 season.

Whale Watching Trends in the Salish Sea

Soundwatch created a vessel catalog with the number of Eco Tour companies, vessels, trip frequency, and homeports engaged in whale watching activities based from on-the-water observations during the 2021 field season (May – September). On-the-water observations included fishing and overnight charters that were engaged in whale watching, although that may not have been a primary focus of their business. Those companies were placed in either 'occasional' or 'rare' vessel frequency categories. Vessel frequency definitions are: 'active' is greater than one day per week from June-October; 'occasional' is less than one day a week from June-October; and 'rare' is equal to or less than once a month from June-October. For simplicity, all companies that were no longer in operation ('inactive') were not included in total company/vessel counts.

During the 2021 season within Soundwatch's survey region, *29* total EcoTour whale watch companies operated May-September, offering whale watching trips from *29* 'active' whale watch vessels in the U.S. and Canadian Haro Strait region, with *17* 'occasional' vessels and *18* 'rare' vessels for a potential combined total of *64* whale watch vessels operating on-the-water at a given time. Of the active EcoTour companies, *87%* of U.S. companies and *100%* of Canadian companies are listed members of the Pacific Whale Watch Association (PWWA) (Figure 5). Straitwatch recorded 18 active Canadian EcoTour companies (including PWWA and non-PWWA members) for a total of 46 active vessels (Cetus 2022).

There were no observed additions to the whale watch fleet during the 2021 season in terms of new vessels or new companies; however, established whale watch companies that were inactive in 2020 due to COVID-19 resumed operations in 2021, resulting in an increase of total active boats in the fleet (Figure 6b). During 2021, specific whale watch vessels changed ownership but there was no net change in whale watch companies.

Shore-based whale watching areas experienced increasing popularity in past years for a number of reasons, including relative accessibility; land-based whale watching is typically less cost-prohibitive, and whale sighting information has become more easily obtained by the public due to the growth of social media sightings platforms. Visitation to Lime Kiln State Park fell dramatically in the 2020 season, estimating approximately 114,000 visitors compared to 244,000 in 2019. This decline in visitorship was likely a result of COVID-19 restrictions, as non-essential travel was discouraged. During the 2021 season, Lime Kiln visitation numbers increased significantly compared to 2020, although still fewer visitors than 2019 (Figure 6a). Attendance data for Lime Kiln was provided by Washington State Parks Office in Olympia, Washington.

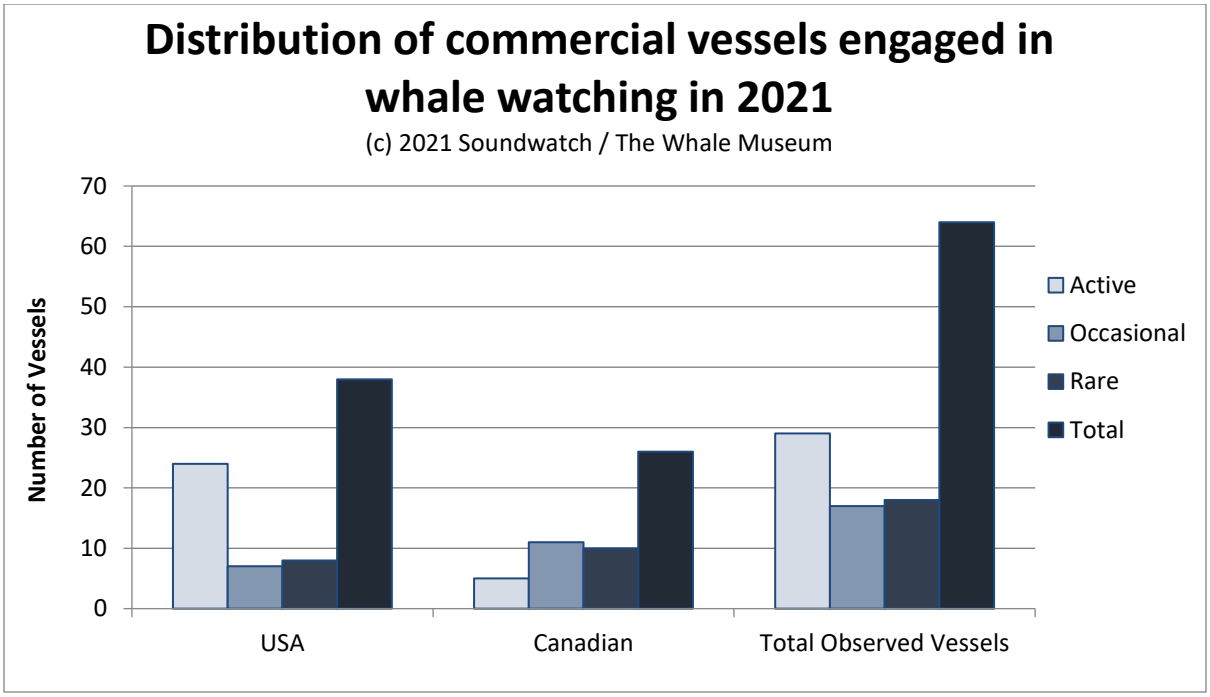

Figure 4: Distribution of total commercial vessels (N=65) engaged in whale watching in 2021.

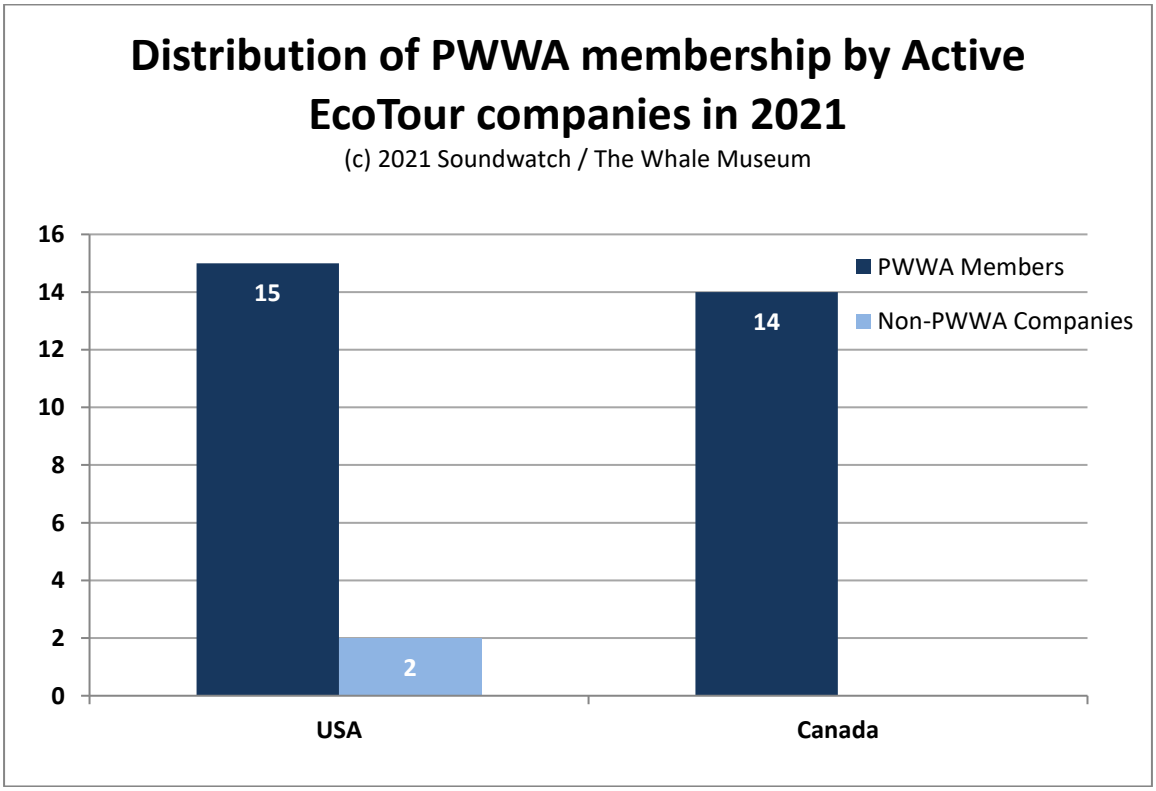

Figure 5: Distribution of active whale watch companies that are also members of the Pacific Whale Watch Association in 2021.

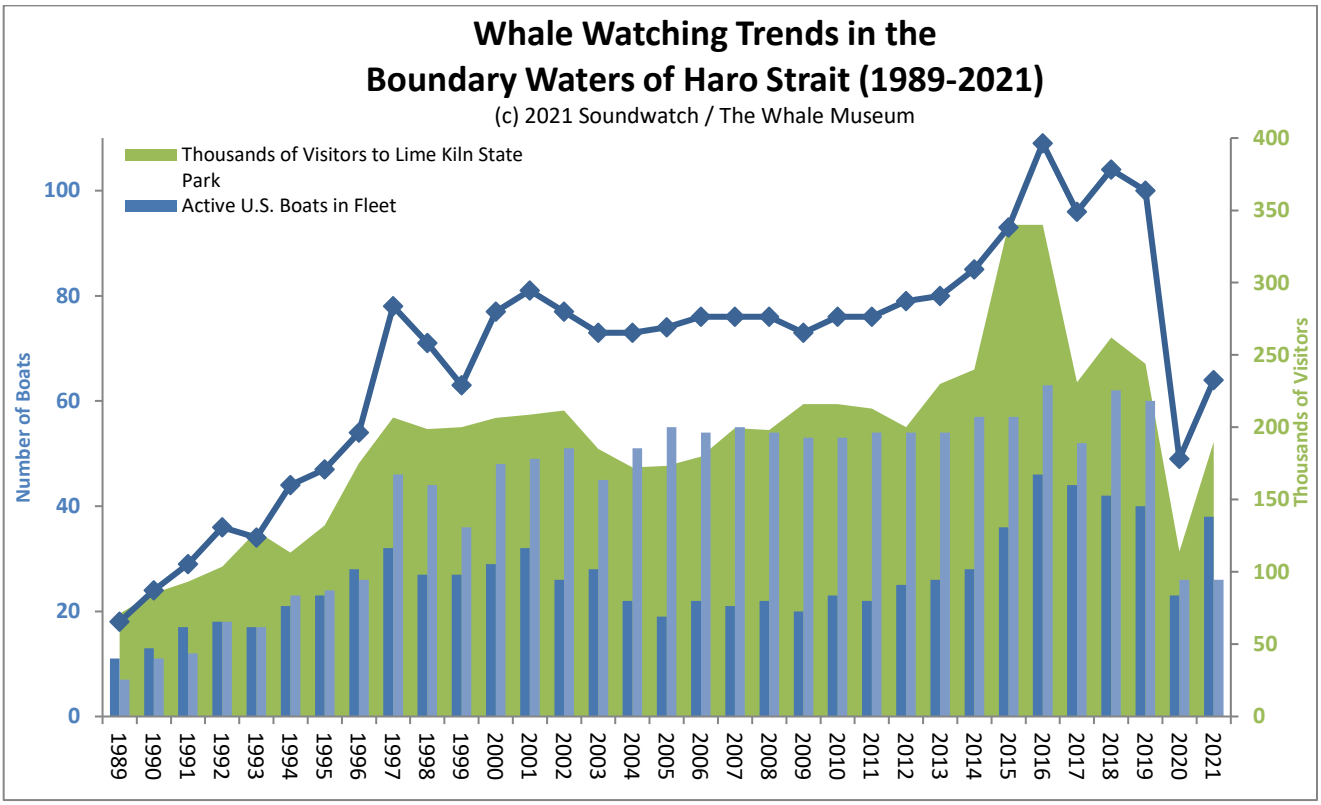

Figure 6a: Whale watching trends in the boundary waters of Haro Strait and Lime Kiln visitation from 1989 to present. Lime Kiln State Park visitation numbers provided by Washington State Parks Department.

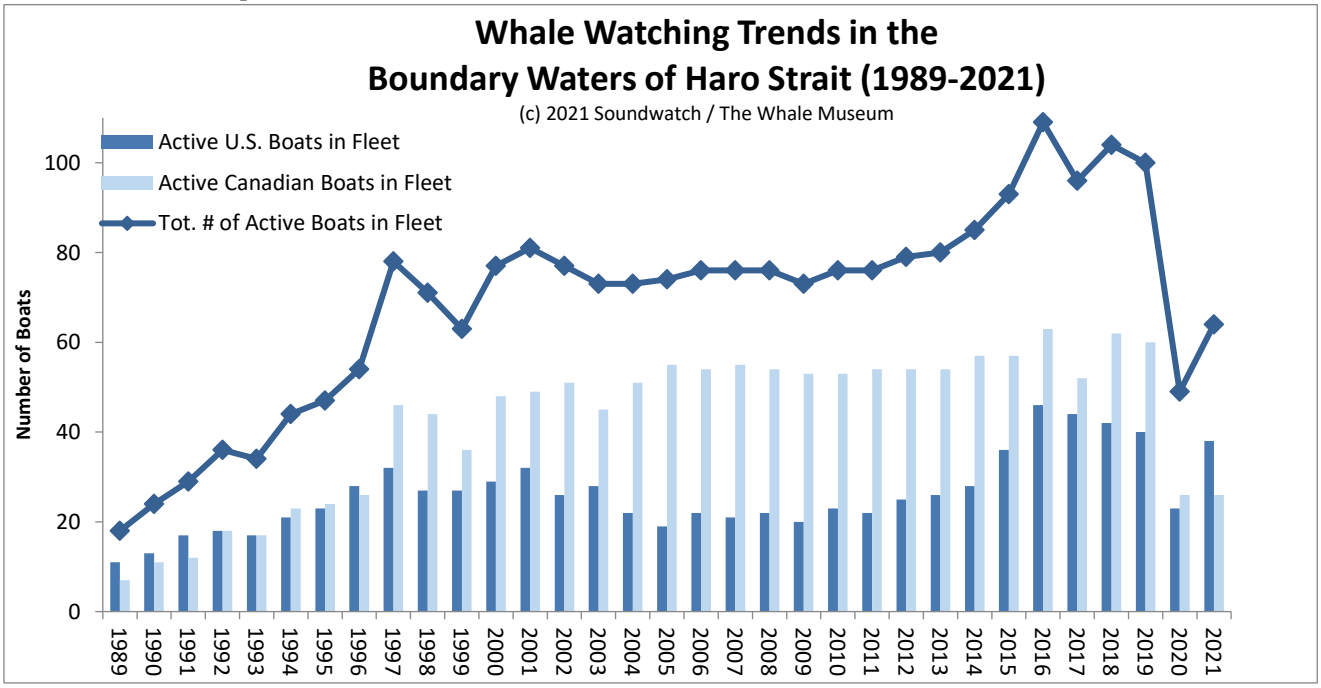

Figure 6b: Whale watching trends in the boundary waters of Haro Strait from 1989 to present.

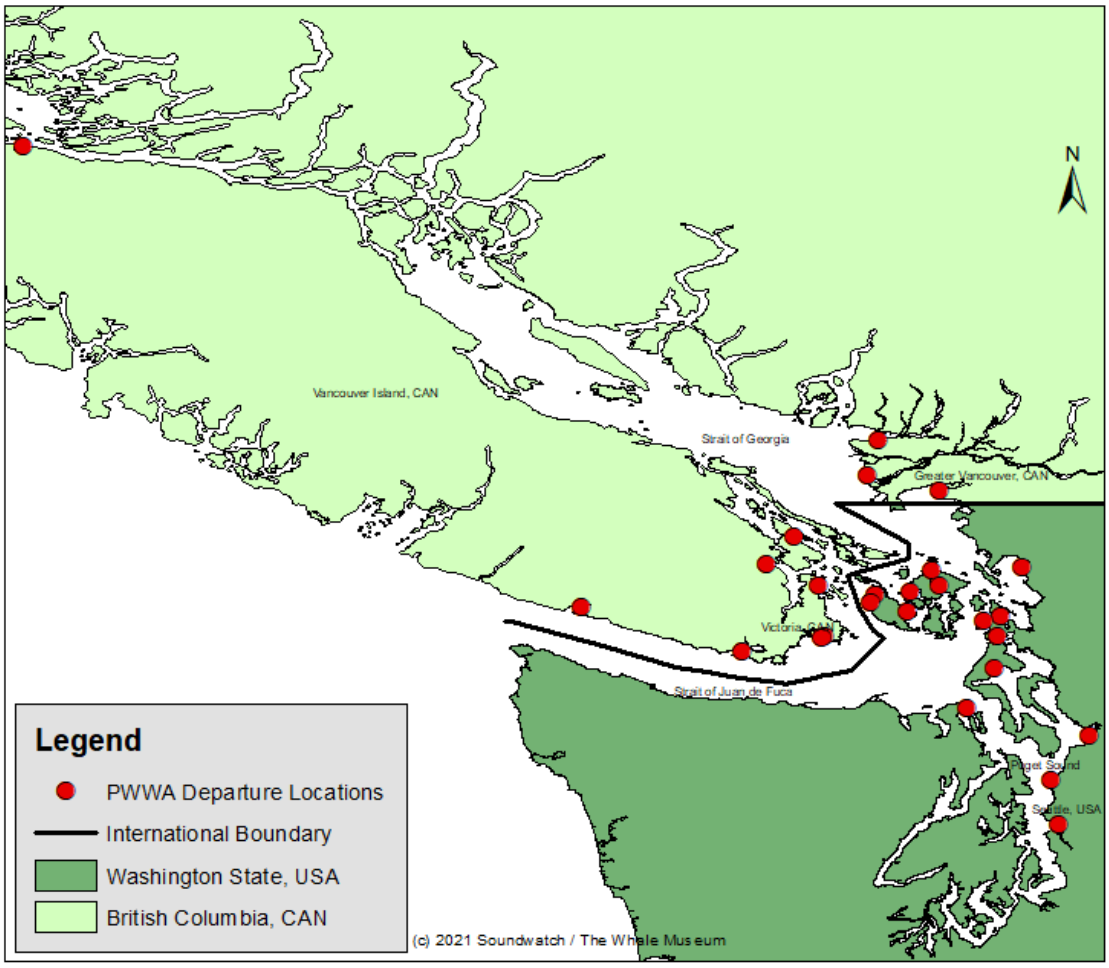

Figure 7: PWWA member vessel departure locations in 2021.

EcoTour kayak companies were also observed by Soundwatch during the 2021 season. Commercial kayak companies generally launched from San Juan County Park or Snug Harbor, primarily operating on the west side of San Juan Island in Haro Strait and Spieden Channel, north of Roche Harbor. Since Soundwatch vessel count data is conducted in the presence of whales, collection of kayak data is dependent on whether or not the Soundwatch vessel was monitoring cetaceans in the same area as kayaks were operating. Due to limited presence of Southern Residents on the west side of San Juan, Soundwatch operated in areas of the Salish Sea with less potential for overlap with kayakers.

Of the *7* EcoTour kayak companies observed operating in the San Juans, *2* are members of PWWA. Commercial kayaks were present for *8* vessel counts over *7* days in Soundwatch vessel counts from May-September 2021. Kayak company activity frequency was updated in the vessel catalog based on San Juan County Park sign-in sheets, company websites, and personal communications. This does not take into account the kayak companies based on other islands within San Juan County that launch from different parks. The number of EcoTour kayaks being launched from San Juan County Park has decreased since 2015, with the historic lowest number

of launches recorded during the 2020 season. The number of kayaks being launched recovered slightly in 2021, and in fact exceeded 2019 launch numbers (Figure 8).

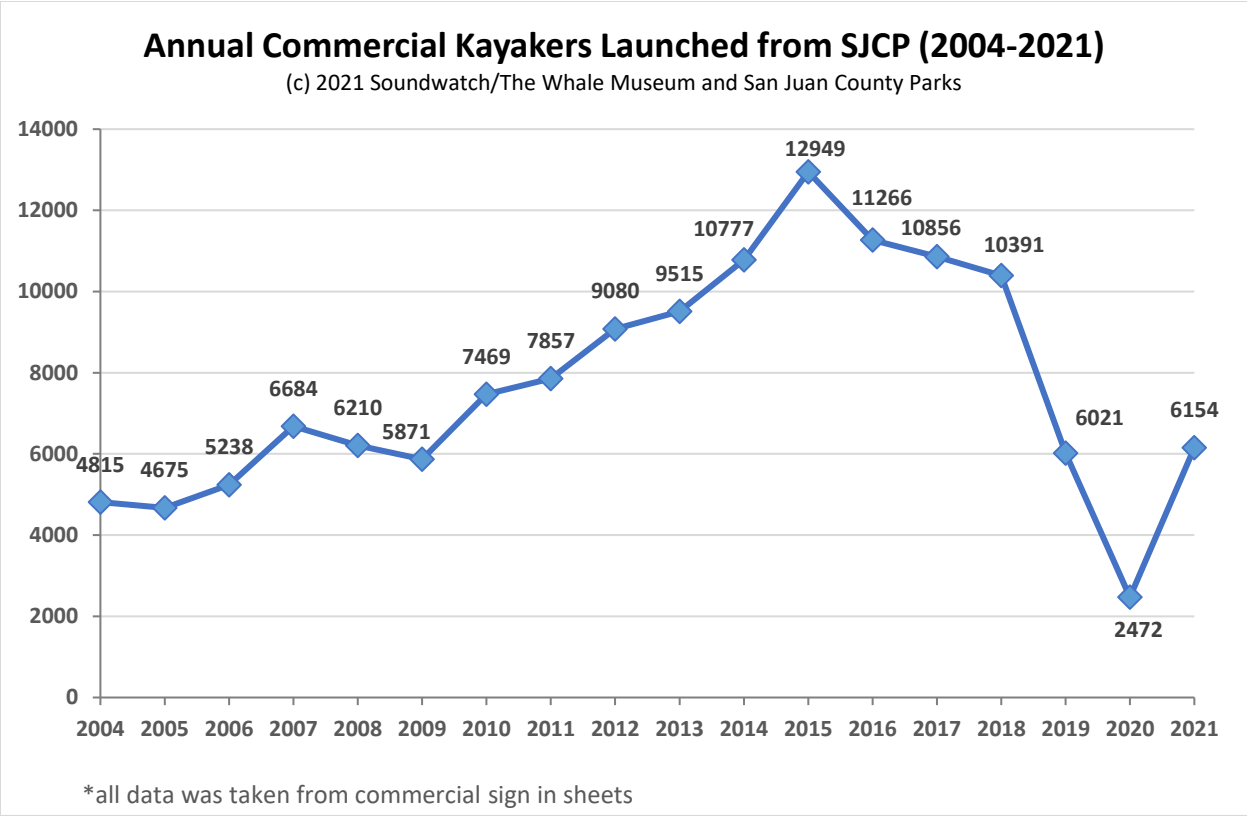

Figure 8: Number of commercial kayakers launched from San Juan County Park on the west side of San Juan Island. The total number represents individual kayakers and not the total number of kayaks launched.

Vessel Activity and Trends Around Whales

Surveys of whales and a count of vessels within one half-mile of whales are collected every half-hour using a *Soundwatch Vessel Count/Whale Survey data sheet* (Appendix I). Soundwatch staff and volunteer crews record whale and vessel data using a set of standardized vessel type and vessel activity definitions as well as whale attributes agreed upon by U.S. and Canadian cetacean researchers (2004 NOAA SRKW workshop) (Appendix K1 & K2). Vessels within one half-mile (880 yards) of all known whale activity are counted according to type and vessel activity (Figure 19). The area of known whale activity is variable and not limited to a half-mile, but rather represents the core of individual whales or groups of whales in the immediate area and can range up to one mile. Often the whales are spread greater than one mile. When visibility and conditions are good, a secondary count may be made for a group of vessels and whales beyond one mile from the Soundwatch vessel, provided crew can reliably record beyond the primary count. A count confidence level is determined by choosing it to be an 'A count' (highest confidence and usually the count the Soundwatch vessel is in) and a 'B count' still reliable enough to count, but with less confidence and usually the count that the Soundwatch vessel is not in.

Each observed vessel within the count range is categorized according to a vessel type and a specific best-fit vessel activity to describe what the vessel was engaged in (Appendix I). Vessel activity categories include *transiting* (moving through the area within one half mile)*; whale oriented* (moving or stationary whale watching); *fishing* (moving or stationary with poles or nets in the water)*; research* (engaged in any type of research, including cetology); *enforcement* (enforcement vessel in pursuit or engaged with a vessel at the time of the count)*; acoustic* (outside of the count range one half mile, but in acoustic/visual range); *or other* (which must be described, such as a rescued vessel in tow, etc.).

Vessel incidents, observations of vessels operating contrary to current voluntary guidelines and regulations, are recorded using standard definitions. Descriptions of guidelines and regulations, along with the incident codes used to record incidents of regulation and guideline violations can be found in Appendices J1 & J2. Incidents are recorded opportunistically as they are observed using a *Vessel Incident datasheet* (Appendix H). Soundwatch staff are conservative in recording incidents.

Vessel Count Trends

Plotting annual locations of Soundwatch vessel counts can be used as an overall indicator of Soundwatch effort and can be compared to annual and long term SRKW habitat use maps generated by The Whale Museum's annual Orca Master Program and presented in annual NOAA Contract Reports (Appendix N). Comparing annual SRKW sightings data with Soundwatch vessel monitoring effort confirms that the Soundwatch program targets effort where the majority of SRKW sightings occur and where the largest concentrations of vessels and whales are likely to be found.

Soundwatch totaled 86 vessel/whale days and 434 vessel counts. U.S. EcoTour vessels were observed 82 days and in 315 vessel counts, Recreational 66 days and 321 counts, Canadian EcoTour 47 days and 177 counts, Research 35 and 134 counts, Monitoring/Enforcement (excluding Soundwatch presence) 21 days and 160 counts, and kayaks (ecotour and recreational) 13 days and 24 counts. Despite the Canadian maritime border closure for commercial and recreational vessels extending until August 2021, Soundwatch was able to cross the border into Canadian waters for the entirety of the 2021 field season as a research entity permitted by Transport Canada.

The Soundwatch study area is separated into zones based on the TWM data quadrants and marine fishing zones for the US and Canada (Appendix Q). Soundwatch concentrates surveys in locations of vessels engaged in whale watching activities. Vessel counts during the 2021 season were concentrated around San Juan Island and Boundary Pass north into the Strait of Georgia (Figure 9). Soundwatch's area of operations in both 2020 and 2021 are similar with the exception of increased activity in Canadian waters during the 2021 season (Figure 10). This is a result of Soundwatch being permitted to enter Canadian waters for the entirety of the 2021 field season.

There are obvious trends of overlap in overall whale habitat use and vessel activities within a half mile of the whales, including whale watching, fishing, transiting as well as acoustic influence from large vessels transiting greater than a half mile from whales. The majority of vessel counts by Soundwatch in 2021 were concentrated around San Juan Island (Zones 1, 2, 3, and 5) and the waters north of the San Juan Islands (Zones 6 and 7) (Figure 11). Haro Strait and

the west side of San Juan Island are historically foraging grounds for SRKW during the summer months, and Soundwatch did monitor and record their presence in these areas. Soundwatch also observed SRKW presence at Pt. Roberts (Zone 7).

Soundwatch collects vessel count/whale survey data on all large cetacean species encountered in the Salish Sea in addition to Southern Resident and Bigg's Transient killer whales, most commonly including the humpback whale (*Megaptera novaeangliae*) and minke whale (*Balaenoptera acutorostrata*). After significant changes to federal and state regulations pertaining to killer whales specifically, it has become important to identify and assess potential impacts on other cetaceans in the region. Whales such as the humpback and minke are protected under the Marine Mammal Protection Act (MMPA), which prohibits take or harassment of marine mammals and current guidelines recommend a minimum viewing distance of 100 yards (Appendix A1-A3). Since regulations surrounding killer whales, and particularly SRKWs, are more prohibitive in terms of distance it may be expected that commercial and recreational whale watch vessels might shift to observing cetacean species such as the humpback and minke with greater regularity and/or frequency. Additionally, increasing awareness of the critically endangered status of SRKWs may further shift preference to watching less threatened cetaceans. Attributes of humpback and minke whales can be more challenging to characterize using Soundwatch data since the primary target species of research is the killer whale. However, vessel counts and activity around these other large cetaceans will be a valuable resource for comparison moving forward.

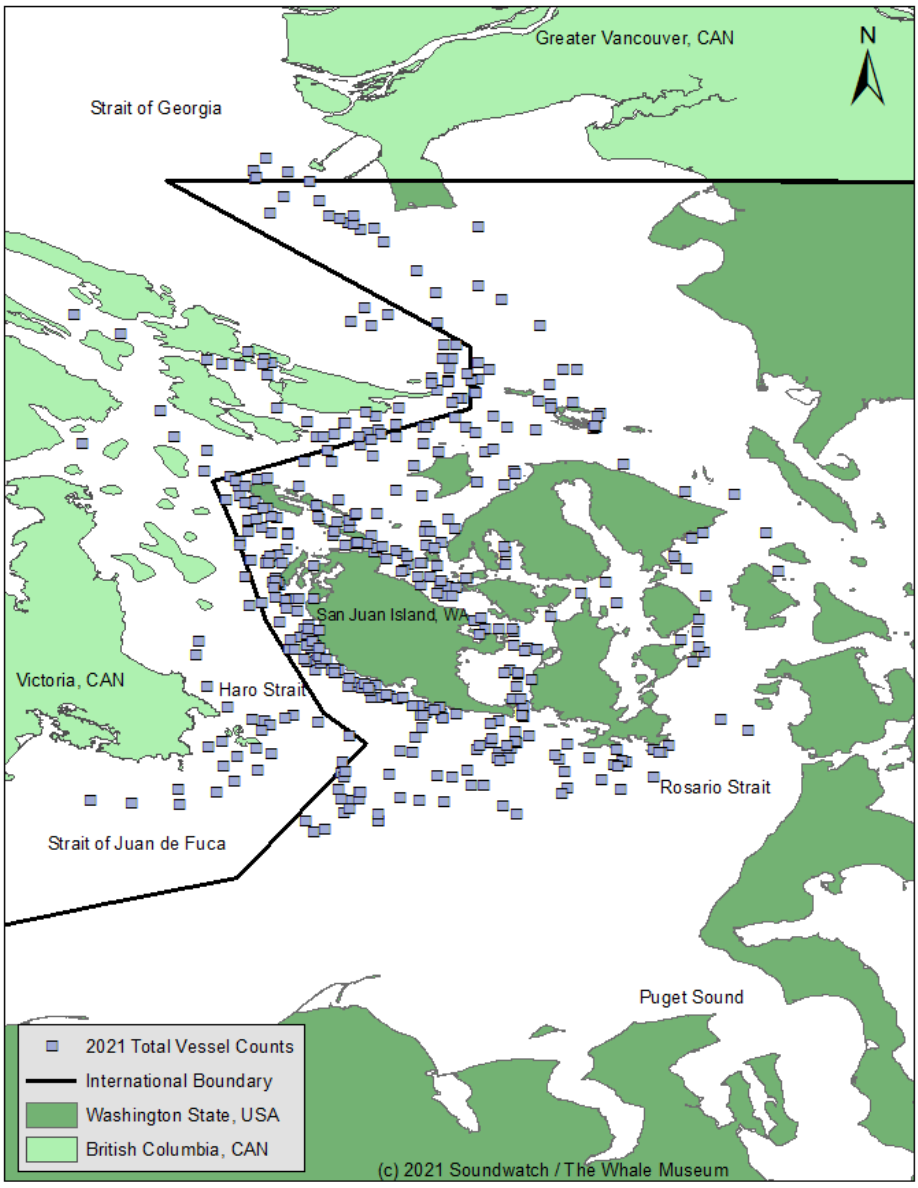

Figure 9: 2021 Soundwatch 434 Vessel Counts by location.

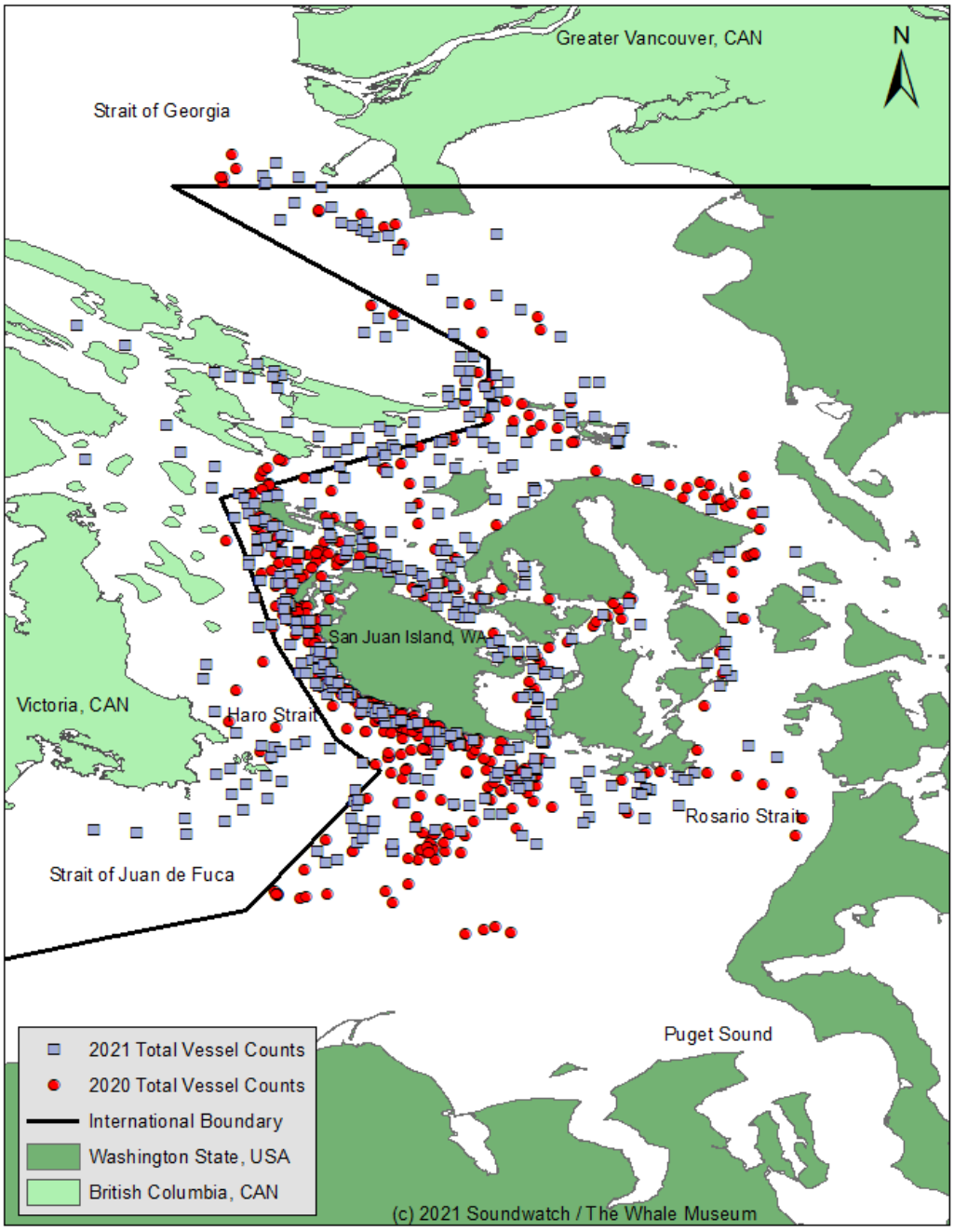

Figure 10: Total Vessel Count Locations from 2020 and 2021, displaying similarities and differences in survey locations and distributions.

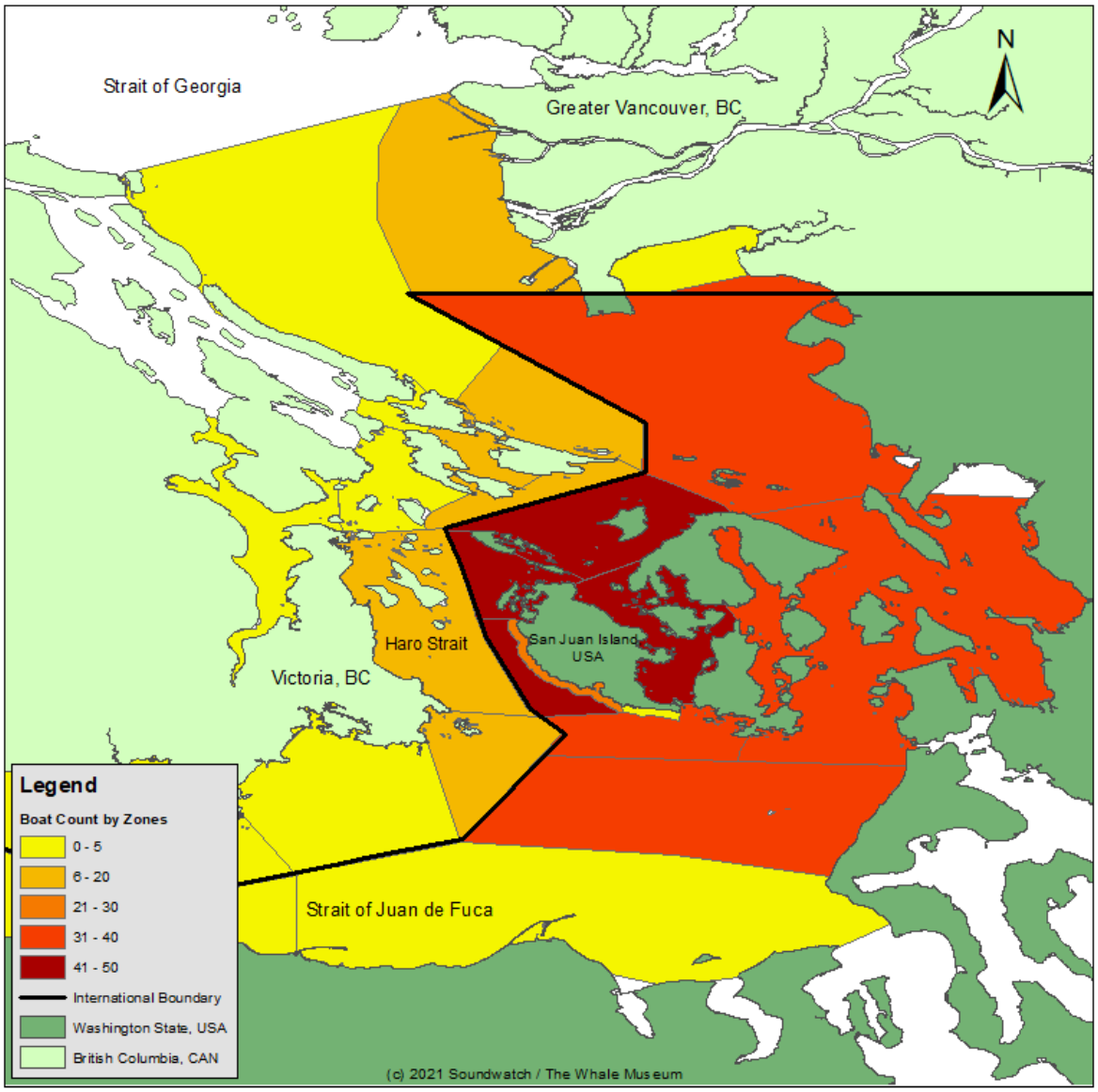

Figure 11: 2021 Soundwatch Total Vessel Counts by Numbered Zone.

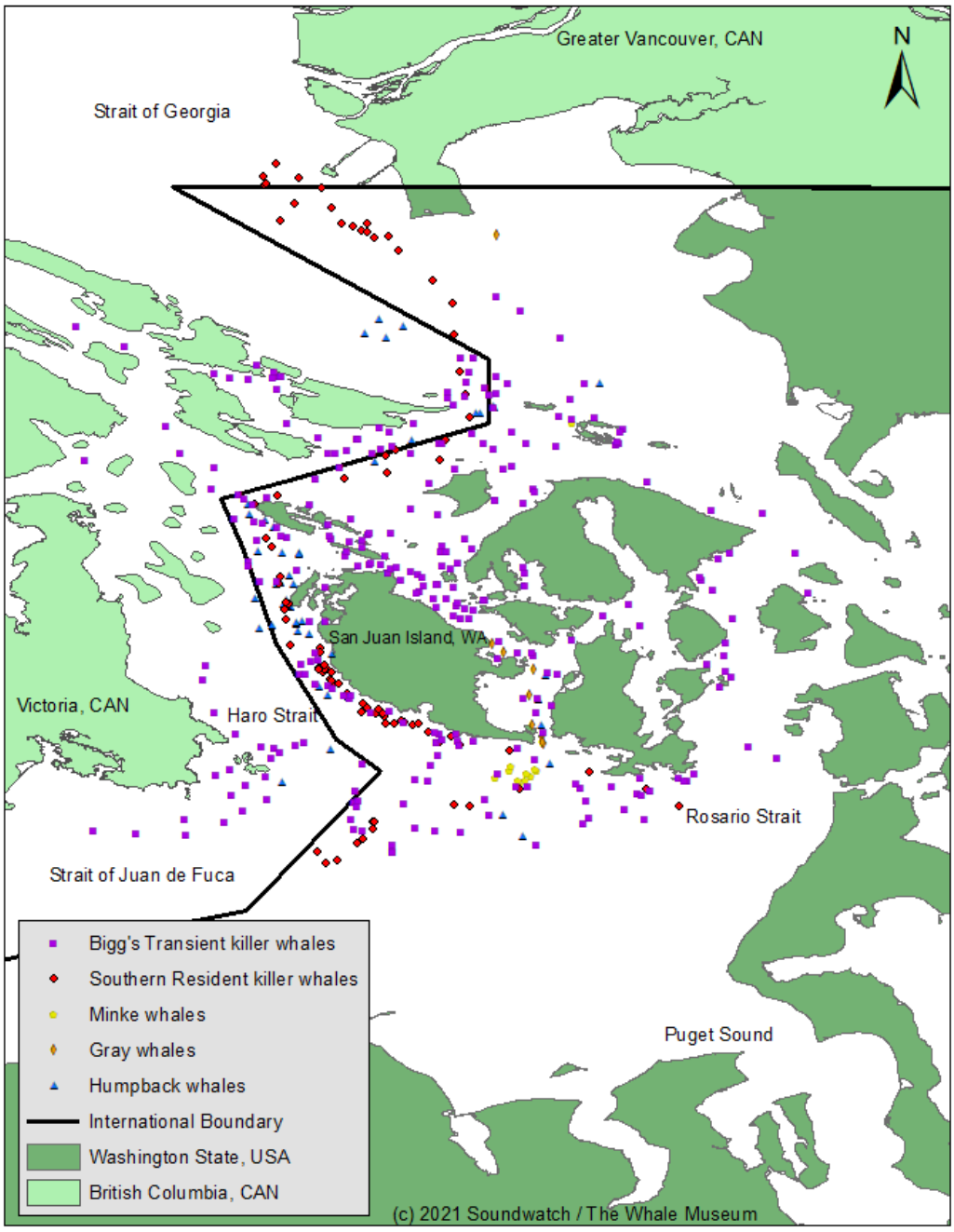

Figure 12: 2021 Vessel Counts by species of cetacean observed within the count.

Vessel Activities Around Whales

Figure 13 displays the type and number of vessels around whales in 2021. US EcoTour vessels had the greatest presence around whales during the months of June, July, and August. Overall vessel activity around whales increased until peaking in August, dropping off again during September. Recreational vessels accounted for the second highest presence in vessel counts, exceeding EcoTour vessels during the month of September.

US and CAN EcoTour vessels accounted for the highest percentage of whale-oriented activity in the vicinity of whales, followed by Monitoring/Enforcement vessels and Recreational vessels (Figure 14). Monitoring/Enforcement vessel percentage includes Soundwatch vessels and reflects the effort of monitoring/enforcement vessels as well as the nature of Soundwatch data collection.

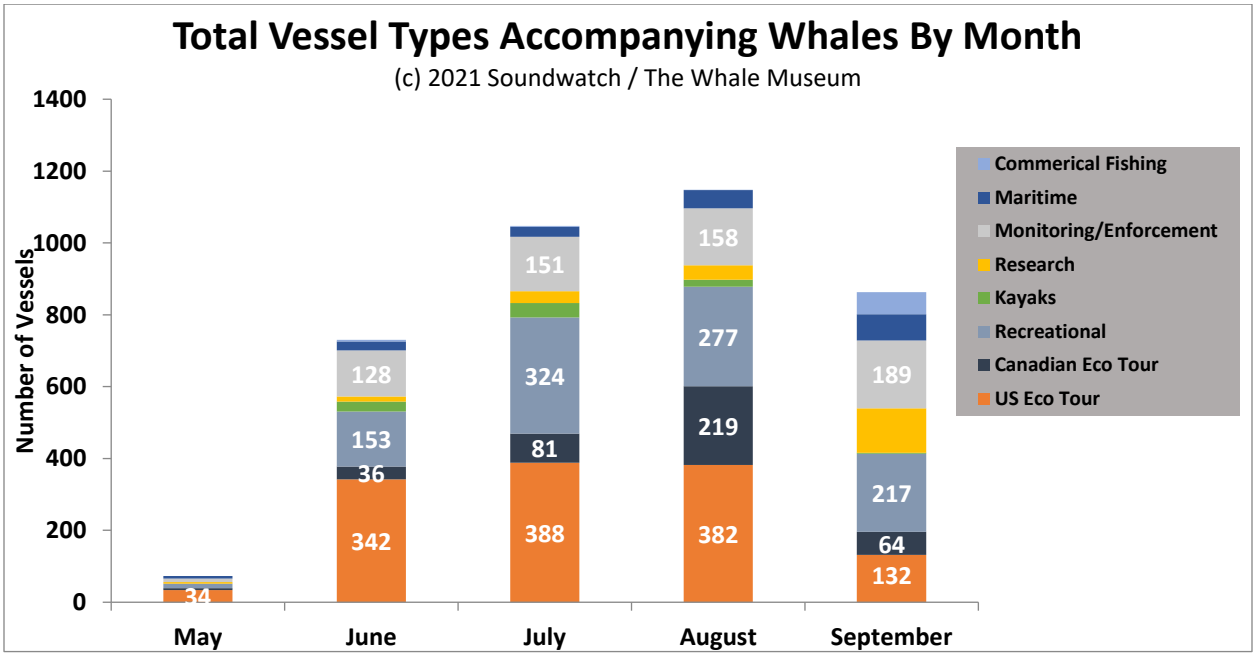

Figure 13: Total number of observed vessels by vessel type and month recorded in 2021.

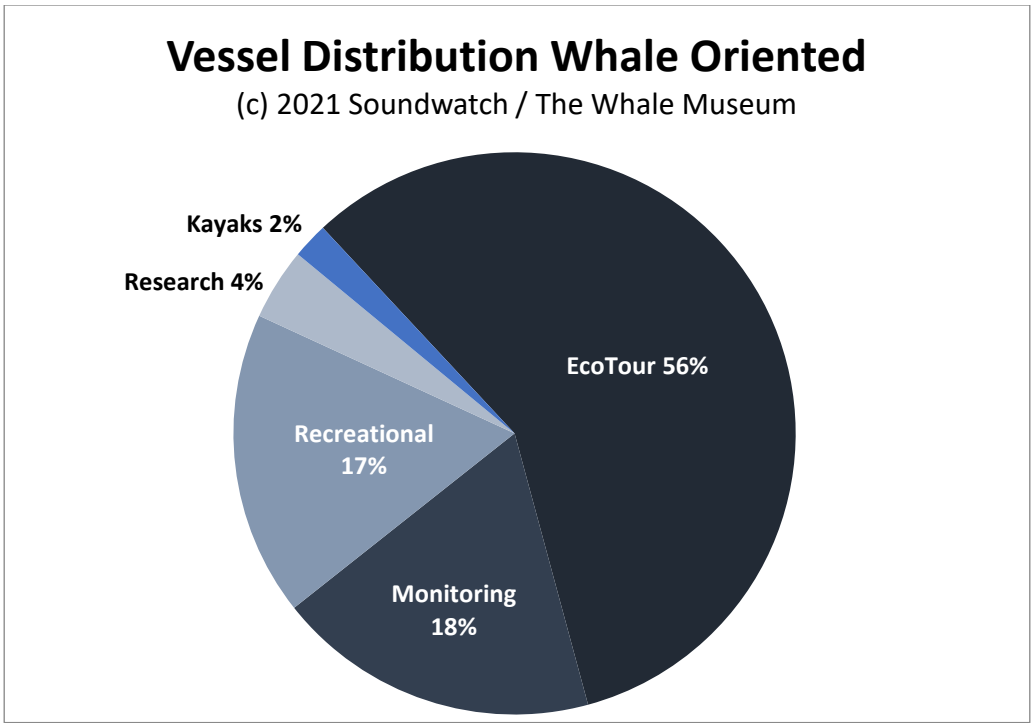

Figure 14: Percentage of 'whale oriented' vessel distribution by vessel categories during the 2021 season.

Number of Vessels Accompanying Whales

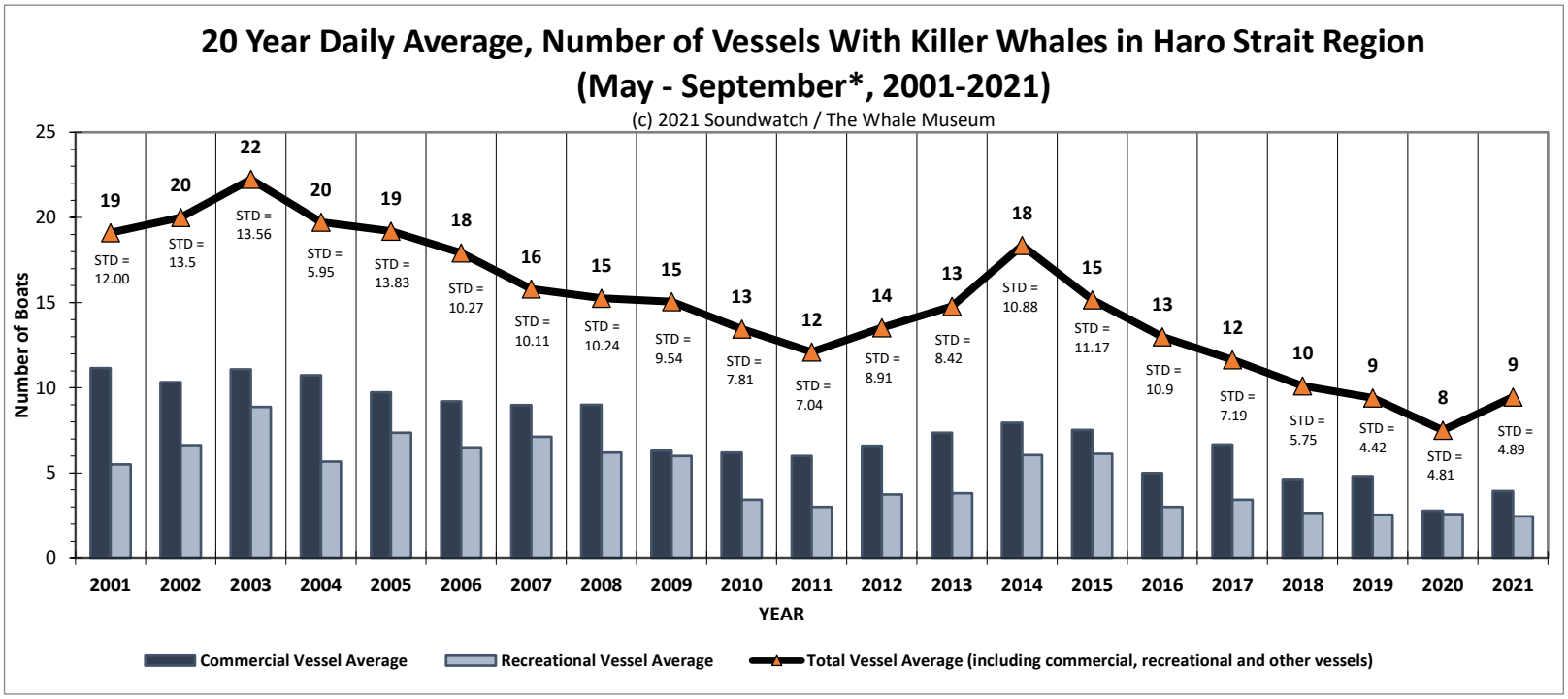

Figure 15: Average number (of recreational, EcoTour (commercial)) and total of all vessels with killer whales in the last twenty years in Haro Strait Region (May-September 1998-2016, 2018-2021 and *June-September 2017 and June-October 2020).

During May-September 2021, the average number of vessels observed within one half-mile of whales was *9*, a slight increase from the 2020 average (Figure 15) and suggests that initial COVID-19 restrictions may have in fact impacted the 2020 season. However, the average number of EcoTour vessels around whales in 2021 increased while the recreational vessel average declined to the lowest ever recorded.

In January 2021, WDFW's Commercial Whale Watch Licensing Program (CWWLP) codified rules permitting a maximum of *3* EcoTour vessels within one-half nautical miles of a group of SRKW. The 2021 season saw an increase in the total average number of vessels accompanying killer whales (Figure 16a). During the 2021 field season, there was a notable decrease in presence of SRKW within the study area when compared to 2020 and a simultaneous increase in the presence of Bigg's (Transient) killer whales, an ecotype for which the CWWLP rules do not directly apply. When compared by ecotype, the average number of vessels accompanying Bigg's killer whales is significantly greater than those accompanying SRKWs. This may be a result of commercial vessels opting to view Bigg's killer whales and other species without CWWLP designation instead of SRKWs. It is also important to note that SRKW were primarily viewed by "other vessels", a category which includes commercial fishing, ferries, and cargo ships (Figure 16b).

Vessel activity in the vicinity of whales was primarily characterized by EcoTour and recreational vessels (Figure 17). Whale-oriented activity was the most commonly observed activity within one-half mile of whales (Figure 18). SRKWs were notably absent in the Salish Sea during the summer field season except for a brief visit in July, and again in September.

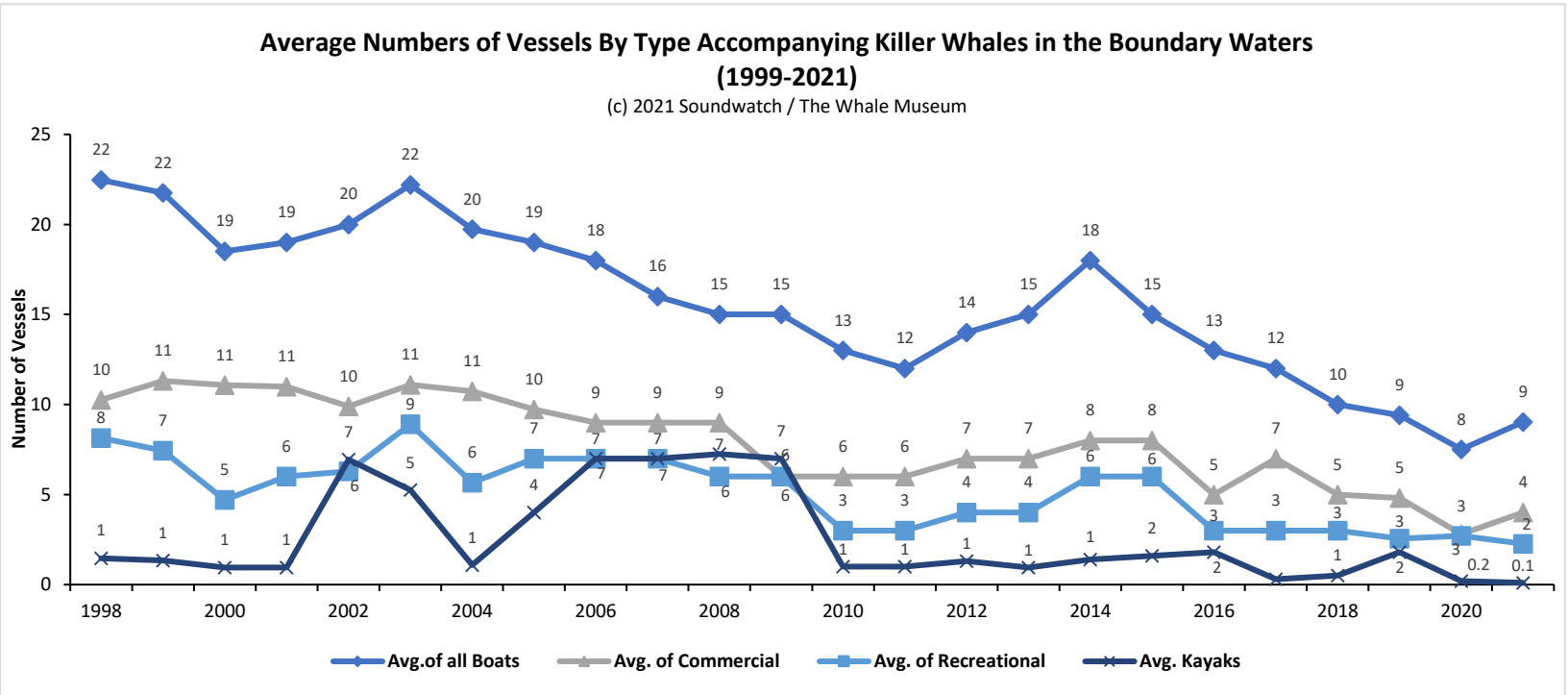

Figure 16a: Average number of vessels by vessel category within one half-mile of killer whales from 1998-2021 in the Salish Sea.

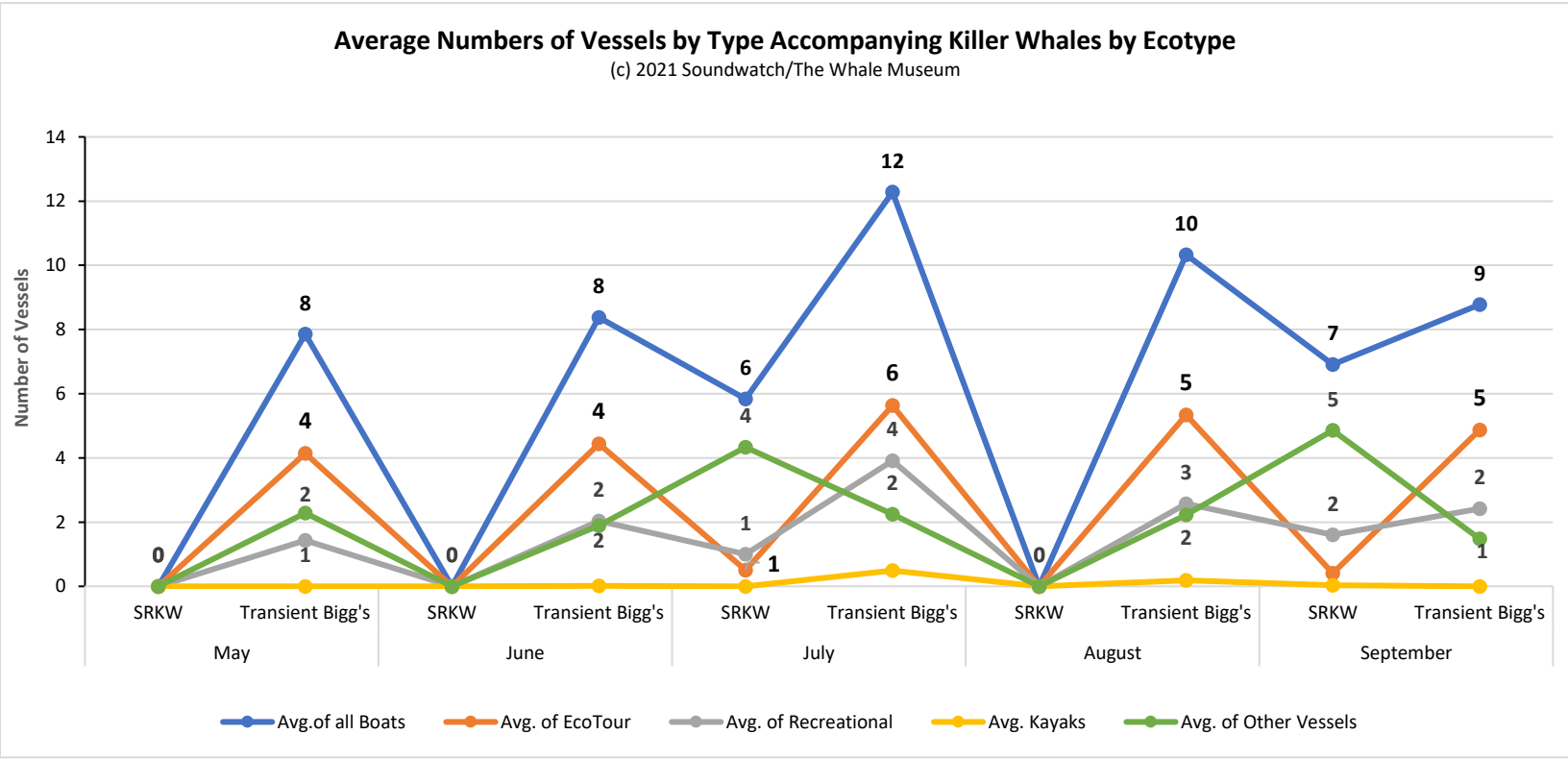

Figure 16b: Average number of vessels by type accompanying killer whales by ecotype. “Other Vessels” includes commercial fishing, ferries and cargo ships, research, monitoring and enforcement. Of this category, commercial fishing and ferries were the particular vessel types that were most frequently accompanying.

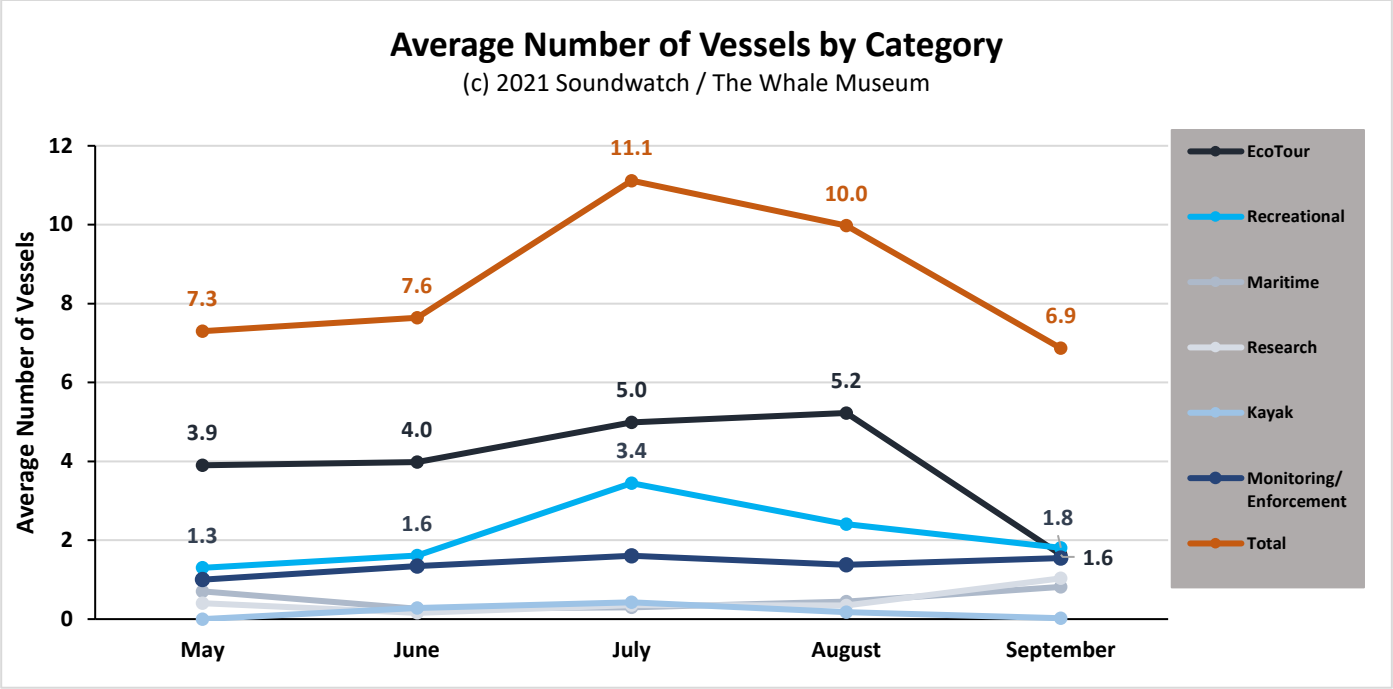

Figure 17: Average number of vessels within one half-mile radius of killer whales by vessel categories and month in 2021 Soundwatch vessel counts.

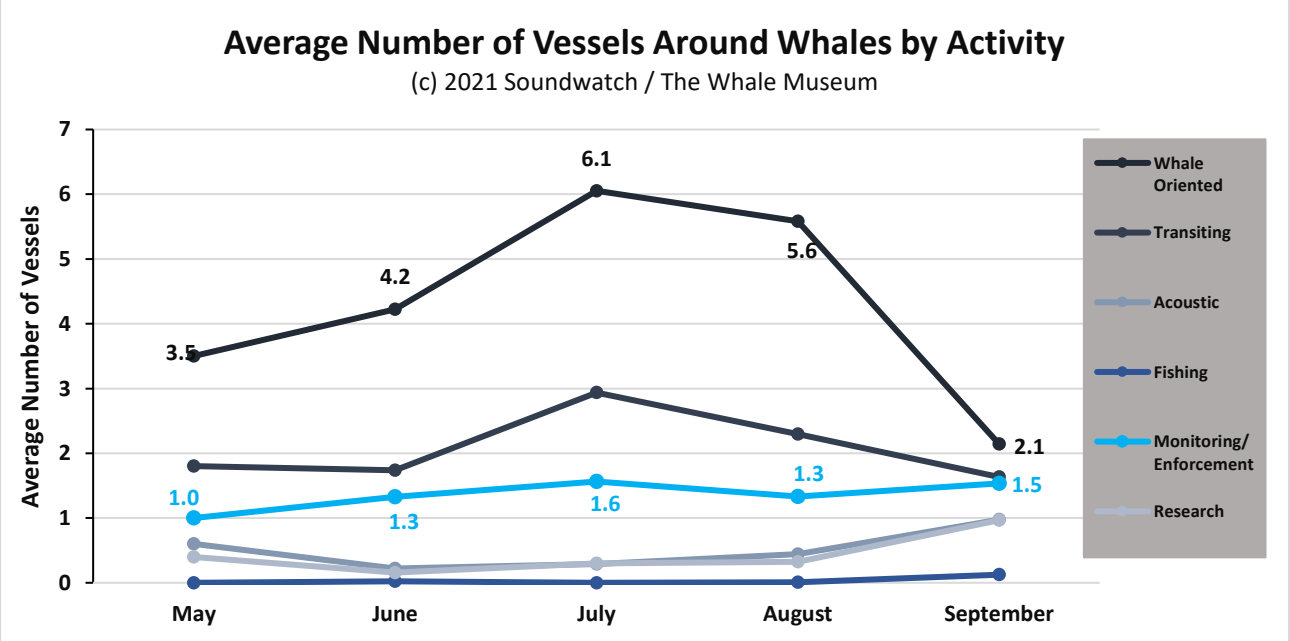

Figure 18: Average number of vessels within one half-mile radius of killer whales by vessel activity and month in Soundwatch 2021 vessel counts.

The 2021 annual maximum number of total vessels observed with whales was *35* (Figure 20). Both EcoTour and recreational vessel maximum numbers show a gradual increase and decrease throughout the summer field season, while maximum kayak numbers show a more dramatic spike, peaking in July (Figure 19).

The 2021 average number of vessels by time of day also depicts a gradual increase and decrease from 0900-1800 during the months of May-September, peaking at *10.3* vessels during the hour of 1401-1500. This disagrees with the historical trend of 'peak times of day' in the morning and mid-afternoon with a mid-day lull during trip turn-around times, shown by the 21-year average (Figure 21). CWWLP rules dictate that viewing of SRKWs by authorized vessels may only occur between the hours of 10:00am-12:00pm and 3:00pm-5:00pm. The 2021 average does not particularly align with these time restrictions, likely because EcoTour vessels were more often with Bigg's killer whales or other whale species (Figure 16b). Both whale presence and EcoTour whale watch schedules contribute to monthly variation. It is possible that daily whale watching tours have become more frequent and flexible to account for the unpredictable nature of whale presence as well as the demand of whale watch customers. It is also possible that as whale sightings reporting methods advance, vessels of any type seeking whales may be able to ascertain their location and engage in whale watching. Vessel averages by time of day also reflects Soundwatch's operations effort; SRKWs returned to the Salish Sea in September and remained within the study area into the evening hours, resulting in an increase of >1800 data (Figure 21).

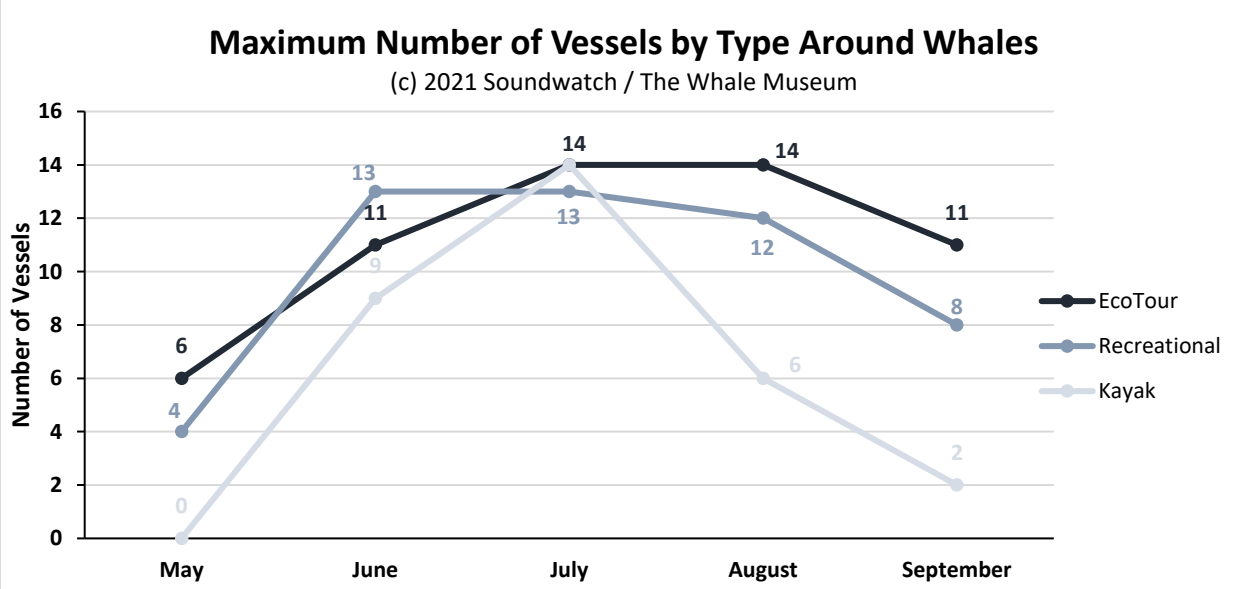

Figure 19: Maximum number of vessels by category and month around killer whales from May-September 2021.

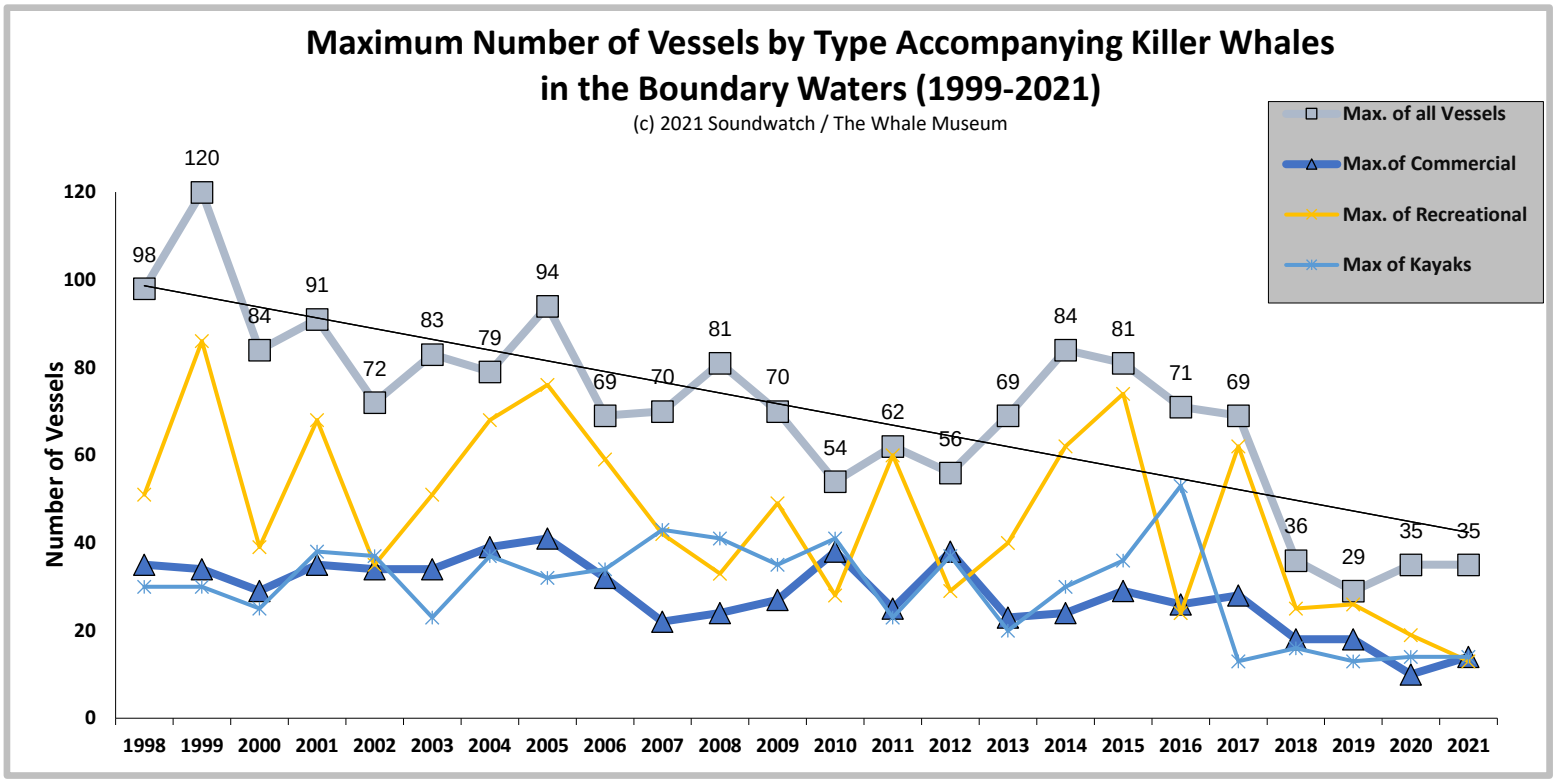

Figure 20: Maximum number of vessels within one half-mile of killer whales in the Salish Sea by vessel category from 1999-2021.

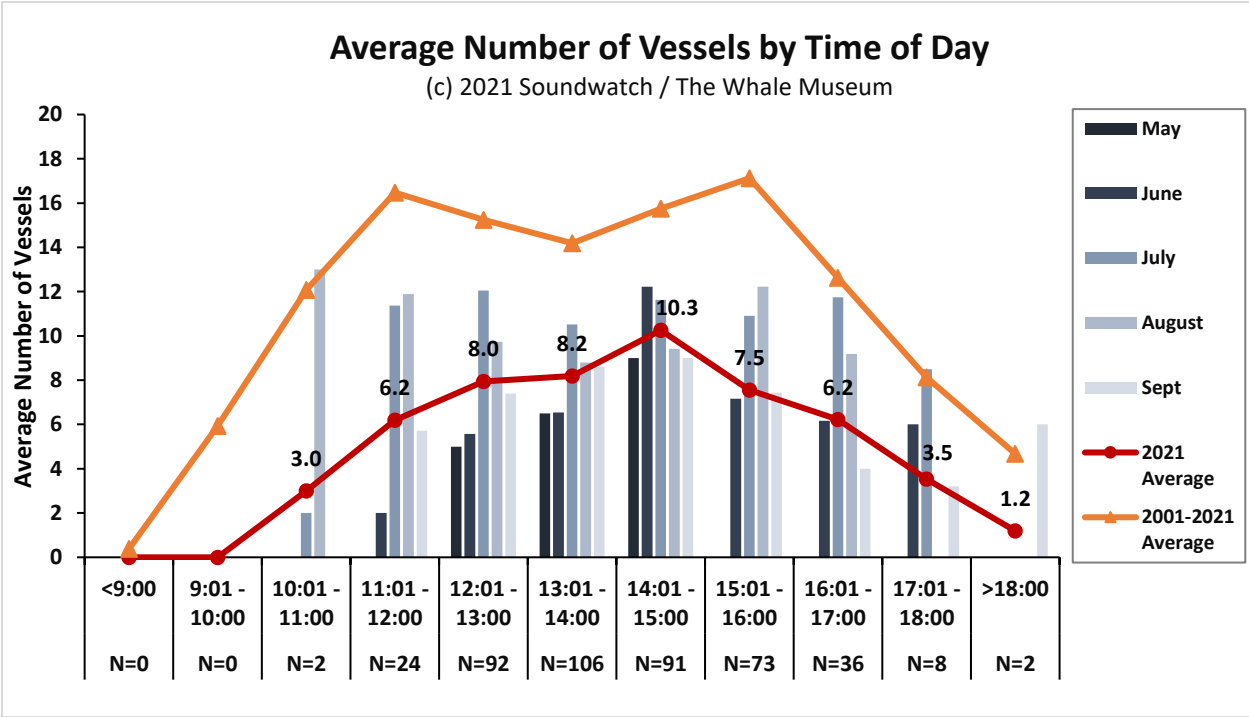

Figure 21: Average number of vessels by time of day includes all vessel categories, the average for 2021 and the 21-year average.

Outreach and Education

The Soundwatch Boater Education Program includes an outreach and education component that is primarily achieved by (1) on-water vessel contacts; (2) off-water via "Dock Talks" and The Whale Museum; (4) Kayak Education and Leadership Program (KELP); and, (5) an increasing presence on social media.

On-Water Education

Soundwatch regularly encounters recreational vessels in the vicinity of marine wildlife and/or wildlife habitats. Contact is made with these vessels either by VHF radio or alongside approach. It is Soundwatch's intention to contact every vessel possible in the vicinity of whales, regardless of whether or not the vessel is violating regulations. Upon contacting, Soundwatch vessel operators inform the boaters of *Be Whale Wise Marine Wildlife Guidelines for Boaters, Paddlers and Viewers* and the *U.S. federal/state vessel regulations* for killer whales, and distributes *Be Whale Wise* brochures if possible (Appendix A3). Due to COVID-19 precautions, Soundwatch suspended on-water distribution of materials.

During the 2021 season, Soundwatch contacted *503* recreational vessels for a total of *1,463* boater contacts, averaging *2.91* boaters per vessel. The 2021 season saw a more historically typical number of recreational contacts by month, compared to the 2020 season which was more directly impacted by COVID-19 (Figure 22). Recreational contact data was not collected during May 2020 or October 2021.

Outreach and education efforts during 2021 from Soundwatch and other Be Whale Wise partners and Salish Sea stakeholders were significant and included increased social media presence and additional Dock Talks around the San Juan Islands. At the state level, WDFW increased outreach efforts to include informational materials, educational videos and press releases as well as the establishment of the CWWLP (Appendix B2). The CWWLP also outlines protocol for notices of vulnerable whales, including calves and potentially unhealthy individuals, a critical component of awareness not only for CWWLP license holders but for the general public as well. When contacted by Soundwatch, boaters were asked if they were familiar with *Be Whale Wise* and *U.S. federal/state vessel regulations* for killer whales. Of the vessels contacted, *50%* were deemed to be correctly aware of the guidelines and laws (Figure 23). The greatest discrepancy between aware and unaware boaters occurring in July 2021. July was also the highest overall number of recreational contacts, suggesting that July may have been a peak season for recreation on the water in the study area (Figure 24). The season saw a significant increase from *26%* awareness in 2020 to 50% awareness in 2021 (Figure 25). It is important to note here that boaters may have self-identified as aware despite potentially being unaware of current regulations, although Soundwatch made efforts to determine actual awareness. Comparable data from Cetus Research and Conservation Society's Straitwatch stewardship program reflected *43%* awareness of vessels contacted in the US and *36%* awareness of vessels contacted in Canada during the 2021 season (Cetus 2022).

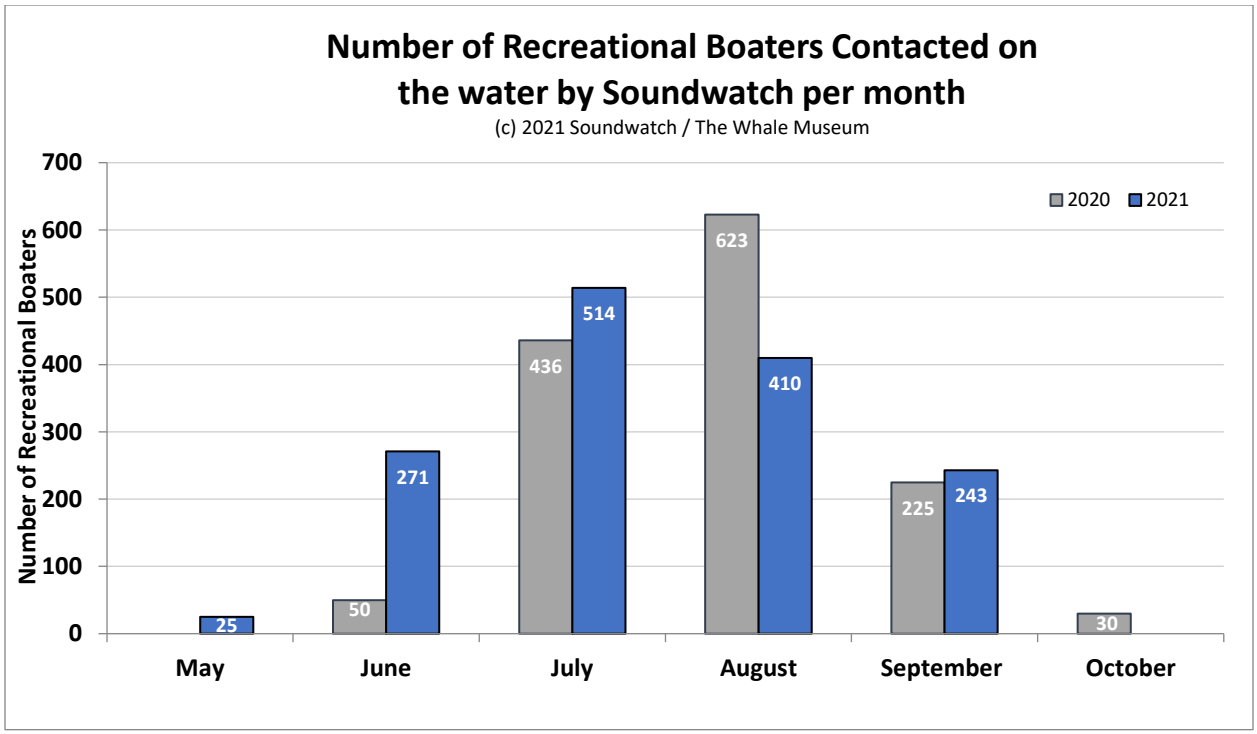

Figure 22: Number of recreational boaters contacted by month on the water by Soundwatch for either prevention and/or education on vessel disturbance to killer whales in the region during the 2021 season (N=1,463) compared to the 2020 season (N=1,364).

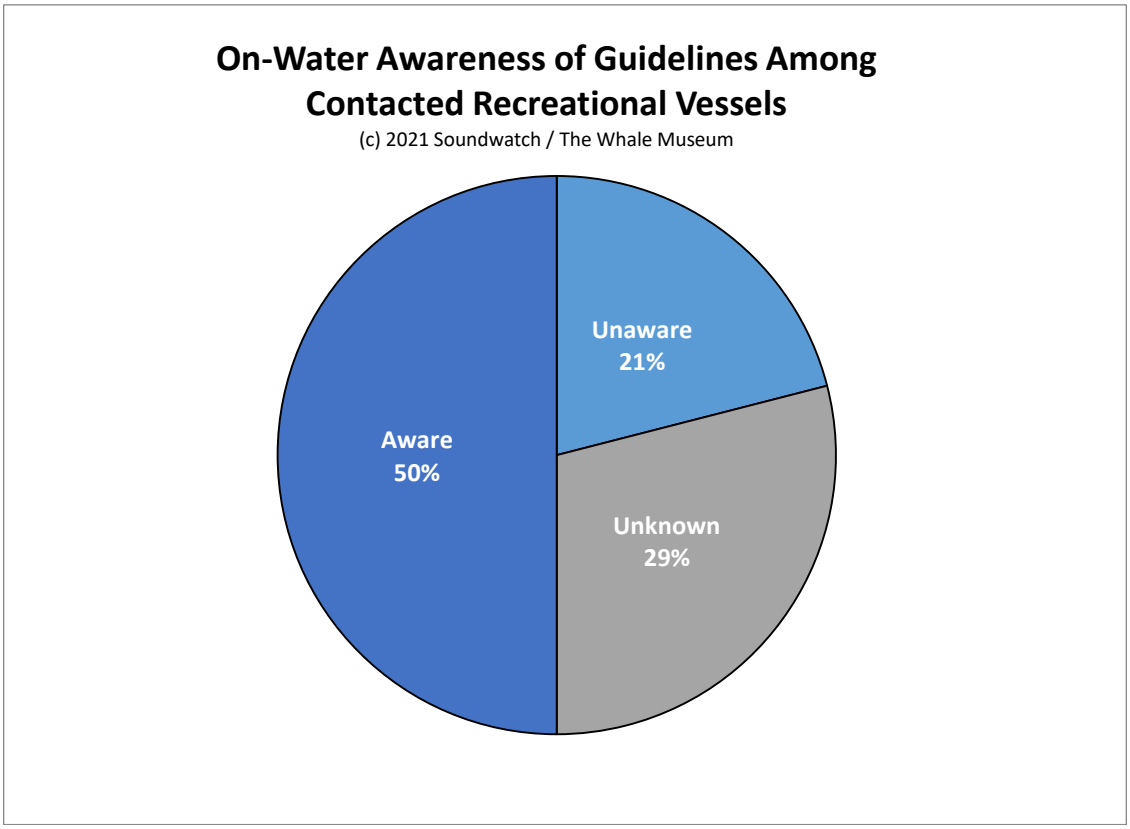

Figure 23: Awareness of Be Whale Wise Guidelines among contacted recreational vessels in 2021.

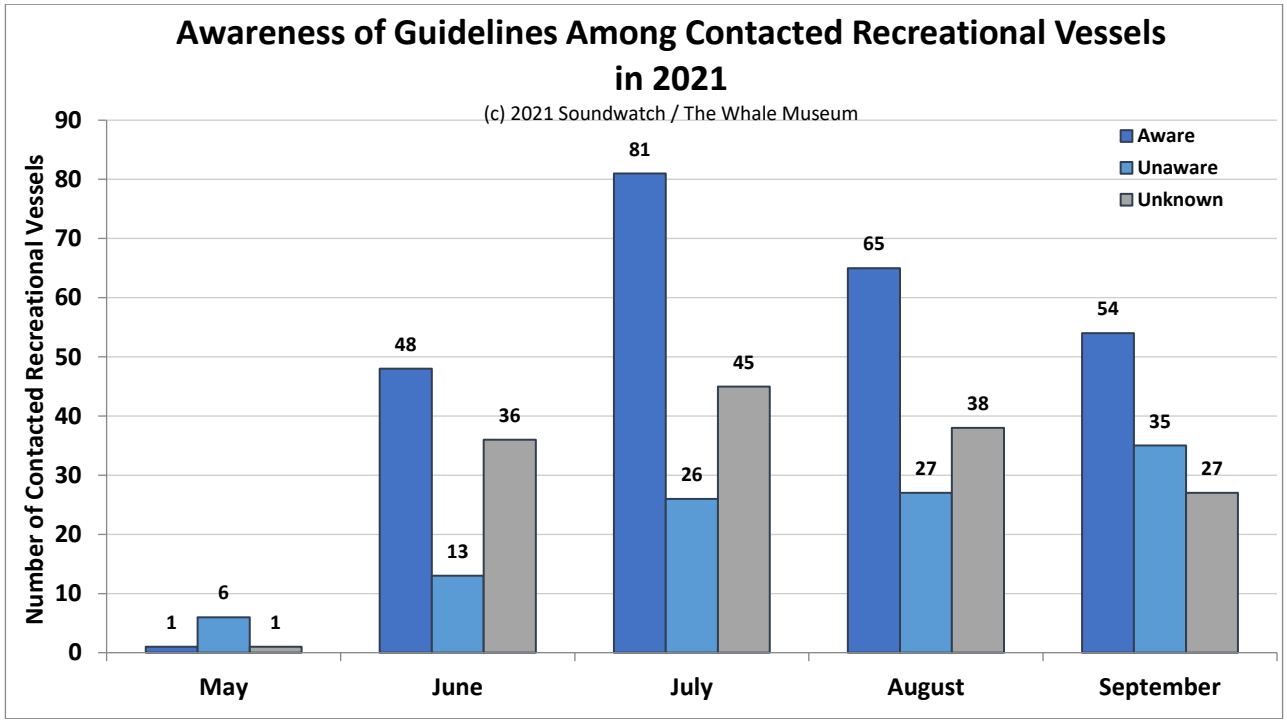

Figure 24: Number of recreational vessels contacted and the awareness of Be Whale Wise Guidelines by month in 2021.

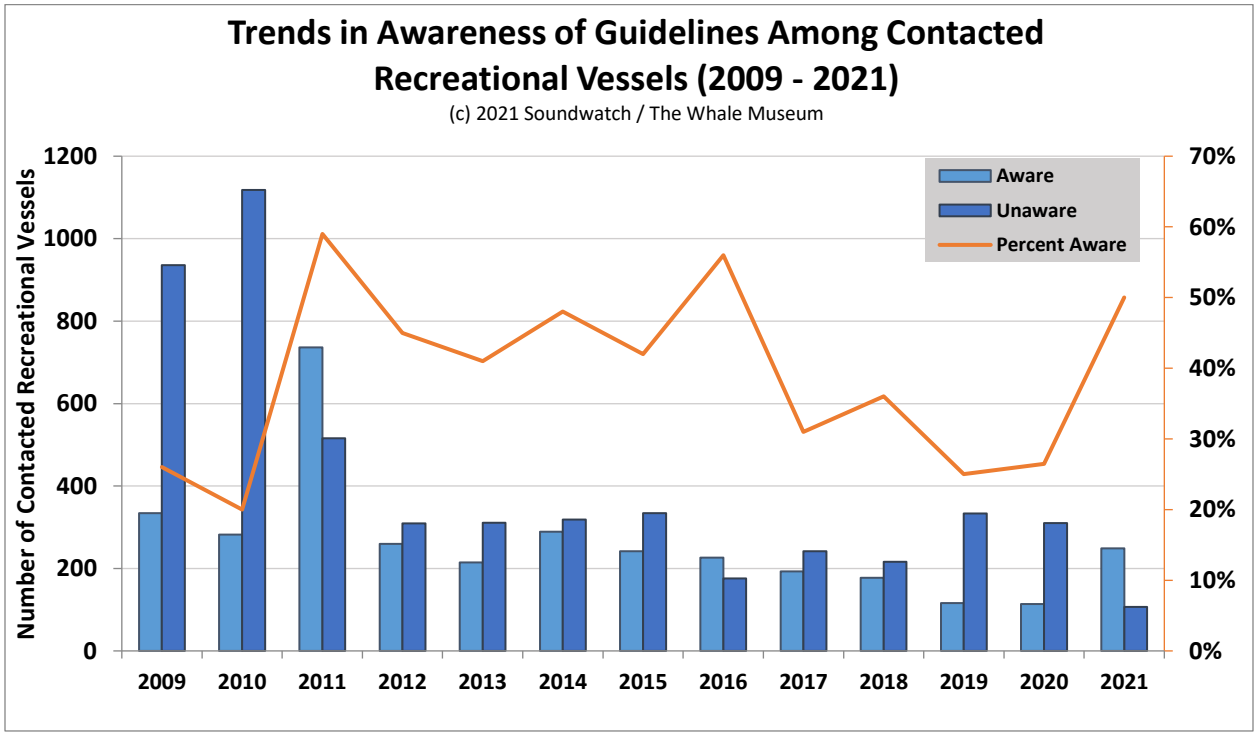

Figure 25: Trends in Recreational Vessels Awareness of Guidelines Contacted by Soundwatch from 2009 – 2021.

Soundwatch crew recorded the registered homeports of contacted vessels when available. Registered ports most commonly contacted in 2021 were Anacortes, Bellingham, Friday Harbor, Roche Harbor, Eastsound, Seattle, and Victoria and Vancouver, British Columbia (Figure 26). Homeports were also recorded from out-of-state, including as far as Alaska and Ontario (Figure 27).

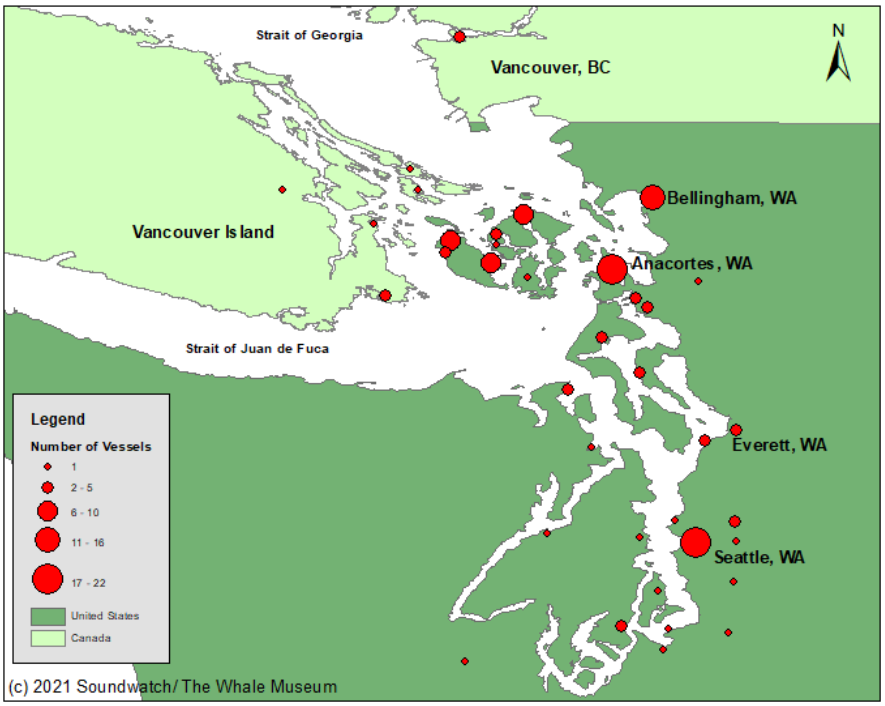

Figure 26: Recreational vessel home ports in the Salish Sea, as recorded by Soundwatch from May – September 2021.

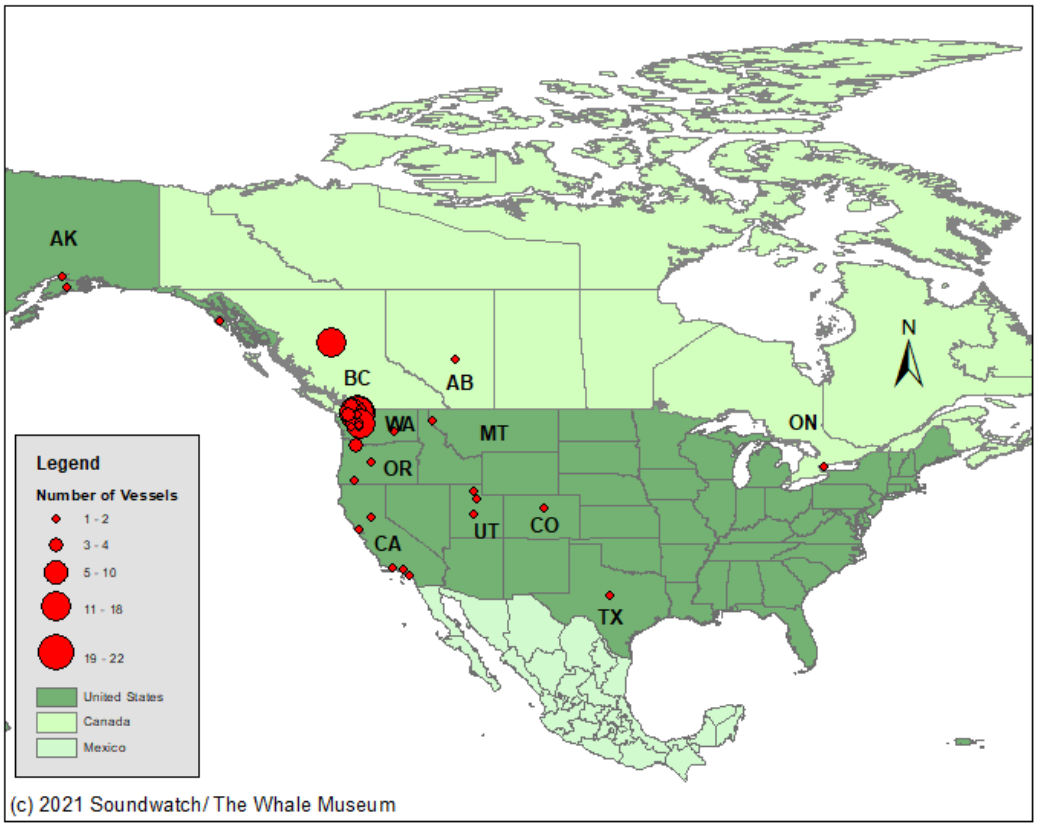

Figure 27: Recreational vessel home ports outside of the Salish Sea within North America, as recorded by Soundwatch from May – September 2021.

Of vessels contacted, *58%* were transiting through the area and *39%* were actively engaged or intended to engage in whale watching activities, and *2%* of vessels were engaged in fishing in proximity to killer whales (Figure 28a). This breakdown of activity of vessels suggests a continued increase in transiting activity compared to whale-oriented change from previous years (*38%* and *48%* transiting in 2019 and 2020, respectively). When contacting recreational boaters, Soundwatch crews found that an observed transiting activity was supported by the vessel's stated purpose of activity. However, when Soundwatch approached vessels observed to be engaged in whale watching, the vessel's stated purpose of activity did not match as closely (Figure 28b). This may be due to a lack of awareness or compliance of regulations, and consequent reluctance of the contacted vessel to share their intentions.

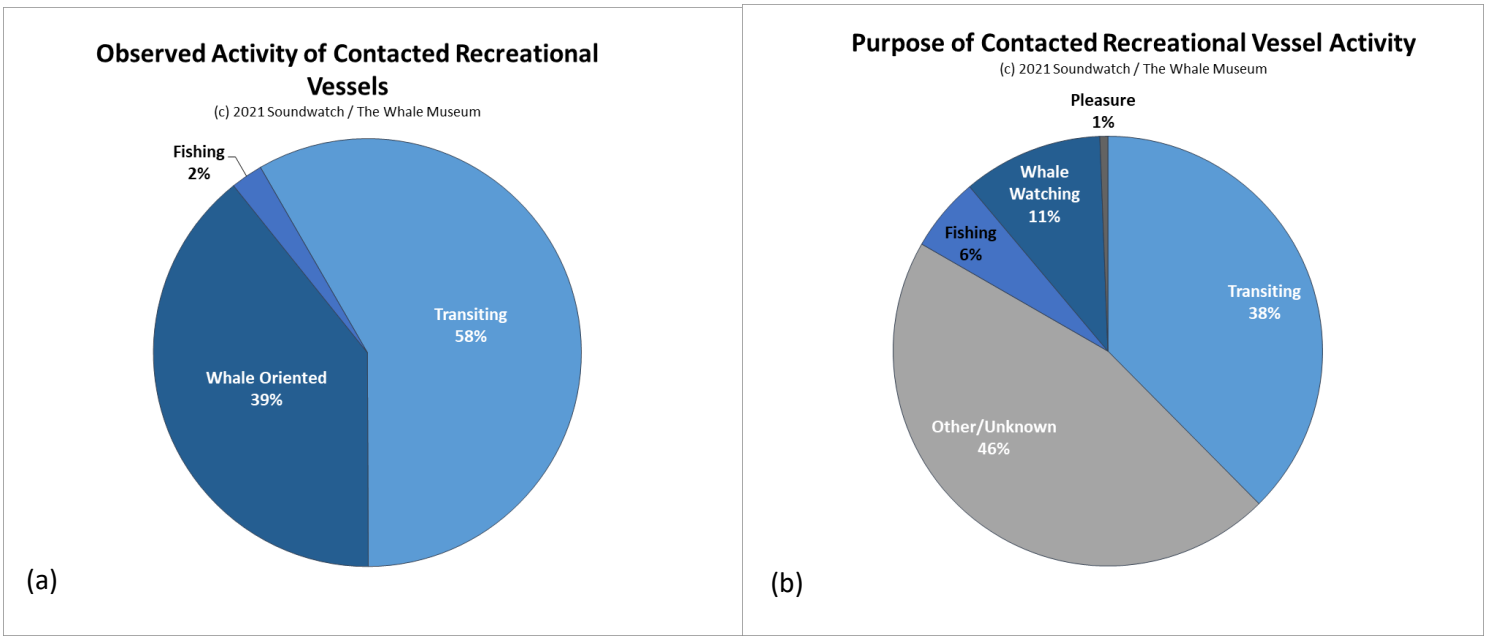

Figure 28a: Observed Activity of Recreational vessels contacted by Soundwatch in 2021.
Figure 28b: Soundwatch Recreational vessel contact responses to "Reason/purpose for visiting the region?" in 2021. "Other/Unknown" responses include individual contacts who did not disclose their purpose of activity.

In order to characterize the whale-oriented recreational vessel audience, Soundwatch asked boaters how they had located the whales they were watching that day. Out of *503* contacts, Soundwatch received *122* responses. These responses were compiled into categories shown in Figure 29. "Observing Whale Watch Vessels" includes such responses as following whale watch vessels to the present location, monitoring whale watch vessels on Automatic Identification System (AIS), or spotting a group of whale watch vessels not making way. "Social Media" includes responses related to platforms such as Facebook or Instagram, while "Word of Mouth" includes such responses as direct contact with friends or individuals who may have sighted the whales.

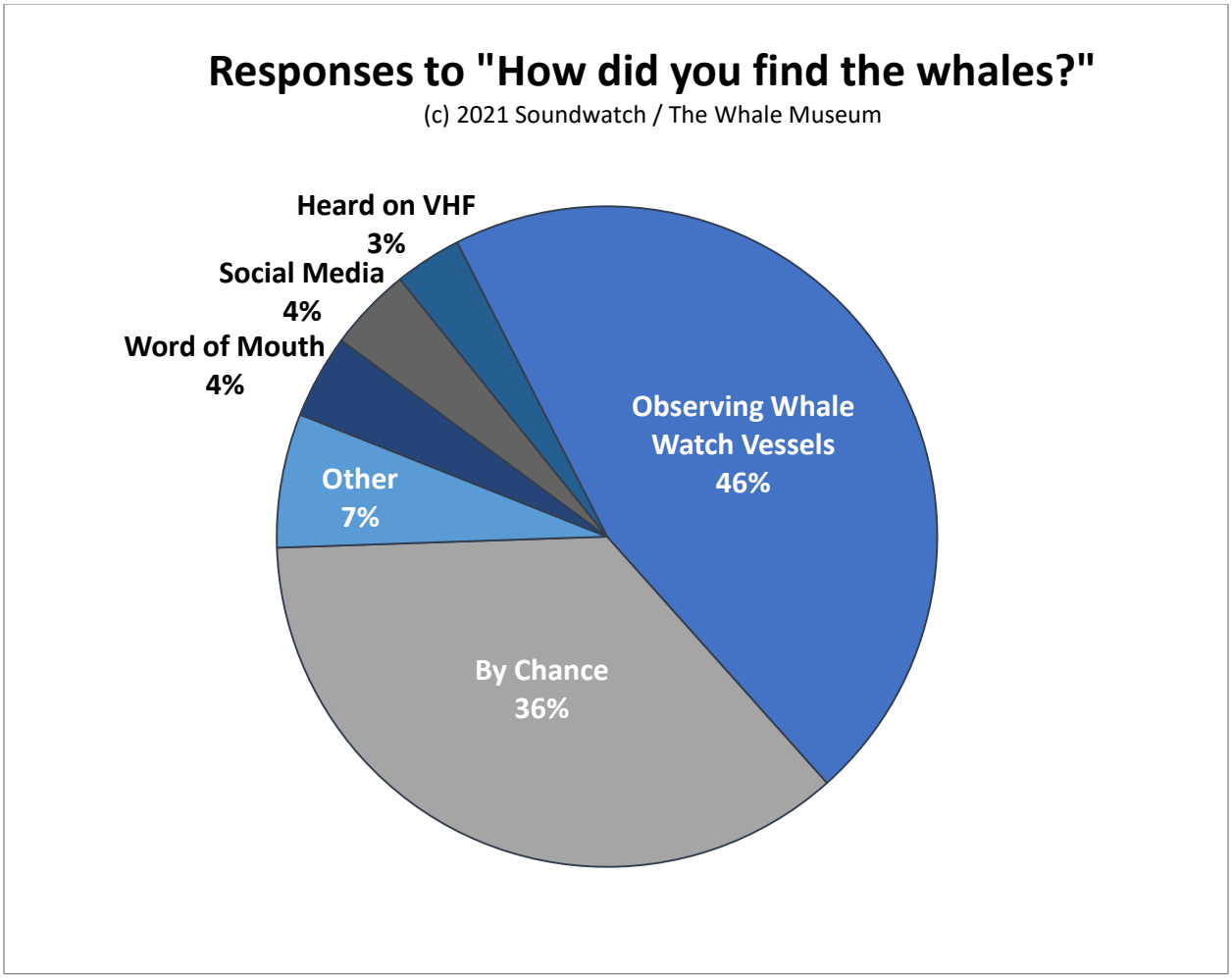

Figure 29: Recreational boater responses to "How did you find the whales?" during May-September 2021.

Off-Water Public Education

Soundwatch personnel conducted *250* hours of "Dock Talks", an off-water public education platform with visual aids and outreach materials for distribution. During Dock Talks, Soundwatch contacted *1,049* individuals; of these contacts, 49% were deemed to be correctly aware of the guidelines and laws (Figure 30). Dock Talks were typically held at the Port of Friday Harbor and Roche Harbor on a weekly basis.

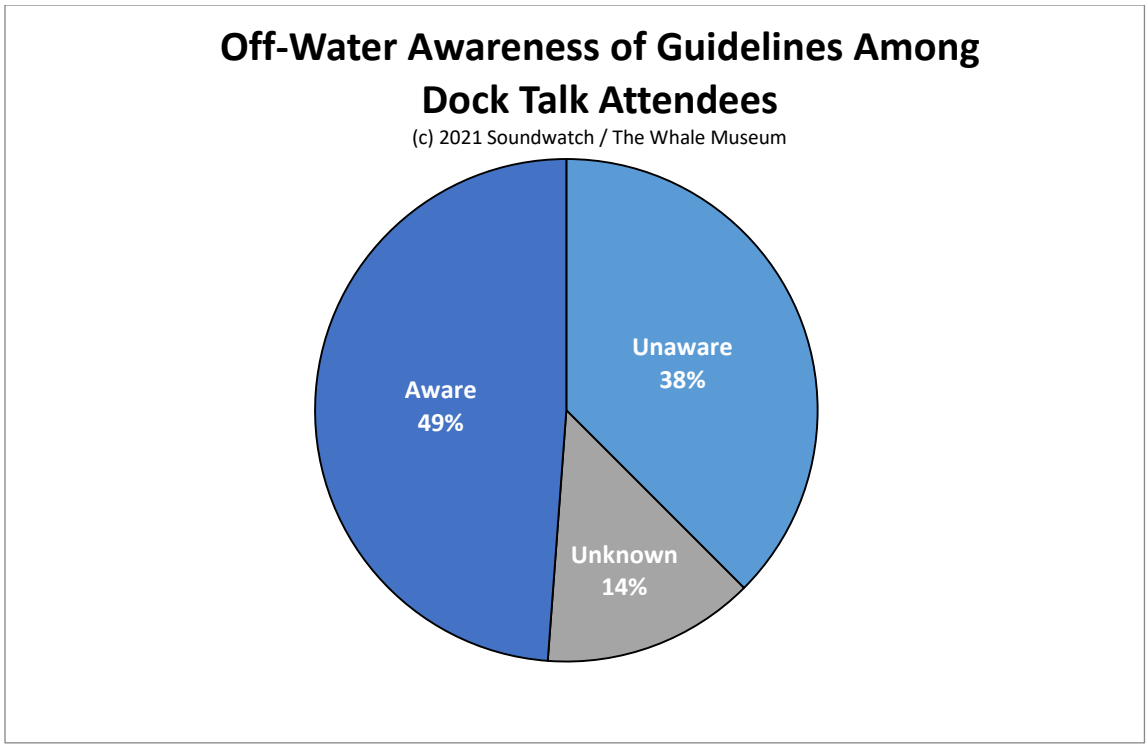

Figure 30: Off-water awareness of guidelines among Dock Talk attendees

The Whale Museum

In July 2016, The Whale Museum installed a permanent exhibit featuring *Be Whale Wise*, Federal and State regulations for killer whales, and vessel effects on killer whales. The exhibit has been viewed by approximately *134,000* museum visitors and education program participants, with *26,690* visitors in 2021. Materials were also given to approximately *3,094* people through either The Whale Museum's Memberships and/or Orca Adoption Program.

Kayak Education and Leadership Program

The Soundwatch Kayak Education and Leadership Program (KELP) targets outreach to recreational and EcoTour kayakers and includes all other human-powered vessels such as paddle boards and canoes. Since 2010, Soundwatch has been contracted by San Juan County Parks to assist with the planning and implementation of a seasonal vessel launch permit, a Kayak Vessel Code of Conduct education program, and to collect data on kayaker use trends at the San Juan Island County Park (SJCP). However, during the 2020 season the San Juan County Park suspended requirements to participate in KELP due to initial concerns over COVID-19 and social distancing measures. Most commercial kayak companies suspended or delayed operations until later in the 2020 season, using returning kayak guides with previous KELP proficiency. Data collection on vessels launching from the park was done through a boater self-reporting system and was administered by the San Juan County Park staff (Appendix C and D).

When kayakers were approached on the water, Soundwatch driver/educators communicated the special concerns for kayakers paddling around marine wildlife. In January 2021, WDFW's CWWLP established training and rules for EcoTour kayak companies. The training was developed in collaboration with Soundwatch.

Social Media

The 2021 season saw continued growth of the Soundwatch Instagram page @soundwatch_twm. Soundwatch increased followership by 430% since 2020, reaching local and international audiences. Ongoing effort is necessary to continue vital growth and establish a social media presence that will support Soundwatch education and outreach objectives.

Be Whale Wise Website

Soundwatch aided in the development of Be Whale Wise's Outreach Toolkit along with other partners and stakeholders. The objective of the toolkit is to provide education and outreach resources to the public while encouraging engagement and comprehension of the regulations and guidelines. The toolkit is available to the public and can be accessed at https://www.bewhalewise.org/outreach-toolkit/

Whale Behavior

Killer Whale Attribute Data

Soundwatch collected killer whale behavior on the hour and half hour, totaling *367* killer whale behavior counts for the 2021 season. Behavioral categories were Modified Rest, Traditional Rest, Milling, Socializing (surface active), Traveling, and Foraging (Appendix K1 & K2). Evidence of prey was necessary to classify 'foraging' behavior. In the event that both SRKWs and Transient killer whales were within range of Soundwatch on the same day, preference was given to monitoring SRKWs.

As in previous years, travel was the predominant behavior in all months and across both ecotypes (Figure 31). The Southern Residents were notably absent in Soundwatch's area of response during the months of May, June and August. Members of K Pod returned very briefly to the Salish Sea in July; Soundwatch recorded *1* day (*6* counts) of data on July 1. SRKWs returned in September for a slightly longer duration; Soundwatch recorded *12* days (*85* counts) of data in early-mid September. When SRKW were present, they did utilize the same general areas within the Salish Sea. However, behavior was generally very widely spread and concentrated more often by Pt. Roberts/ Fraser River than the west side of San Juan Island. This absence suggests changing use of their historic core habitat, likely due to factors such as prey availability.

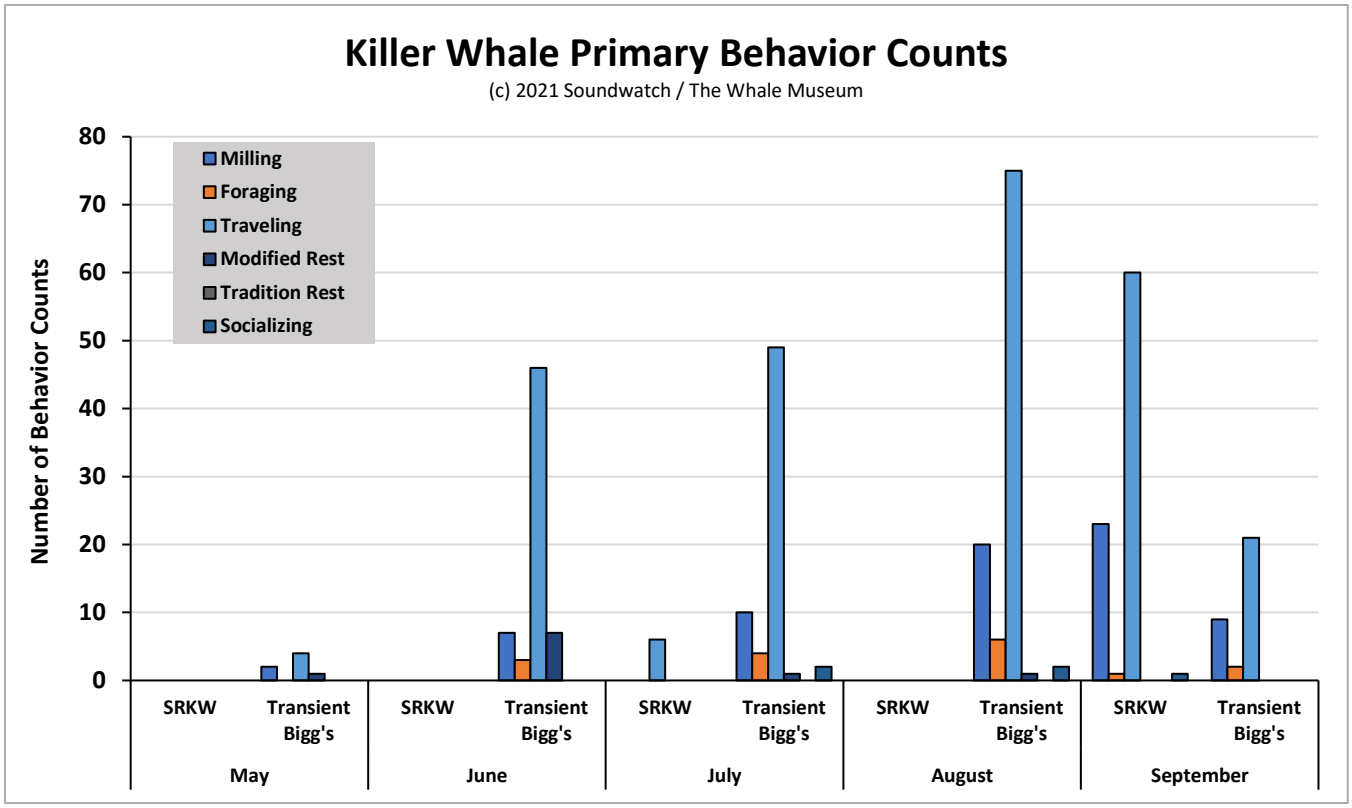

Figure 31: Southern Resident and Transient killer whale behavior counts from May-September 2021 conducted near the hours and half hour by Soundwatch.

Other Large Cetacean Attribute Data

Soundwatch recorded whale behavior data for all large cetaceans encountered during the 2021 season, *16* days (*46* data counts) opportunistically with Humpback whales, *7* days (*11* data counts) opportunistically with Minke whales, and *2* days (*10* data counts) opportunistically with gray whales. Figure 32 depicts Humpback whale primary behaviors recorded by Soundwatch from May-September 2021. The most common primary behavior across all months was traveling. Foraging behavior would only be recorded if there was evidence of prey or obvious foraging behavior. Minke whale and gray whale data have been excluded due to low sample size for whale behavior.

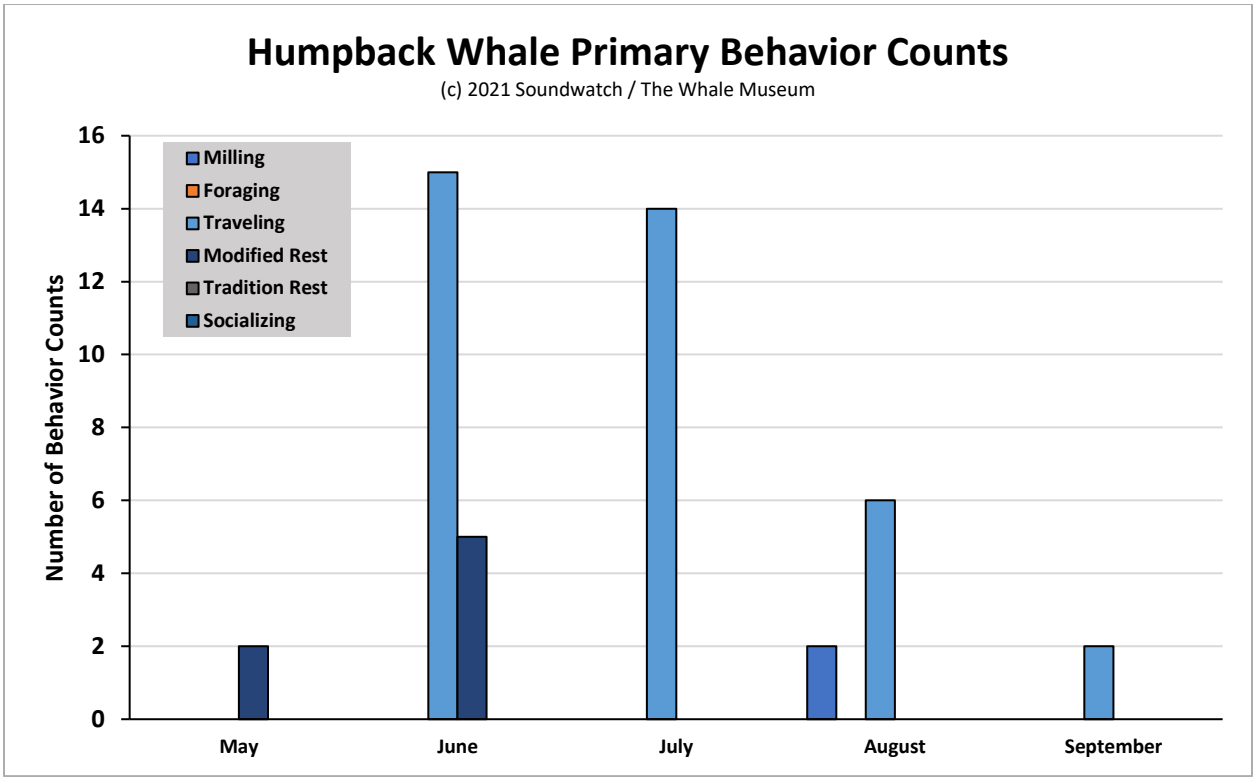

Figure 32: Humpback whale behavior counts from May-September 2021 conducted near the hours and half hour by Soundwatch.

Compliance and Incidents

Vessel Incident Data

Soundwatch *Vessel incident* data can be utilized to characterize types of vessels, types of vessel incidents, and geographic locations where vessel incidents are most commonly observed. A *vessel incident* is specifically defined as a driver of an EcoTour (commercial) vessel, recreational boat operator, kayaker or other vessel operating contrary to current voluntary *Be Whale Wise Guidelines*, the *Kayakers Code of Conduct*, the San Juan Marine Stewardship Area (including close proximity to National Wildlife Refuges, Voluntary No-Go Zones, etc.), the PWWA Commercial Whale Watch Guidelines and/or federal and state vessel regulations. Only trained Soundwatch staff driver/educators make the determination of an observation of a potential *vessel incident*. A set of standardized *incident descriptions* was established in 2007 and updated in 2011 to include the vessel regulations (Appendices J1 & J2). This standardized set of definitions is used by the U.S. and Canadian federal governments, Straitwatch of British Columbia, and Soundwatch of Washington State. Incidents are recorded opportunistically as they are observed using a *Vessel Incident datasheet* (Appendix H). Soundwatch staff are conservative in recording incidents.

Soundwatch uses summary statistics to analyze annual vessel incident data (Table 1); while useful, there are some obstacles when comparing historical data due to adaptive management of regulations and guidelines. For example, in 2016 a vessel between 200-300 yards abeam of

SRKWs would not be considered in violation, but the same action in 2020 would be recorded as an incident. Beginning in 2017, vessel incidents were recorded for Transient and SRKWs, since both species are covered under the federal killer whale law. Similarly, in 2019 WDFW, San Juan County, PWWA, and NOAA recognized and promoted a voluntary No-Go-Zone on the west side of San Juan Island from Mitchell Point to Cattle Point out a quarter of a mile and a half mile from the lighthouse at Lime Kiln State Park. This extended the previous voluntary No-Go-Zone from Eagle Point to Cattle Point, now including more of the popular fishing grounds near Eagle Point. As a result, there are more vessels operating within this expanded No-Go-Zone than in previous years and this may have driven the higher percent of incidents of vessels within the zone. To further complicate matters, it is difficult to measure the true effectiveness of guidelines and regulatory measures when they were not consistent on both sides of the U.S./Canadian border (trans-boundary) prior to July 2018 when Canada updated their federal guidelines to better coincide with the United States. However, today there are still discrepancies across the border in terms of cohesive regulations and guidelines.

Soundwatch Observed All Vessel Behaviors Contrary to Guidelines and/or Regulations 1998-2021 (© 2021 Soundwatch/The Whale Museum)																								
Behavior Category	**Yearly Incident Percentages**																							
•Note Categories Not Used During All Years	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Leapfrogging	37%	31%	23%	1%																				
Under power within 0-100 yards of whales	6%	4%	5%	4%	5%	12%	9%	10%	12%	15%	12%	13%	12%	8%	4%	10%	9%	7%	9%	9%	2%	5%	9%	6%
Stopped within 0-100 yards of whales														17%	8%	7%	13%	11%	12%	10%	2%	1%	0%	1%
Under power within 100-200yards of whales														12%	10%	15%	12%	8%	14%	16%	9%	9%	9%	17%
Stopped within 100-200yards of whales														18%	15%	6%	14%	13%	15%	14%	7%	1%	<1%	3%
Within SJI No-Go-Zone	39%	26%	17%	17%	7%	13%	4%	8%	4%	5%	6%	8%	10%	6%	6%	2%	0%	2%	2%	<1%	15%	7%	2%	1%
Within 880 yards of Lime Kiln	2%	2%	2%	1%	2%	5%	1%	2%	1%	3%	1%	3%	4%	1%	2%	1%	1%	2%	<1%	<1%	<1%	1%	<1%	<1%
Crossing path of whales	4%	3%	5%	2%	4%	7%	6%	4%	5%	8%	4%	5%	5%	2%	7%	10%	8%	3%	0%	0%	<1%	0%	0%	<1%
Chasing/pursuing whales	3%	1%	3%	2%	<1%	4%	3%	1%	2%	3%	3%	3%	3%	1%	<1%	<1%	0%	0%	0%	0%	4%	2%	4%	3%
Inshore of whales	5%	29%	24%	25%	19%	16%	22%	18%	17%	16%	21%	24%	17%	13%	10%	10%	9%	9%	4%	3%	<1%	7%	7%	8%
Airplane within 1000 feet	4%	2%	4%	7%	14%	6%	6%	4%	6%	8%	8%	6%	4%	3%	<1%	8%	2%	2%	<1%	1%	<1%	<1%	0%	5%
Within 200 yards of National Wildlife Refuge	0%	1%	3%	1%	2%	2%	1%	0%	<1%	1%	1%	<1%	1%	<1%	1%	<1%	0%	0%	0%	<1%	<1%	1%	0%	<1%
Other		1%	3%	3%	14%	5%	15%	11%	10%	3%	2%	1%	1%	0%	1%	1%	0%	0%	0%	3%	13%	3%	0%	0%
Within 220 yards of shore; whales present			4%	4%	2%	<1%	4%	1%	2%	2%	<1%	<1%	1%	1%	2%	1%	0%	0%	<1%	1%	<1%	0%	3%	0%
Repositioning within 100 yards			7%	7%																				
In the Path (formerly Parked in the path of whales)				26%	24%	17%	19%	27%	26%	17%	25%	19%	23%	11%	16%	18%	17%	26%	23%	23%	21%	12%	11%	8%
Fast within 1/2 mile					3%	4%	9%	10%	11%	16%	11%	13%	13%	6%	8%	9%	8%	11%	6%	6%	7%	35%	44%	44%
1st Approach head on, behind, or on shore					4%	2%	1%	<1%	1%	2%	3%	2%	3%	1%	4%	1%	3%	2%	7%	5%	8%	0%	0%	0%
Kayaks spread out					<1%	3%	0%	<1%	1%	1%	1%	1%	1%	<1%	2%	1%	1%	2%	<2%	<1%	2%	1%	0%	0%
Kayaks with whales outside 1/4 SJI Zone					<1%	1%	0%	<1%	1%	<1%	1%	1%	1%	<1%	1%	<1%	0%	0%	<1%	<1%	<1%	0%	0%	0%
Kayaks paddling w/in 0-100 yds						3%	0%	<1%	1%	<1%	1%	<1%	1%	<1%	1%	<1%	0%	<1%	3%	<1%	3%	3%	<1%	1%
Kayaks paddling w/in 100-200 yds														1%	1%	1%	1%	1%	3%	<1%	0%	0%	0%	0%
Kayaks parked on headland															<1%	<1%	0%	0%		0%	0%	0%	0%	0%
Within 300 yards of SRKWs (Washington 2019)																						10%	9%	4%
Within 400 yards of killer whales (Canada interim order 2021)																						2%	<1%	<1%
Total %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Observed Incidents	398	791	653	533	259	373	761	957	1,281	1,085	1,419	2,572	1,067	2,500	2,621	2,234	2,509	1,635	1,847	2,257	1,117	749	365	414
Estimated Annual Observation Hours	426hr	510hr	462hr	486hr	378hr	312hr	486hr	564hr	516hr	420hr	540hr	420hr	442hr	573hr	306hr	331hr	425hr	393hr	451hr	689hr	547hr	290hr	498hr	490hr

Table 1: Summary of vessel incidents as defined by *Be Whale Wise* Guidelines and federal/state vessel guidelines in U.S. and Washington State from 1998-2021.

During the 2021 field season, Soundwatch recorded *259* vessels for a total of *414* incidents; *259* committed by private motorized vessels, *36* by private vessels under sail, *35* by EcoTour U.S. vessels, *24* by EcoTour Canada vessels, *18* by commercial aircraft, *14* by commercial fishing, and *6* by private kayak (Table 2). Supplementary incident numbers for EcoTour vessels are provided by Soundwatch's Canadian sister program, Straitwatch, for a total of *37* Canadian EcoTour incidents and *74* US EcoTour incidents in their area of response during the 2021 season (Cetus 2022).

Incident Type	EC	EK	EU	MF	PK	PM	PS	GC	CA	R	GN	GW	MC	PA	Total
100 yards under power	1		3	1		16	4	1							26
200 yards under power	7		11	1		35	13	1			1				69
300 yards under power (SRKW WA)				3		10	4								17
400 yards under power (T CAN)															0
400 yards in the path	4		3	3		13	7			1	1		1		33
inshore of whales	1		5	2		22	2	1							33
drone violation														1	1
fast approach within 400 yards	3		3			16	1								23
fast departure within 400 yards	1		2			11									14
over 7 kts within half mile of whales	3		4	2		117	1	2			1	1	6		137
fishing within 100 yards						1									1
fishing within 200 yards						1									1
paddling within 100 yards of whales					6										6
shutdown within 100 yards															0
shutdown within 200 yards	1		1			6	2								11
SJI No-Go-Zone				2		1	1								4
spread out kayaks with whales															0
traveling behind whales 100-400 yards	3		2			9	1								15
within eighth mile of shore															0
within half mile of Lime Kiln Lighthouse`						1									1
within 200 yards of a Wildlife Refuge															1
aircraft under 1000 ft								1	18					2	21
Total															**414**

Table 2: Summary of vessel incidents in 2021 by incident type and vessel involved in the incident. See Appendix L for Vessel Codes.

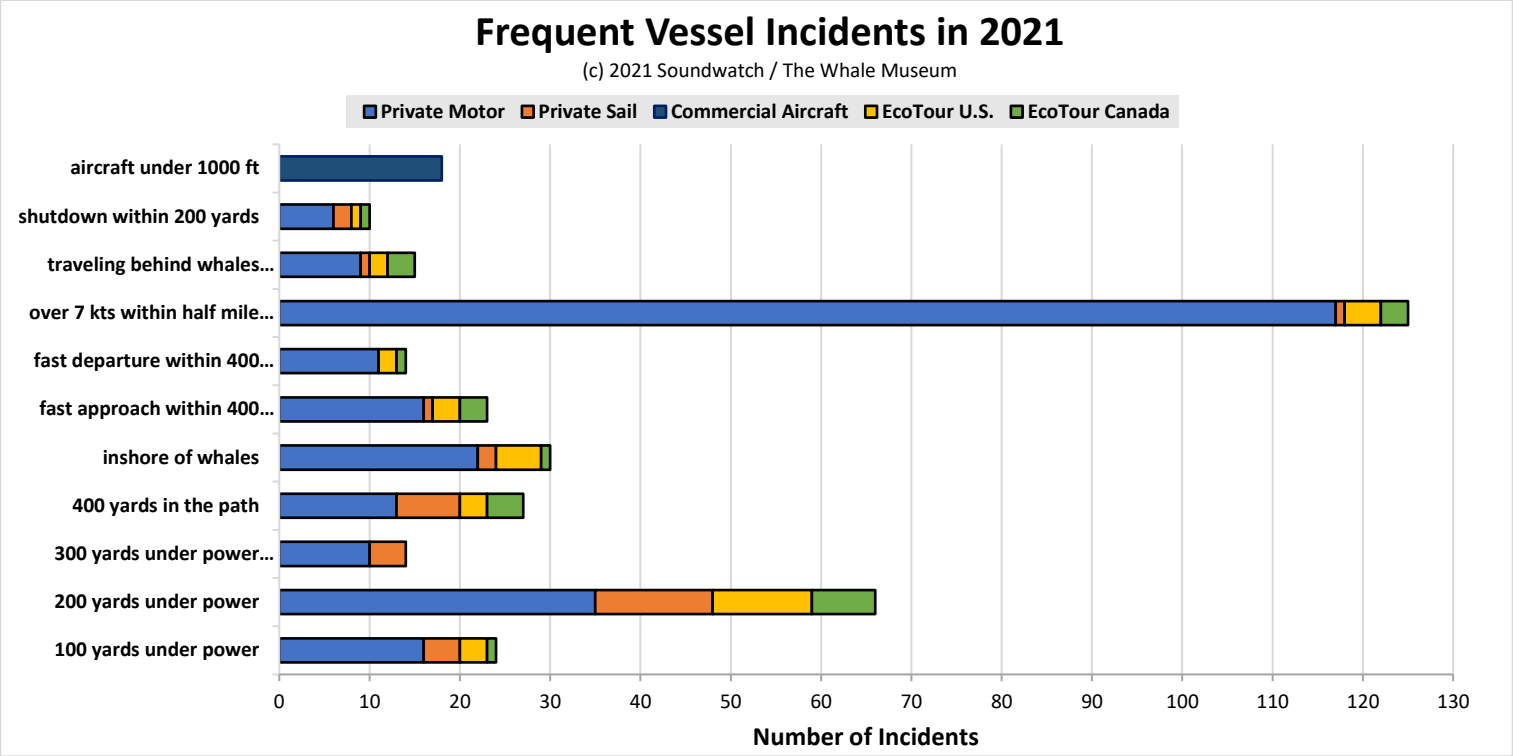

Figure 33: Most frequent vessel incidents observed by Soundwatch from May-September 2021 by incident and vessel categories.

Recreational private motors were responsible for *73%* of total recorded incidents, most frequently violating the 7kt speed limit when within one-half mile of whales (Figure 33).

Areas with high incident density overlap with whale use, boating activity, and Soundwatch presence to opportunistically record incidents while conducting research (Figure 34). Vessel activity during incidents was observed and categorized as transiting, whale oriented, or fishing. Of the *259* vessels, *58%* were transiting, *41%* whale oriented, and *1%* actively fishing (Figure 35). The volume and activity of transiting vessels likely contributed to the number of speed-related incidents reported, particularly the 7kt speed limit. Transiting vessels often appeared to be unaware of their vicinity to whales, and either unequipped with a VHF radio or unwilling to respond to attempted contact.

The area with the most vessel incidents observed by Soundwatch in 2021 was within San Juan Channel (Zone 4). This was a result of a number of compounding factors. Though SRKW were notably absent from the study area for much of the season, there was a greater presence of Bigg's Transient killer whales in the region (Figure 12). Bigg's killer whales can be found in nearly all areas around the San Juans, although not as dedicated to the west side of San Juan Island when compared to historical SRKW use. Bigg's killer whale presence in San Juan Channel overlapped with heavy vessel traffic and high potential for incidents (Figure 36). In comparison, the 2020 season saw greater presence of SRKW and therefore recorded more incidents on the west side of San Juan (Figure 37).

Of the incidents recorded, *64%* were U.S. Vessel Regulation violations; **Vessels Within 200 Yards of Whales** were *23%* and **In the Path of Whales** were *8%*. The greatest number of incidents recorded was under the Washington State Law of **Under 7 knots within a half mile of**

SRKWs at *33%*.
In 2021, **Vessels within 200 Yards of Whales** incidents (*23%* of all incidents) were broken down by;

- Vessels Stopped within 0-100 yards (*<1%*) Vessels Stopped 100-200 Yards (*3%*) Vessels Under Power Within 100 Yards (*6%*) were made by *76%* recreational vessels, *1%* Canadian EcoTour commercial vessels, and *<1%* U.S. EcoTour commercial vessels.
- Vessels Under Power Within 200 Yards (*16%*) were made by *70%* recreational vessels, *16%* Canadian EcoTour commercial vessels, and *10%* U.S. EcoTour commercial vessels.
- Fishing Within 100 Yards (*<1%*) and Fishing Within 200 Yards (*<1%*) was committed by recreational vessels (*100%*).
- Under Power Following Whales Within 400 Yards (*4%*) was committed by recreational vessels (*67%*).

In 2021, **In the Path of Whales** incidents (*8%* of all incidents) were *61%* recreational vessels and *1%* U.S. commercial vessels. **Over 7 knots within a half mile of whales** incidents (*33%* of all incidents) were committed by recreational vessels (*85%*), maritime cargo/ferries (*5%*), Canadian EcoTour vessels (*3%*), and U.S. EcoTour vessels (*2%*). As in previous years, private recreational vessels committed the majority of incidents (*73%*), distantly followed by U.S. commercial vessels (*8%*), Canadian commercial vessels (*6%*), commercial aircraft (*4%*), commercial fishing vessels (*4%*), maritime cargo/ferries (*2%*), enforcement (*2%*), private aircraft *(<1%*) and research vessels (*<1%*) (Figure 33). There is a continued trend of most incidents committed by recreational vessels. The 2021 season saw increased number of recorded aircraft incidents compared to the 2020 season.

Whale watching activities ('whale oriented') accounted for *41%* of vessel incidents when comparing vessel activities, while vessels transiting ('transiting') accounted for *58%* of incidents around whales (Figure 35). Whale oriented vessels still committed violations, such as **Under power within 200 yards** and **Fast approach/departure within 400 yards** in the known vicinity of whales (Figure 38). There was a decrease in No-Go Zone and Lime Kiln incidents recorded. This may be a result of reduced SRKW presence on the west side during the 2021 season as compared to 2020 (*13* days with SRKW in 2021 compared to *24* days in 2020).

Variations in maximum vessel numbers and average vessels on scene are likely due to annual variation in whale presence, social cohesion, and awareness. These factors will reduce the number of incidents recorded by Soundwatch (Figure 39). Soundwatch operations are limited by time, resources, weather, and other research or education activities on-the-water. Therefore, incident numbers recorded by Soundwatch are not a full representation of the whale watching scene on the water over the course of the season, and lower incidents recorded does not necessarily mean improved boater behavior.

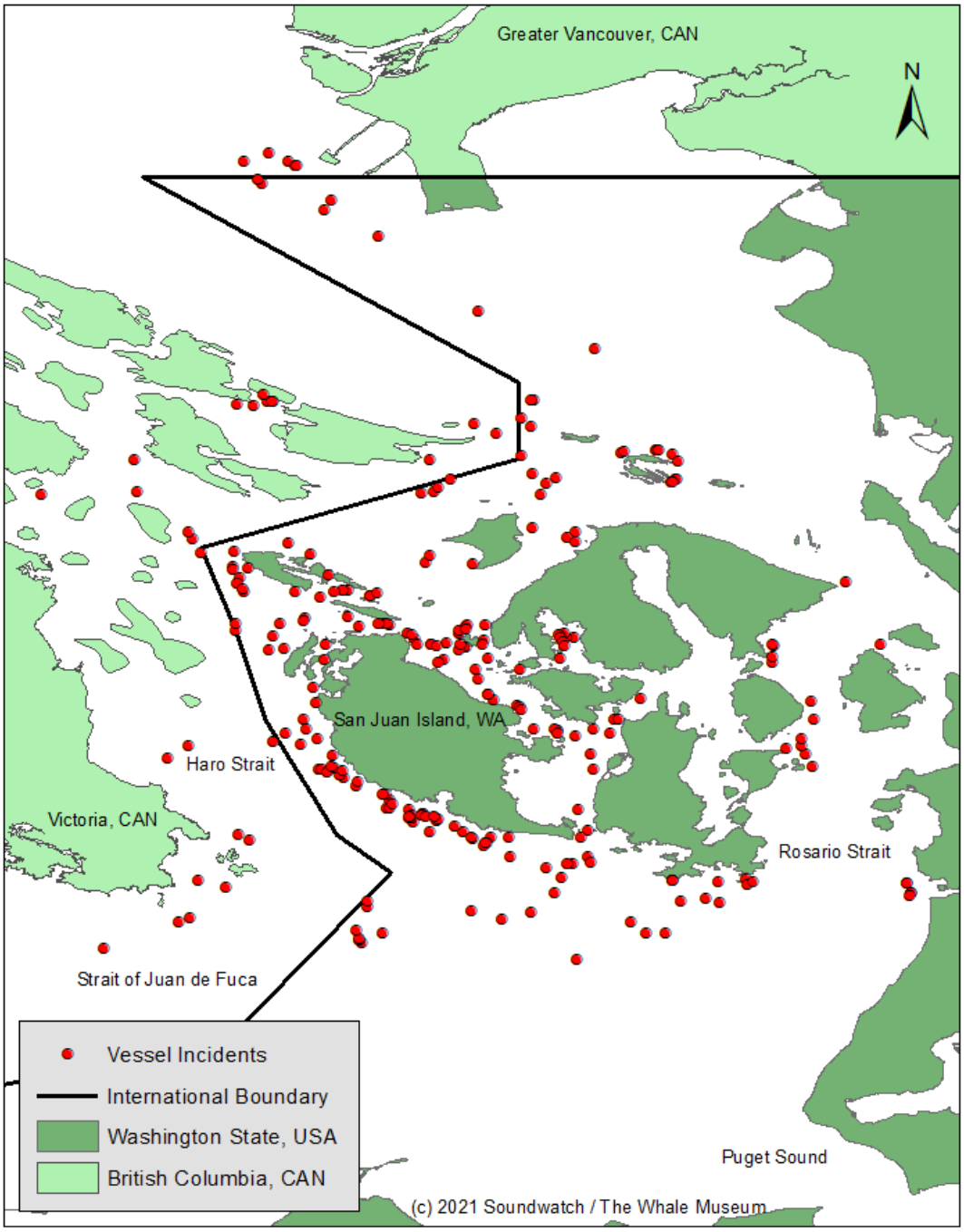

Figure 34: Total vessel incident locations observed by Soundwatch from May – September 2021. Single points can represent multiple violations, *N=259.*

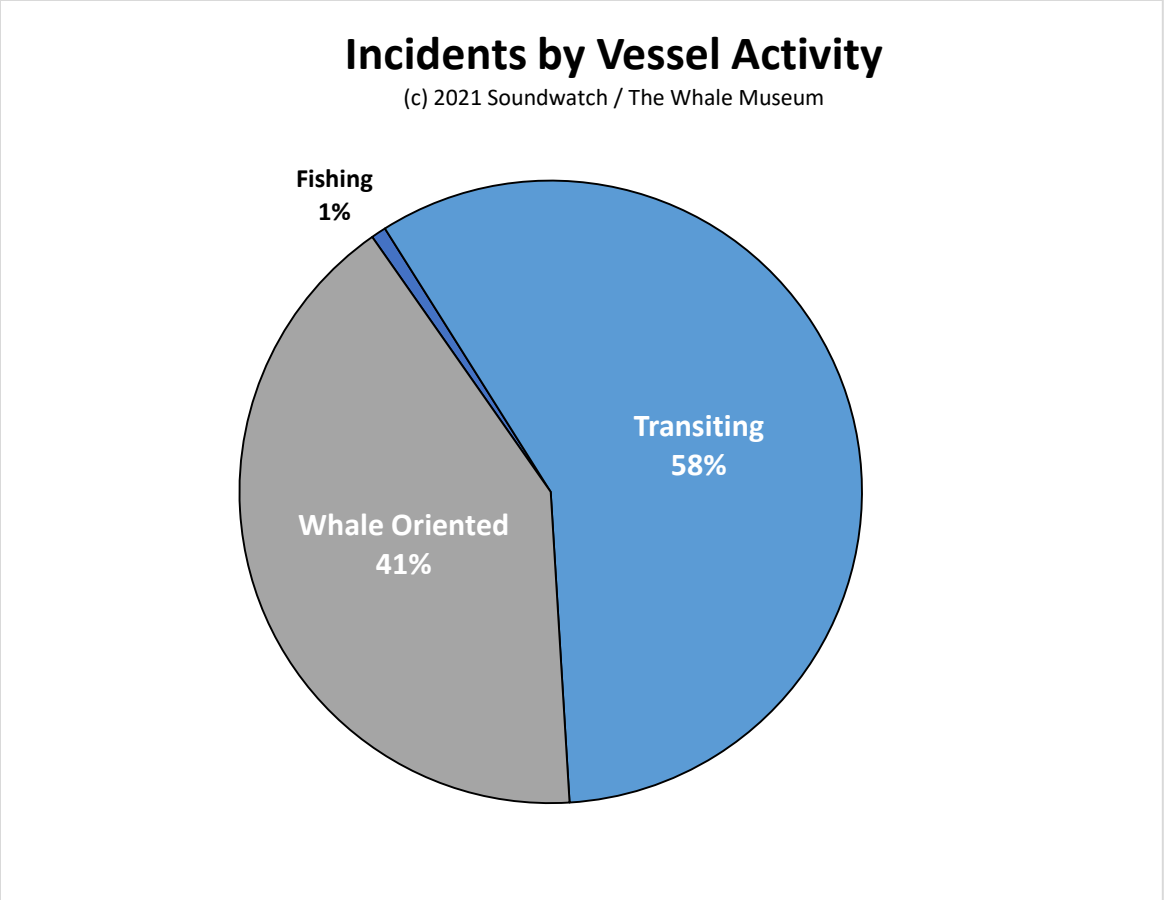

Figure 35: Percentage of all vessel incidents by vessel activity observed by Soundwatch May-September 2021.

Vessel Incident Trends

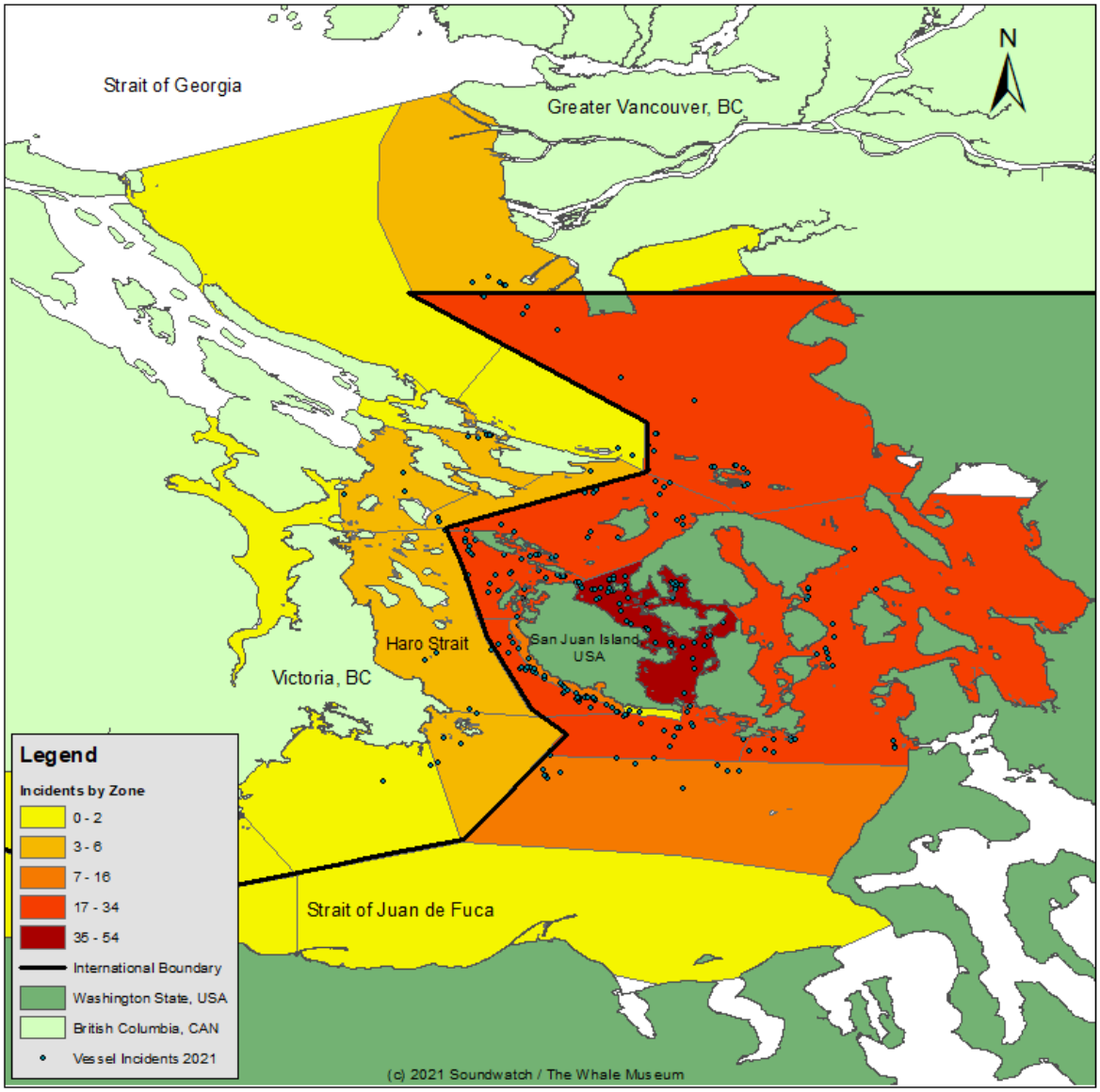

Figure 36: 2021 Vessel incidents by zones, with lighter colors having fewer total incidents than zones in darker colors. Locations can be multiple violations, *N=414 incidents*.

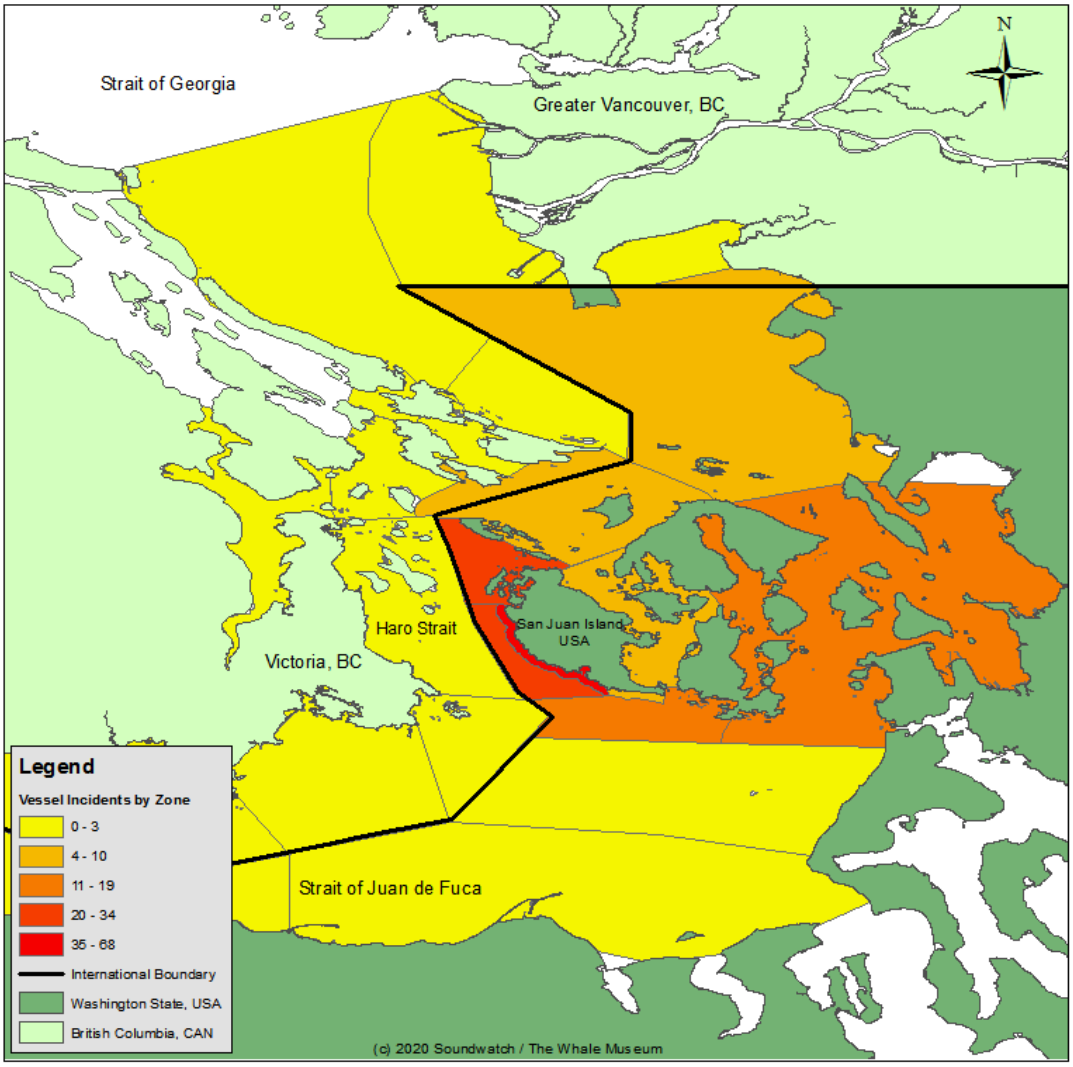

Figure 37: 2020 Vessel incidents by zones, with lighter colors having fewer total incidents than zones in darker colors. Locations can be multiple violations, *N=365 incidents*.

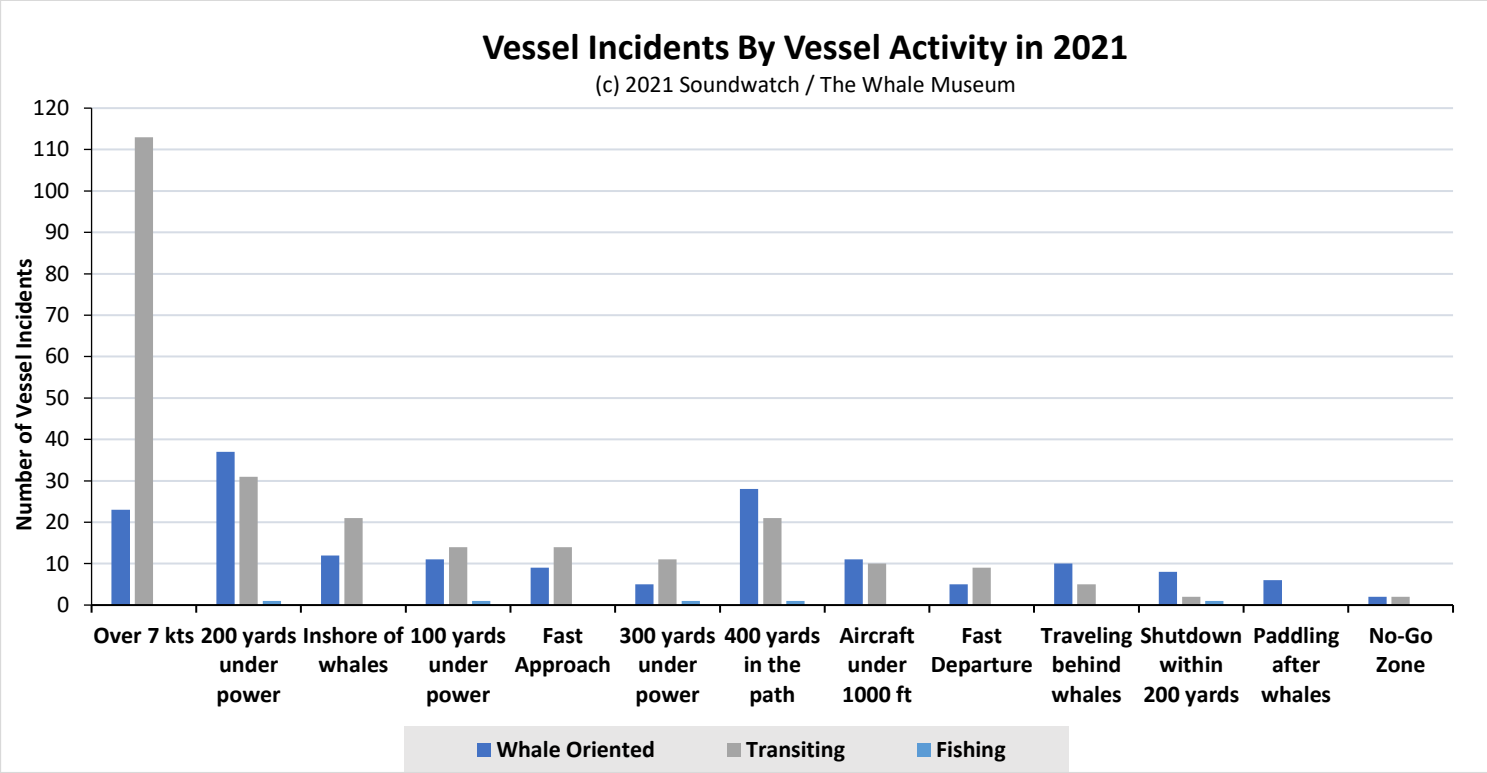

Figure 38: Most frequent vessel incidents observed by Soundwatch from May-September 2021 by incident and vessel activity.

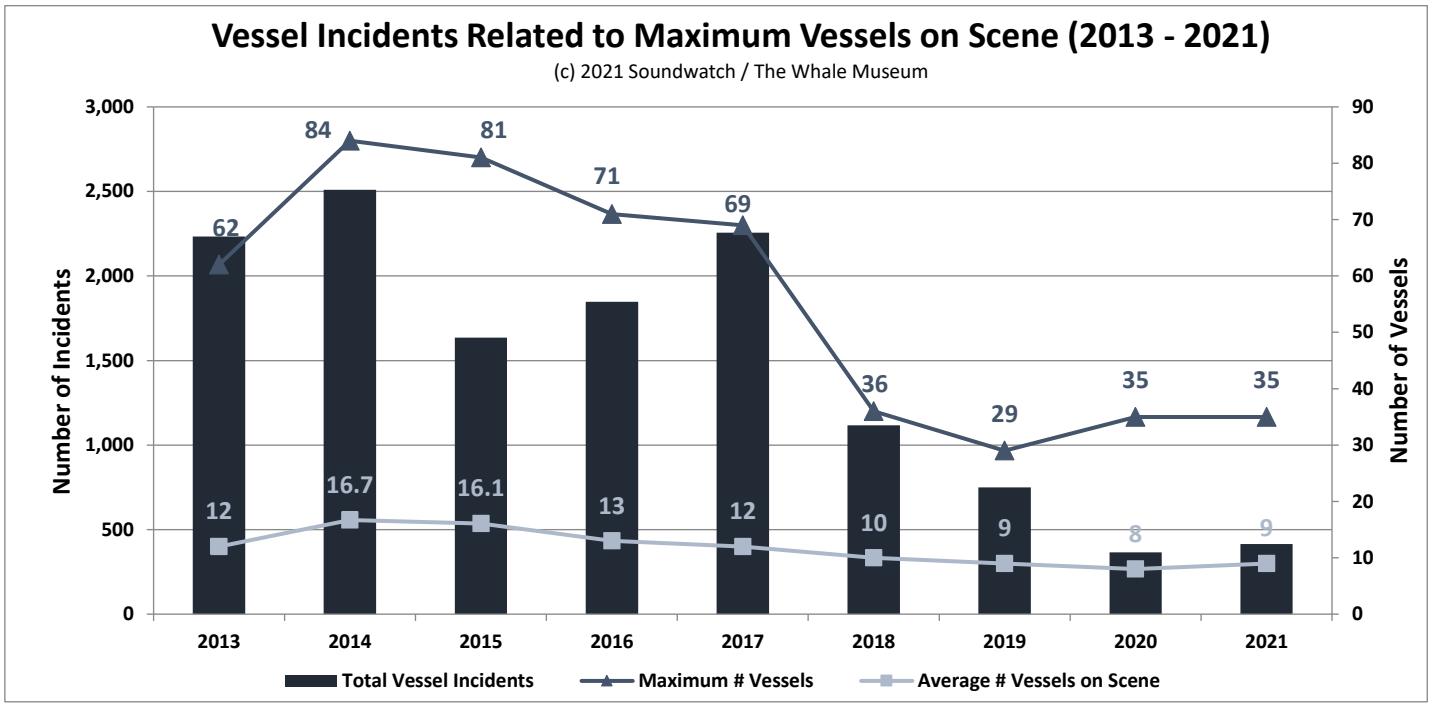

Figure 39: Average, Maximum, and Total number of vessels on scene with killer whales plotted with number of vessel incidents from May-September 2013-2021 observed in the Salish Sea by Soundwatch.

Vessel Type Incident Rates

Incident data was recorded by Soundwatch for *434* vessel counts with *414* incidents. Therefore, the overall incident rate is: 2 x 414/434 resulting in *1.91* total incidents per hour for the 2021 season (Figure 40-42). To determine vessel incident rates per vessel type: 2 x the annual number of incidents per vessel category were divided by the annual number of 30-minute vessel counts in which those vessel types were recorded. From 2009 to present, recreational vessels remain the most likely vessel type to commit all incidents (Figure 40). Recreational incident rates were also significantly higher than incident rates of any other vessel type (Figure 41).

Incident data specific to SRKWs was recorded by Soundwatch for *55* vessel counts with *104* incidents, yielding *3.78* SRKW-related incidents per hour during the 2021 season. SRKW-specific incident rates by type also differed from overall incident rates by type, although the speed violation remains the violation with highest rate of incident (Figure 42b). Cetus Research & Conservation Society's Straitwatch stewardship program recorded an overall incident rate of *13.23%* in 2021, a slight increase compared to *10.2%* in 2020 (Cetus 2022). This increase may have been due to a larger sample size in 2021 as a result of the maritime border opening to all vessels in August.

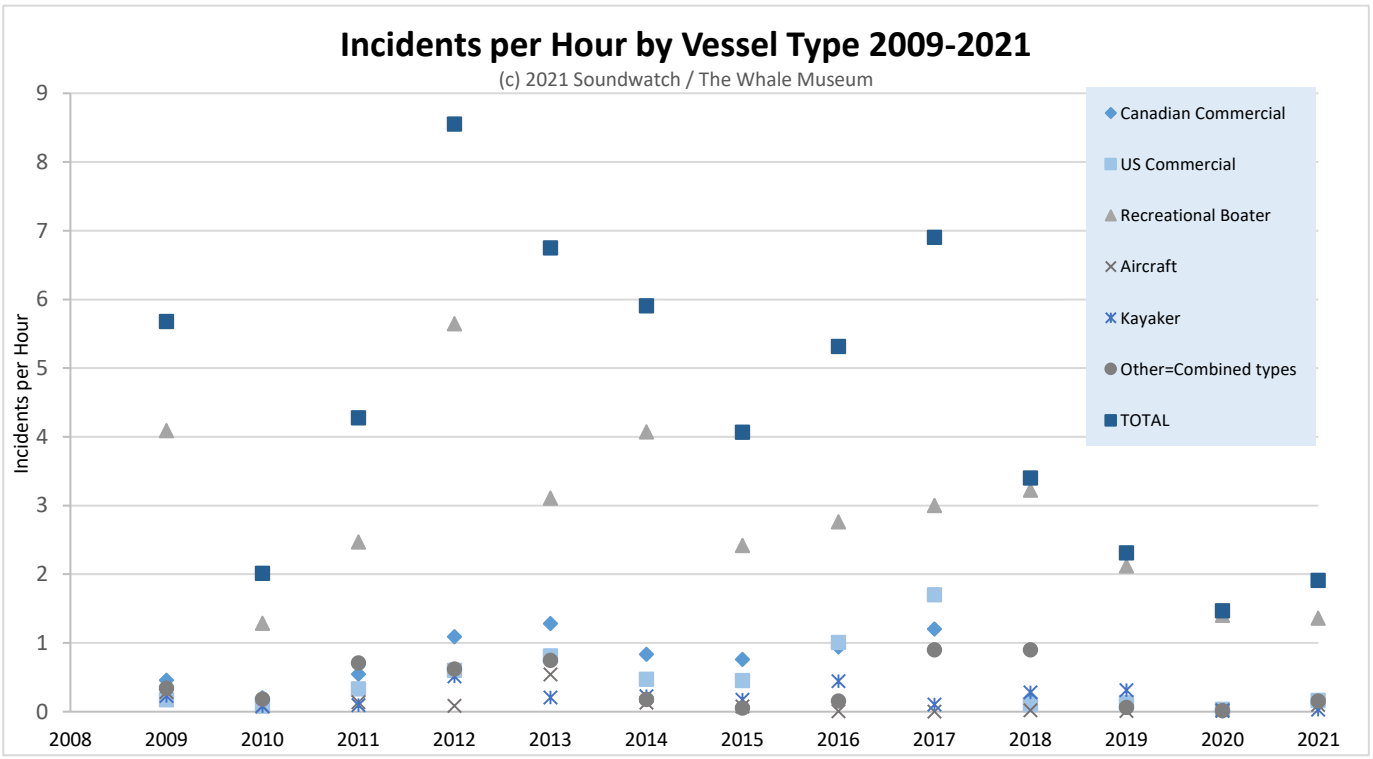

Figure 40: Trend from 2009 – 2021 Guideline and Regulation incidents per hour by vessel type.

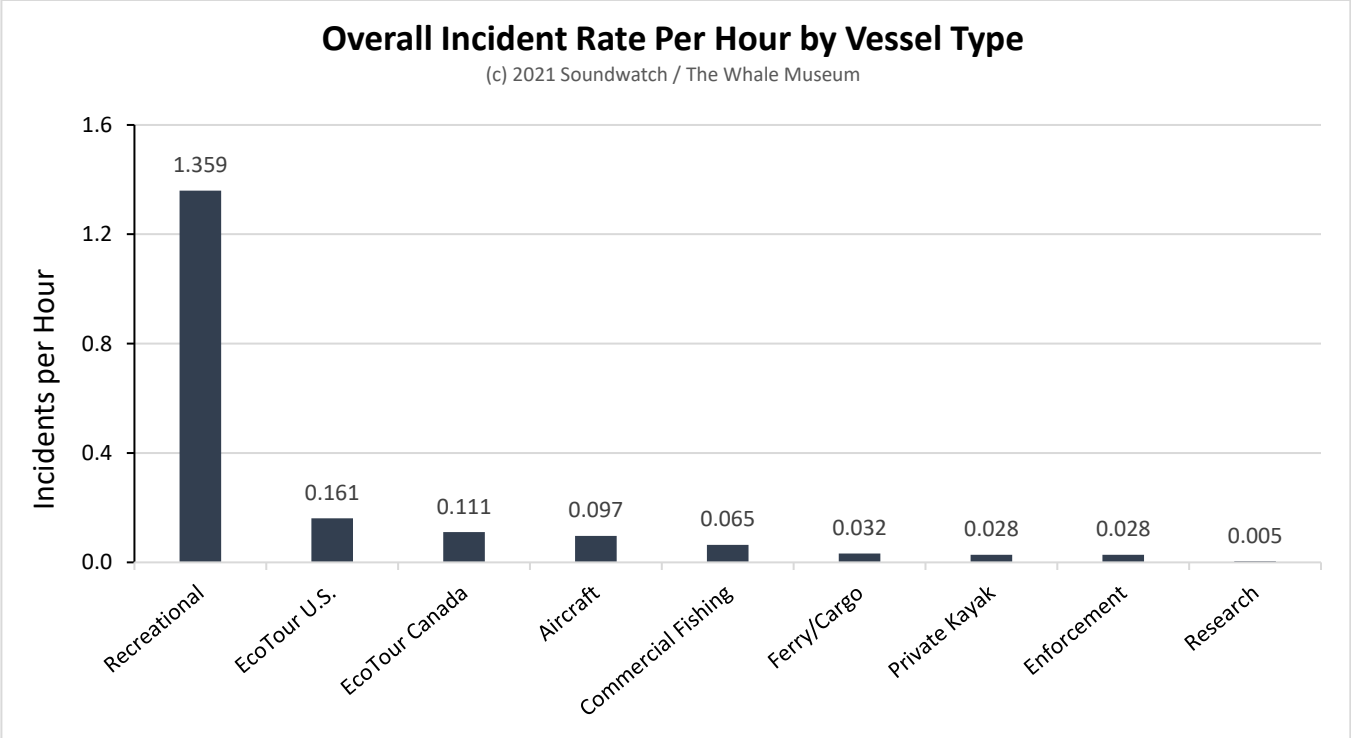

Figure 41: 2021 vessel incidents per hour by all vessel types.

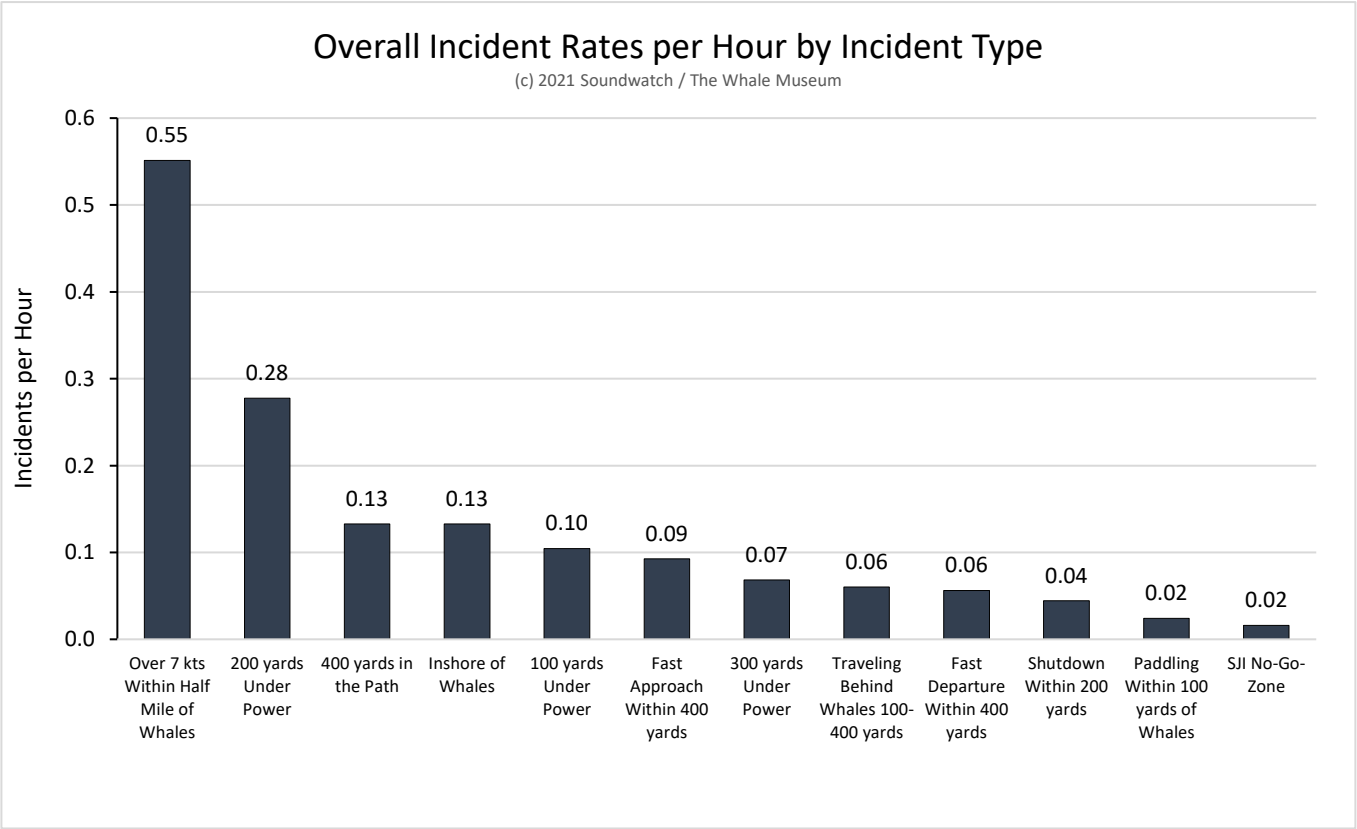

Figure 42a: 2021 vessel incident rates per hour by incident type.

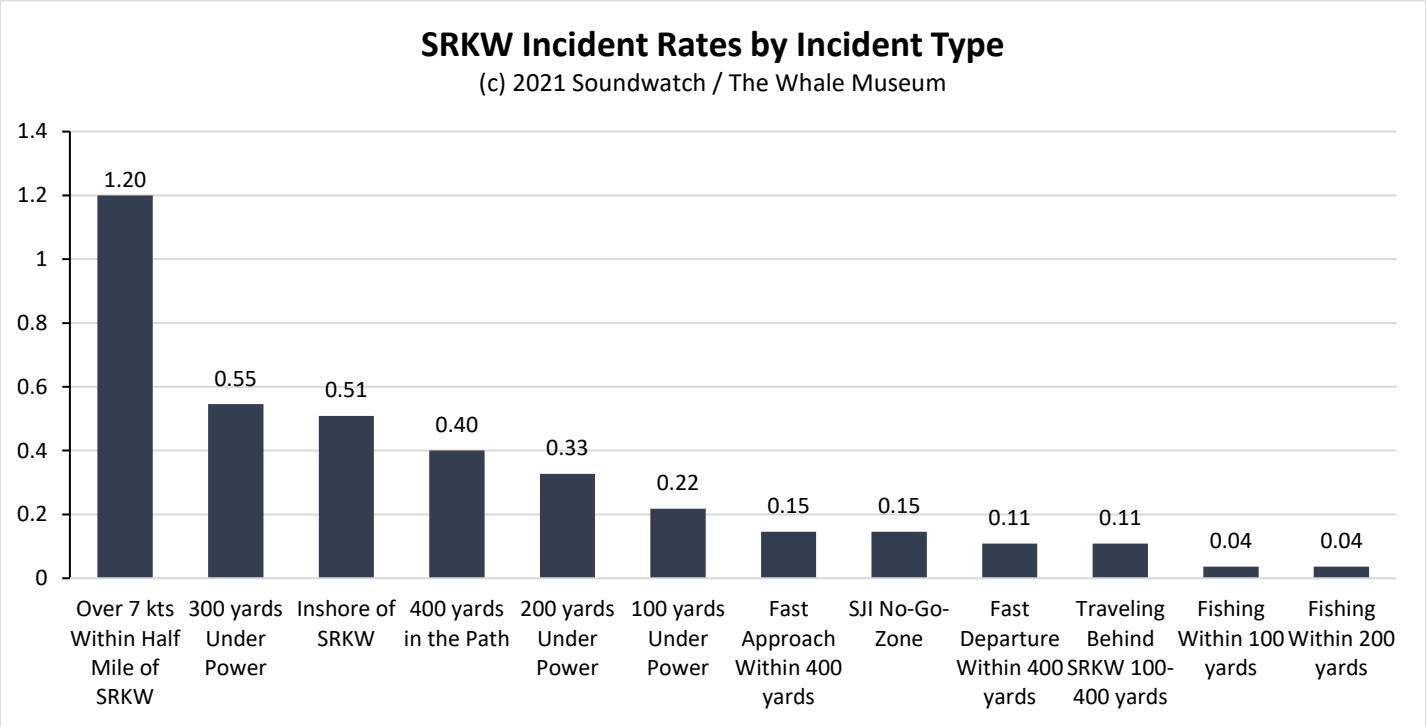

Figure 42b: 2021 SRKW-specific vessel incident rates per hour by incident type.

Enforcement

Soundwatch vessel count data recorded *33.5* hours over *21* days with maritime law enforcement agencies on scene, *9* days of which multiple agencies were present; *0.5* hours with Canadian Coast Guard, *1* hour with USCG, *1* hour with San Juan County Sheriff, *2* hours with Canadian Department of Fisheries and Oceans, *9* hours with NOAA Enforcement, and *24.5* hours with WDFW.

As in previous years, Figure 43 displays a greater level of compliance when law enforcement was monitoring in the vicinity (half-mile) of whales. Figure 43 is a simple ratio of all incidents with enforcement agencies on scene or off scene. Since enforcement was only present for *~15%* of vessel counts, this ratio is time-corrected for improved comparison (Figure 44). Across all vessel categories, vessel incidents increased with the presence of enforcement. This relationship is one of correlation, not causation. It is important to note the following factors influencing this data: Soundwatch data sampling, enforcement mission, and coordination of effort. Soundwatch usually encountered and recorded enforcement presence while monitoring whales in areas of high vessel traffic overlapping with core whale habitat, such as the west side of San Juan Island where incidents were most frequently observed. The role of enforcement in the context of SRKW recovery is typically to respond in areas and times of greatest need – generally regions with high potential for incident violations. Additionally, enforcement was present with whales more than is reflected by Soundwatch data. Due to increased coordination between Soundwatch

and WDFW, multiple vessels were intentionally spread out to increase education and monitoring of vessels near multiple groups of whales. Soundwatch and WDFW frequently communicate to avoid being in the same place with the same whales in the interest of covering a wider range with limited resources.

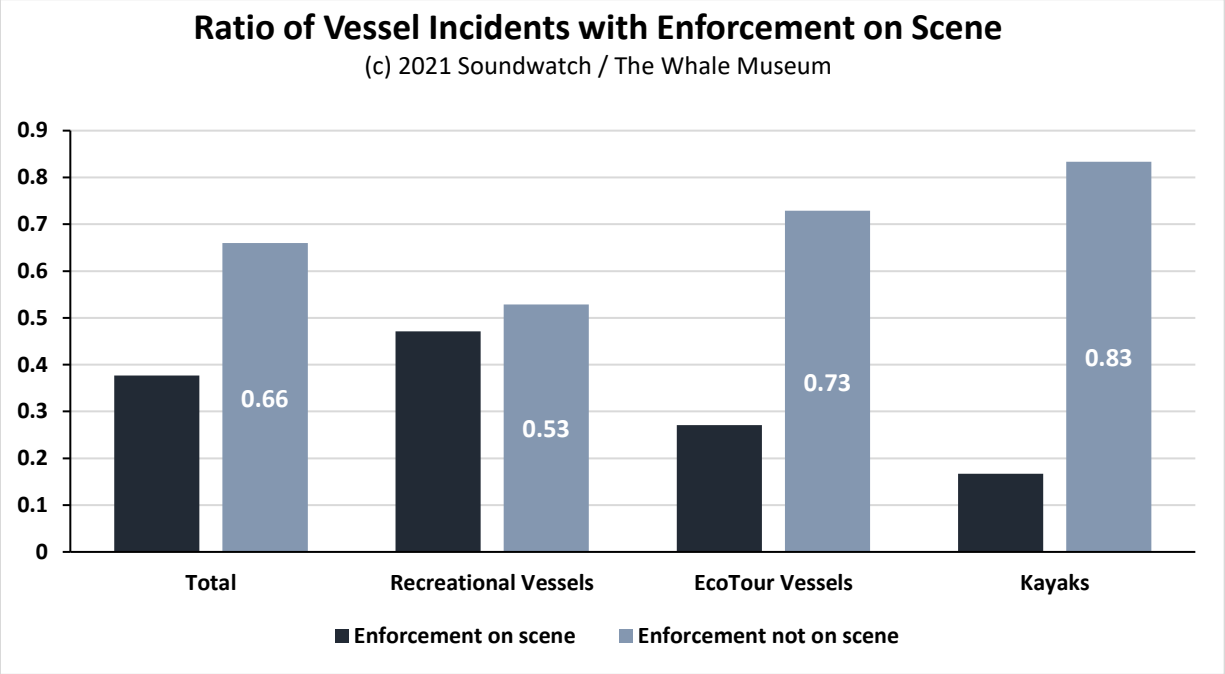

Figure 43: Ratio of incidents recorded with Enforcement on scene vs Enforcement not on scene.

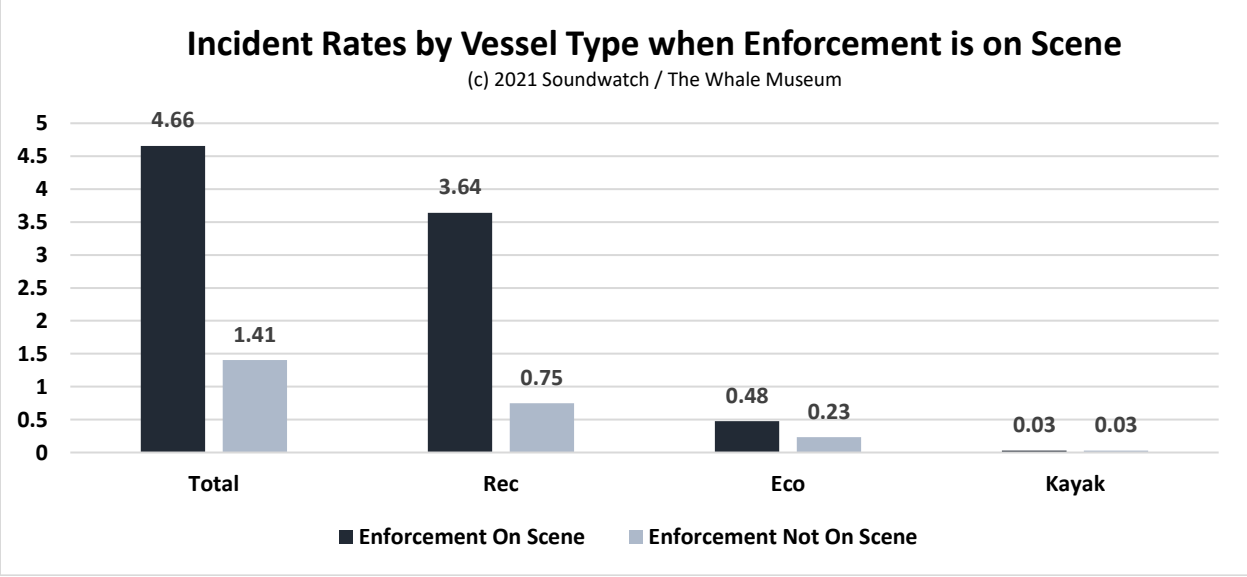

Figure 44: Incident rates by vessel types with Enforcement on scene and with Enforcement not on scene with whales when time-corrected for enforcement presence. Although it appears that incident rates increase in the presence of enforcement, this data is a result of enforcement response in the context of SRKW recovery; to focus presence in areas and times of greatest need – generally regions with high numbers of vessels and high potential for incident violations.

Whale Warning Flag

The Whale Warning Flag was introduced by the San Juan County Marine Resources Committee in 2018. Flags were distributed to research, monitoring and private boaters early on in the boating season. Flags were provided to commercial whale watch vessels in 2018 in mid-June, after the start of the boating season, so use of flags was limited by these operators. This led to an inconsistent presence of Whale Warning Flags and inability to analyze their effectiveness during the 2018 season. Throughout winter 2018 and into the 2019 summer season, the commercial whale watch fleet, enforcement vessels and more private boaters were outfitted with flags. Targeted education on the proper use and meaning of the flag was increased through the Be Whale Wise campaign during this time as well.

One frequently expressed concern is that the whale warning flag would act as a means to attract vessels to the whales; however, data suggests that the Whale Warning Flag did not act as an attractant to recreational vessels to draw them to the presence of whales since there was not a significant increase in the average number of vessels with the whales since the introduction of the flag (Figure 16a).

In 2021, the average number of whale warning flags within a half mile of all whale species was *2.85* flags with a max of *9* flags. EcoTour (Canadian and U.S. commercial wildlife vessels) had the highest average any vessel type at *1.43* flags. Recreational vessels flew an average of *0.03* flags and a max of *2* flags, a decrease from the average of *0.16* and *0.73* flags flown by recreational boats in 2019 and 2020, respectively. Other vessels averaged *1.4* flags and max of *5* (Figure 45).

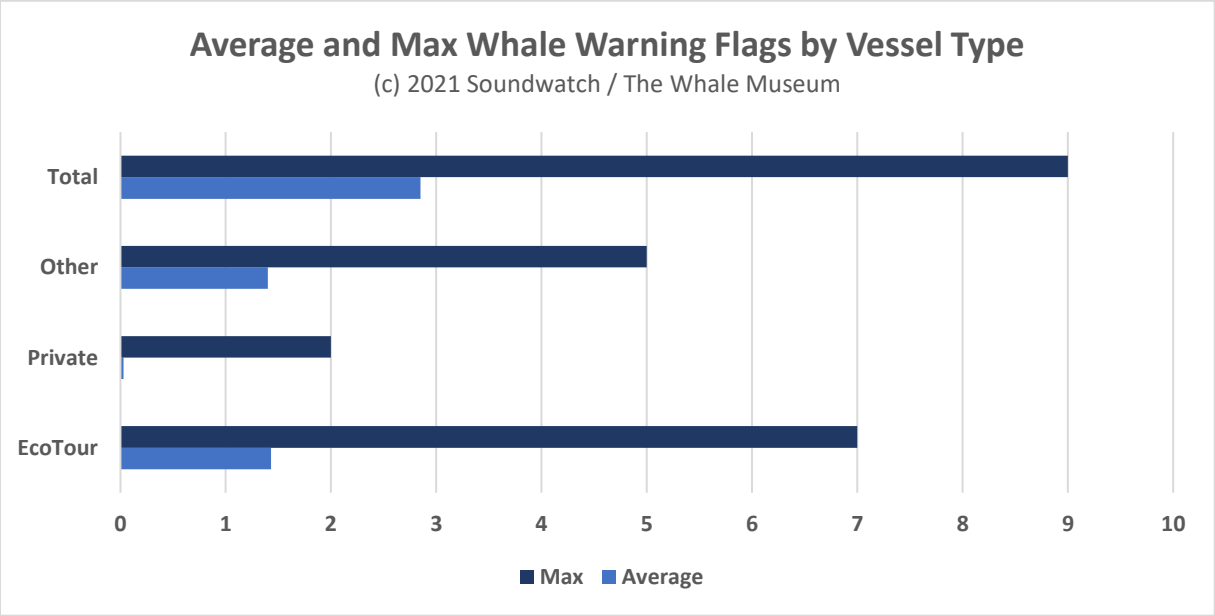

Figure 45: Average and max of Whale Warning Flags within a half mile of whales by vessel type in 2021.

Other vessels include Soundwatch, which always flew a whale warning flag and research permit flag when on scene with whales, and other monitoring and research vessels. In 29% of boat counts Soundwatch was the only vessel flying a whale warning flag (Figure 46).

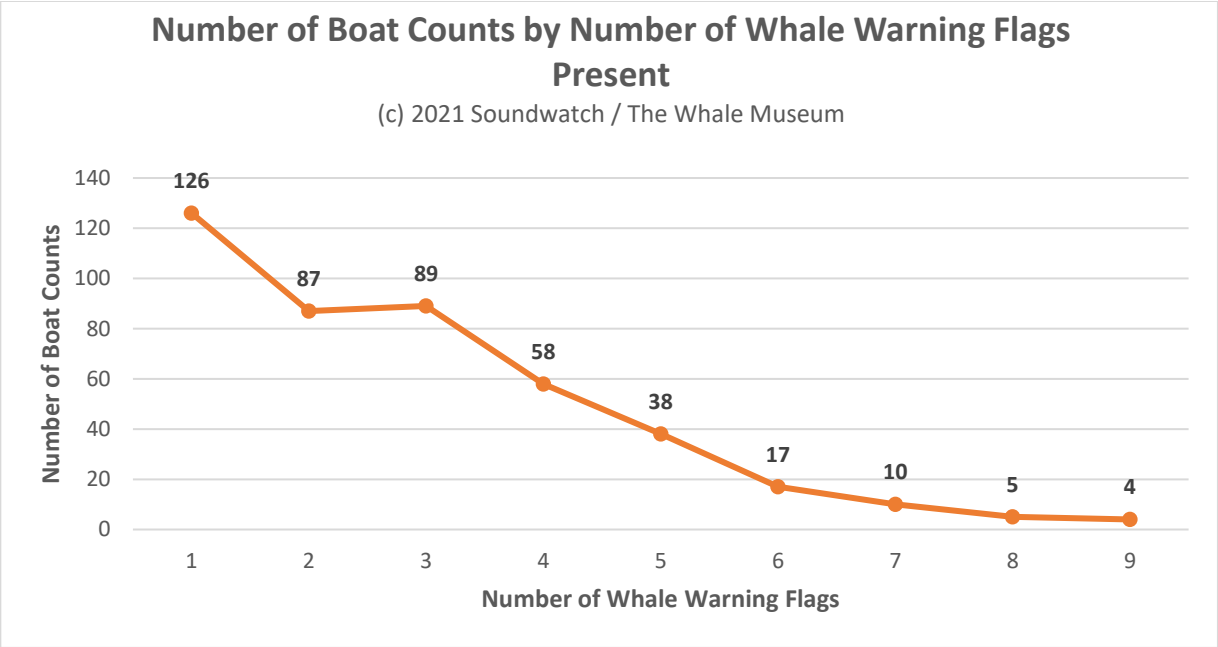

Figure 46: Number of Boat Count with number of Whale Warning Flags present in 2021.

As stated earlier, Soundwatch recorded *259* vessel incidents for a total of *414* violations during the 2021 season. Since Soundwatch always flew a whale warning flag when present with whales, all incidents recorded were with at least one flag was present. There were *186* (*72*%) incidents recorded when there was at least one other flag besides Soundwatch flown. When vessel incidents are displayed graphically against the number of Whale Warning Flags present one might assume that fewer incidents would be observed in the presence of more flags. This may be true, but when compared to boat counts by number of flags present the trend is very similar in that there are fewer vessel incidents when there are more flags due to the fact there were fewer boat counts with higher numbers of flags (Figure 48). When plotted, the negative relationship between number of vessel counts and vessel incidents is comparable with negative slopes and strong trends (R=0.89 and R=0.93) (Figure 47). This further suggests that the reduction in vessel incidents as number of Whale Warning Flags increase is due to the smaller sample size of boat counts with >7 Whale Warning Flags present. However, when there were greater than 7 flags present no incidents were recorded. This could be due to higher recognition and awareness of whales' presence by boaters due to the sheer number of vessels present. It could also be due to the high proportion of EcoTour vessels present in these scenarios, which may also serve as an indication of whales in the vicinity (Figure 29).

Overall, the rate of vessel incidents has decreased since 2017, but this trend has not been consistent (Figure 49). This is calculated by vessel incidents recorded per hour, but it is also impacted by factors including the number of hours on scene with killer whales, presence of Southern Residents, and location of killer whale sightings.

Commercial whale watch vessels are responsible for fewer incidents and are generally more likely to fly Whale Warning Flags than recreational vessels. Therefore, only in rare cases were commercial whale watch vessels flying Whale Warning Flags while they were observed committing incidents of noncompliance. Out of the *257* incidents recorded by Soundwatch, *47* were committed by EcoTour vessels, and of those, 14 were observed flying the Whale Warning Flag. There was only one case in which a private vessel flying a Whale Warning Flag was observed in violation.

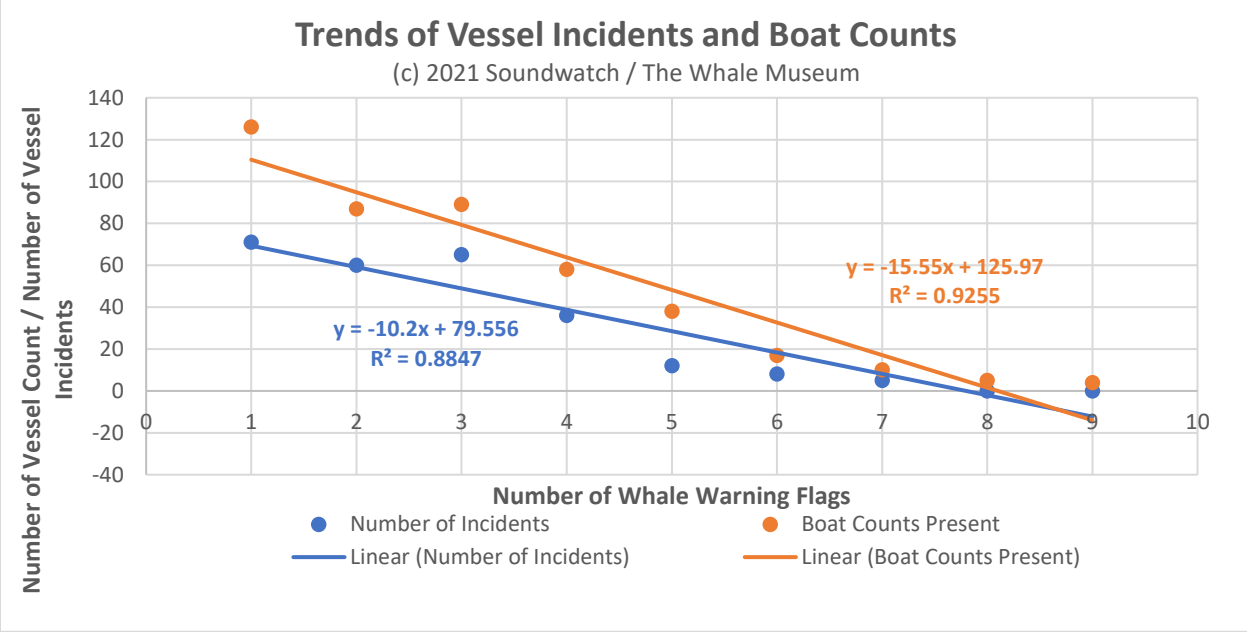

Figure 47: Displays the negative trends of vessel incidents and boat counts as related to number of Whale Warning Flags present.

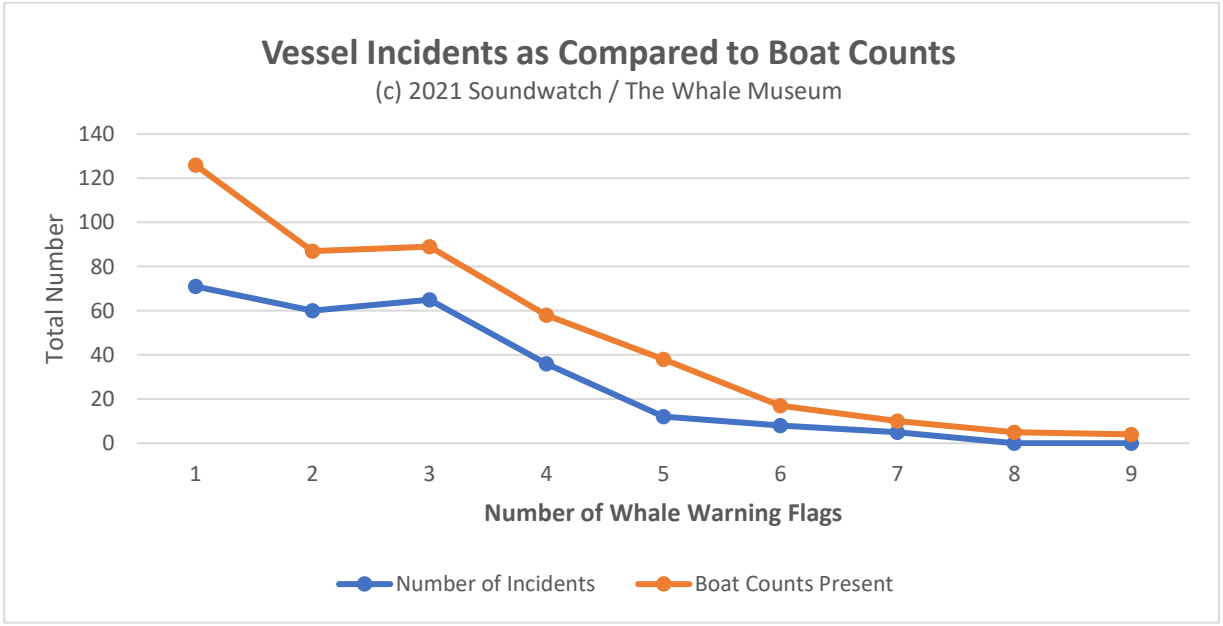

Figure 48: Number of Vessel Incidents and Boat Count by number of WWFs present.

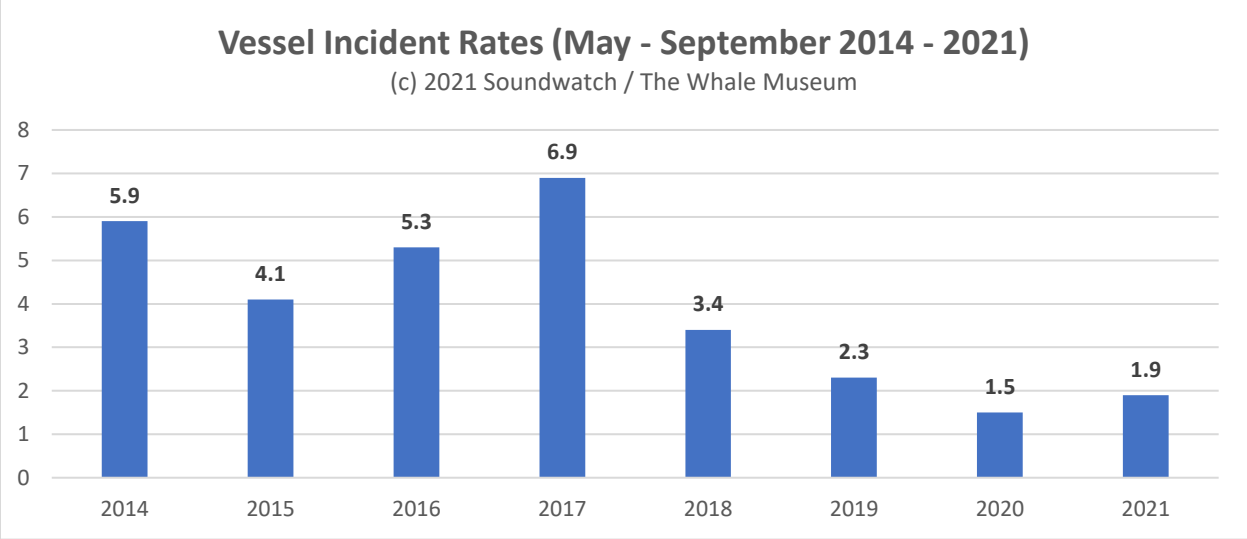

Figure 49: Average vessel incident rate per hour from 2014-2021.

In 2018 when the flag was first introduced, Soundwatch did not record any usable data due to the lack of presence of the flag out on the water. Deployment methods for the flag appeared to be one of the challenges faced by flag recipients at first. Many commercial operators were either slow to utilize their flags or did not utilize their flags due to logistical difficulties. In 2019, under an agreement between the Pacific Whale Watch Association (PWWA) and Transport Canada members were "required" to fly their flags when present with whales. This resulted in an increase in the use of whale warning flags since 2019. In a recent collaboration, Washington State Parks Boating Program partnered with San Juan County's Marine Resources Committee to provide whale warning flags to the boating public in an effort to raise awareness of the flag and its purpose.

Discussion

Recommendations for SRKW Protection and Recovery

Soundwatch data from 1998-2021 shows continued boating pressures and noncompliance with best practice guidelines and vessel regulations for killer whales throughout the Salish Sea, the inland waters of Washington State, and British Columbia. Ongoing noncompliance demonstrates the continued need for the continuation and expansion of shore and water-based boater education and outreach efforts. Increased efforts and funding for additional enforcement patrols and enforcement action are vital to the success of Southern Resident Killer Whale protection and recovery. Sustainable funding for education, monitoring and enforcement may become a critical issue due to economic impacts of COVID-19.

Continued lack of SRKW social cohesion and multiple matrilineal groups within the Salish Sea makes it difficult to monitor vessel behavior; as the whales spread out, so do vessels engaged in whale watching activities. Thus, one Soundwatch vessel and/or one WDFW enforcement vessel were left to monitor several groupings of vessels over a greater geographic area instead of just one group in a concentrated area. Prioritization of Soundwatch vessel monitoring were; 1)

Southern Resident killer whales, 2) Transient killer whales near/in San Juan County marine waters, 3) killer whales in high traffic areas, 4) Humpback whales in high traffic areas, and 5) Minke whales in high traffic areas. The long-term Soundwatch database is very effective in tracking vessel and whale behavior trends over many years. However, with changes to SRKW presence and distribution throughout the Salish Sea, Soundwatch's standardized data collection procedures and operations are limiting the utilization of the dataset to answer specific questions, such as impacts of law enforcement presence and the sentinel role vs. magnet effect of EcoTour companies.

The 2019-2021 ESA Section 6 funding provided enhanced WDFW Enforcement presence in the vicinity of killer whales around the San Juan Islands (including a WDFW vessel and one additional FTE officer). The continuation of ESA Section 6 funding, and/or the funding from Washington State's 2020 budget, and other sources, for these programs to conduct more cooperative outreach education, monitoring and enforcement is critically needed. Collaboration of these two programs along with NOAA, DFO, Straitwatch and all *Be Whale Wise* partners is essential for boater education, marine monitoring and enforcement around killer whales.

The issue of recreational boaters requires further assessment and effort. Recreational vessels commit the highest overall number of incidents as well as overall highest rate of incidents across the board. Recommendations to address recreational vessel activity and noncompliance include: increase distance buffer around killer whales in order to lessen vessel disturbance; create a course on how to safely operate around marine mammals; and distribute BWW information with vessel registration and tabs. 2020 recommendations included the implementation of Local Notice to Mariners broadcasts to alert boats of whales in their vicinity, and the addition of regulations and guidelines to Washington State Boater Education course. During the 2021 season, the United States Coast Guard broadcasted Local Notice to Mariners in order to alert boaters to the presence of killer whales as well as remind them of the federal regulations. Washington State and Puget Sound Partnership collaborated to include marine mammal regulations in the Boater Education course. Similar efforts to require education at the boater licensing level are underway in Canada through Marine Education & Research Society (MERS).

The trans-boundary nature of the Salish Sea highlights the need for consistent regulations and guidelines between the U.S. and Canada. Different regulations across the border poses a challenge to education efforts on both sides. Updated federal regulations are recommended in order to establish better protections for SRKW as well as improve education and outreach effectiveness.

Commercial Whale Watching License Program and Sentinel Role vs. Magnet Effect

Sentinel role is defined as the presence of commercial whale watch vessels serving to alert and slow other vessels, while a magnet effect is defined as the presence of commercial whale watch vessels drawing in other vessels (Watson 2020). Soundwatch data is designed to characterize vessel trends and impacts on cetaceans in the Salish Sea. While vessel trends include commercial EcoTour vessels, it is not clear whether whale watching vessels serve as a magnet or as a sentinel for other boats observing whales. Limited data prevent definitive statements on the sentinel or magnet effect of these vessels (WSAS 2020). Anecdotally, Soundwatch has observed commercial whale watch vessels engaged in actively signaling and contacting other boaters via VHF to alert them to the presence of whales in their vicinity and the corresponding regulations.

Figure 29 suggests that commercial operators do alert recreational boaters to the presence of whales, but the extent to which commercial vessels also prevent them from violating regulations is unmeasured by Soundwatch data.

Further study is necessary to determine the claim and efficacy of sentinel role or magnet effect. In late 2020, WDFW established the Commercial Whale Watching License Program (CWWLP) as a means to address the need for managing EcoTour whale watch operations. The CWWLP establishes rules for commercial viewing of Southern Resident killer whales and requires commercial whale watching businesses including motorized, sailing, and sea kayak operations to obtain a license in order to conduct operations within the inland waters of Washington State. CWWLP rules permit commercial viewing of Southern Residents during the time periods of 10:00am-12:00pm and 3:00pm-5:00pm from July 1 through September 30 (WDFW 2020).

The program, effective January 2021, is adaptively managed, highlighting the necessity for continued research and monitoring of SRKWs in Soundwatch's area of response. While there is currently no equivalent licensing program on the Canadian side of the maritime border, the CWWLP is generally considered the pilot for corresponding Canadian efforts. Canadian operators are required to obtain the CWWLP license in order to operate in U.S. waters.

As regulations surrounding killer whales become more stringent and if SRKW sightings continue to decline, it is possible that other cetaceans in the Salish Sea will feel increased pressure from commercial and recreational whale watching. Soundwatch observed a relative increase of whale-oriented behavior on Bigg's Transient killer whales during the 2021 season. This may be a result of CWWLP rules combined with decreased presence of SRKW in the Salish Sea and increased presence of Bigg's killer whales.

Summary of 2021 Soundwatch Data

Vessels

- Soundwatch conducted *434* vessel counts within ½ mile (0.8 km) of whales; *48* days (*275* data counts) with Transient (aka Bigg's) killer whales, *16* days (*46* data counts) opportunistically with Humpback whales, *13* days (*92* data counts) directly monitoring Southern Residents, *7* days (*11* data counts) opportunistically with Minke whales, and *2* days (*10* data counts) opportunistically with gray whales (Figure 2).
- The numbers of vessels observed within ½ mile of whales (May-September) varies widely by time, date and location with maximum numbers nearly four times larger than average numbers (2021 Max. 35, Avg. 8.9).
- Soundwatch was able to operate two vessels during the 2021 season for monitoring cetaceans. The second vessel was essential to operations due to unexpected mechanical issues with the primary vessel. This added effort was supported by the National Fish and Wildlife Foundation through the Killer Whale Research and Conservation Grant.
- The highest average and max vessel counts were recorded in July; May average *7.3* max *11*, June average *7.7* max *20*, July average *11.1* max *35*, August average *9.98* max *21*, September average *8.7* max *20*.

- Recreational (private) vessels observed within ½ mile of whales had lower maximum numbers and lower average numbers than commercial vessels within ½ of whales; Recreational vessels average *2.3* max *13*, Commercial vessels average *3.9* max *14*.
- Soundwatch contacted *504* vessels with *1,463* people on board, averaging *2.9* people per vessel, around whales for education and prevention purposes.
- An average of *49%* of recreational vessels contacted for educational purposes were correctly aware of the guidelines and laws for boating around killer whales. Therefore, *51%* of contacted boaters were unaware or misinformed about the guidelines and laws for boating around marine mammals in the Salish Sea. This is an increase in awareness as compared to 2020 (*27%* awareness).

Commercial Whale Watch Industry

- The commercial whale watching season typically occurs April –October with increasing numbers of U.S. & Canadian commercial whale watch vessels going out year-round and/or starting earlier and going later into the season.
- *29* total EcoTour whale watch companies operated June-October, offering whale watching trips from *49* 'active' whale watch vessels in the U.S. and Canadian Haro Strait region, with *5* 'occasional' vessels and *14* 'rare' vessels for a potential combined total of *68* whale watch vessels operating on-the-water at a given time. This number was much lower than recent years, likely due to operational changes from COVID.
- There were no observed additions to the whale watch fleet during the 2021 season in terms of new vessels or companies; Soundwatch recorded a *36%* decrease in active whale watch companies and *51%* decrease in active whale watch vessels.
- *78%* of U.S. companies and *59%* of Canadian companies are listed members of the Pacific Whale Watch Association (PWWA). http://www.pacificwhalewatchassociation.org/
- Canadian commercial whale watch vessels continue to be mostly the smaller rigid hull inflatable (RHIB) style of vessels while the U.S. fleet is made up of mostly larger passenger style vessels.

Vessel Incidents

- Soundwatch totaled *86* vessel/whale days and *434* vessel counts. U.S. EcoTour vessels were observed *82* days and in *315* vessel counts, Recreational *66* days and *321* counts, Canadian EcoTour *47* days and *177* counts, Research *35* and *134* counts, Monitoring/Enforcement (excluding Soundwatch presence) *21* days and *160* counts, and kayaks (ecotour and recreational) *13* days and *24* counts.
- A total of *259* incidents were recorded by Soundwatch in 2021, committing a total of *414* violations.
- Of the incidents recorded, *64%* were U.S. Vessel Regulation violations; **Vessels Within 200 Yards of Whales** were *23%* and **In the Path of Whales** were *8%*. The greatest number of incidents recorded was under the Washington State Law of **Under 7 knots within a half mile of SRKWs** at *33%*.
- **Vessels within 200 Yards of Whales** incidents (*23%* of all incidents) were broken down by;

  - Vessels Stopped within 0-100 yards (*<1%*) Vessels Stopped 100-200 Yards (*3%*) Vessels Under Power Within 100 Yards (*6%*) were made by *76%* recreational vessels, *1%* Canadian EcoTour commercial vessels, and *<1%* U.S. EcoTour commercial vessels.
  - Vessels Under Power Within 200 Yards (*16%*) were made by *70%* recreational vessels, *16%* Canadian EcoTour commercial vessels, and *10%* U.S. EcoTour commercial vessels.
  - Fishing Within 100 Yards (*<1%*) and Fishing Within 200 Yards (*<1%*) was committed by recreational vessels (*100%*).
  - Under Power Following Whales Within 400 Yards (*4%*) was committed by recreational vessels (*67%*).
- **In the Path of Whales** incidents (*8%* of all incidents) were *61%* recreational vessels and *1%* U.S. commercial vessels. **Over 7 knots within a half mile of whales** incidents (*33%* of all incidents) were committed by recreational vessels (*85%*), maritime cargo/ferries (*5%*), Canadian EcoTour vessels (*3%*), and U.S. EcoTour vessels (*2%*).
- Private recreational vessels committed the majority of incidents (*73%*), distantly followed by U.S. commercial vessels (*8%*), Canadian commercial vessels (*6%*), commercial aircraft (*4%*), commercial fishing vessels (*4%*), maritime cargo/ferries (*2%*), enforcement (*2%*), private aircraft *(<1%*) and research vessels (*<1%*) (Figure 33).
- Whale watching activities ('whale oriented') accounted for *41%* of vessel incidents when comparing vessel activities, while vessels transiting ('transiting') accounted for *58%* of incidents around whales (Figure 35). Whale oriented vessels still committed violations, such as **Under power within 200 yards** and **Fast approach/departure within 400 yards** in the known vicinity of whales (Figure 38).
-

Direct Takes by Soundwatch under Permit # 21114

- In 2021, Soundwatch made *0* close approaches (closer than regulations and guidelines) as authorized under National Marine Fisheries Service Research Permit #21114.
- Any takes are directed for prevention and educational purposes due to vessel breaking U.S. Vessel Regulations and not responding to other means of communication. Any takes are conducted under discretion of professional vessel drivers to mitigate risk away from whales and maintain safety of vessels and whales.

Spatial Trends

- SRKWs display continued trend of dispersal/lack of social cohesion. SRKWs were not sighted in Soundwatch's area of response during the months of May, June and August.
- SRKWs continue to utilize their core habitat, although time and duration of use has decreased.
- A variety of vessel types, engaged in a variety of activities, routinely commit a multitude and variety of incident types, with the majority of incident types being contrary to U.S. federal vessel laws throughout the ESA designated SRKW Core Summer Critical Habitat Areas, especially in the vicinity of San Juan Island and San Juan Channel.

Education Materials/Onshore Education

- In 2021, Soundwatch Dock Talks reached *1049* guests visiting Port of Friday Harbor and Roche Harbor on San Juan Island, Washington. *49%* were aware of guidelines and regulations.
- Soundwatch aided in the development of the Be Whale Wise Outreach Toolkit.
- Soundwatch increased outreach on social media platform Instagram (@soundwatch_twm) by *430%*.
- The BWW exhibit at TWM, installed in 2016, has reached over *134,000* people.

Individuals and/or Organizations that Collaborated with the Grantee and Performed the Work:

The Whale Museum staff (Executive Director: Jenny L. Atkinson, Finance Manager: Mark Green and Soundwatch Coordinator: Alanna Frayne) administered grant funds, including accounting and disbursement, from award RA-133F-12-CQ-0057. The Soundwatch Coordinator (Alanna Frayne) along with seasonal Soundwatch driver/educator staff (Cassandra Lozano, Jessica Newley), academic interns (Casey Madill, Melanie Smith, Victoria Zelinski) were responsible for the outreach, monitoring and data collection activities as well as data entry. Thank you to The Sighting Network Coordinator: Salma Abdel-Raheem, for the data analysis support. Thank you to The San Juan County Marine Mammal Stranding Network Program Coordinator Alyssa Scott for operations support. We could not conduct such a successful program without the Board of Directors and staff of The Whale Museum, the vision of the former Soundwatch Program Directors, Rich Osborne and Kari Koski, the help of Lynne Barre from NOAA Fisheries West Coast Region, the help of Alan Myers, Taylor Kimball and Washington Department of Fish and Wildlife Law Enforcement Officers, and the assistance and the dedication of the more than 842 past and present interns and volunteers who have collectively contributed more than 70,000 volunteer hours to Soundwatch activities since 1996. Special thanks also go the numerous supporters along with the following organizations that help support and collaborate with our efforts: NOAA Fisheries West Coast Region, Northwest Fisheries Science Center, Fisheries and Oceans Canada, Transport Canada, Washington Department of Fish and Wildlife, San Juan County's Marine Resource Committee, San Juan County Parks, Straitwatch & Cetus Society, U.C. Davis, the Center for Whale Research, Orca Network, Wild Orca, Snug Harbor, Roche Harbor Marine and Marina, and the numerous, generous contributions from regional foundations, businesses and individuals over the years. To all our partners and supporters, Thank you!

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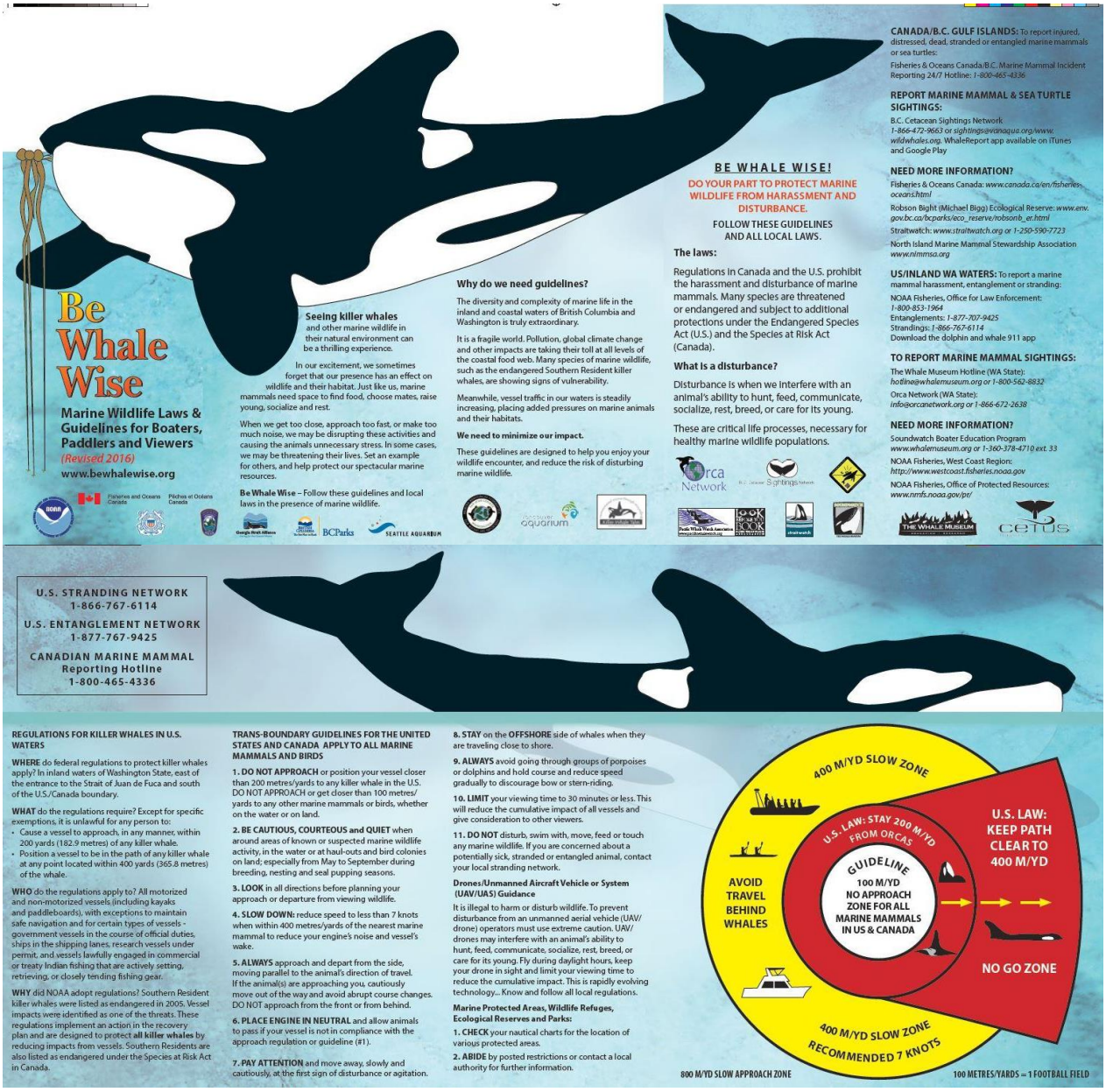
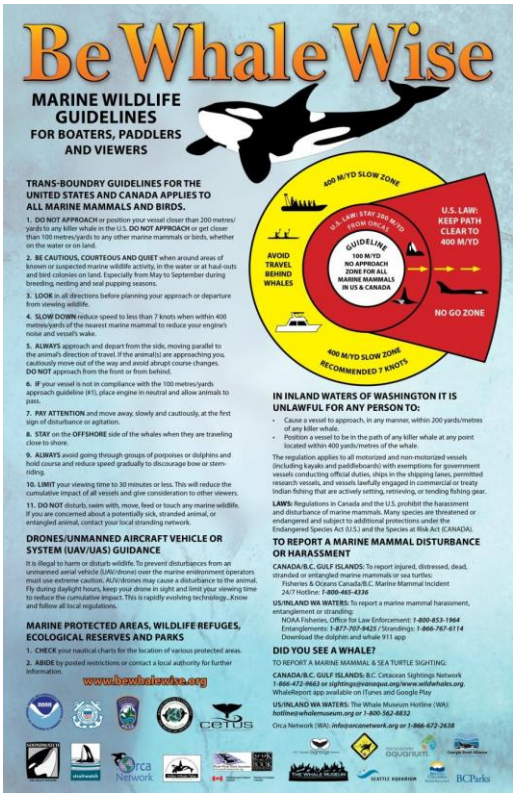
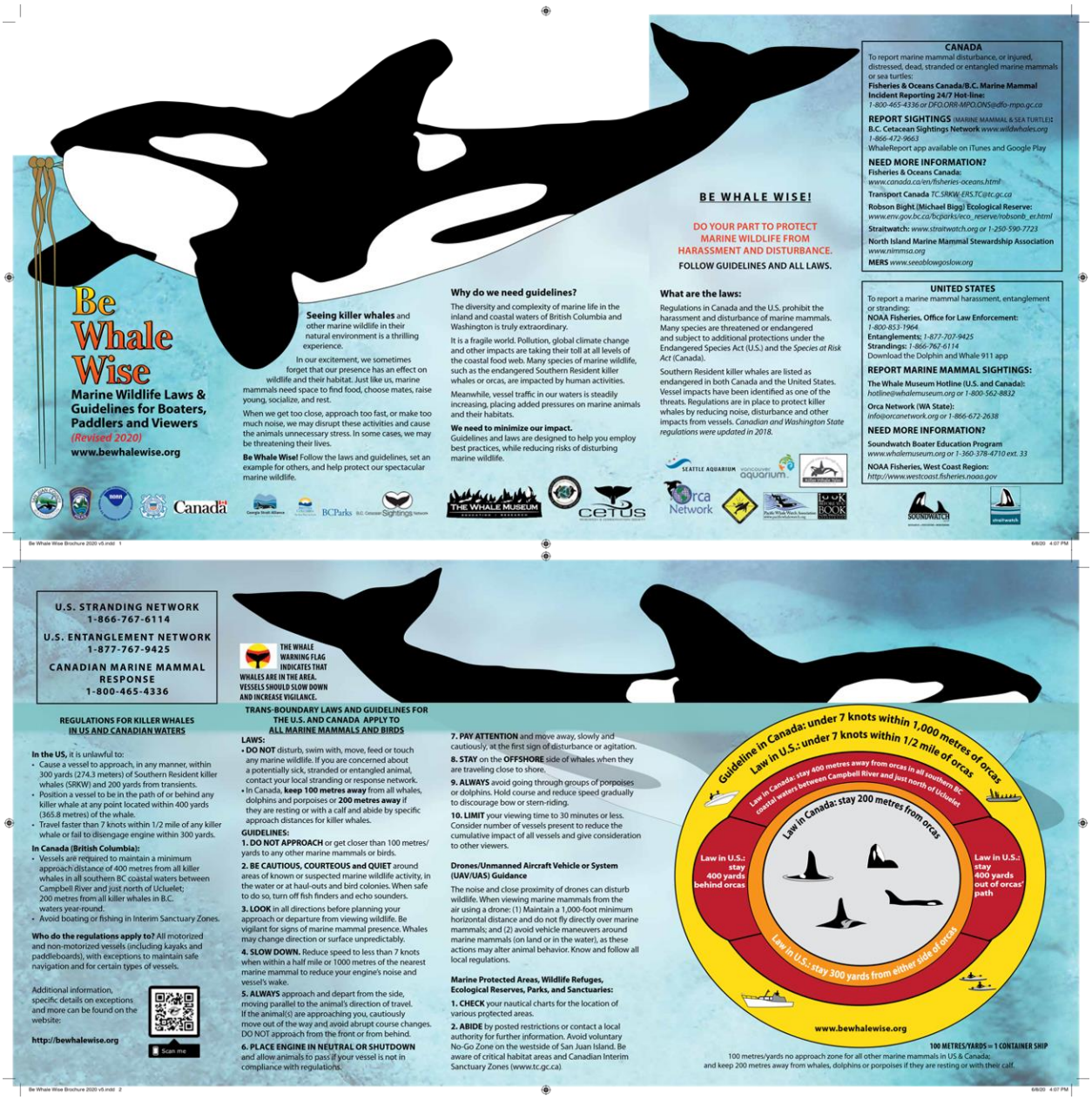
Appendices



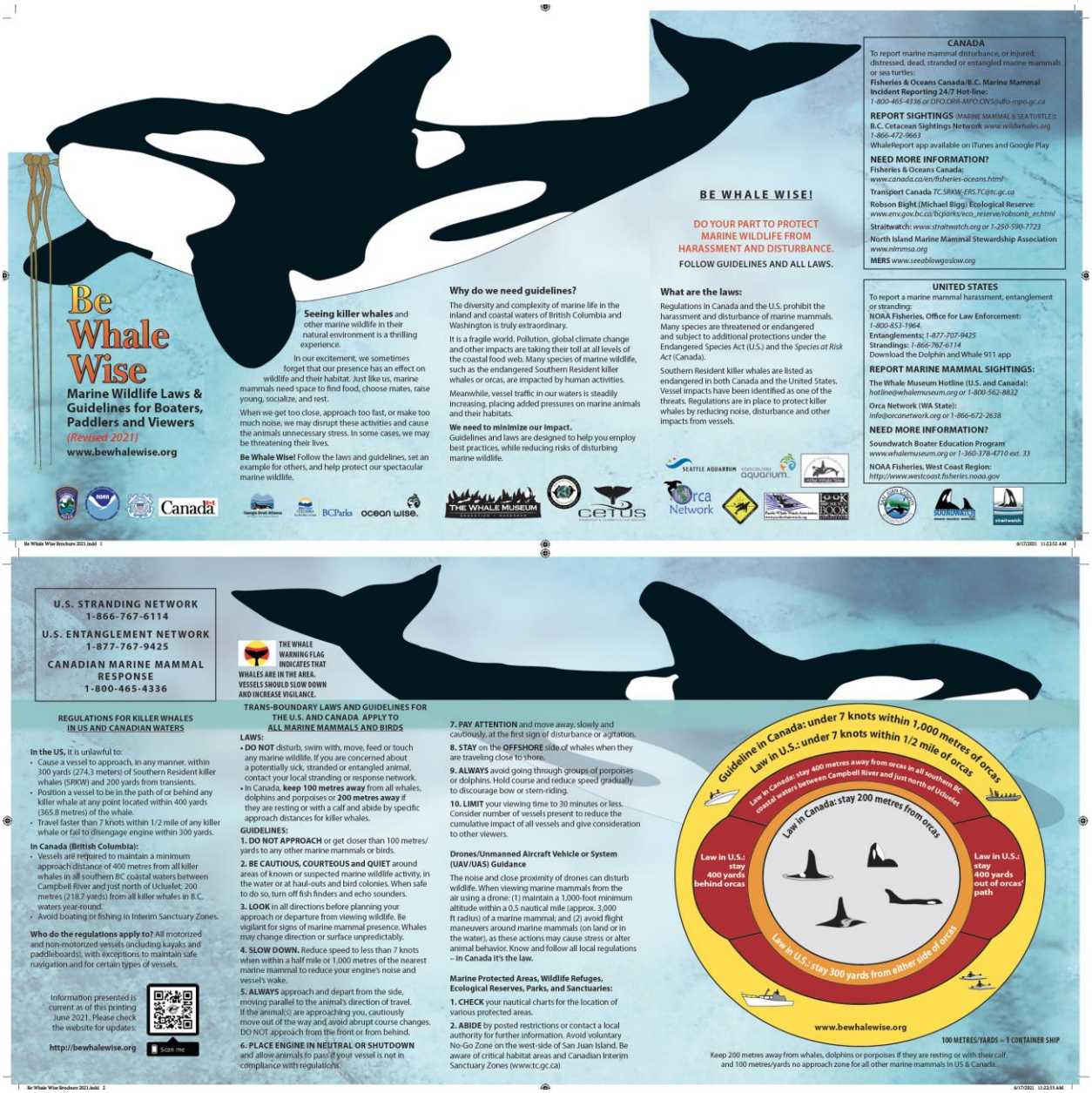
Appendix A1: Be Whale Wise Guidelines and Federal/State Regulations for Boaters, Paddlers and Viewers; Revised 2016.



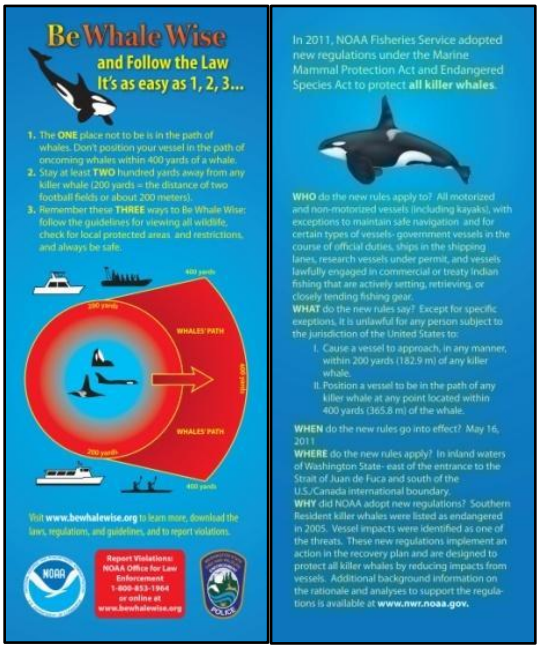
Appendix A2: Be Whale Wise Guidelines and Federal/State Regulations Poster for Boaters, Paddlers and Viewers; Revised 2016



Appendix A3: Be Whale Wise Be Whale Wise Guidelines and Federal/State Regulations for Boaters, Paddlers and Viewers; Revised 2020, Double-sided Brochure Version.

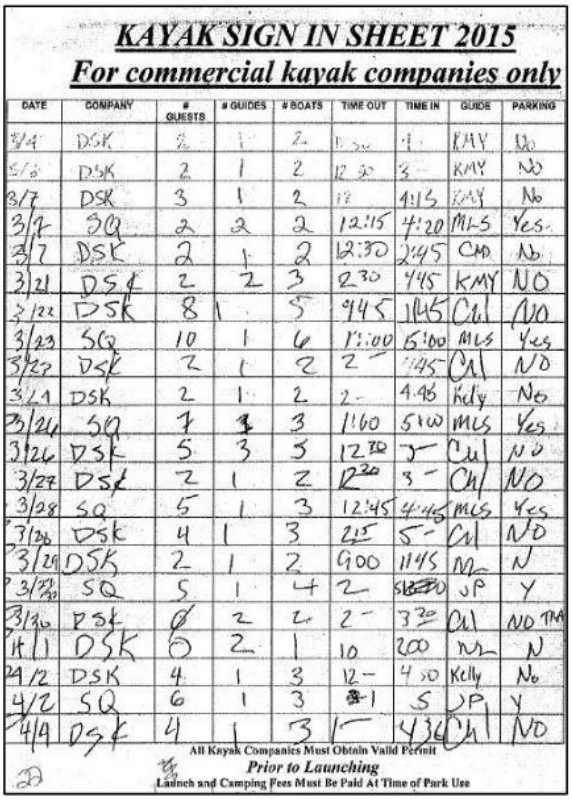


Appendix A4: Be Whale Wise Be Whale Wise Guidelines and Federal/State Regulations for Boaters, Paddlers and Viewers; Revised 2021, Double-sided Brochure Version (Available at http://www.bewhalewise.org).



Appendix B: Federal and State Vessel Regulations for Killer Whales Double-sided Rack Card used by WDFW in 2016 and 2017.

Appendix B2: Federal and State Vessel Regulations for Killer Whales used by WDFW in 2021.



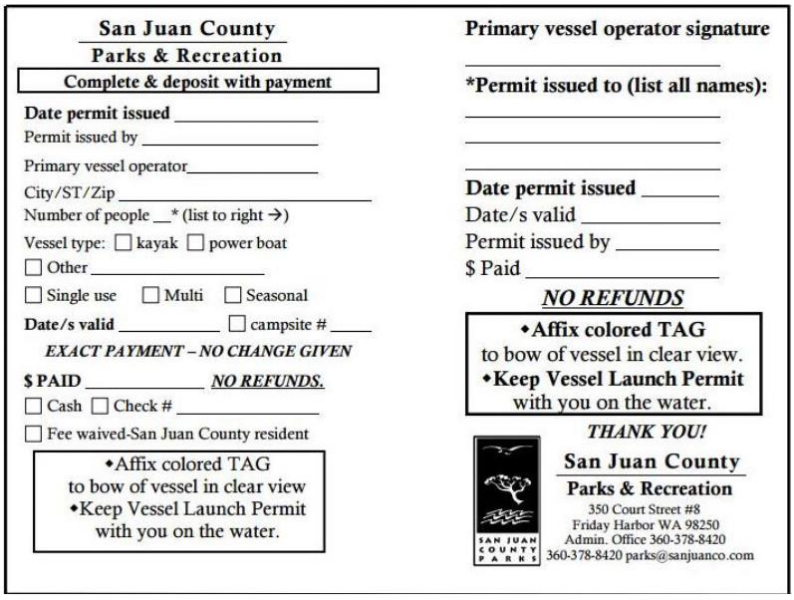
KAYAK SIGN IN SHEET 2015

For commercial kayak companies only

DATE	COMPANY	# GUESTS	# GUIDES	# BOATS	TIME OUT	TIME IN	GUIDE	PARKING
3/4	DSK	2	1	2	1:30	4	KMY	No
3/6	DSK	2	1	2	12:30	3	KMY	NO
3/7	DSK	3	1	2	12	4:15	KMY	No
3/7	SQ	2	2	2	12:15	4:20	MLS	Yes
3/7	DSK	2	1	2	12:30	2:45	CHD	No
3/21	DSK	2	2	3	2:30	4:45	KMY	NO
3/22	DSK	8	1	5	9:45	1:45	Chl	NO
3/23	SQ	10	1	6	12:00	5:00	MLS	Yes
3/27	DSK	2	1	2	2	1:45	Chl	NO
3/29	DSK	2	1	2	2	4:45	Kelly	No
3/24	SQ	7	1	3	1:60	5:00	MLS	Yes
3/26	DSK	5	3	5	12:30	3	Chl	NO
3/27	DSK	2	1	2	12:30	3	Chl	NO
3/28	SQ	5	1	3	12:45	4:45	MLS	Yes
3/26	DSK	4	1	3	2:15	5	Chl	NO
3/29	DSK	2	1	2	9:00	11:45	MC	N
3/27	SQ	5	1	4	2	5:30	JP	Y
3/30	DSK	0	2	2	2	3:30	Chl	NO TM
4/1	DSK	5	2	1	10	2:00	MC	N
4/2	DSK	4	1	3	12	4:30	Kelly	No
4/2	SQ	6	1	3	1	5	JP	Y
4/9	DSK	4	1	3	1	4:30	Chl	NO

All Kayak Companies Must Obtain Valid Permit
Prior to Launching
Launch and Camping Fees Must Be Paid At Time of Park Use

Appendix C: 2015 San Juan County Commercial Kayaker Launch Form



San Juan County
Parks & Recreation

Complete & deposit with payment

Date permit issued _____
Permit issued by _____
Primary vessel operator_____
City/ST/Zip _____
Number of people __* (list to right →)
Vessel type: ☐ kayak ☐ power boat
☐ Other _____
☐ Single use ☐ Multi ☐ Seasonal
Date/s valid _____ ☐ campsite # ____
EXACT PAYMENT – NO CHANGE GIVEN
$ PAID _____ ***NO REFUNDS.***
☐ Cash ☐ Check # _____
☐ Fee waived-San Juan County resident

•Affix colored TAG
to bow of vessel in clear view
•Keep Vessel Launch Permit
with you on the water.

Primary vessel operator signature
_____
***Permit issued to (list all names):**
_____
_____
_____
Date permit issued _____
Date/s valid _____
Permit issued by _____
$ Paid _____

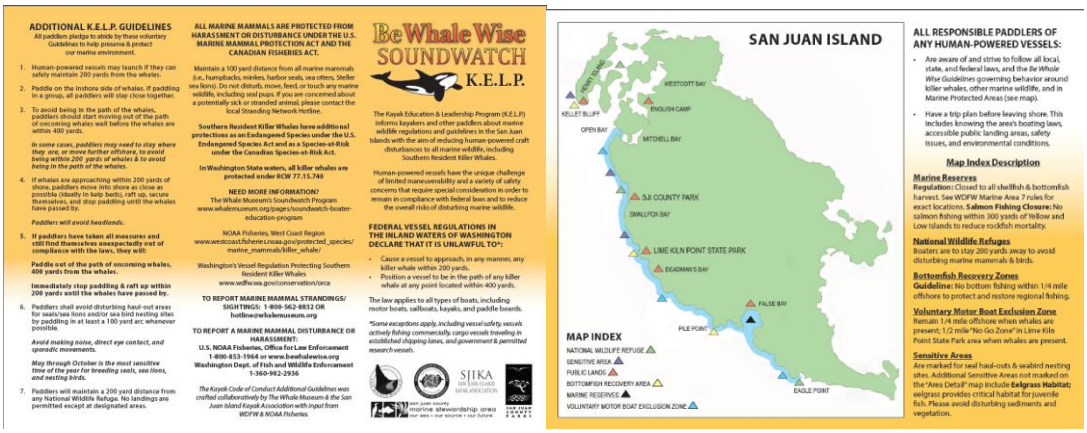
NO REFUNDS

•Affix colored TAG
to bow of vessel in clear view.
•Keep Vessel Launch Permit
with you on the water.

THANK YOU!

San Juan County
Parks & Recreation
350 Court Street #8
Friday Harbor WA 98250
Admin. Office 360-378-8420
360-378-8420 parks@sanjuanco.com

Appendix D: 2013 - 2018 San Juan County Park Recreational Boat Launch Permit Form.



ADDITIONAL K.E.L.P. GUIDELINES

All paddlers pledge to abide by these voluntary Guidelines to help preserve & protect our marine environment.

1. Human-powered vessels may launch if they can safely maintain 200 yards from the whales.
2. Paddle on the inshore side of whales. If paddling in a group, all paddlers will stay close together.
3. To avoid being in the path of the whales, paddlers should start moving out of the path of oncoming whales well before the whales are within 400 yards.

In some cases, paddlers may need to stay where they are, or move further offshore, to avoid being within 200 yards of whales & to avoid being in the path of the whales.

4. If whales are approaching within 200 yards of shore, paddlers move into shore as close as possible (ideally in kelp beds), raft up, secure themselves, and stop paddling until the whales have passed by.

Paddlers will avoid headlands.

5. **If paddlers have taken all measures and still find themselves unexpectedly out of compliance with the laws, they will:**

Paddle out of the path of oncoming whales. 400 yards from the whales.

Immediately stop paddling & raft up within 200 yards until the whales have passed by.

6. Paddlers shall avoid disturbing haul-out areas for seals/sea lions and/or sea bird nesting sites by paddling in at least a 100 yard arc whenever possible.

Avoid making noise, direct eye contact, and sporadic movements.

May through October is the most sensitive time of the year for breeding seals, sea lions, and nesting birds.

7. Paddlers will maintain a 200 yard distance from any National Wildlife Refuge. No landings are permitted except at designated areas.

ALL MARINE MAMMALS ARE PROTECTED FROM HARASSMENT OR DISTURBANCE UNDER THE U.S. MARINE MAMMAL PROTECTION ACT AND THE CANADIAN FISHERIES ACT.

Maintain a 100 yard distance from all marine mammals (i.e., humpbacks, minkes, harbor seals, sea otters, Steller sea lions). Do not disturb, move, feed, or touch any marine wildlife, including seal pups. If you are concerned about a potentially sick or stranded animal, please contact the local Stranding Network Hotline.

Southern Resident Killer Whales have additional protections as an Endangered Species under the U.S. Endangered Species Act and as a Species-at-Risk under the Canadian Species-at-Risk Act.

In Washington State waters, all killer whales are protected under RCW 77.15.740

NEED MORE INFORMATION?
The Whale Museum's Soundwatch Program
www.whalemuseum.org/pages/soundwatch-boater-education-program

NOAA Fisheries, West Coast Region
www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/

Washington's Vessel Regulation Protecting Southern Resident Killer Whales
www.wdfw.wa.gov/conservation/orca

TO REPORT MARINE MAMMAL STRANDINGS/ SIGHTINGS: 1-800-562-8832 OR hotline@whalemuseum.org

TO REPORT A MARINE MAMMAL DISTURBANCE OR HARASSMENT:
U.S. NOAA Fisheries, Office for Law Enforcement 1-800-853-1964 or www.bewhalewise.org
Washington Dept. of Fish and Wildlife Enforcement 1-360-902-2936

The Kayak Code of Conduct Additional Guidelines was crafted collaboratively by The Whale Museum & the San Juan Island Kayak Association with input from WDFW & NOAA Fisheries.

Be Whale Wise SOUNDWATCH K.E.L.P.

The Kayak Education & Leadership Program (K.E.L.P.) informs kayakers and other paddlers about marine wildlife regulations and guidelines in the San Juan Islands with the aim of reducing human-powered craft disturbances to all marine wildlife, including Southern Resident Killer Whales.

Human-powered vessels have the unique challenge of limited maneuverability and a variety of safety concerns that require special consideration in order to remain in compliance with federal laws and to reduce the overall risks of disturbing marine wildlife.

FEDERAL VESSEL REGULATIONS IN THE INLAND WATERS OF WASHINGTON DECLARE THAT IT IS UNLAWFUL TO*:

- Cause a vessel to approach, in any manner, any killer whale within 200 yards.
- Position a vessel to be in the path of any killer whale at any point located within 400 yards.

The law applies to all types of boats, including motor boats, sailboats, kayaks, and paddle boards.

**Some exceptions apply, including vessel safety, vessels actively fishing commercially, cargo vessels traveling in established shipping lanes, and government & permitted research vessels.*

SJIKA SAN JUAN ISLAND KAYAK ASSOCIATION

san juan county marine stewardship area

SAN JUAN ISLAND

SAN JUAN COUNTY PARKS

SAN JUAN ISLAND

WESTCOTT BAY
ENGLISH CAMP
KELLETT BLUFF
OPEN BAY
MITCHELL BAY
SJI COUNTY PARK
SMALLPOX BAY
LIME KILN POINT STATE PARK
DEADMAN'S BAY
FALSE BAY
PILE POINT
EAGLE POINT

MAP INDEX
NATIONAL WILDLIFE REFUGE
SENSITIVE AREA
PUBLIC LANDS
BOTTOMFISH RECOVERY AREA
MARINE RESERVES
VOLUNTARY MOTOR BOAT EXCLUSION ZONE

ALL RESPONSIBLE PADDLERS OF ANY HUMAN-POWERED VESSELS:

- Are aware of and strive to follow all local, state, and federal laws, and the *Be Whale Wise Guidelines* governing behavior around killer whales, other marine wildlife, and in Marine Protected Areas (see map).
- Have a trip plan before leaving shore. This includes knowing the area's boating laws, accessible public landing areas, safety issues, and environmental conditions.

Map Index Description

Marine Reserves
Regulation: Closed to all shellfish & bottomfish harvest. See WDFW Marine Area 7 rules for exact locations. **Salmon Fishing Closure:** No salmon fishing within 300 yards of Yellow and Low Islands to reduce rockfish mortality.

National Wildlife Refuges
Boaters are to stay 200 yards away to avoid disturbing marine mammals & birds.

Bottomfish Recovery Zones
Guideline: No bottom fishing within 1/4 mile offshore to protect and restore regional fishing.

Voluntary Motor Boat Exclusion Zone
Remain 1/4 mile offshore when whales are present; 1/2 mile "No Go Zone" in Lime Kiln Point State Park area when whales are present.

Sensitive Areas
Are marked for seal haul-outs & seabird nesting sites. Additional Sensitive Areas not marked on the "Area Detail" map include **Eelgrass Habitat;** eelgrass provides critical habitat for juvenile fish. Please avoid disturbing sediments and vegetation.

Appendix E: 2018 Kayaker Code of Conduct Brochure, Folded, Double-sided (Available at http://www.whalemuseum.org)

Be Whale Wise SOUNDWATCH K.E.L.P.

The Kayak Education & Leadership Program (K.E.L.P.), is a program that informs kayakers on marine wildlife regulations and guidelines with the aim to reduce human-powered vessel disturbance to Southern Resident orcas and all marine wildlife within the San Juan Islands.

Human powered vessels have the unique challenge of limited maneuverability and a variety of safety concerns that require special consideration to remain in compliance with federal laws and to reduce the overall risks of disturbing marine wildlife.

GUIDELINES FOR KAYAKERS WHEN ORCAS ARE PRESENT

The Kayakers' Code of Conduct is a set of San Juan Island orca specific guidelines meant to be used along with regional Be Whale Wise Marine Wildlife guidelines and current Federal Vessel Laws.

- Do not launch from shore if you are unable to maintain 200 yards from the whales.
- Paddle to shore of further offshore to maintain 200 yards to the side and 400 yards out of their path.
- If within 400 yards of whales, kayakers should paddle toward shore, raft up in kelp beds, stop paddling, secure themselves and wait until the whales are 400 yards away.
- If offshore of whales and within 400 yards, raft up for safety in boat traffic (preferable kayakers will always be in shore of boat traffic.)
- Always adjust your plan of action according to the whales' direction of travel and the state and federal laws.

SJIKA SAN JUAN ISLAND KAYAK ASSOCIATION

HENRY ISLAND
WESTCOTT BAY
KELLETT BLUFF
ENGLISH CAMP
OPEN BAY
MITCHELL BAY
AREA IN DETAIL
SJI COUNTY PARK
SMALL FOR BAY
LIME KILN STATE PARK
DEADMAN'S BAY
PILE PT

NATIONAL WILDLIFE REFUGE
SENSITIVE AREAS
PUBLIC LANDS
BOTTOMFISH RECOVERY AREA
MARINE PRESERVE
VOLUNTARY MOTOR BOAT EXCLUSION ZONE

Marine Preserves
Regulation: Closed to all shellfish & bottomfish activities. (See WDFW Marine Rules 7 for exact locations.) **Salmon Fishing Closure:** No salmon fishing within 300 yards of Yellow & Low Islands to reduce rockfish mortality.

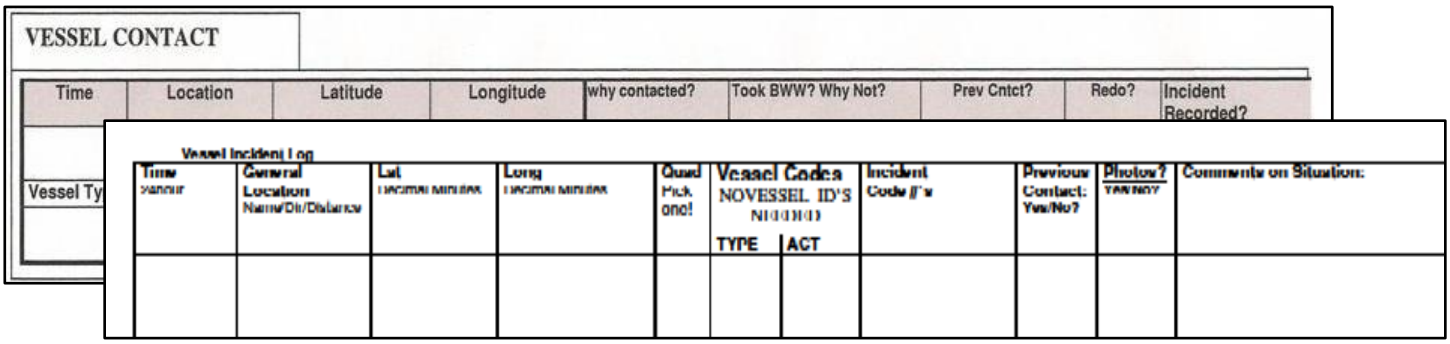
National Wildlife Refuges
Boaters are advised to stay 200 yards away to avoid disturbing marine mammals & birds.

Bottomfish Recovery Zone
Guideline: No bottomfishing within 1/4 mile of shore to protect & restore regional fishing.

Voluntary Motor Boat Exclusion Zone
Guideline: Remain 1/4 mile offshore when orcas are present.
Guideline: 1/2 mile no go zone at Lime Kiln Point State Park when orcas are present.

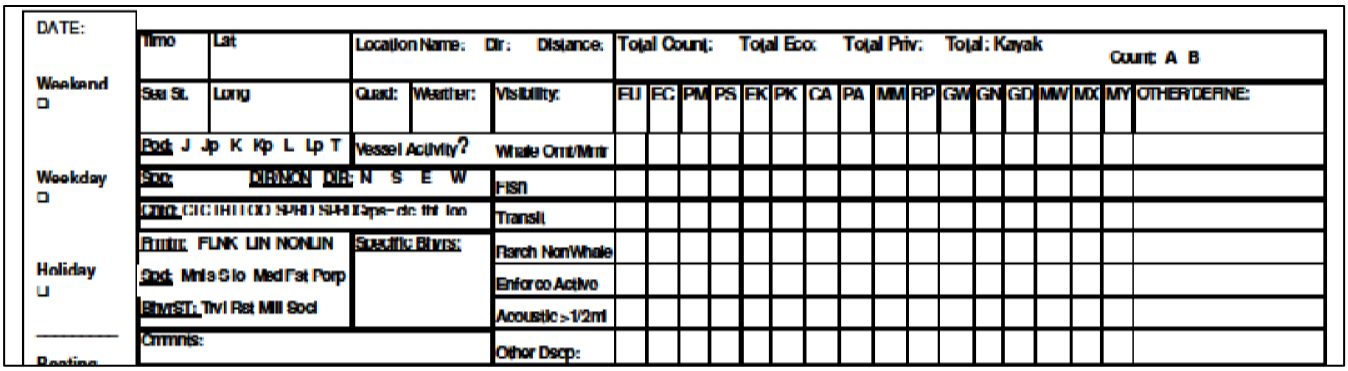
Sensitive Areas
Areas marked are for seal haul-outs & seabird nesting sites. Eelgrass beds provide critical habitat for juvenile fish. Please avoid disturbing sediments & vegetation.

Appendix F: 2016 - 2018 Kayaker Code of Conduct Rack Card, Double-sided (Available at http://www.whalemuseum.org)



Appendix G: Soundwatch Data Sheet Vessel Contact.

Appendix H: Soundwatch Data Sheet Vessel Incidents.



Appendix I: Soundwatch Data Sheet Vessel Count/Whale Survey.

	FAST/SPEED	
2.0	speed	vessel traveling over 7 knots w/in **400y**/366m of whales, fast w/in 1/4 mile (**440y**/402m)
2.1	speed - approaching scene	vessel traveling over 7 knots w/in **400y**/366m of whales, fast w/in 1/4 mile (**440y**/402m)
2.2	speed - departing scene	vessel traveling over 7 knots w/in **400y**/366m of whales, fast w/in 1/4 mile (**440y**/402m)
	IN PATH	**NEW 2011 LAWS**
3.1A	In path 200-400 yds	w/in **200y**/183m corridor path in front of whales between **200-400y**/183-365m ahead of whales
3.3	In path - cross	crossing path of whales, vessel traveling across expected path **(200-400yds)**whales predictable
	APPROACH	
4.1	approach - head on	vessel approaching a whale/group head on w/in **200-400y**/181-366m when whales are traveling in a relatively predictable pattern
4.2	approach - behind	vessel approaching/traveling behind a whale/group w/in **200-400y/181-366m** when whales are traveling in a relatively predictable pattern
	W/in 100 YARDS/M	
5.1	**100y/91m - stopped**	**vessel stopped w/in 100y/91m of whales**
5.2	**100y/91m - under power**	**vessel under power w/in 100y/91m of whales**
5.4	100y/91m - fishing	vessel fishing w/in **100y/91m** of whales (did not attempt to move out of path of whales)
	W/in 200 YARDS/M	**NEW 2011 LAWS**
6.1	**200y/183m - stopped**	**vessel stopped w/in 200y**/183m **of whales**
6.2	**200y/183m - under power**	**vessel under power w/in 200y**/183m **of whales**
6.4	200y/183m - fishing	vessel fishing w/in **200y**/183m of whales (did not attempt to move out of path of whales)
7.0	**INSHORE**	vessel on the inshore side of whales, when whales are traveling close to shore (within 1/2 mile)
	AREA RESTRICTION	****Placeholder for WDFW Proposed New SLOW ZONE Guideline: NOT IN EFFECT as of June 2011****
40.1	area restriction - SJIVNBZ 1	vessel w/in **1/4mile** (**440y**/402m) of the SJI shoreline in the determined zone with whales present
40.2	area restriction - Lime Kiln	vessel w/in **1/2mile** (**880y**/808m) of shoreline 1mile radius of Lime Kiln Light with whales present
40.3	area restriction - NWR	vessel w/in **200y**/183m of U.S. National Wildlife Refuse (NWR) site
40.4	area restriction - RRER	vessel w/in **100y**/91m of any Race Rocks Ecological Reserve shoreline
40.6	area restriction - SJIVNBZ 2	vessel w/in **1/8mile** (**220y**/201m) of ANY shoreline with whales present
40.7	area restriction -SJI Slow Zone	vessel > 7 knots w/in **1/2mile** (880y/808m)SJIVNBZ with whales present ****WDFW PROPOSED New Guideline****
	AIRCRAFT	
50.1	aircraft - low flying	aircraft flying lower than 1000feet (**333y**/305m)
50.2	aircraft - low circling	aircraft circling lower than 1000 feet (**333y**/305m)

Appendix J1: Soundwatch Marine Wildlife Guideline and Law Incident Codes for Vessel Incident Observations (Page 1).

60.1	**kayaks - spread out**	**kayaks not rafted up (spread loosely) when whales are present**
60.2	**kayaks - 100y/91m**	**kayaks paddling w/in 100y/91m of whales**
60.3	kayaks - launching	kayaks launching into area when whales are present
60.4	kayaks - offshore 1/4m	kayaks paddling farther than 1/4 mile (**440y**/402m) offshore when whales are present
60.5	**kayaks- parked on headland**	**kayaks parked on headland with whales present**
60.6	**kayak - 200y/183m**	**kayaks paddling w/in 200y/183m of whales NEW 2011 LAW**
	BOWRIDING	
20.1	bowriding - erratic	vessel operating in erratic fashion while engaged in bowriding
20.2	bowriding - deliberate	vessel deliberately attempting to have animal(s) bow/stern ride i.e. REPEATED CIRCLING
	HAULOUT	
30.0	haulout - speed	vessel over 7 knots w/in **200y**/183m of active haulout
31.2	haulout - no navigation restriction	vessel w/in **100y**/91m of an active haulout - no navigation restriction
32.0	haulout - disturbance	vessel w/in **400y**/366m of active haulout causing disturbance
32.1	haulout - disturb deliberate	any deliberate disturbance of active haulout
32.2	haulout - disturb maintain	disturbance with no attempt to move away from haulout
32.3	haulout - disturb but moved	disturbance but moved away
9.0	INTERACTION	swimming, feeding, touching wildlife DEFINE INTERACTIONS
10	Other: Define	something out of the ordinary or site specific DEFINE OTHER
8.0	TIME LIMIT	vessel is staying longer than 30 minutes w/in 1/4 Mi (**440y**/402m) of whales- record if only a few whales

Appendix J2: Soundwatch Marine Wildlife Guideline and Law Incident Codes for Vessel Incident Observations (Page 2).

Species code	Species Name	Latin Name
oror (SR)	killer whale - **southern resident**	Orcinus orca
oror (T)	killer whale - **transients**	Orcinus orca
oror (NR)	killer whale - **northern resident**	Orcinus orca
esro	gray whale	Eschrichtius robustus
meno	humpback whale	Megaptera novaeangliae
baac	minke whale	Balaenoptera acutorostrata
bamu	fin whale	Balaenoptera musculus
phph	harbour porpoise	Phocoena phocoena
phda	Dall's porpoise	Phocoena dalli
laob	Pacific white-sided dolphin	Lagenorhyncus obliquidens
phvi	harbour seal	Phoca vitulina richardsi
euju	Stellar's sea lion	Eumatopius jubatus
enlu	sea otter	Enhydra lutris
brma	marbled murrelet	Brachyramphus marmoratus
syan	ancient murrelet	Synthliboramphus antiquus
arhe	Pacific great blue heron	Ardea herodias fannini

Configuration
Contact: physical contact
Tight: 0 to 10m from another animal
Loose: 10 to 100m
Spread: Greater than 100m

Orientation/Formation
Flank: side-to-side-to-side
Linear: head-to-tail
Non-linear: no particular orientation within group

Speed
Motionless: 0 knots, "hanging", "logging"
Slow: less than 2 knots, less smooth or "jerky" surfacing
Medium: 2-6 knots, slow roll, "normal"
Fast: 6-10 knots, fast roll
Porpoising: greater than 10 knots, large portion of body out of water

Common Behaviors		
Spy Hop	Aerial scan	Breach
Half breach	Bellyflop	Pec slap
Pec wave	Inverted pec slap	Tail wave
Tail Slap	Inverted tail slap	Tail lift-headstant
Dorsal fin slap	Cartwheel	Chasing
Lunging/surging	Rolling at surface	High arch dives
Reverse	Push/lift/carry whale	Playing with log / object
Kelping	Fish seen	Vocalization heard
Bubble blowing	Synchronous surfacing	Mating
Penis seen-whale w/another	Penis seen-whale alone	Other-describe

Direction of travel	
N	North
NW	SouthWest
NE	NorthEast
E	East
S	South
SW	SouthWest
SE	SouthEast
W	West

Directionality
Directional: less than or equal to 90deg from previous direction of travel
Non-directional: deviation of greater than 90deg from previous direction of travel

Appendix K1: Soundwatch Whale Survey & Behaviors Codes for Whale Scans (Page 1).

Species code	Species Name	Latin Name
oror (SR)	killer whale - **southern resident**	Orcinus orca
COOSE ALL THAT APPLY: J Jpartial K Kpartial L Lpartial List ID's If possible		
oror (T)	killer whale - **transients**	Orcinus orca
oror (NR)	killer whale - **northern residents**	Orcinus orca
esro	gray whale	Eschrichtius robustus
meno	humpback whale	Megaptera novaeangliae
baac	minke whale	Balaenoptera acutorostrata
phvi	harbour seal	Phoca vitulina richardsi

Common Behaviors/Overall Behavior State		
Spy Hop	Aerial scan	Breach
Half breach	Bellyflop	Pec slap
Pec wave	Inverted pec slap	Tail wave
Tail Slap	Inverted tail slap	Tail lift-headstant
Dorsal fin slap	Cartwheel	Chasing
Lunging/surging	Rolling at surface	High arch dives
Reverse	Push/lift/carry whale	Playing with log / object
Kelping	Fish seen	Vocalization heard
Bubble blowing	Synchronous surfacing	Mating
Penis seen-whale w/another	Penis seen-whale alone	Milling
Tail-Lob	Sharking	**Other-describe:**
Fast Non-Directional	Long-dives	
Behavior States: TRAVEL REST MILL SOCIALIZE		

Sea State	Effect of Combined Wind And Currents on Sea State
0	like a mirror (flat)
1	ripples form with the appearance of scales, but w/out foam crests
2	small wavelets, crests appear glassy, no breaking
3	larger wavelets begin to break, glassy foam, scattered white caps
4	small waves predominant but fairly frequent white caps
5	moderate waves, distinctly elongated, many white horses, chance of spray
6	long waves with extensive white foam breaking crests begin to form, spray likely
7	seas heaps up, white foam breaking waves start to be blown in streaks
8+	WHY THE HELL ARE BOATS STILL OUT THERE?

Configuration (Overall Group)	
Contact: physical contact	
Tight: 0 to 10m from another animal	
Loose: 10 to 100m	
Spread: Greater than 100m	**Spread in Groups:** Distinct sprd groups

Formation (Overall Group)
Flank: side-to-side-to-side
Linear: head-to-tail
Non-linear: no particular orientation within group

Speed
Motionless: 0 knots, "hanging", "logging"
Slow: less than 2 knots, less smooth or "jerky" surfacing
Medium: 2-6 knots, slow roll, "normal"
Fast: 6-10 knots, fast roll
Porpoising: greater than 10 knots, large portion of body out of water

Direction of travel
Directionality
Directional: less than or equal to 90deg from previous direction of travel
Non-directional: deviation of greater than 90deg from previous direction of travel
N, NW, NE, E, S, SW, SE, W

Weather & Abbrv.
sunny **S**
sunny w/ partial clouds **SPC**
overcast - high **OCH**
overcast **OC**
foggy **FOG**
rain - light **RL**
rain - heavy **RH**

Appendix K2: Soundwatch Whale Survey & Behaviors Codes for Whale Scans (Page 2).

Beaufort Scale	Mariner's Description	Wind Speed	Effect of Wind at Sea
0	calm	0-1	like a mirror (flat)
1	light air	1-3	ripples form with the apperance of scales, but w/out foam crests
2	light breeze	4-6	small wavelets, crests appear glassy, no breaking
3	gentle breeze	7-10	larger wavelets begin to break, glassy foam, scattered white caps
4	moderate breeze	11-16	small waves predominant but fairly frequent white caps
5	fresh breeze	17-21	moderate waves, distinctly elongated, many white horses, chance of spray
6	strong breeze	22-27	long waves with extensive white foam breaking crests begin to form, spray likely
7	moderate gale	28-33	sea heaps up, white foam breaking waves start to be blown in streaks, beginning of spindrift
8	fresh gale	34-40	
9	strong gale	41-47	
10	white gale	48-55	
11	storm	56-66	
12	hurricane	above 66	

Vessel Code	Description
CA	Commercial Aircraft
EA	Ecotour aircraft
EC	Ecotour Canadian
EK	Ecotour Kayak
EU	Ecotour US
PA	Private Aircraft
PK	Private Kayak/Paddle
PM	Private Motor
PS	Private Sail
MC	Marine Charter
MF	Marine Fishing
ML	Marine Tug with log barge
MM	Marine Monitoring
MQ	Marine Cruiseship
MW	Marine Tug with tow
MX	Marine Shipping
MY	Marine Ferry
GA	Government aircraft
GB	Government BC Parks
GC	Government Coast Guard
GD	Government DFO
GL	Government military
GN	Government NOAA
GO	Government
GW	Government WDFW
RP	Permitted Research

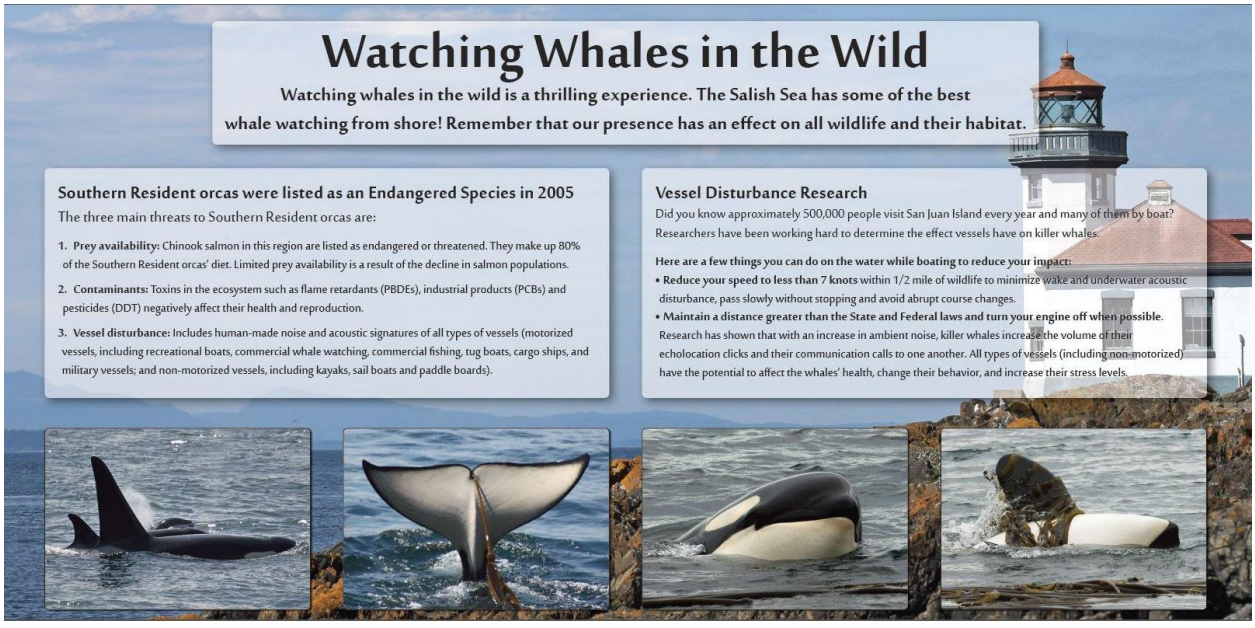
Visibility
none
poor
fair
good
excel

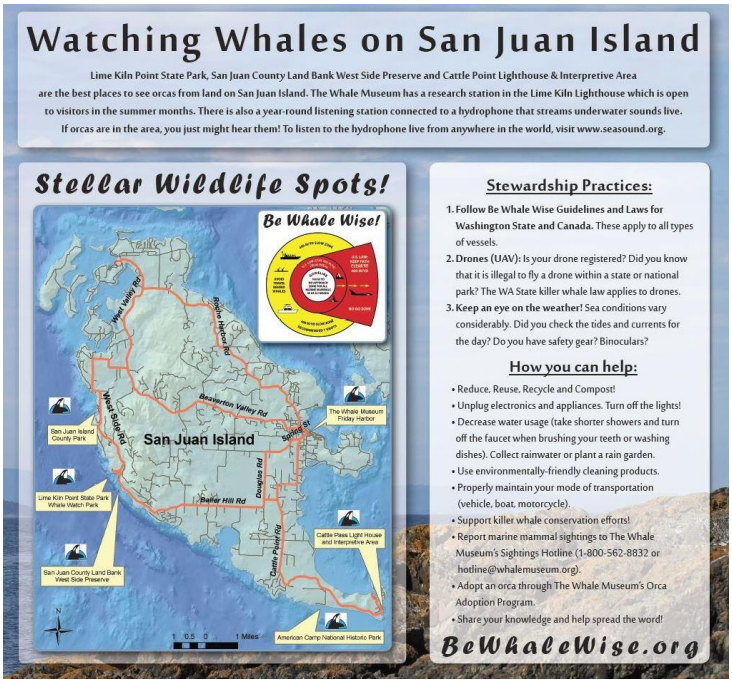
Weather
sunny
sunny w/ partial clouds
overcast - high
overcast
foggy
rain - light
rain - heavy

Location
Prominent Place Name
Direction:
N, NE, NW, E, S, SE, SW, W
Distance:
1/4 Mi, 1/2 Mi, 1 Mi, 2mi, 2+Mi

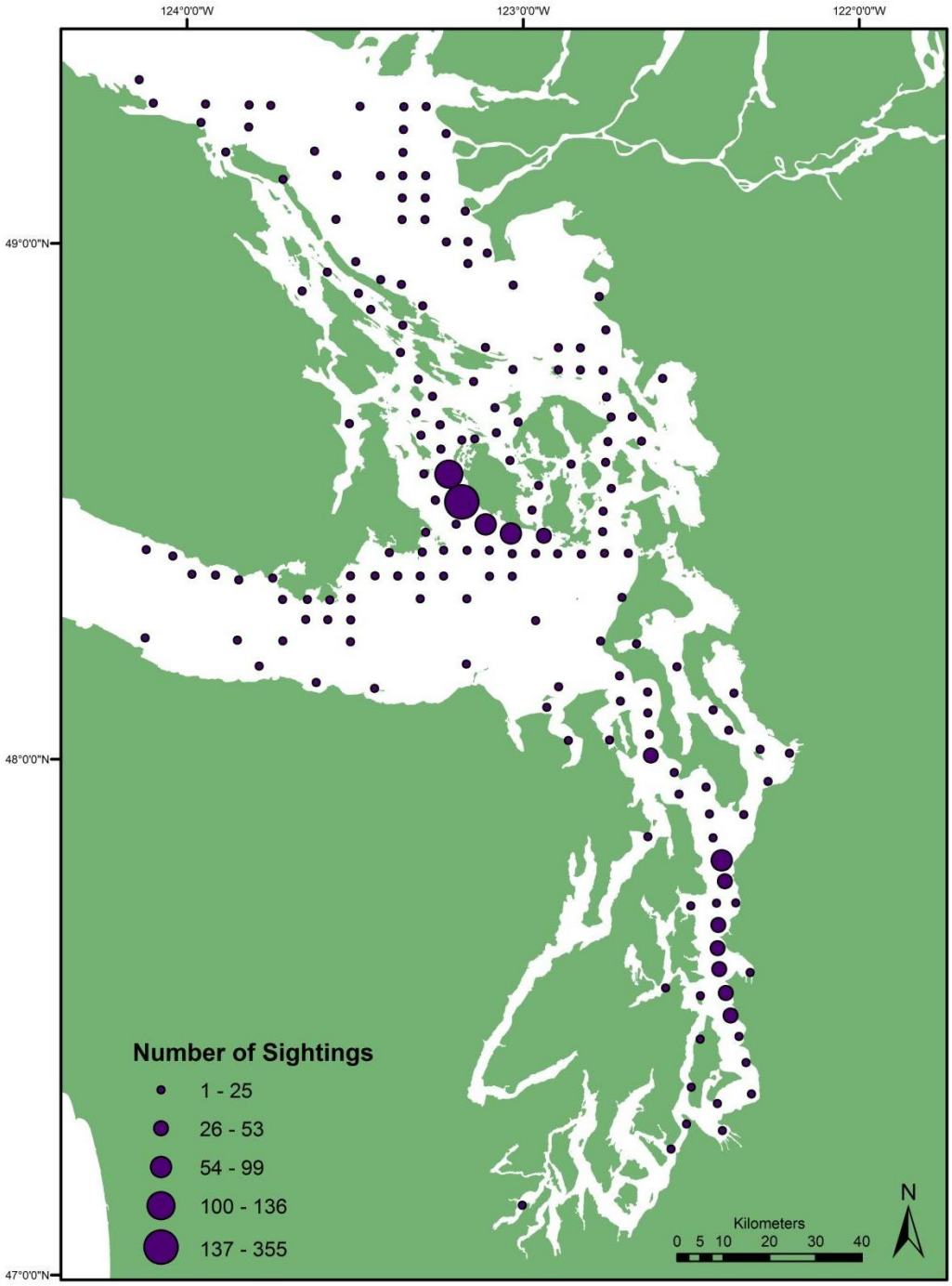
Vessel activity	
W	Whale Oriented
F	Fishing
T	Transiting
R	Research (whale oriented)
E	Enforcement
A	Acoustic Range
O	Other with description

Appendix L: Soundwatch Marine Conditions &Vessel Codes for Vessel Counts.

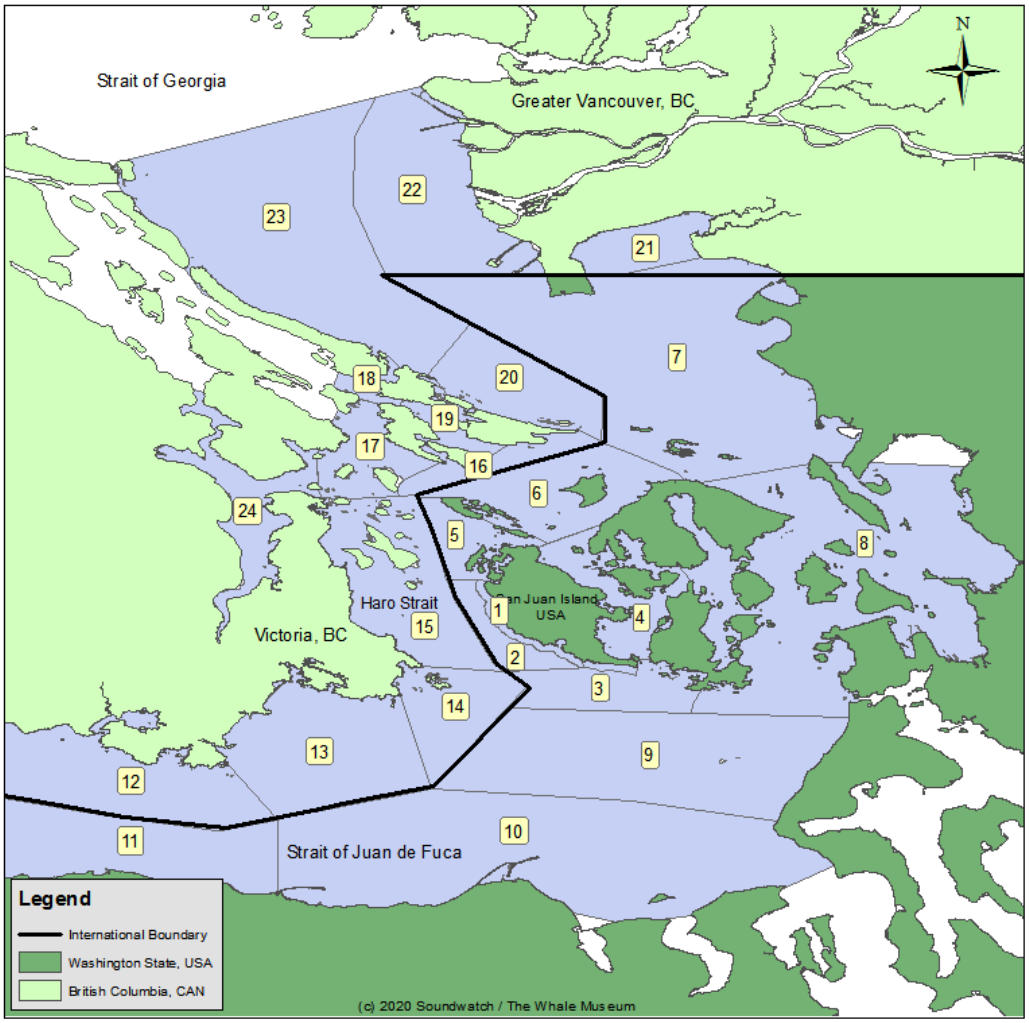




Appendix M: The Whale Museum Watching Whales in the Wild Exhibit Hall Panels.



Appendix N: Map depicting the number of SRKW sightings reported by area in 2017. Its size is proportional to the number of reports in 2017.



Appendix Q: Soundwatch study area numbered zones based on the TWM data quadrants and marine fishing zones for the US and Canada.