2020 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 2020 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 2019 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 2020 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) typically 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 December 2020, there were 74 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 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 Governor Jay Inslee in March 2018, and was signed May 8th becoming effective July 28, 2019. Similarly, Canada increased vessel approach distances from 200 meters to 400 meters of all killer whales through a Transport Canada interim order effective June 15 – October 15, 2019. The interim order was renewed for the 2020 season, with the provision of a mandatory 400 meter approach distance for killer whales in southern BC coastal waters effective June 1 – October 30, 2020 for an additional 30 days of coverage. In addition to the interim order, most commercial whale watching companies signed an agreement allowing those companies to approach 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.

The 2020 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 Marine Mammal 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. Soundwatch activities during 2020 were modified due to COVID-19. In an effort to reduce unnecessary exposure, Soundwatch crews were limited to 3 personnel per vessel. Soundwatch also suspended the on-water volunteer program for any visitors to the area. In typical years, Soundwatch would distribute materials directly to boaters while underway; during the 2020 season, Soundwatch staff opted to suspend on-water distribution. Outreach events such as Dock Talks were held outdoors within taped off areas to provide masked interns and volunteers a socially-distanced space. A timeline of program modifications, state mandates and various closures and openings can be seen in Appendix O.

Data analyzed for this annual update report reflects data collected by The Whale Museum's Soundwatch Boater Education Program in 2020 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 2020 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 2020 whale watching season and provide data analysis updates to the 2019 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 2020 whale watch season
2) Collect data on vessel activities during the 2020 whale watch season, especially relative to the 2011 U.S. Federal, 2019 Washington State vessel regulations and 2020 Transport Canada Interim Order
3) Conduct analysis on current whale watch activities including continued evaluation of 2011 U.S. Federal vessel regulations
4) Provide 2020 data updates to the 2019 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) (Appendices G-I, K and L). 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.

Soundwatch was prohibited from conducting research in Canadian waters for part of the field season due to the maritime border closure (Appendix O). For the 2020 annual update report, Soundwatch has included data provided by Cetus Research and Conservation Society's Straitwatch stewardship program. Straitwatch is based in British Columbia and operates using similar methodology within the same study region as Soundwatch, allowing for comparison of data (Cetus 2021).

Summary of Soundwatch Activities

From June – October 2020, 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 *146* days of effort, with *118* days on-the-water between June 1 and October 8, 2020, totaling *669* hours of effort on the water traveling *4,658* nautical miles throughout the trans-boundary Salish Sea (Figure 1). Whales were present on *84* days of these days, *24* days (*196* data counts) directly monitoring Southern Residents, *30* (*186* data counts) days with Transient (aka Bigg's) killer whales, *20* days (*70* data counts) opportunistically with Humpback whales, and *10* days (*35* data counts) opportunistically with Minke whales (Figures 2). This effort totaled in *243.5* hours on scene collecting cetacean data averaging *5.99* hours per day of on-the-water effort (Figure 3). There were 9 days in which Soundwatch monitored multiple species of marine mammals. Over the summer seasons (May – October) since 1998, Soundwatch has totaled more than *13,180* 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 driver/educator and three full-time summer interns. Over the season *2023.5* 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 interns totaled *200* 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 2020 consisted of a *17'* American Eagle rigid hulled vessel, *R/V Raydiance* and a 19' Safe Boat rigid hulled vessel, *R/V L-98*, 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* 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 helped provide funding through June 2020, enabling both programs to maintain vessels and operate on the water on a more consistent basis.

In 2020, the San Juan County Kayak Education Leadership Program (K.E.L.P.) and permit 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.

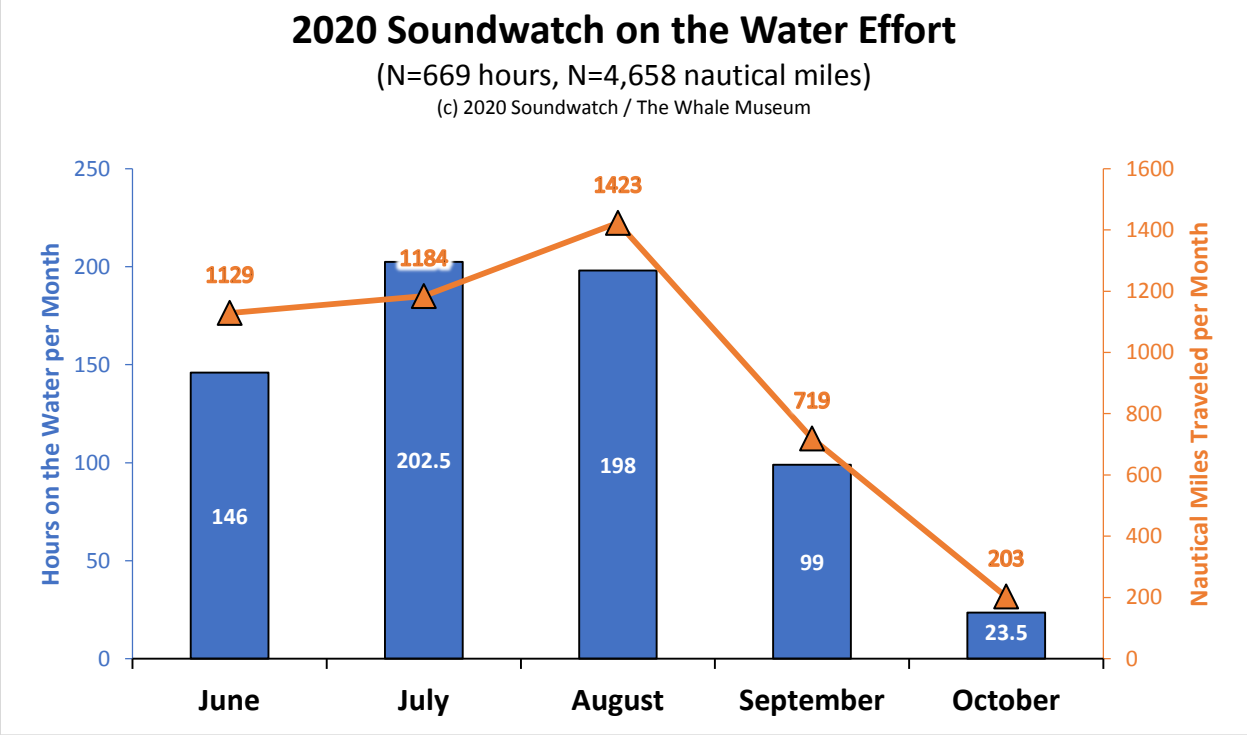

Figure 1: Distribution of Soundwatch vessel hours and miles by month for 2020.

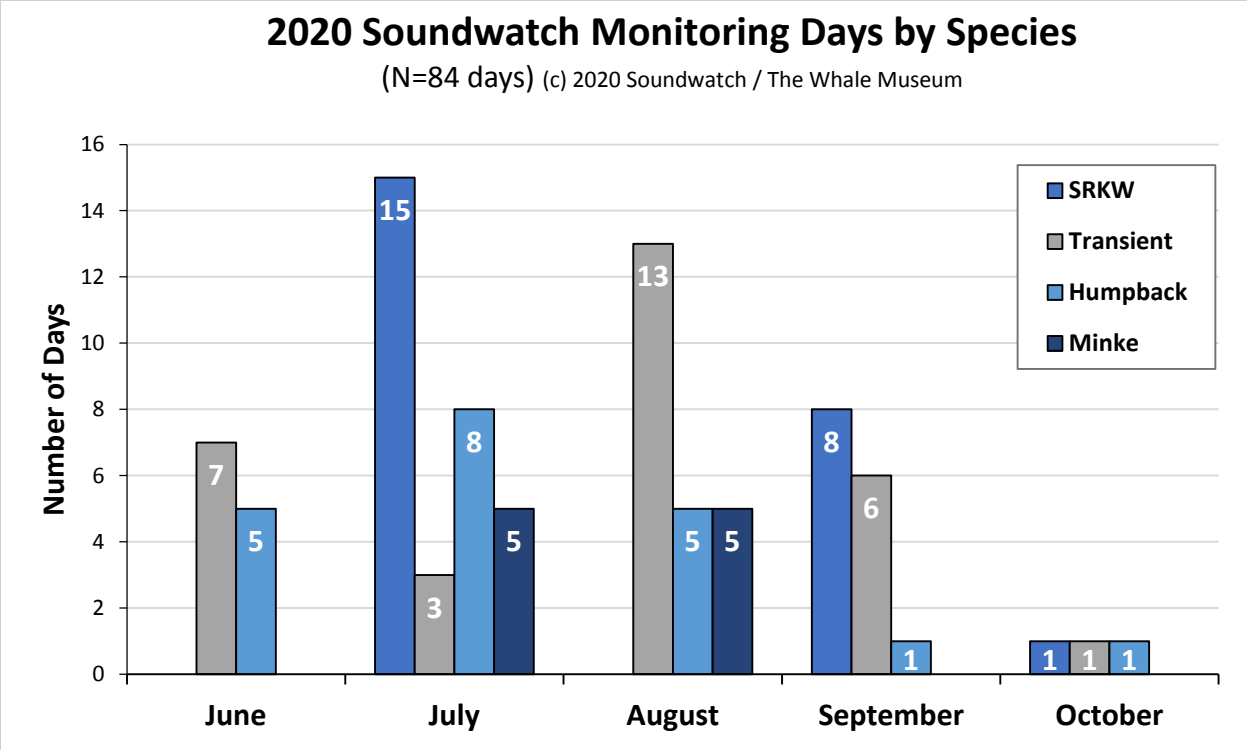

Figure 2: Distribution of Soundwatch monitoring days by species in the summer 2020 season.

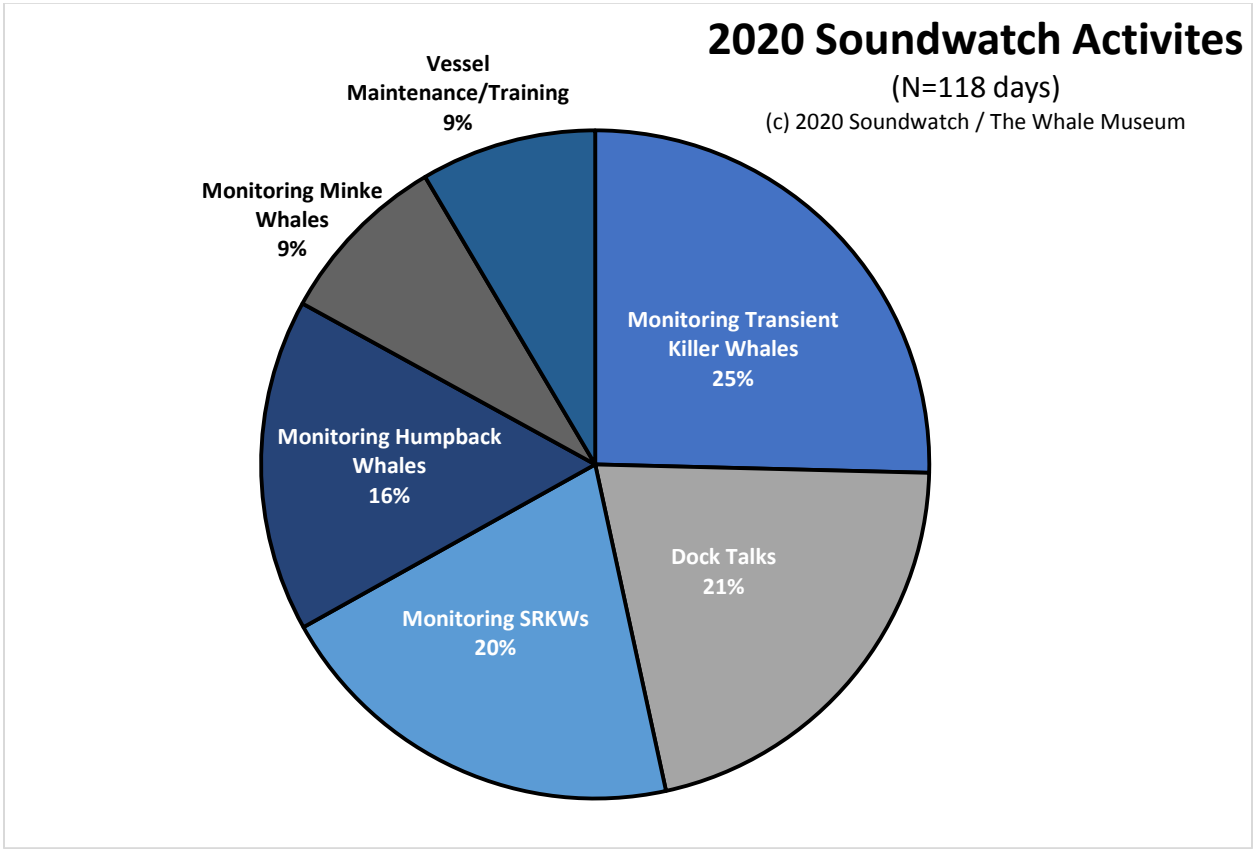

Figure 3: Distribution of Soundwatch activities during the 2020 season.

Findings

Whale Watching Trends in the Salish Sea

Soundwatch has created an annual vessel catalog with the number of EcoTour companies, vessels, trip frequency, and homeports engaged in whale watching activities based from on-the-water observations during the 2020 field season (June-October). 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.

In 2020, *35* 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. Of the active EcoTour companies, *78%* of U.S. companies and *59%* of Canadian companies are listed members of the Pacific Whale Watch Association (PWWA) (Figure 5). There may have been more active Canadian EcoTour companies in operation than recorded since Soundwatch was temporarily unable to cross the maritime border into regions with higher potential for Canadian commercial activity. Straitwatch recorded 16 active Canadian EcoTour companies for a total of 34 active vessels (Cetus 2021).

There were no observed additions to the whale watch fleet during the 2020 season in terms of new vessels or companies; in fact, Soundwatch recorded a significant decrease in the number of operating EcoTour vessels as compared to previous years (Figure 6). Although historic data depicts an overall decreasing trend since peak operation in 2016, the dramatic change observed in 2020 may be a result of COVID-19 restrictions on non-essential travel and lodging. For comparison, 2019 data recorded *55* total EcoTour whale watch companies with the potential combined total of *138* whale watch vessels, meaning a *36%* decrease in active whale watch companies and *51%* decrease in active whale watch vessels were observed during the 2020 season.

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. However, visitation to Lime Kiln State Park fell dramatically in the 2020 season, estimating approximately 114,000 visitors compared to 244,000 in 2019. This decrease may further suggest that the reduced operations of on-water EcoTour whale watch companies were likely due to COVID-19 impacts, and not a result of a shift in preference to land-based whale watching (Figure 6). Attendance data for Lime Kiln was provided by Washington State Parks Office in Olympia, Washington.

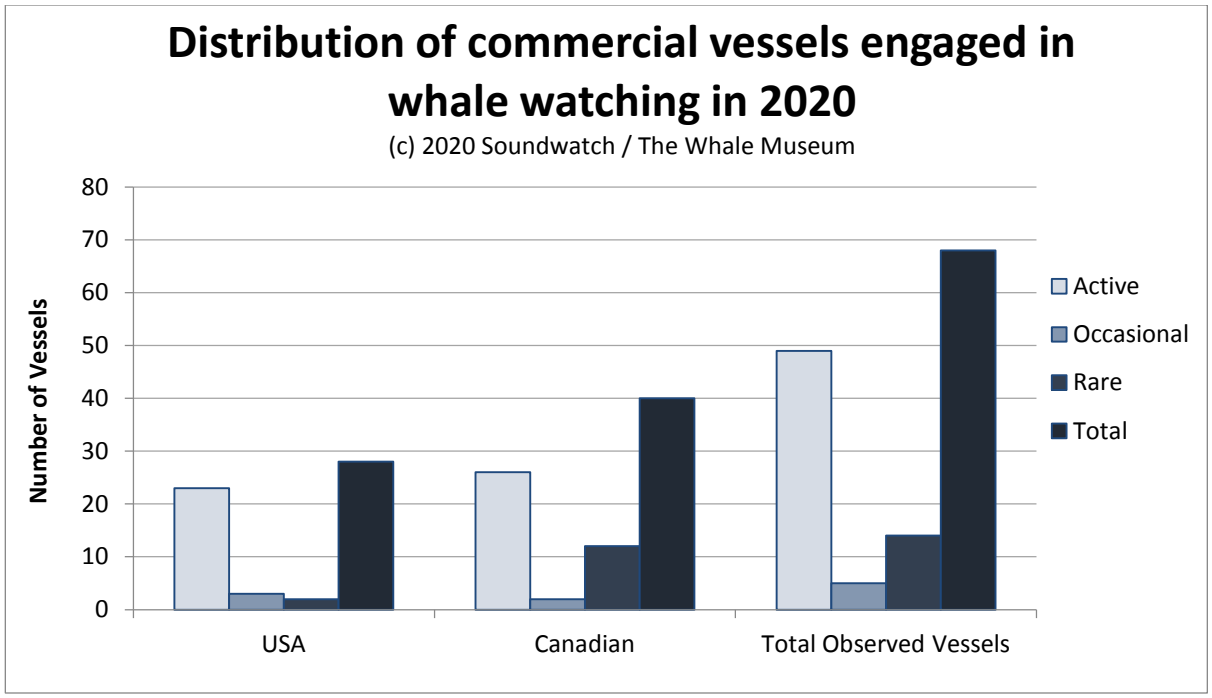

Figure 4: Distribution of total commercial vessels (N=68) engaged in whale watching in 2020.

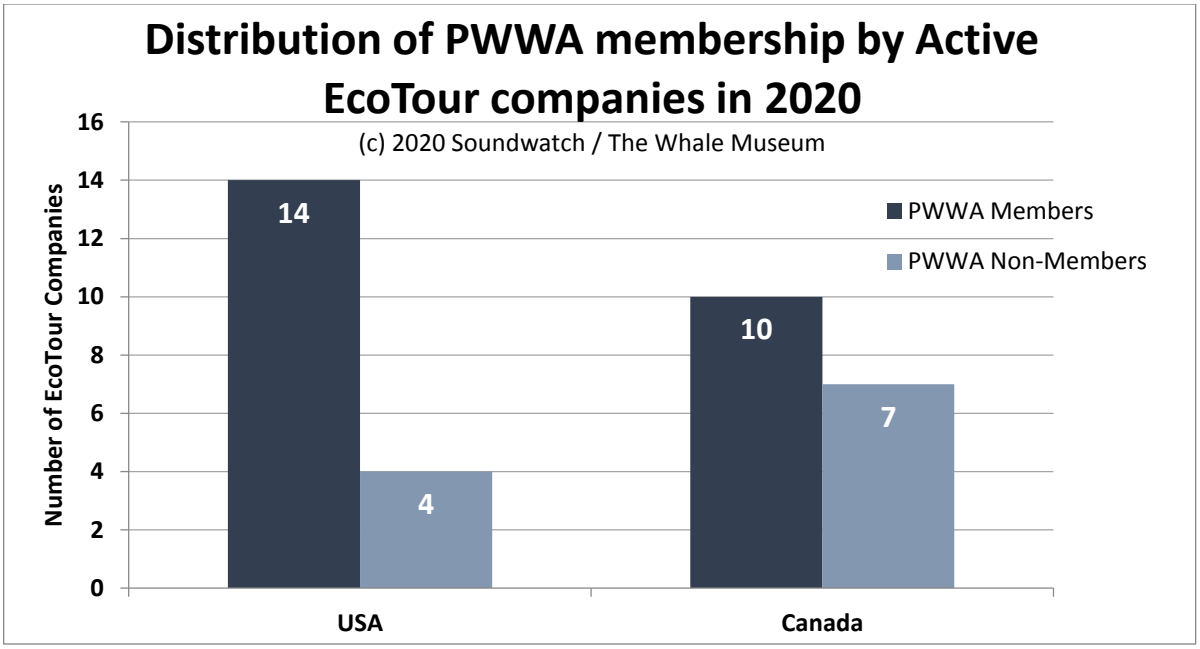

Figure 5: Distribution of active whale watch companies that are also members of the Pacific Whale Watch Association in 2020.

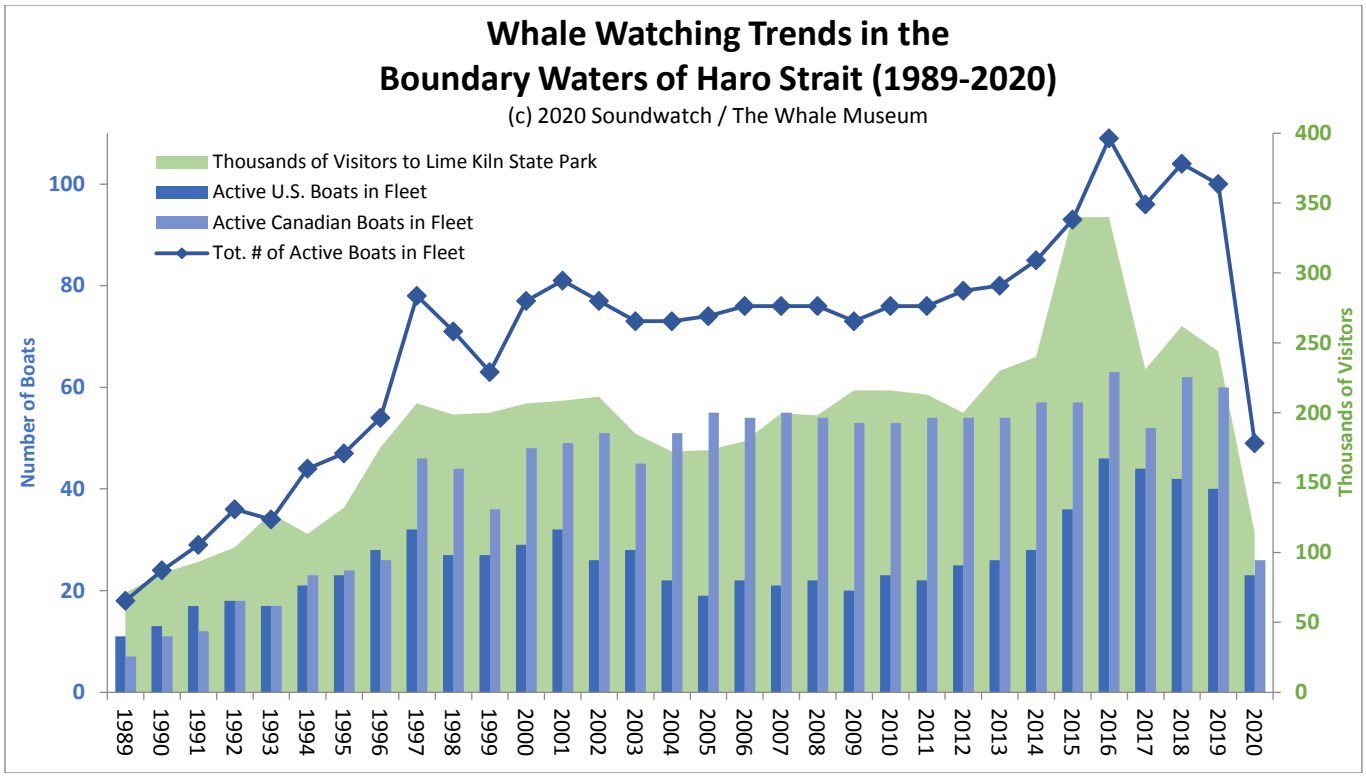

Figure 6: Whale watching trends in the boundary waters of Haro Strait from 1989 to present. Lime Kiln State Park visitation numbers provided by Washington State Parks Department.

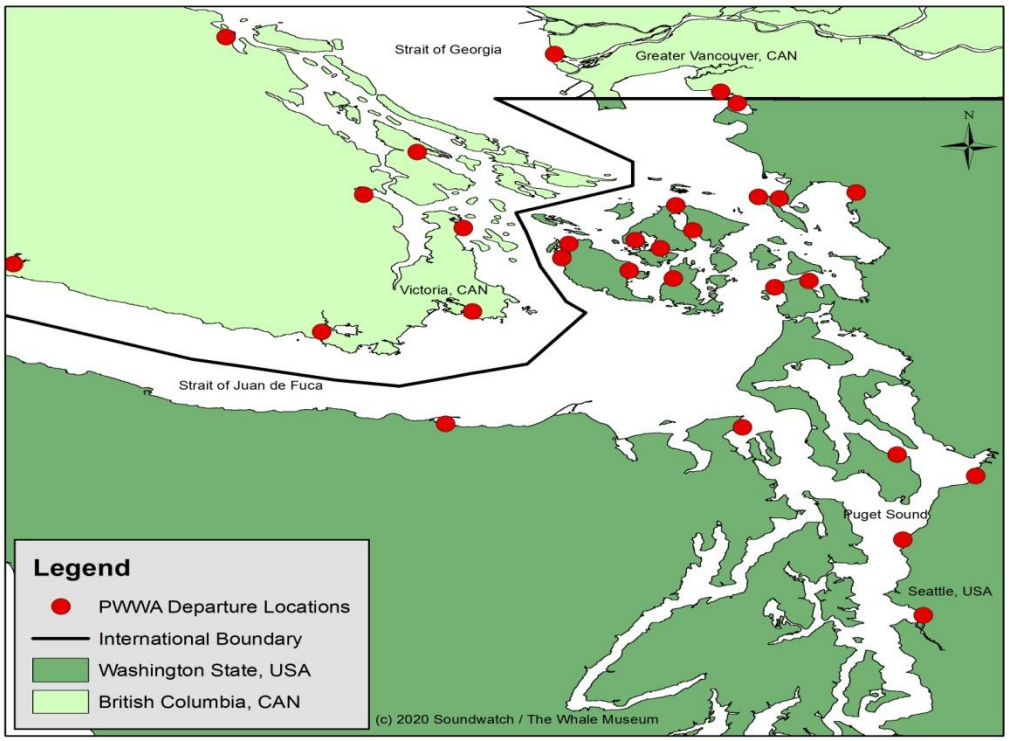

Figure 7: PWWA member vessel departure locations in 2020.

EcoTour kayak companies were also observed by Soundwatch during the 2020 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 further offshore in areas with less potential for kayakers.

Of the *7* EcoTour kayak companies observed operating in the San Juans, *2* are members of PWWA. Commercial kayaks were present for *15* vessel counts over *11* days in Soundwatch vessel counts along the west side of San Juan Island from June-October 2020. 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. This could also be a result of COVID-19 restrictions as well as companies potentially utilizing alternant launching sites on San Juan Island, such as Friday Harbor (Figure 8).

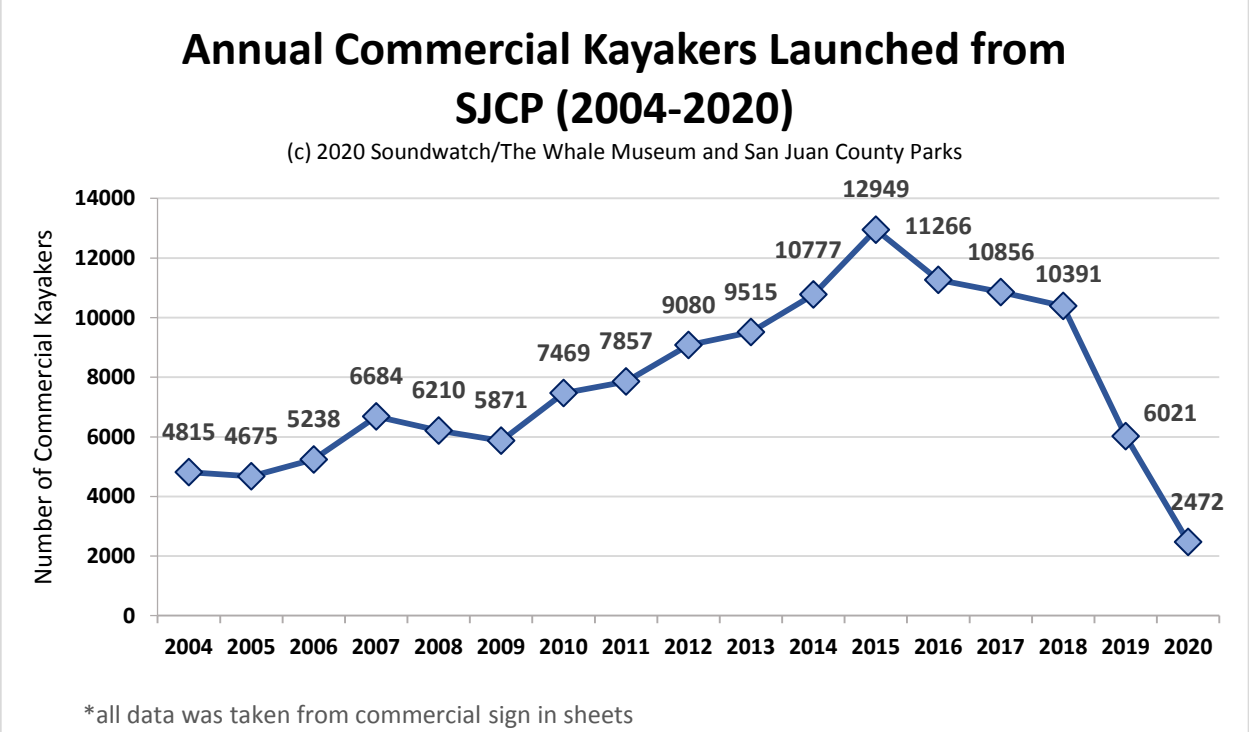

Figure 8: Number of commercial kayakers launched from San Juan County Park on the west side of San Juan Island. The total number represents individual kayakers and not the total number of kayaks launched.

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 Dataset 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 *84* vessel/whale days and *497* vessel counts. U.S. EcoTour vessels were observed *72* days and in *475* vessel counts, Recreational *67* days and *494* counts, Canadian EcoTour *29* days and *79* counts, Research *30* and *117* counts, Monitoring/Enforcement

(including Soundwatch presence) *71* days and 467 counts, and kayaks (ecotour and recreational) *17* days and *28* counts. The low number of Canadian EcoTour vessel counts is likely a result of Soundwatch being unable to cross the maritime border into Canada for most of the 2020 field season, which meant there were fewer opportunities to collect data. The PWWA also encouraged both Canadian and US EcoTour members to refrain from crossing over the border, even though Canadian boaters were still technically permitted in US waters.

The Soundwatch study area is separated into zones based on the TWM data quadrants and marine fishing zones for the US and Canada (Appendix P). Soundwatch concentrates surveys in locations of vessels engaged in whale watching activities. This year most vessel counts were taken in northern Haro Strait off the west side of San Juan Island, which is historically a preferred foraging ground for SRKW (Figure 9 and 10). In 2019, Soundwatch recorded more vessels in Boundary Pass and the Canadian islands in comparison to 2020 (Figure 10). This may be a result of COVID-19 restrictions which prohibited Soundwatch from crossing the maritime border for part of the 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 2020 were concentrated on the west side of San Juan Island (Zones 1, 2, 3, and 5) and the waters south of the San Juan Islands (Zone 9) (Figure 11). This reflects Soundwatch's increased efforts in these regions while SRKWs were in the area.

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 (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.

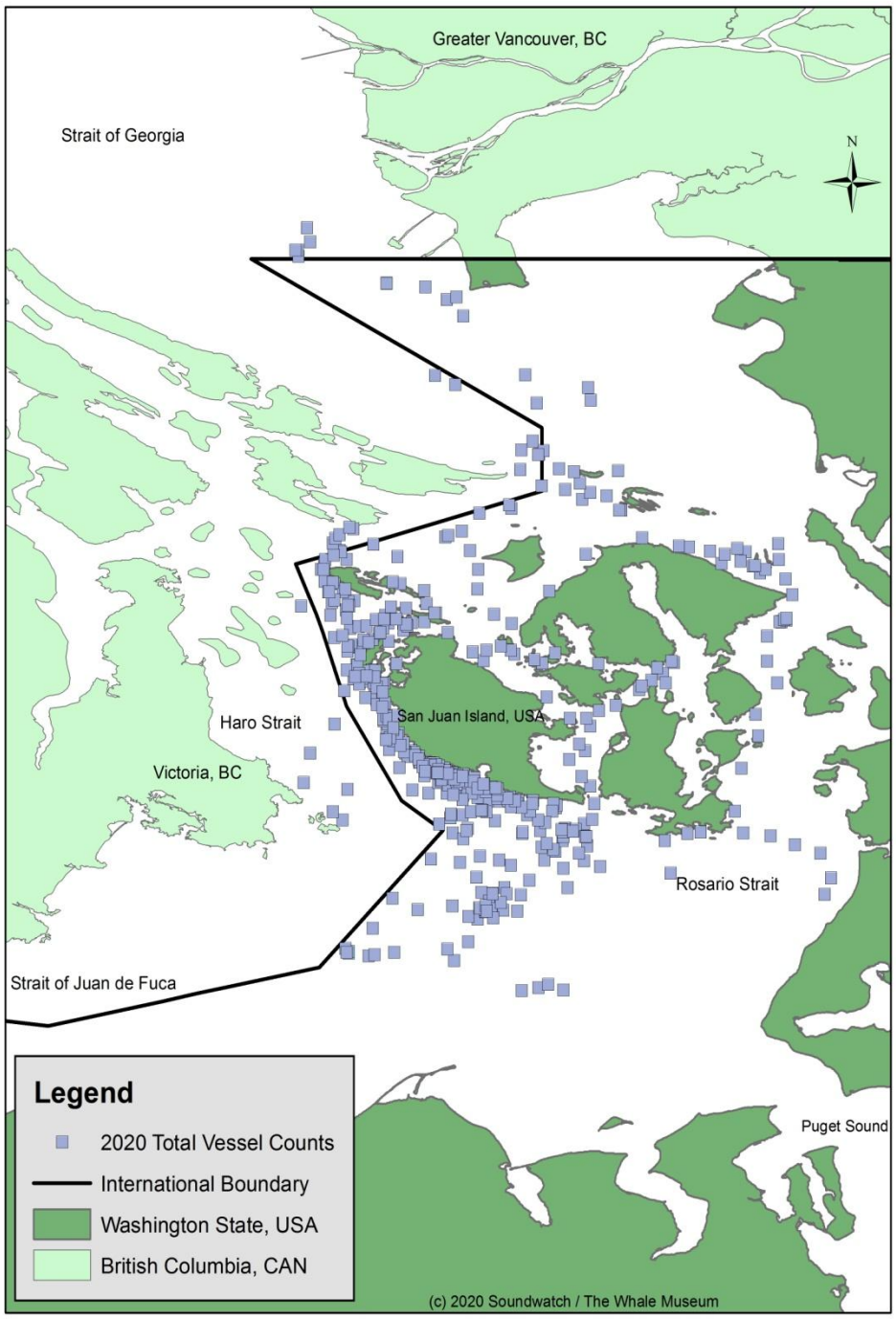

Figure 9: 2020 Soundwatch 648 Vessels Counts by location.

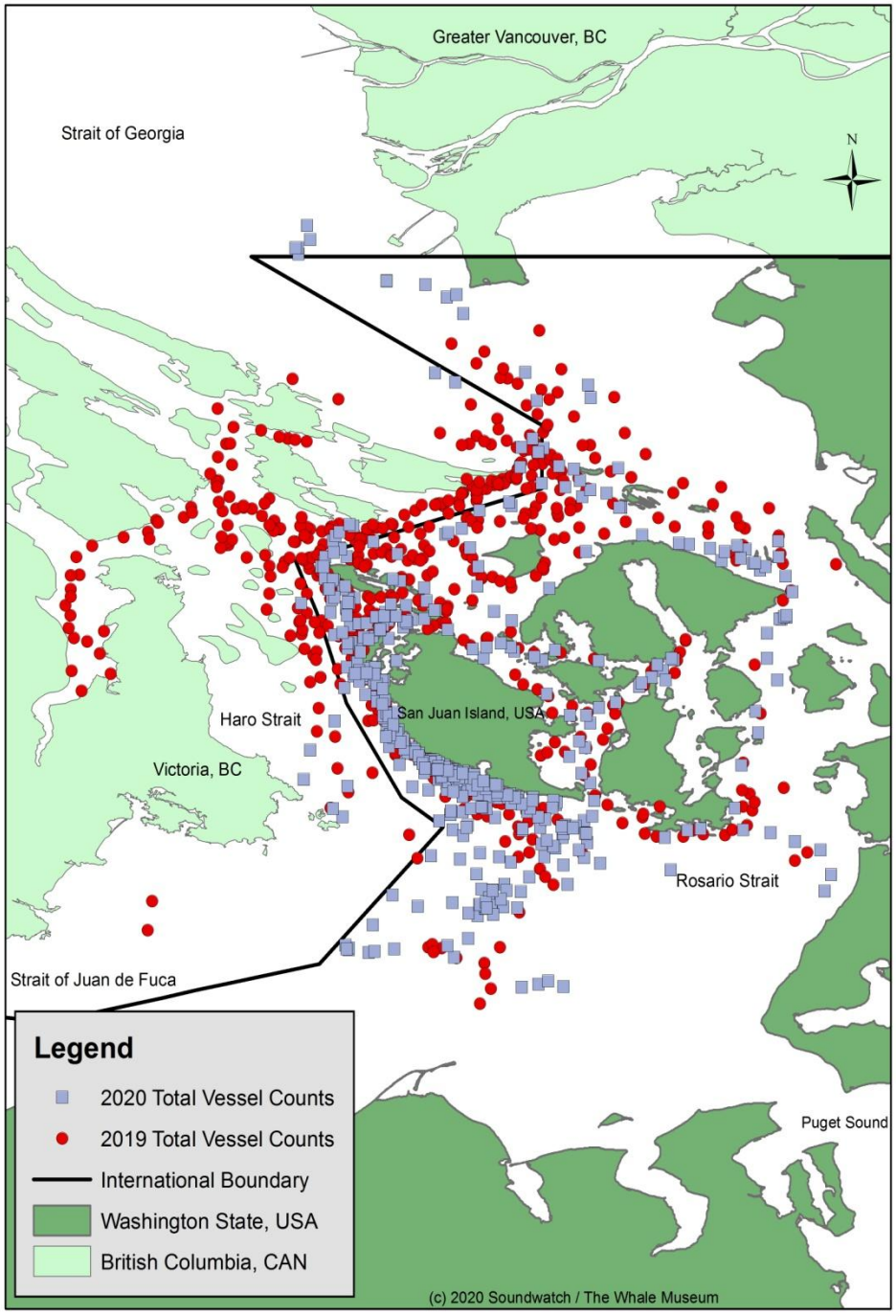

Figure 10: Total Vessel Count Locations from 2020 over Total Vessel Count Locations from 2019, displaying differences in survey locations and distributions.

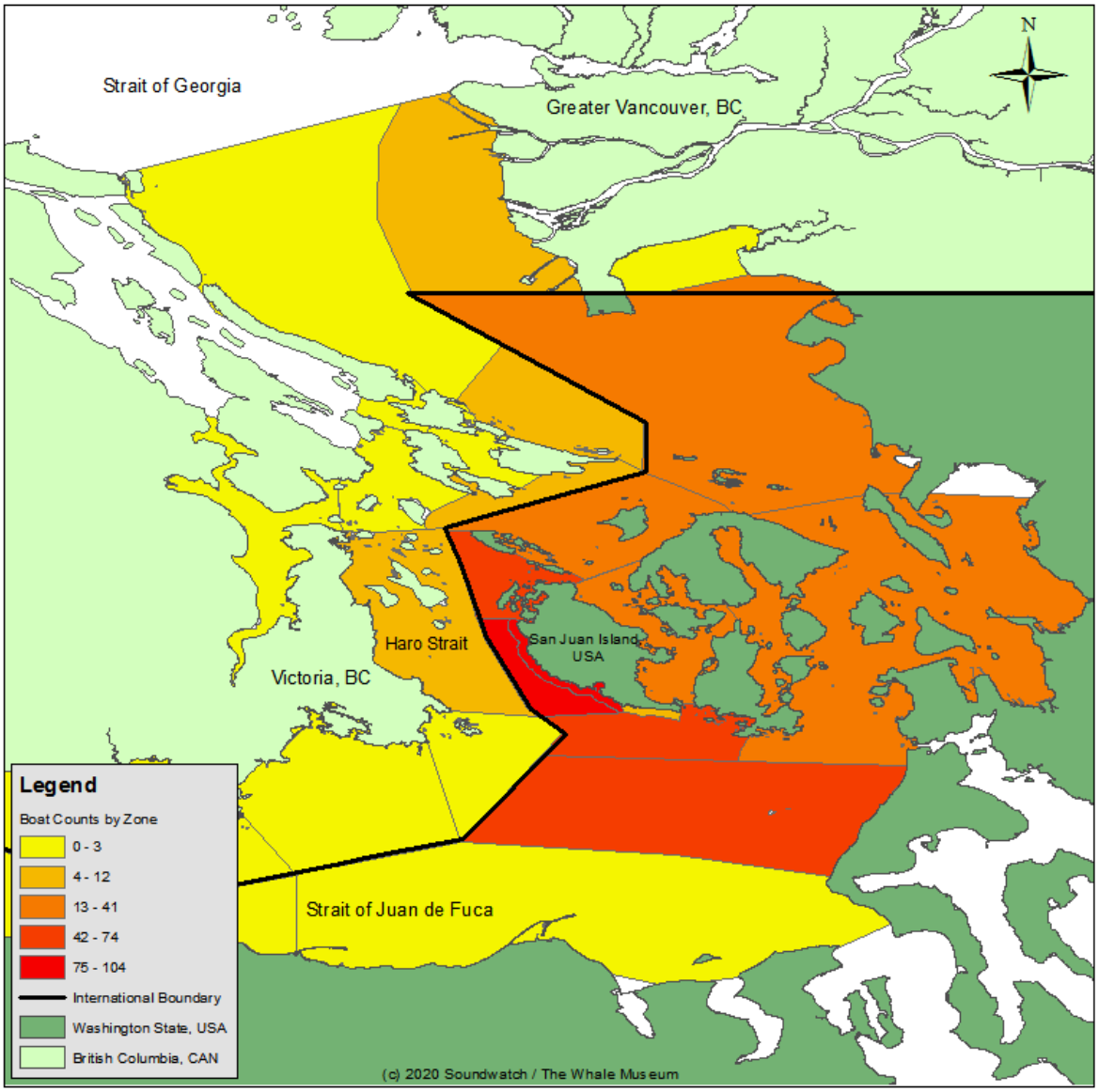

Figure 11: 2020 Soundwatch Total Vessel Counts by Numbered Zone.

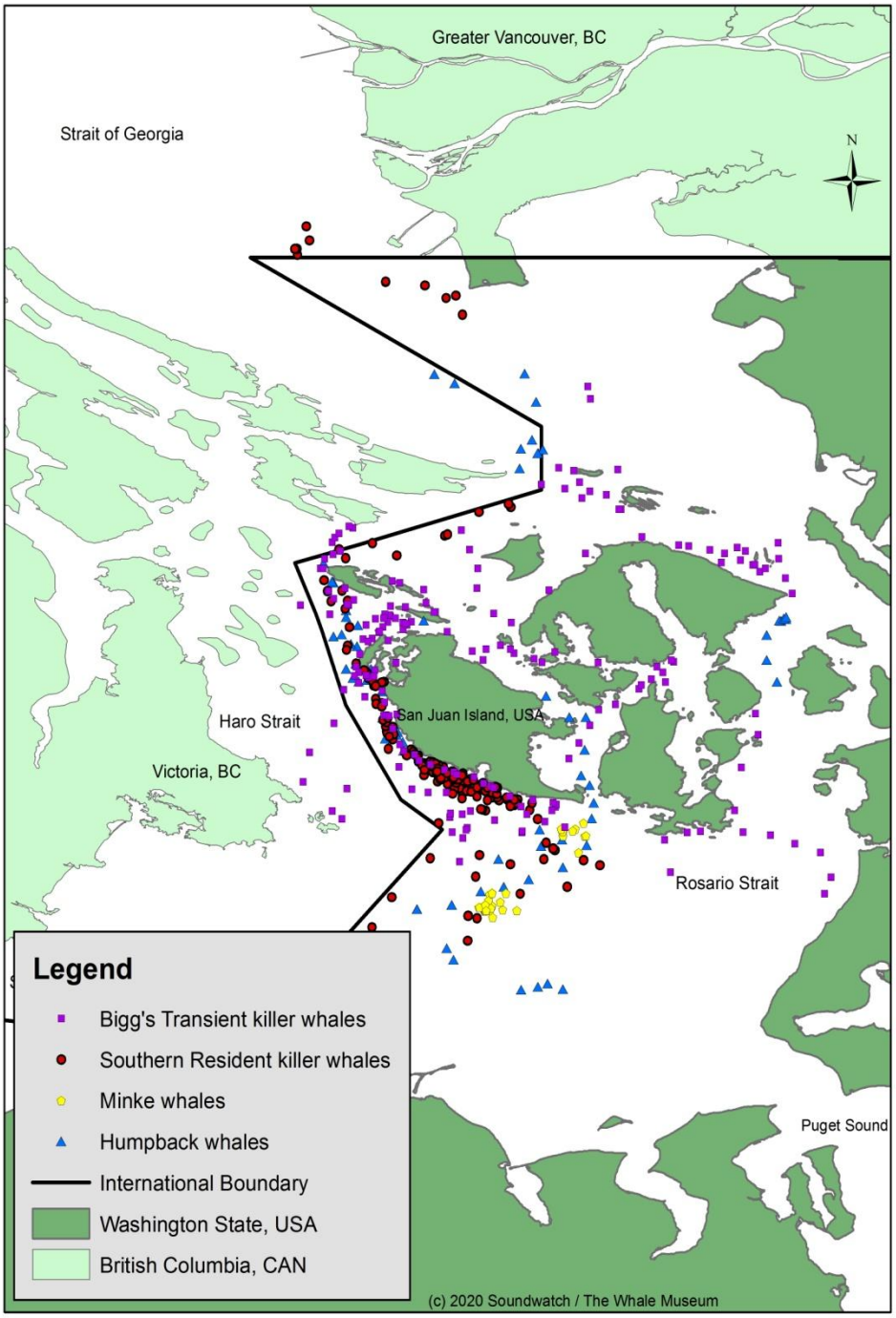

Figure 12: 2020 Vessel Counts by species of cetacean observed within the count.

Vessel Activities Around Whales

Figure 13 displays the type and number of vessels around whales in 2020. Recreational vessels had the greatest presence around whales during the peak season months of July, August, and

September. Overall vessel activity around whales saw a sharp increase after the month of June, likely due to the lifting of certain COVID-19 restrictions in the region (Appendix O). Monitoring/Enforcement vessels, which includes Soundwatch and Straitwatch, accounted for the second highest presence in vessel counts, which reflects the effort of monitoring/enforcement vessels as well as the nature of Soundwatch data collection.

Although recreational vessels were the greatest presence around whales, EcoTour vessels accounted for the highest percentage of whale-oriented activity in the vicinity of whales (Figure 14). This suggests that recreational boaters in the Salish Sea do not generally recreate for the purpose of whale watching.

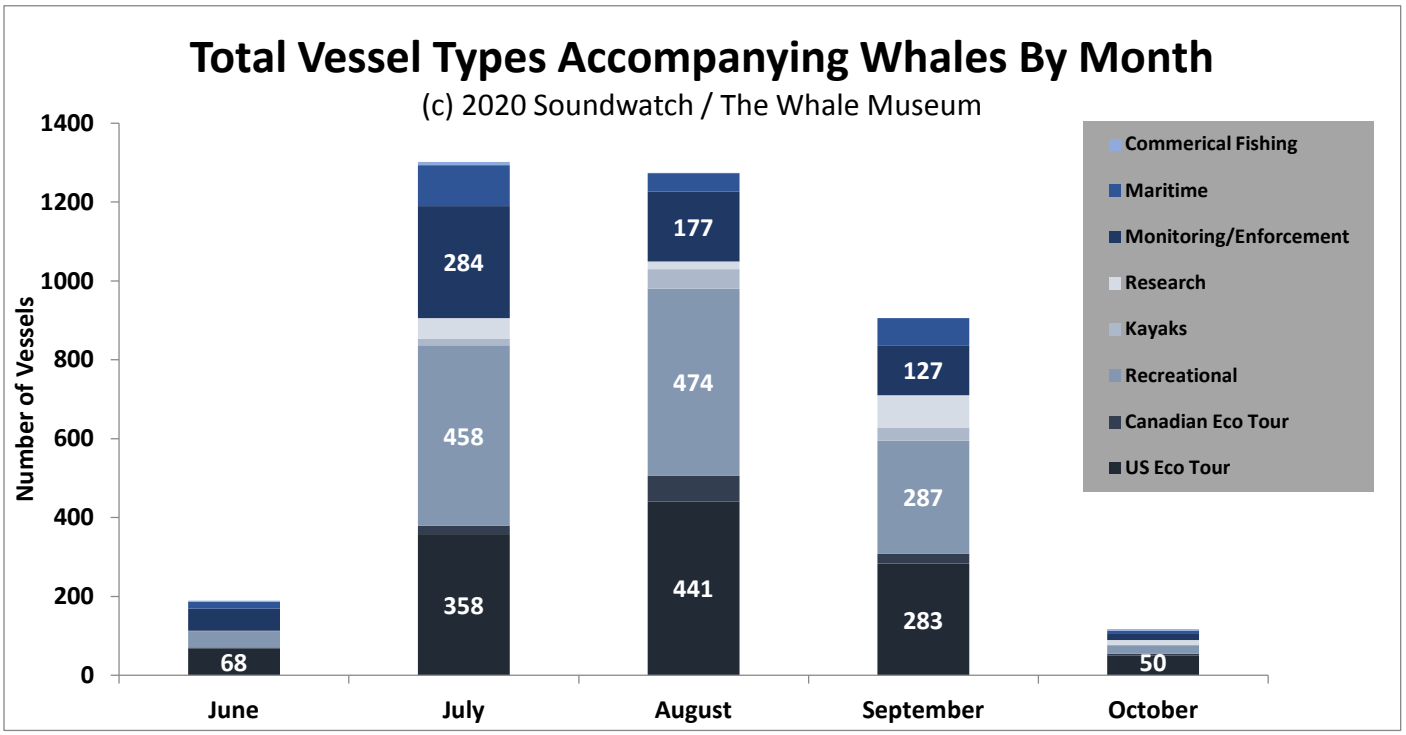

Figure 13: Total number of observed vessels by vessel type and month recorded in 2020.

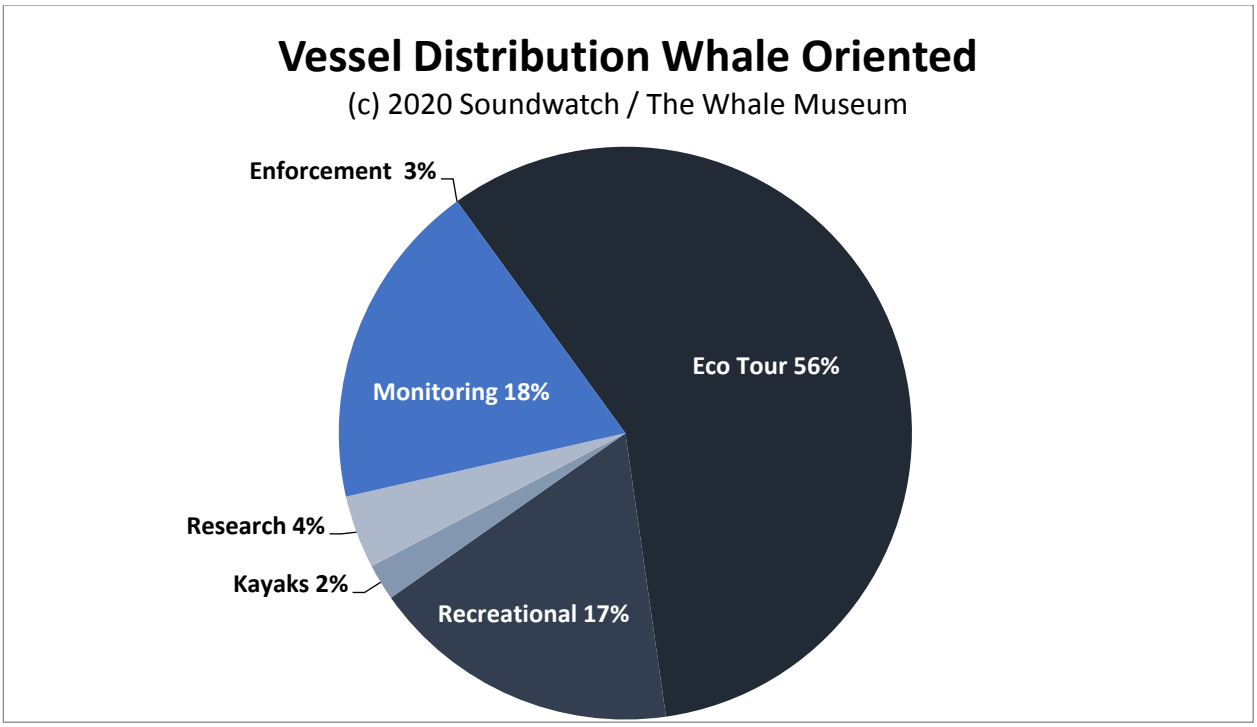

Figure 14: Percentage of 'whale oriented' vessel distribution by vessel categories during the 2020 season.

Number of Vessels Accompanying Whales

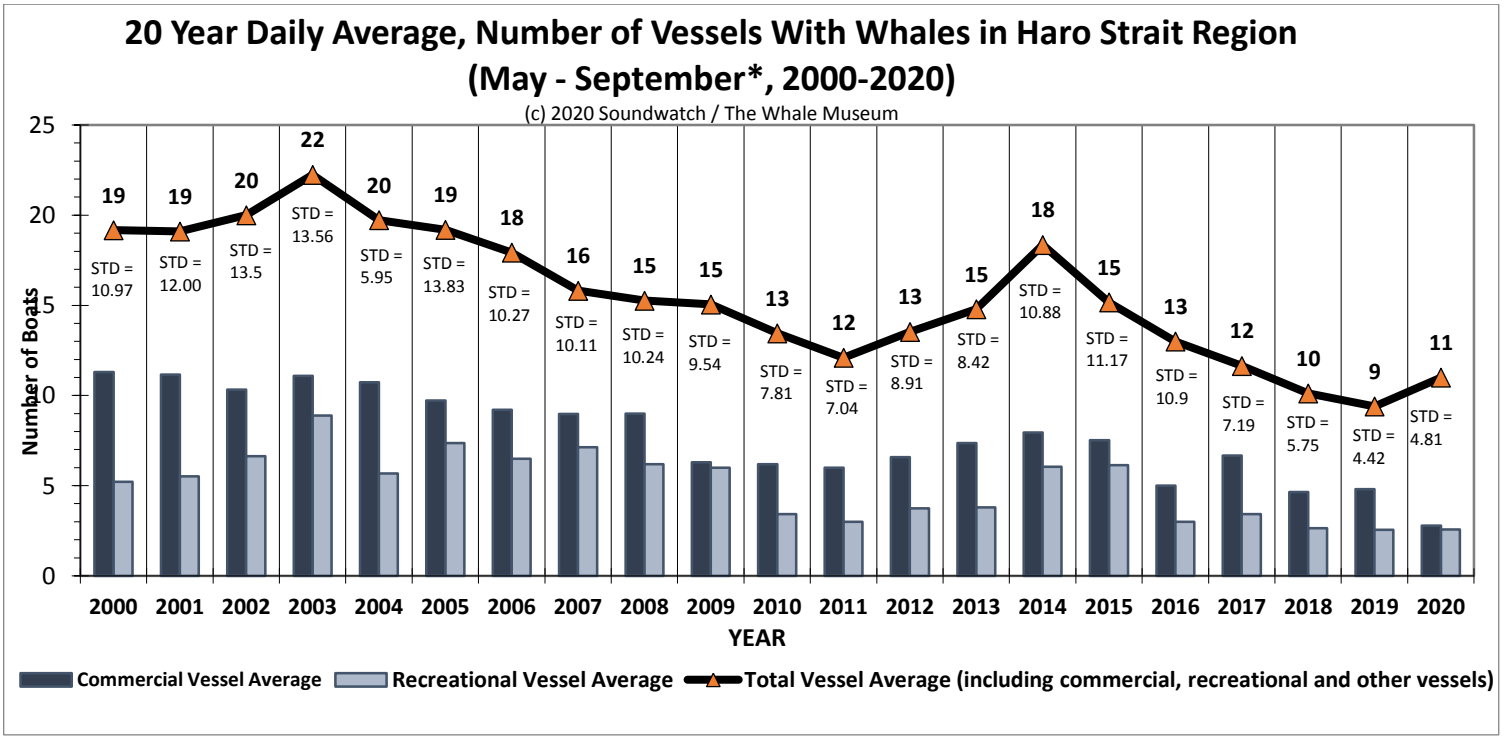

Figure 15: Average number (of recreational, EcoTour (commercial)) and total of all vessels with killer whales in the last twenty years in Haro Strait Region (May-September 1998-2016, 2018-2019 and *June-September 2017 and June-October 2020).

During June-October 2020, the average number of total vessels observed within one half-mile of orcas was *11* (Figure 15), contradicting the previous downward trend since the average of *18* in 2014. The observed average increase in total vessel traffic around orcas during the summer of 2020 may be due to increased use of the Salish Sea as a result of boating being permitted as a suitable socially-distanced activity. The increase could also be linked to presence of orcas during events of increased vessel activity, such as the September fishing season. Average number of commercial vessels accompanying orcas specifically continues to trend downward since 2017 while the average number of recreational boaters has remained at around *3*. The Pacific Whale Watchers Association (PWWA) does suggest a limit of the maximum number of EcoTour vessels around a single group of orcas. This limit was codified into law by WDFW's Commercial Whale Watch Licensing Program (CWWLP), instated along with other regulations in January 2021. This observed decrease in the average EcoTour vessels with the whales since 2017 could be linked to increased dispersion of SRKW in particular. During the 2020 season, recreational boating was the only category to see a slight increase from 2.6 to 2.7 (Figure 16).

Vessel activity in the vicinity of orcas was primarily characterized by recreational and EcoTour vessels (Figure 17). Whale-oriented activity was the most commonly observed activity within one-half mile of whales, with the exception of the month of September, when the primary activity was fishing (Figure 18). This may be due to the opening of salmon fishing (Appendix O1) overlapping with SRKW presence during the month of September. The SRKWs returned to the west side of San Juan Island after their noted absence for the entirety of August.

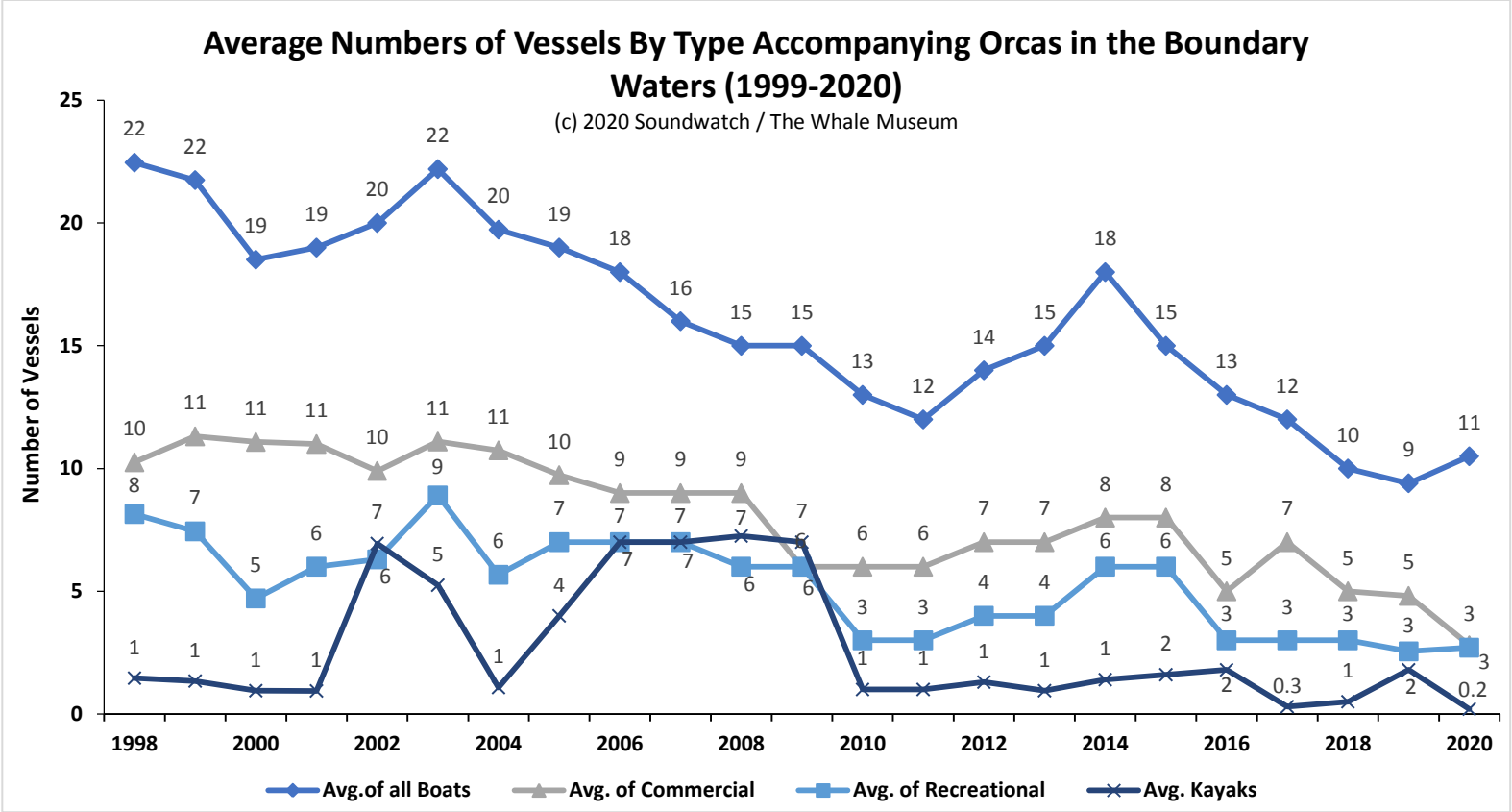

Figure 16: Average number of vessels by vessel category within one half-mile of killer whales from 1998-2020 in the Salish Sea.

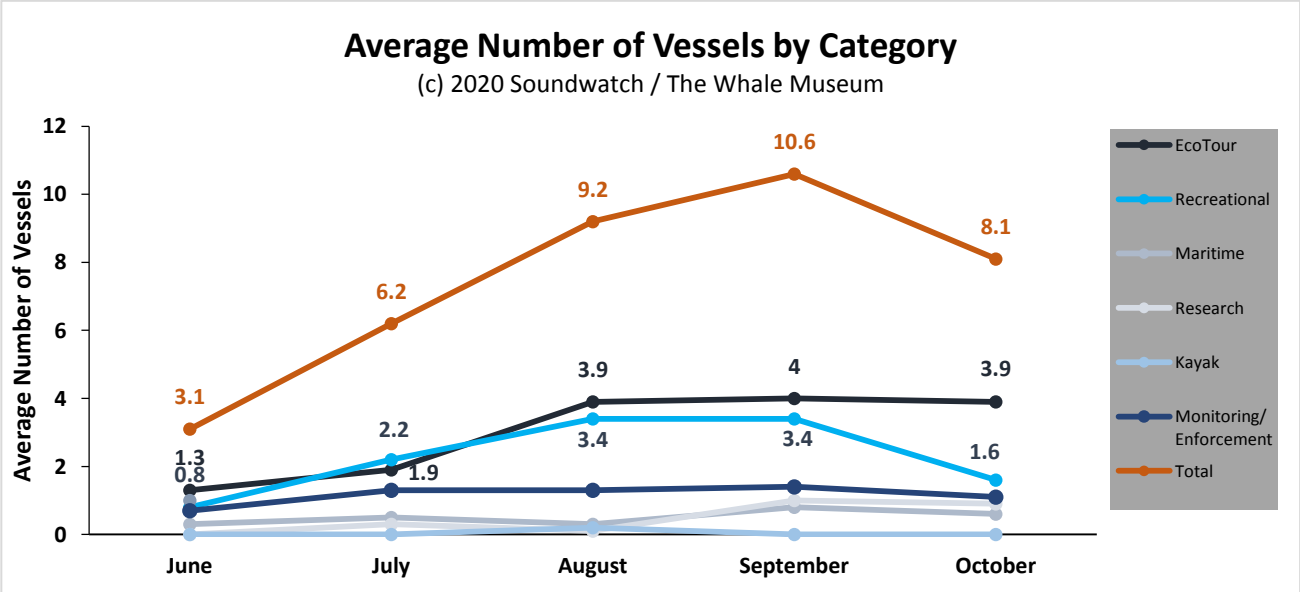

Figure 17: Average number of vessels within one half-mile radius of killer whale by vessel categories and month in 2020 Soundwatch vessel counts.

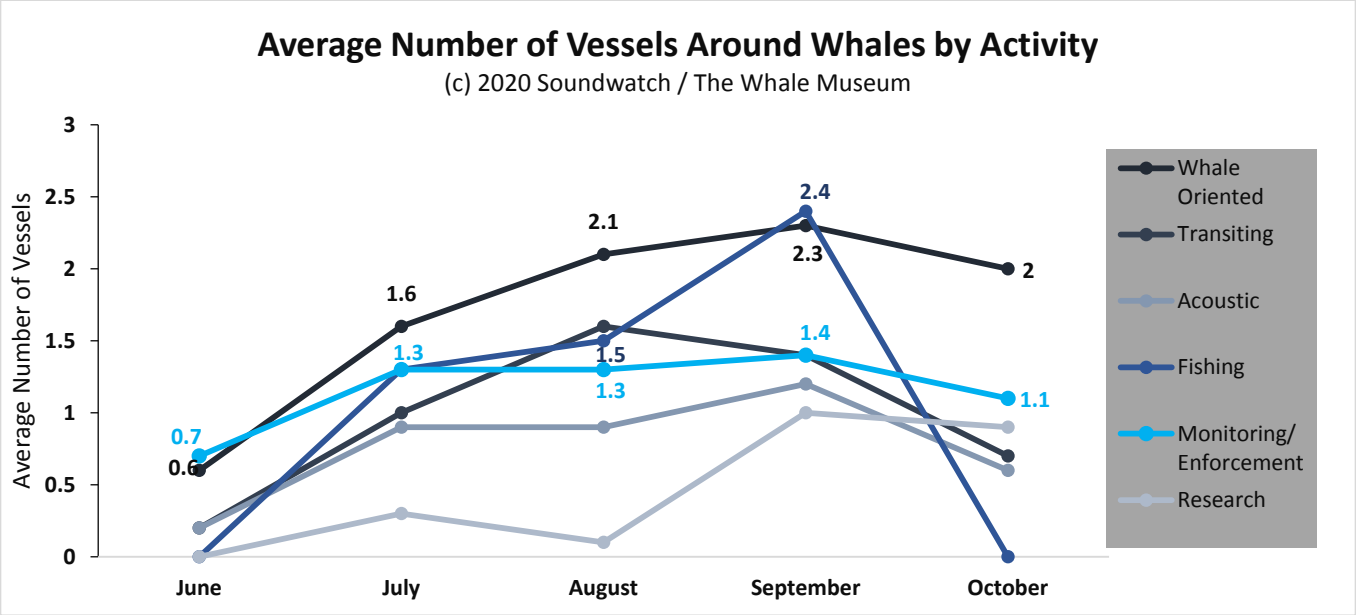

Figure 18: Average number of vessels within one half-mile radius of killer whales by vessel activity and month in Soundwatch 2020 vessel counts.

The 2020 annual maximum number of total vessels observed with whales was *39*, a slight increase over previous years likely due to an influx of recreational boaters observed later in the season (Figure 20). Variations in the maximum number of recreational vessels are generally dependent on three variables: 1) fishing season, 2) the presence of killer whales in popular fishing locations and 3) location of the Soundwatch vessel.

Soundwatch 2020 data saw a slightly different trend of variability in vessel averages and maximum by month and activity, and also by time of day. Historically, the summer season reflects 'peak times of day' in the morning and mid-afternoon with a mid-day lull during trip turn-around times. In 2020 (June-October) the 'peak time of day' does not follow the traditional mid-day lull – instead, average number of vessels held relatively steady throughout the day until late afternoon (Figure 21). This is possibly a result of COVID-19 impacts to the season – EcoTour operations may have shifted to compensate for regulations and opportunity. Both whale presence and EcoTour whale watch schedules contribute to monthly variation.

Figure 21 also depicts a sharp increase in vessel number during the >1800 time slot. This is likely a direct result of Soundwatch effort to remain on scene during the Superpod observed in early September. The Superpod coincided with some of the first sightings of SRKWs in the region after their absence in August, as well as the first sighting of J57 Phoenix, J35 Tahlequah's new calf. EcoTour vessel presence was high on this day and extended past 1800.

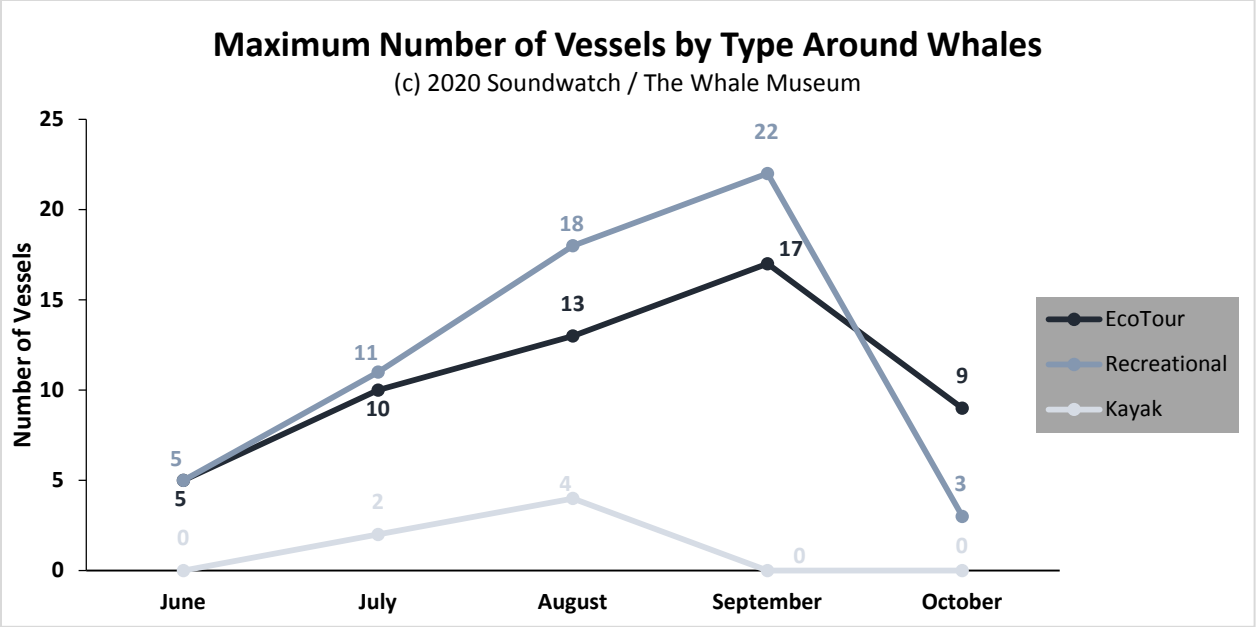

Figure 19: Maximum number of vessels by category and month around killer whales from June-October 2020.

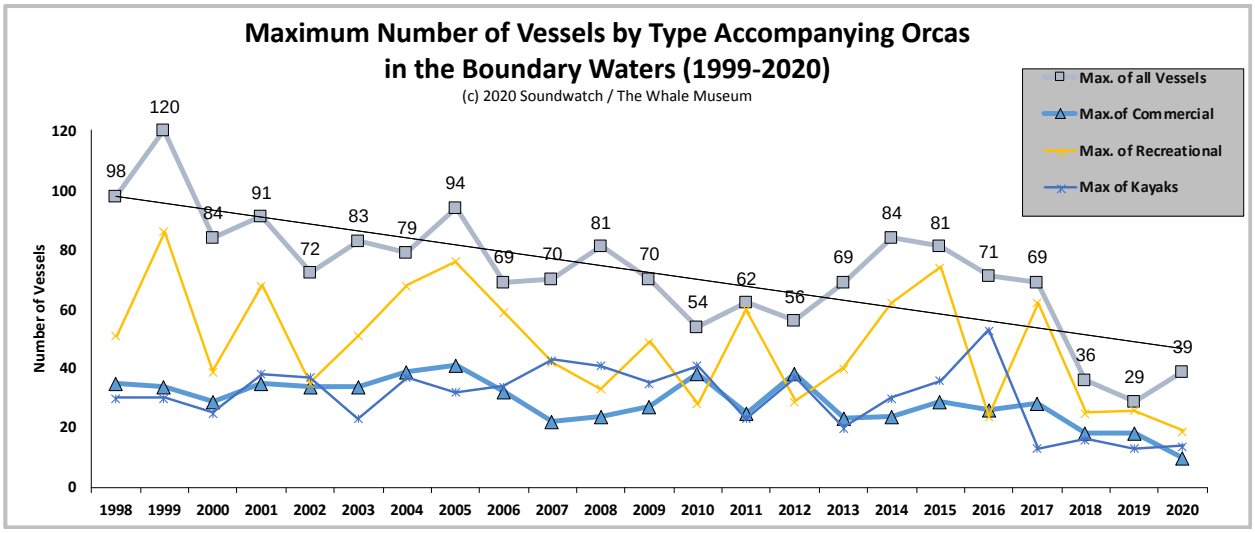

Figure 20: Maximum number of vessels within one half-mile of killer whales in the Salish Sea by vessel category from 1998-2020.

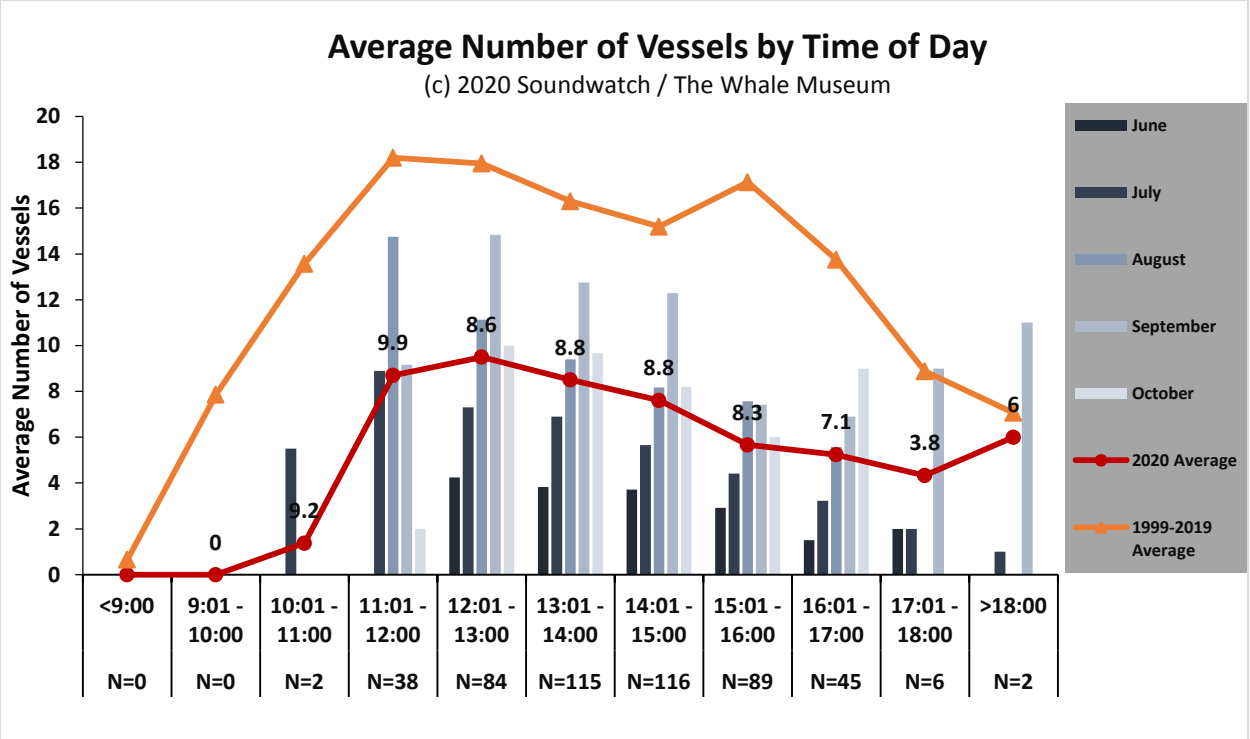

Figure 21: Average number of vessels by time of day includes all vessel categories, the average for 2020 and the 21-year average.

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 contact, Soundwatch vessel crew inform the boaters of *Be Whale Wise Marine Wildlife Guidelines for Boaters, Paddlers and Viewers* and *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 2020 season, Soundwatch contacted *431* recreational vessels for a total of *1,364* boater contacts, averaging *3.16* boaters per vessel. This data describes an overall trend of decreasing numbers of contacted recreational vessels (*487* vessels and *1,551* boaters in 2018, *468* vessels and *1,469* boaters in 2019). In comparison with 2019 recreational contact data, there was an apparent shift in the numbers of recreational boaters active on the water (Figure 22). This is

likely due to delayed start of season as a result of COVID-19 restrictions (Appendix O). Recreational contact data was not collected during May 2020 or October 2019.

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, *26%* were deemed to be correctly aware of the guidelines and laws (Figure 23), with the greatest discrepancy between aware and unaware boaters occurring in August 2020. The season saw a very slight increase from *25%* awareness in 2019 to 26% awareness in 2020 (Figure 25). It is important to note here that boaters may have self-identified as aware despite potentially being unaware of current regulations. Comparable data from Cetus Research and Conservation Society's Straitwatch stewardship program reflected an increase from *35%* awareness in 2019 to *43%* awareness in 2020 (Appendix Q2). Straitwatch further characterized awareness by vessel type, determining *0%* awareness of regulations for both kayaks and jet skis (Appendix Q3).

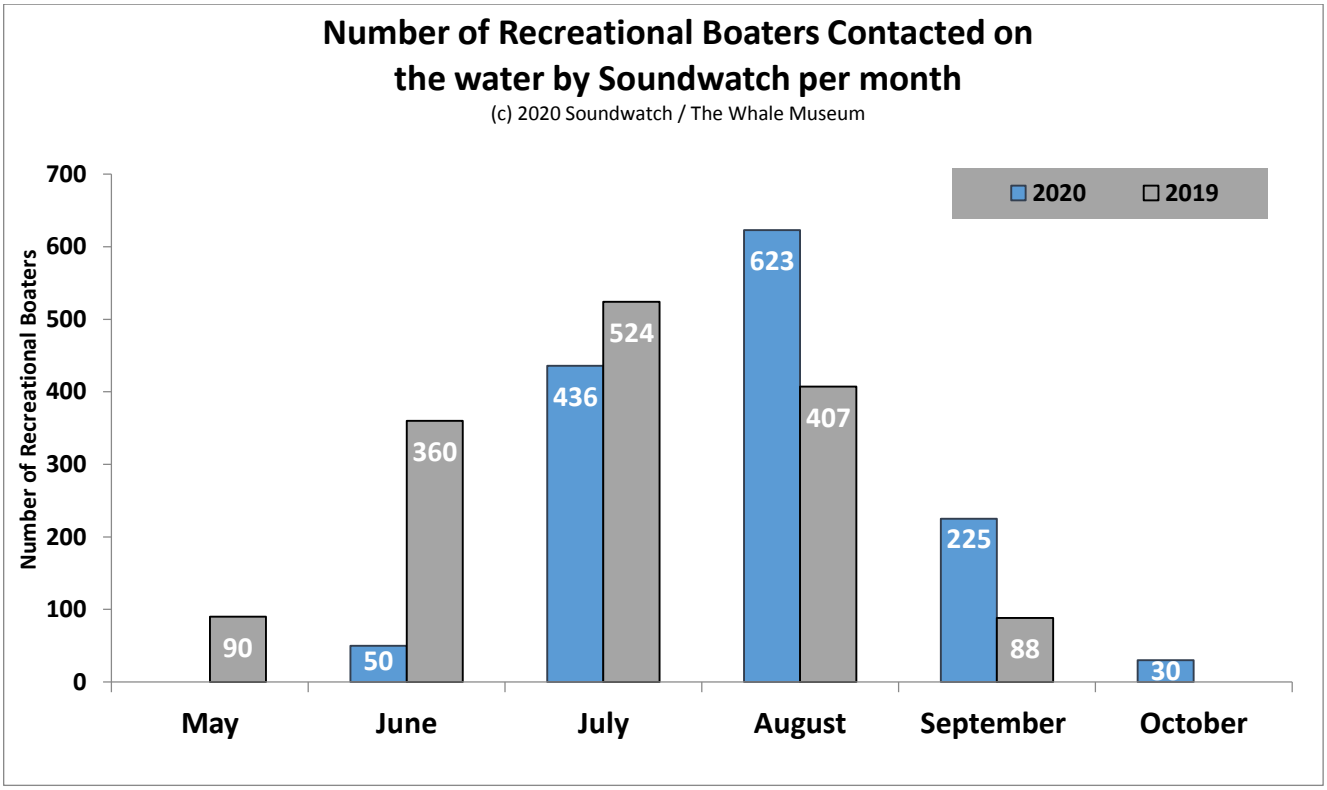

Figure 22: Number of recreational boaters contacted by month on the water by Soundwatch for either prevention and/or education on vessel disturbance to killer whales in the region during the 2020 season (N=1,364) compared to the 2019 season (N=1,469).

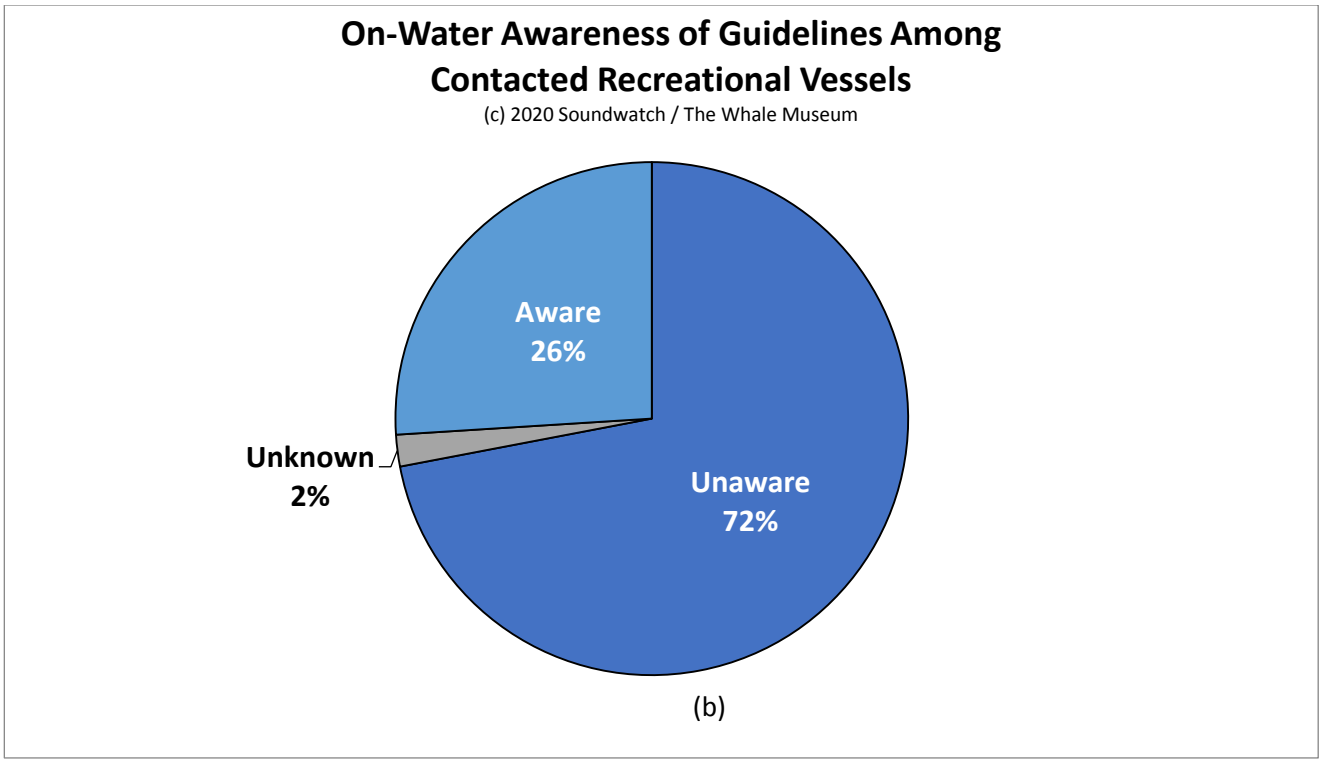

Figure 23: Awareness of Be Whale Wise Guidelines among contacted recreational vessels in 2020.

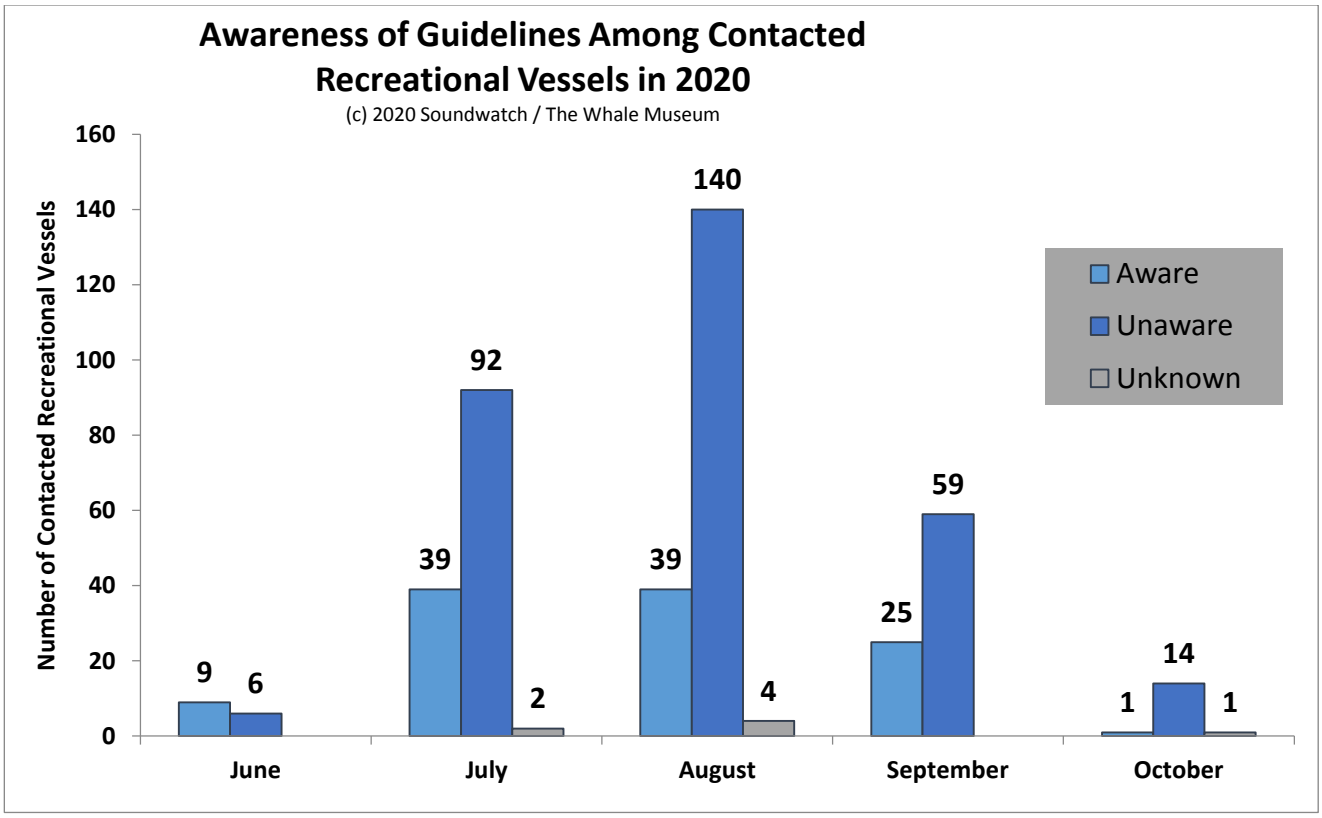

Figure 24: Number of recreational vessels contacted and the awareness of Be Whale Wise Guidelines by month in 2020.

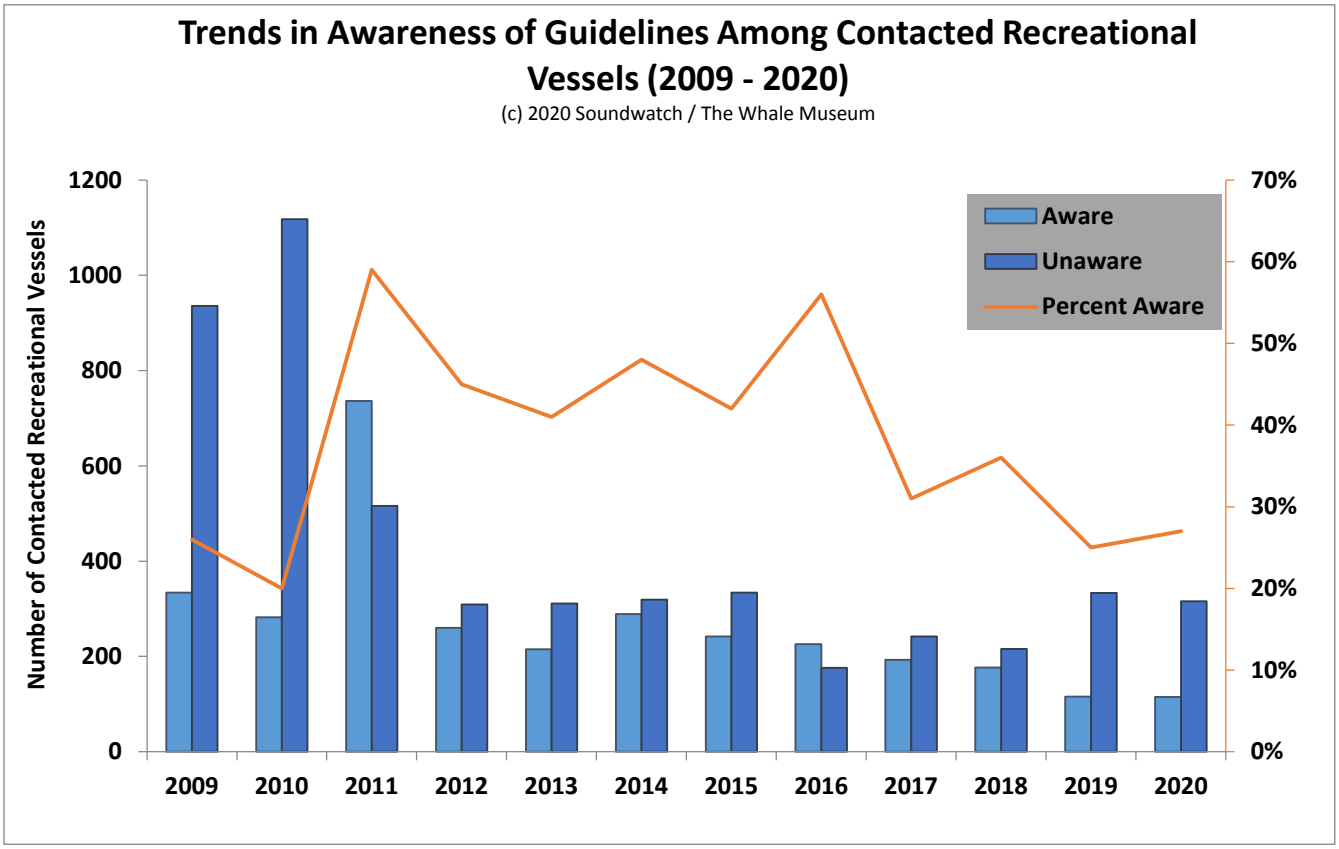

Figure 25: Trends in Recreational Vessels Awareness of Guidelines Contacted by Soundwatch from 2009 – 2020.

Soundwatch crew recorded the registered homeports of contacted vessels when available (Figure 26). Registered ports most commonly contacted in 2020 were Anacortes, Bellingham, Friday Harbor, Roche Harbor and Seattle, Washington and Victoria and Vancouver, British Columbia. Homeports were also recorded from out-of-state, including as far as Alaska and Pennsylvania (Figure 27).

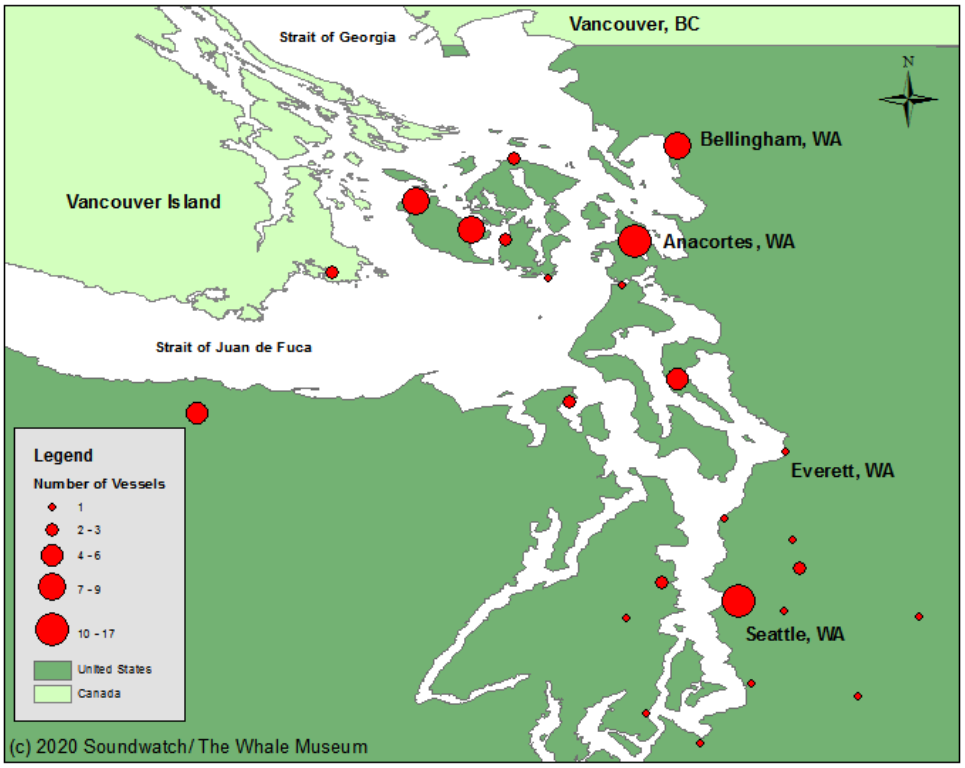

Figure 26: Recreational vessel home ports in the Salish Sea, as recorded by Soundwatch from June – October 2020.

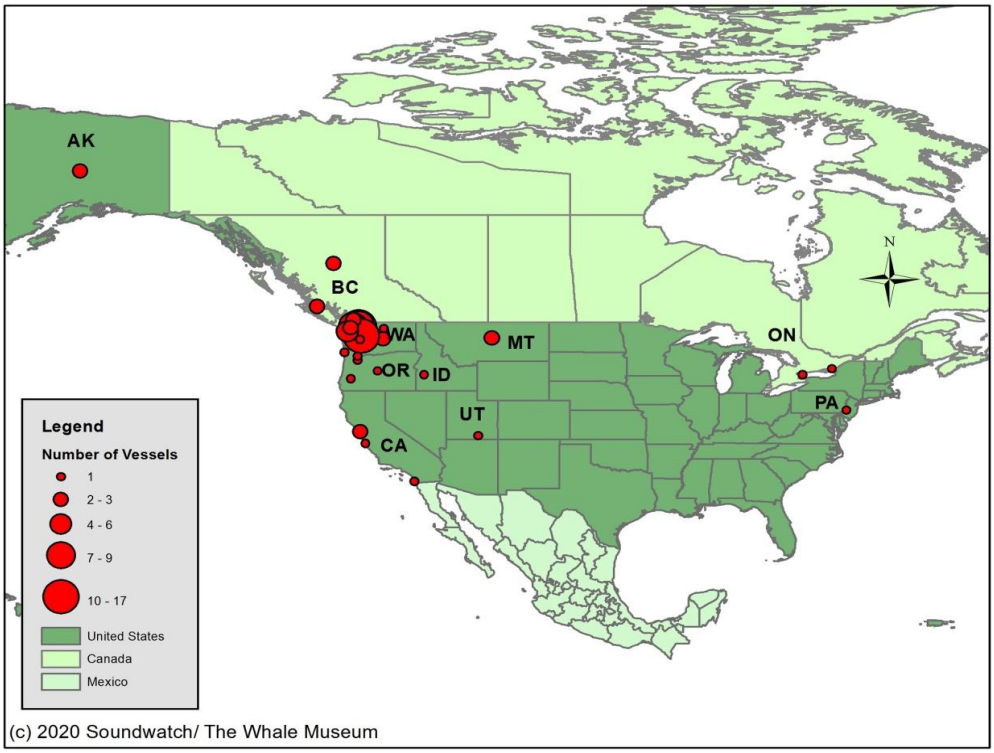

Figure 27: Recreational vessel home ports outside of the Salish Sea within North America, as recorded by Soundwatch from June – October 2020.

Of vessels contacted, *48%* were transiting through the area and *44%* were actively engaged or intended to engage in whale watching activities, and *9%* of vessels were engaged in fishing in proximity to killer whales (Figure 28a). This breakdown of activity of vessels suggests a change from previous years, with a greater percentage of recreational contacts transiting than recorded in 2018 and 2019 (*38%* transiting). 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.

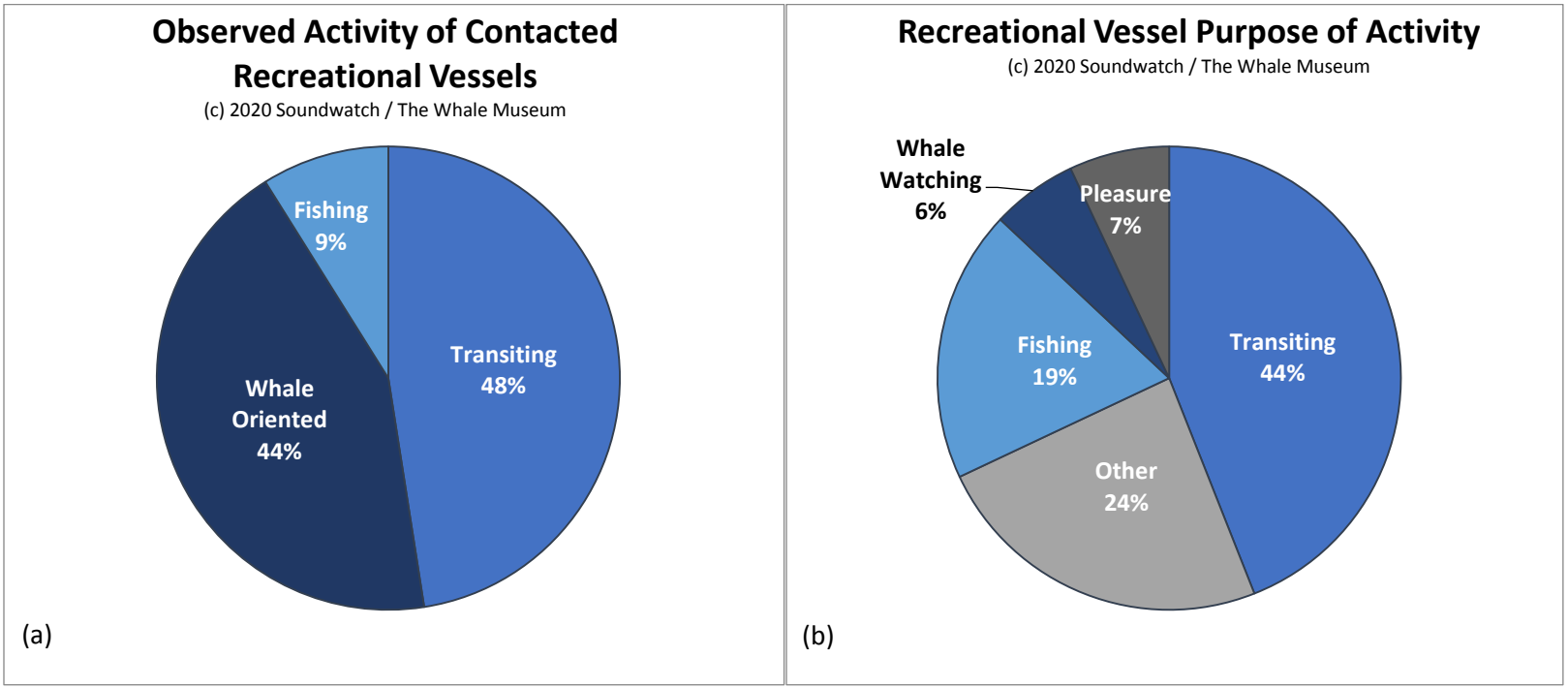

Figure 28a: Observed Activity of Recreational vessels contacted by Soundwatch in 2020.
Figure 28b: Soundwatch Recreational vessel contact responses to "Reason/purpose for visiting the region?" in 2020.

Off-Water Public Education

Soundwatch personnel conducted *200* hours of "Dock Talks", an off-water public education platform with visual aids and outreach materials for distribution. During Dock Talks, Soundwatch contacted *695* individuals; of these contacts, 29% were deemed to be correctly aware of the guidelines and laws (Figure 29), slightly greater than on-water awareness. This is likely due to the inherent difficulties of distributing and collecting information in an on-water setting versus dry land. Dock Talks were typically held at the Port of Friday Harbor on a weekly basis.

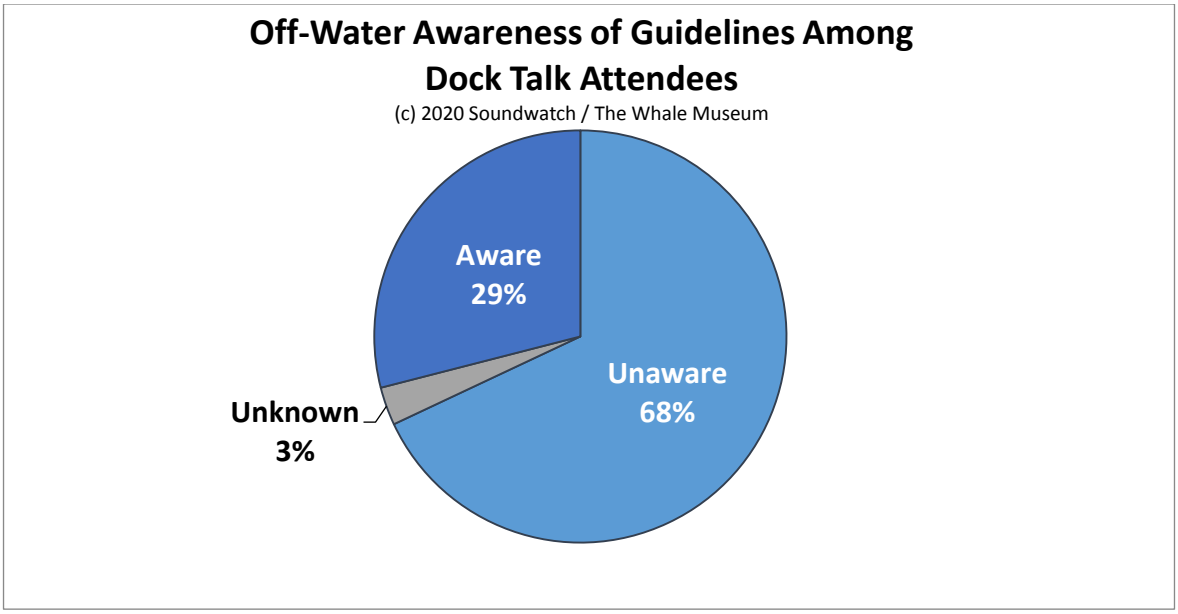

Figure 29: Off-water awareness of guidelines among Dock Talk attendees

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 *107,000* museum visitors and education program participants, with *2,933* visitors in 2020. Typically, the museum sees a greater number of visitors in a season; however, due to COVID-19 restrictions the museum exhibits remained closed until August 22, 2020 (Appendix O). Materials were also given to approximately *815* 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. Kayak Education and Leadership Training Video can be found using the following link: https://youtu.be/QQoqcakYc-g.

Social Media

The 2020 season introduced new outreach obstacles to the Soundwatch program, particularly the challenge of educating new audiences on updated regulations while social distancing measures were implemented due to COVID-19. In response, Soundwatch increased efforts on social media platforms, primarily the program's Instagram account @soundwatch_twm. During the 2020 season, @soundwatch_twm followership increased by *69.2%* and expanded to global audiences including regions of Australia and New Zealand. Ongoing effort is necessary to continue vital growth and establish a social media presence that will support Soundwatch education and outreach objectives.

Whale Behavior

Killer Whale Attribute Data

Soundwatch collected killer whale behavior on the hour and half hour, totaling 381 whale behavior counts for the 2020 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, with the only exception to the above in October with 'milling' and 'modified rest' as the dominant behavior for SRKWs (Figure 30). The Southern Residents were notably absent in Soundwatch's area of response during the months of June and August. This absence suggests changing use of their historic core habitat, likely due to factors such as prey availability.

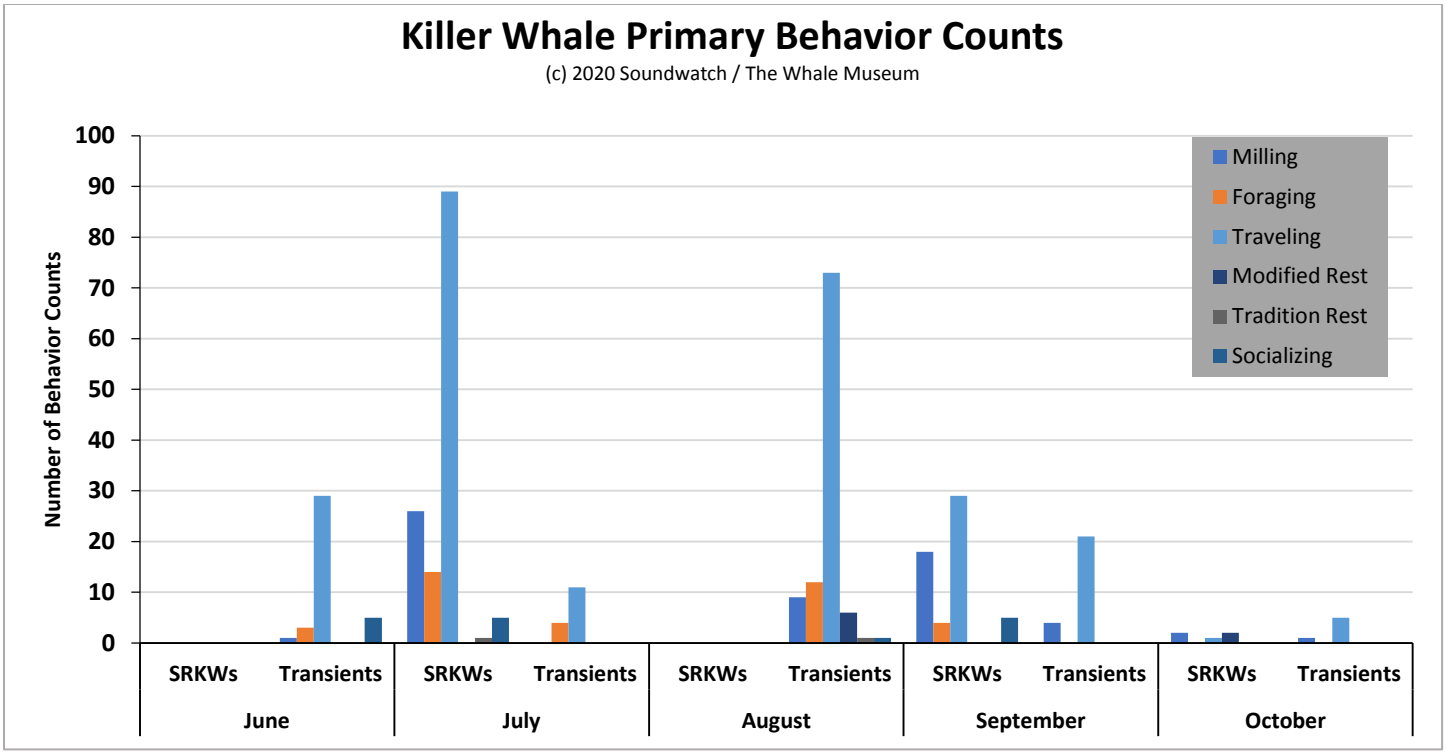

Figure 30: Southern Resident and Transient killer whale behavior counts from June – October 2020 conducted near the hours and half hour by Soundwatch.

Other Large Cetacean Attribute Data

Soundwatch recorded whale behavior data for all large cetaceans encountered during the 2020 season, including humpback whales (n=70 counts) and minke whales (n=35 counts). Travel was the predominant behavior of observed humpback whales (Figure 31), while minke behavior is more variable (Figure 32). This is likely due to lower sample size and high site fidelity of minke whales.

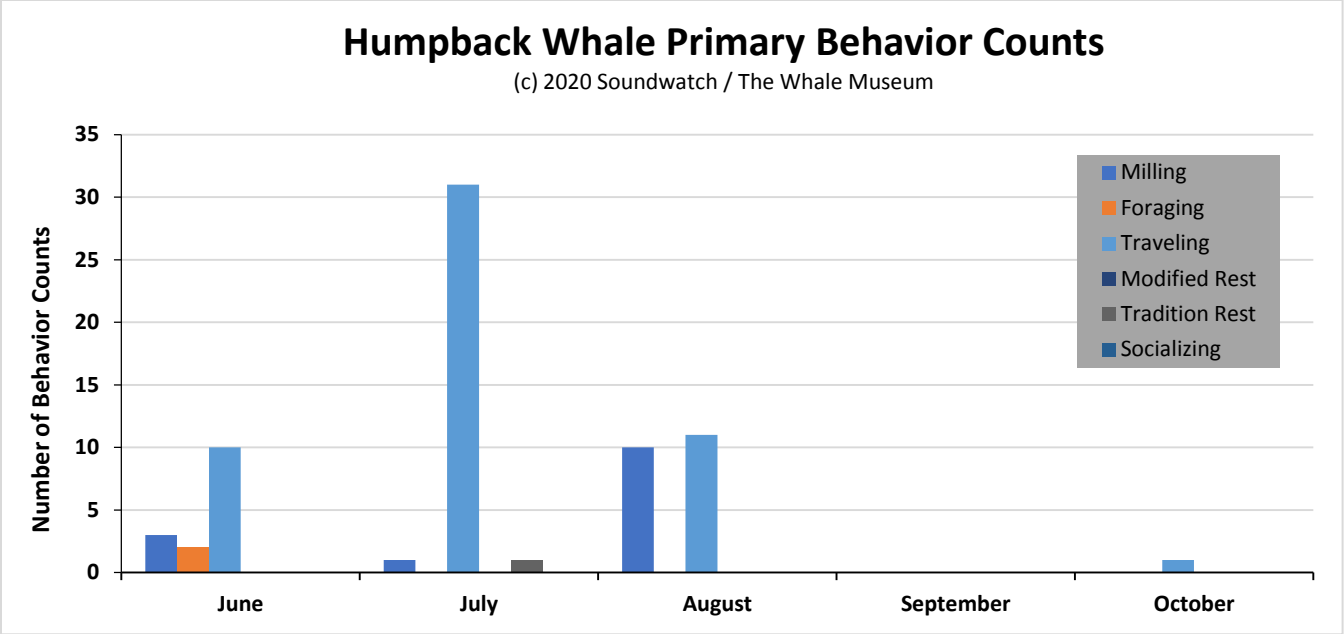

Figure 31: Humpback whale behavior counts from June – October 2020 conducted near the hour and half hour by Soundwatch.

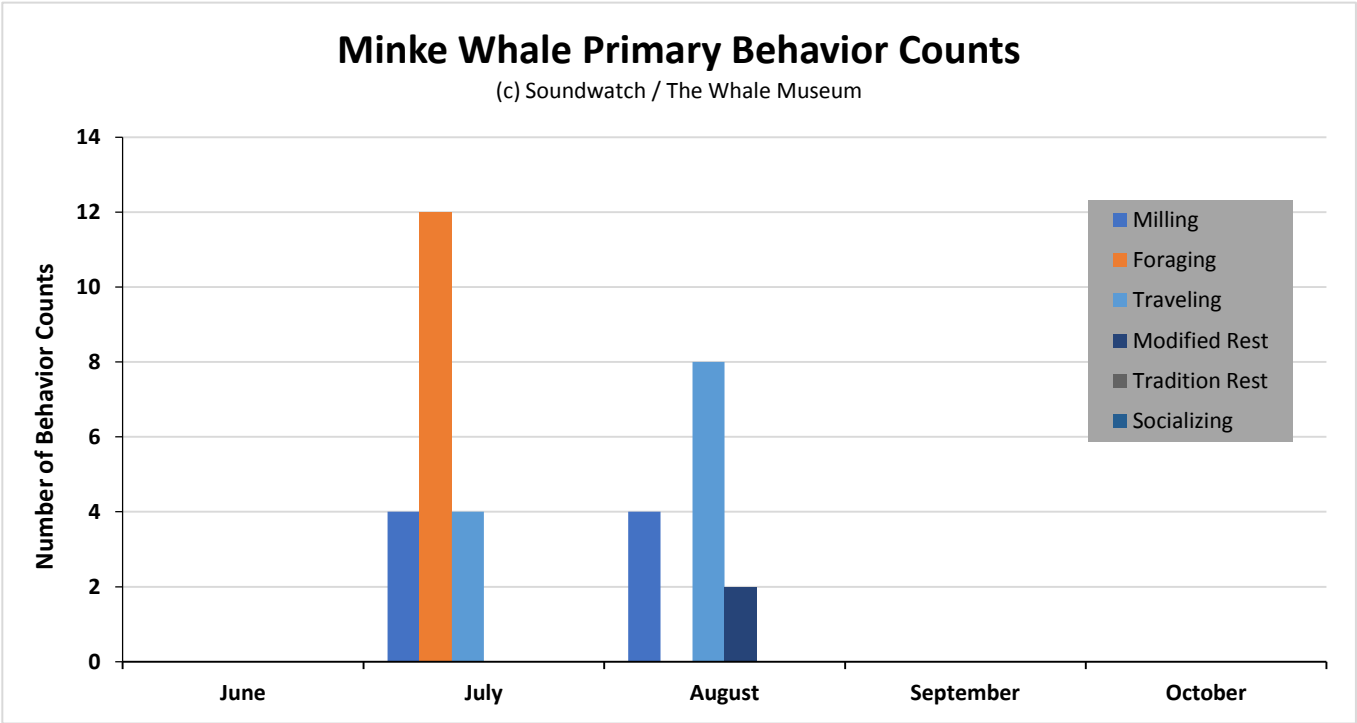

Figure 32: Minke whale behavior counts from June – October 2020 conducted near the hours and half hour by Soundwatch.

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 1998-2020 (© 2020 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**
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%
Stopped within 0-100 yards of whales														17%	8%	7%	13%	11%	12%	10%	2%	1%	0%
Under power within 100-200yards of whales														12%	10%	15%	12%	8%	14%	16%	9%	9%	9%
Stopped within 100-200yards of whales														18%	15%	6%	14%	13%	15%	14%	7%	1%	<1%
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%
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%
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%
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%
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%
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%
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%
Other		1%	3%	3%	14%	5%	15%	11%	10%	3%	2%	1%	1%	0%	1%	1%	0%	0%	0%	3%	13%	3%	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%
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%
Fast within 1/2 mile					3%	4%	9%	10%	11%	16%	11%	13%	13%	6%	8%	9%	8%	11%	6%	6%	7%	35%	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%
Kayaks spread out					<1%	3%	0%	<1%	1%	1%	1%	1%	1%	<1%	2%	1%	1%	2%	<2%	<1%	2%	1%	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%
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%
Kayaks paddling w/in 100-200 yds														1%	1%	1%	1%	1%	3%	<1%	0%	0%	0%
Kayaks parked on headland															<1%	<1%	0%	0%		0%	0%	0%	0%
Within 300 yards of SRKWs (Washington 2019)																						10%	9%
Within 400 yards of killer whales (Canada interim order 2019)																						2%	<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%
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
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

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 1998-2020.

During the 2020 field season, Soundwatch recorded *177* vessels for a total of *365* incidents; *334* committed by private motorized vessels, *14* by private vessels under sail, *8* by EcoTour U.S. vessels, *4* by private kayak, *2* by EcoTour Canada vessels, *1* by commercial fishing vessels, *1* by private paddleboard, and *1* by US Coast Guard (Table 2). The low number of Canadian violations is likely a result of limited opportunity for Soundwatch to collect data during the maritime border closure combined with the PWWA encouraging EcoTour operators not to cross the border. Supplementary incident numbers for EcoTour Canada vessels (EC) are provided by Soundwatch's Canadian sister program, Straitwatch, for a total of *90* incidents in their area of response during the 2020 season (Appendix Q1).

The absence of violations by EcoTour kayaks may be explained by the delayed and reduced operations of the commercial kayak industry in the 2020 season due to COVID-19 restrictions. Recreational private motors were responsible for *92%* of total recorded incidents, most frequently violating the 7kt speed limit when within one-half mile of whales (Figure 33).

Incident Type	EC	EK	EU	MF	PK	PPB	PM	PS	GC	Total
100 yards under power			2				27	2		**31**
200 yards under power			1				30	3		**34**
300 yards under power			1				29	3		**33**
400 yards under power										-
400 yards in the path			2		1		35	3		**41**
inshore of whales							24			**24**
drone violation							2			**2**
fast approach within 400 yards			1				29			**30**
fast departure within 400 yards							21			**21**
over 7 kts within half mile of whales	2		1	1			105		1	**110**
fishing within 100 yards							6			**6**
fishing within 200 yards							4	1		**5**
paddling within 100 yards of whales					2	1				**3**
shutdown within 100 yards										-
shutdown within 200 yards							1			**1**
SJI No-Go-Zone							6			**6**
spread out kayaks with whales										-
traveling behind whales 100-400 yards					1		10	2		**13**
within eighth mile of shore							3			**3**
within half mile of Lime Kiln Lighthouse							2			**2**
within 200 yards of a Wildlife Refuge										-
Total										**365**

Table 2: Summary of vessel incidents in 2020 by incident type and vessel involved in the incident. (EC=Eco Tour Canada, EU=Eco Tour U.S., EK=Eco Tour Kayak, PK=Private Kayak, PPB=Private Paddleboard, PM=Private Motor, PS=Private Sail, GC=US Coast Guard)

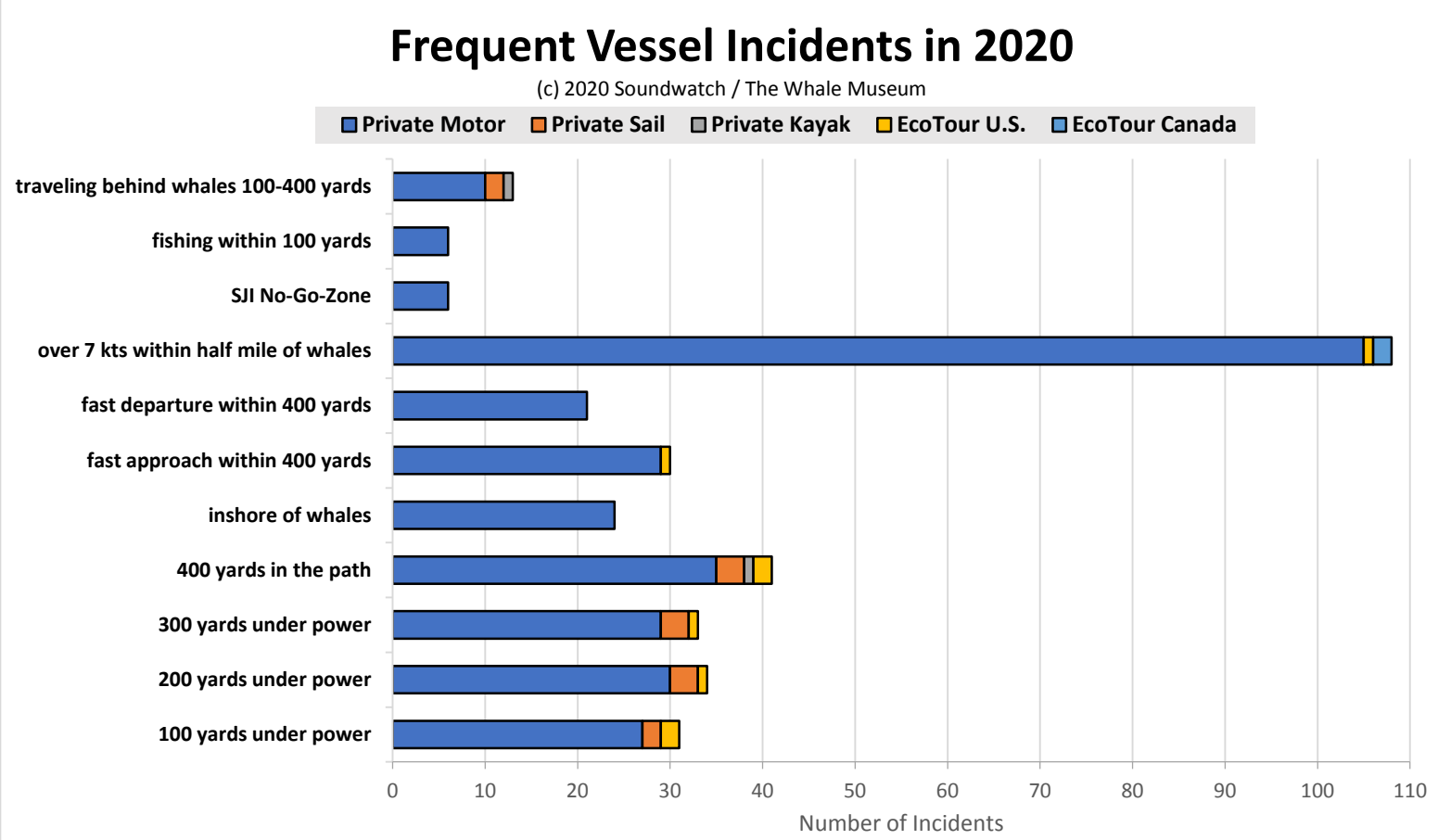

Figure 33: Most frequent vessel incidents observed by Soundwatch from June-October 2020 by incident and vessel categories.

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 *177* vessels, *71%* were transiting, *22%* whale oriented, and *7%* 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 areas with the most vessel incidents observed by Soundwatch in 2020 were within one half-mile near shore along the west side of San Juan Island (Zone 1) and Haro Strait (Zone 2 and 5) (Figure 36). Soundwatch recorded notably fewer incidents in Canadian waters in 2020 as compared to 2019 (Figure 37). This may be due to the fact that in 2020, Soundwatch was prohibited from crossing the maritime border for part of the season. Soundwatch also recorded fewer incidents in the southern sector of Zone 1 during the 2020 season. This may be due to the fact that SRKW in particular tended to concentrate further up island on the west side in Zone 1 (Figure 12).

During the 2020 season, *92%* of all incidents were committed by private/recreational motor vessels, *4%* private sailing vessels, *3%* U.S. commercial vessels, *<1%* commercial kayaks, *<1%*

Canadian commercial vessels, and *<1%* by commercial fishing vessels. (Table 2). Straitwatch data shows recreational vessels as responsible for more than half of recorded incidents, followed by EcoTour Canada and EcoTour US vessels, respectively (Appendix Q4). Straitwatch further distinguishes incidents recorded per month during the 2020 field season, with the highest number of recorded incidents occurring in August (Appendix Q6). This may relate to the highest number of recreational vessels unaware of regulations in the study area also occurring in August, as recorded by Soundwatch (Figure 24).

Of the 365 recorded incidents, *35%* were U.S. Vessel Regulation violations; **Vessels Within 200 Yards of Whales** were *23%* and **In the Path of Whales** were *12%*. The greatest number of incidents recorded was under the new Washington State Law of **Under 7 knots within a half mile of SRKWs** at 31%.
In 2020, **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 (*<1%*) Vessels Under Power Within 100 Yards (9*%*) were made by *93%* recreational vessels and *7%* U.S. commercial vessels.
- Vessels Under Power Within 200 Yards (*10%*) were made by *97%* recreational vessels and *3%* U.S. commercial vessels.
- Fishing Within 100 Yards was not observed by Soundwatch during the 2020 season. Fishing Within 200 Yards (*<1%*) was committed by recreational vessels (*100%*).
- Under Power Following Whales Within 400 Yards (*4%*) was committed by recreational vessels (*100%*).

In the Path of Whales incidents (*12%* of all incidents) were committed by *95%* recreational vessels and *5%* U.S. commercial vessels. **Under 7 knots within a half mile of whales** incidents (*31%* of all incidents) were committed by recreational vessels (*95%*), Canadian commercial vessels (*2%*), U.S. commercial vessels (*<1%*), commercial fishing vessels (*<1%*), and enforcement (*<1%*). As in previous years, private recreational vessels ranked the highest number of incidents in all of the frequent incident categories when comparing vessel categories, distantly followed by US and Canadian EcoTour vessels (Figure 33).

Whale watching activities ('whale oriented') accounted for *22%* of vessel incidents when comparing vessel activities, while vessels transiting ('transiting') accounted for *71%* of incidents around whales (Figure 35). It can be seen in the data that 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. These incidents are hypothesized to create the most disturbance and risk, such as vessel strike, to whales.

Variations in maximum vessel numbers and average vessels on scene are likely due to annual variation in whale presence, social cohesion, awareness; and 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. In 2020, an overall decrease in incidents was recorded. This could be

due to: heightened awareness of the plight of the SRKWs; decreased number of commercial whale watch vessels operating in both the US and Canada within Soundwatch's area of response due to COVID-19: increased outreach and enforcement: wider dispersal of whales and, therefore, Soundwatch research and recovery efforts in focused areas.

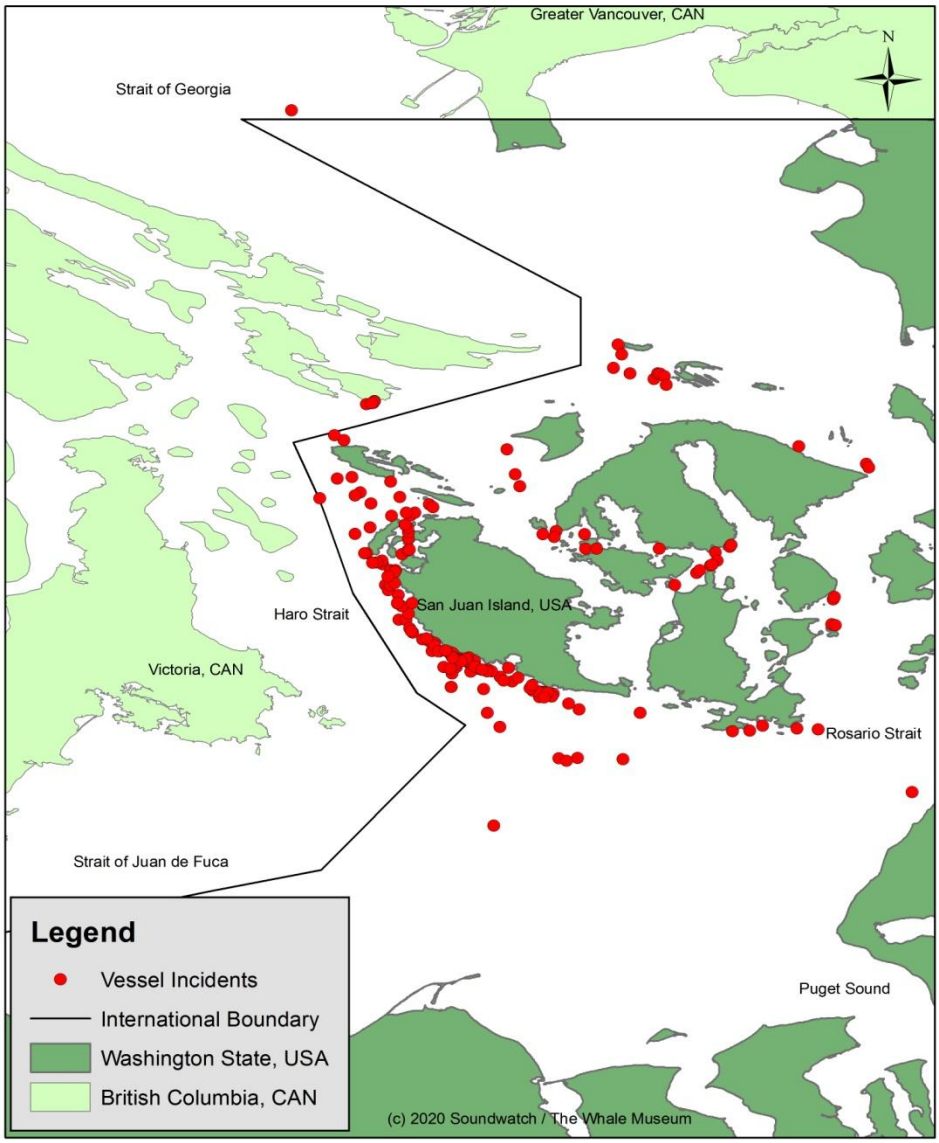

Figure 34: Total vessel incident locations observed by Soundwatch from June – October 2020. Points can be multiple violations, *N=177*.

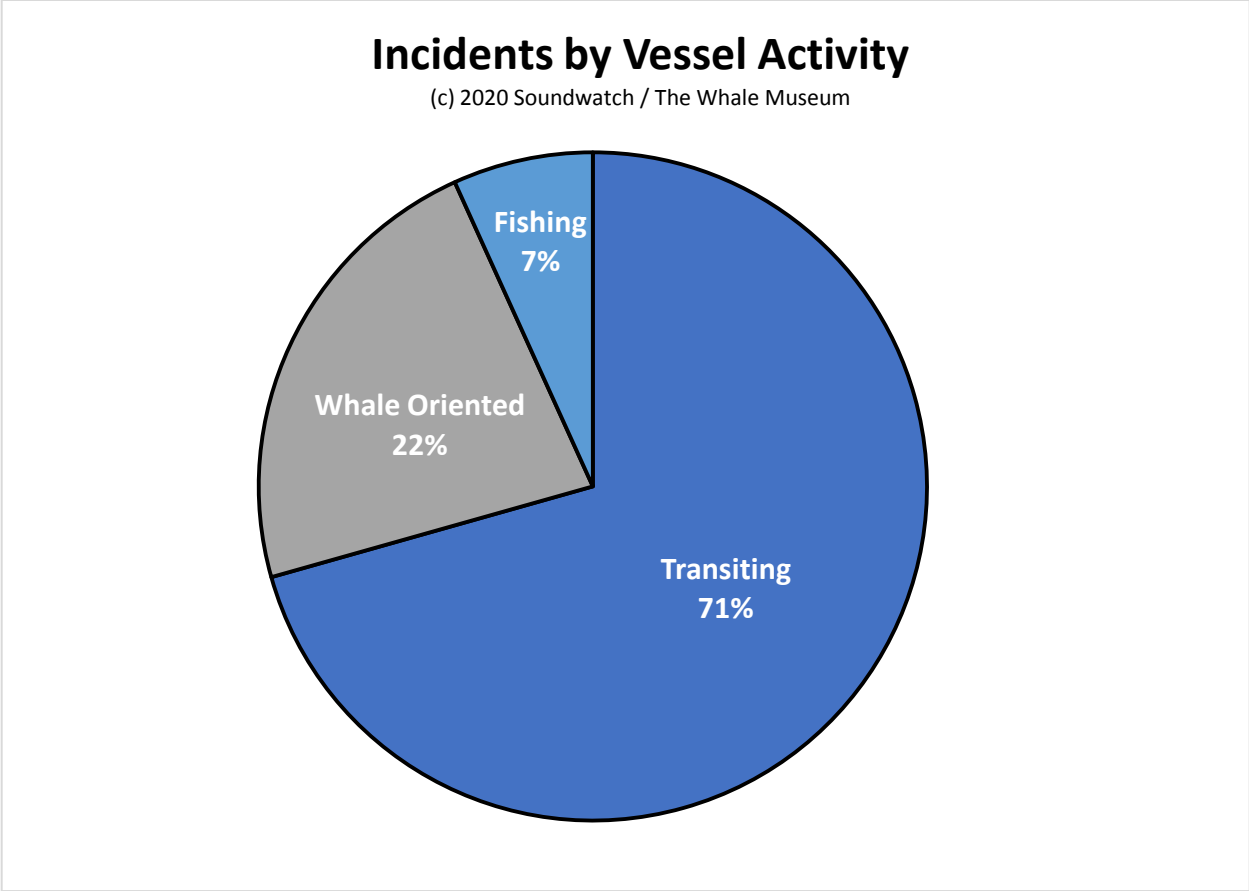

Figure 35: Percentage of all vessel incidents by vessel activity observed by Soundwatch June-October 2020.

Vessel Incident Trends

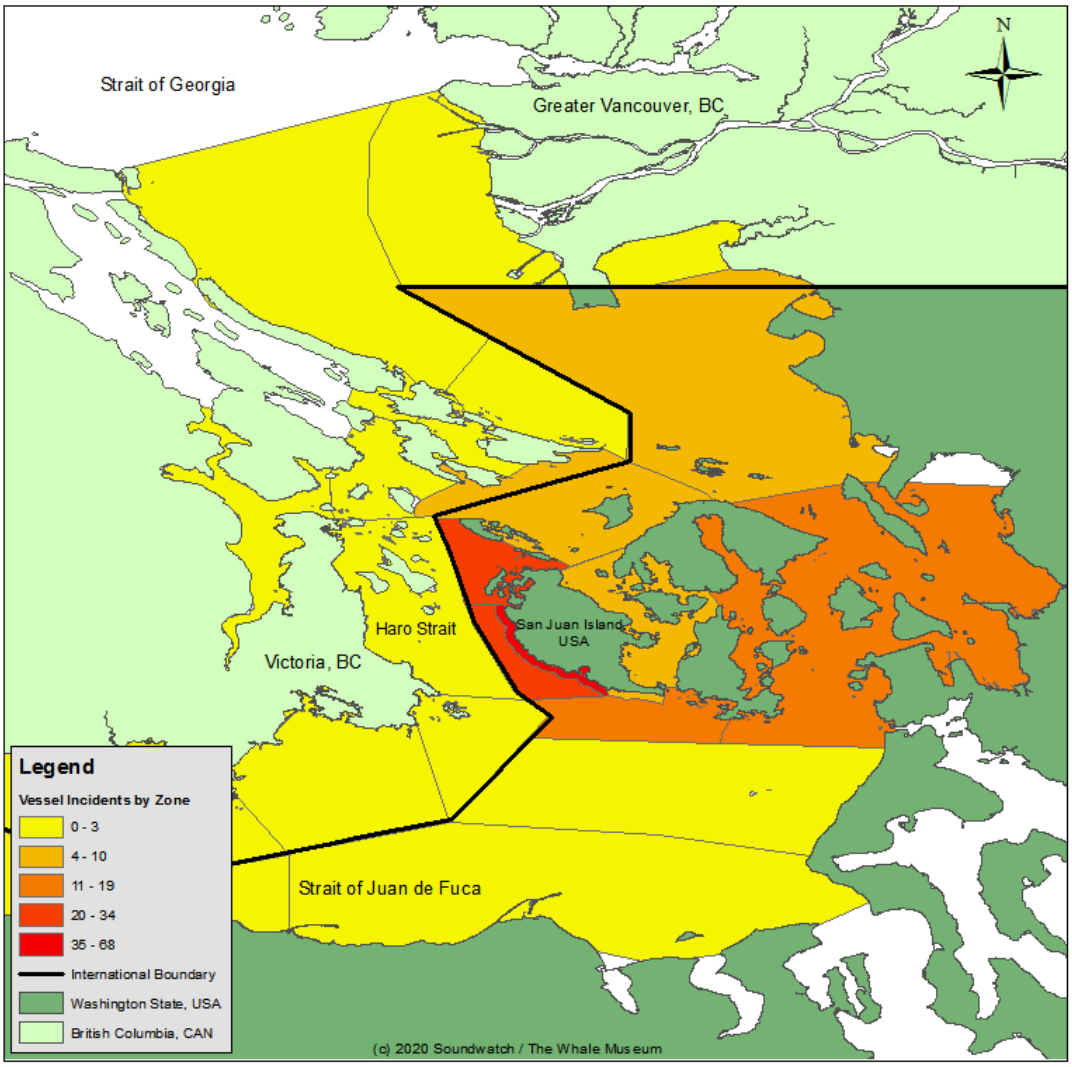

Figure 36: 2020 Vessel incidents by zones, with lighter colors having fewer total incidents than zones in darker colors. Locations can be multiple violations, *N=365 incidents.*

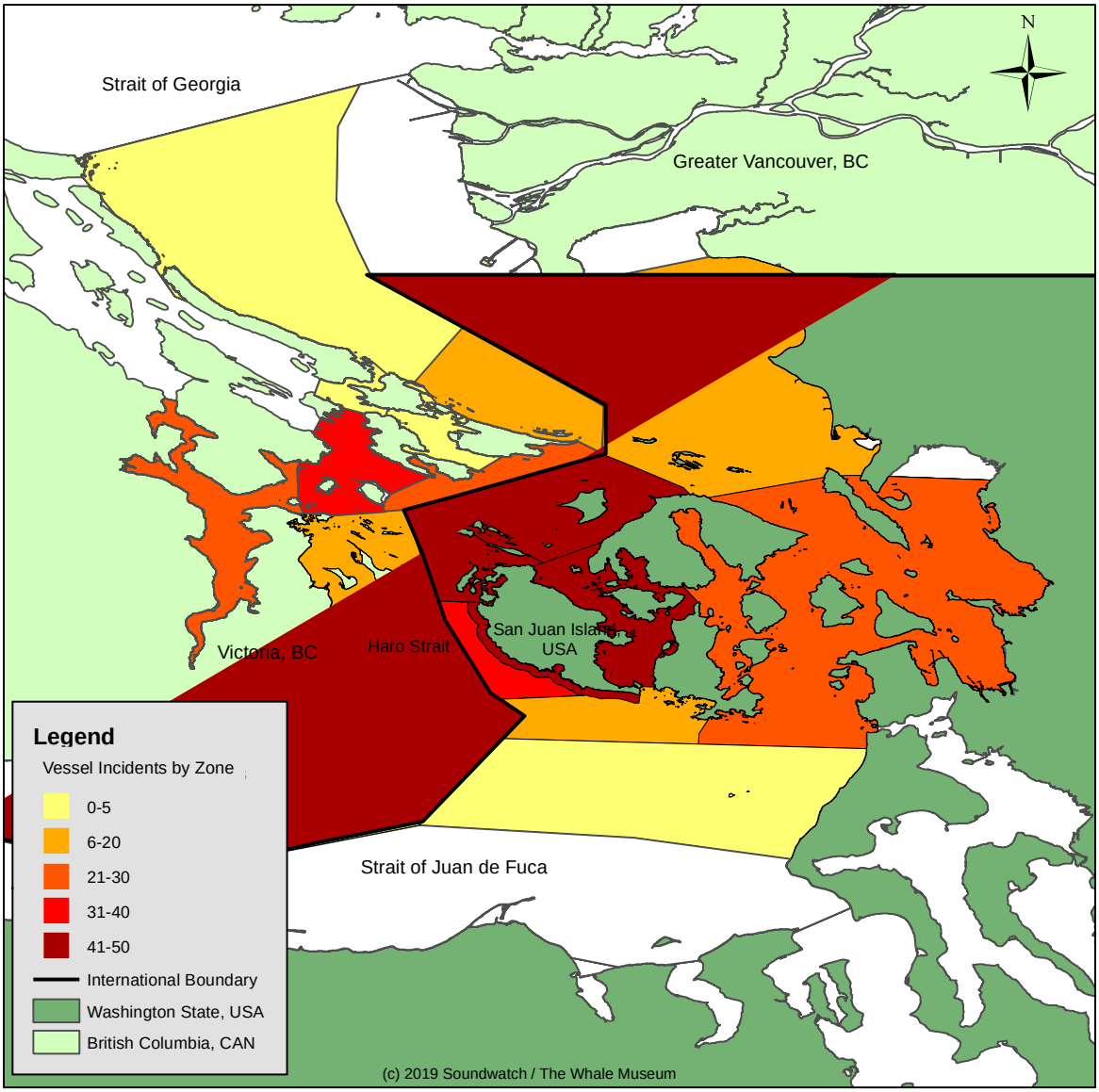

Figure 37: 2019 Vessel incidents by zones, with lighter colors having fewer total incidents than zones in darker colors. Locations can be multiple violations, *N=749 incidents*.

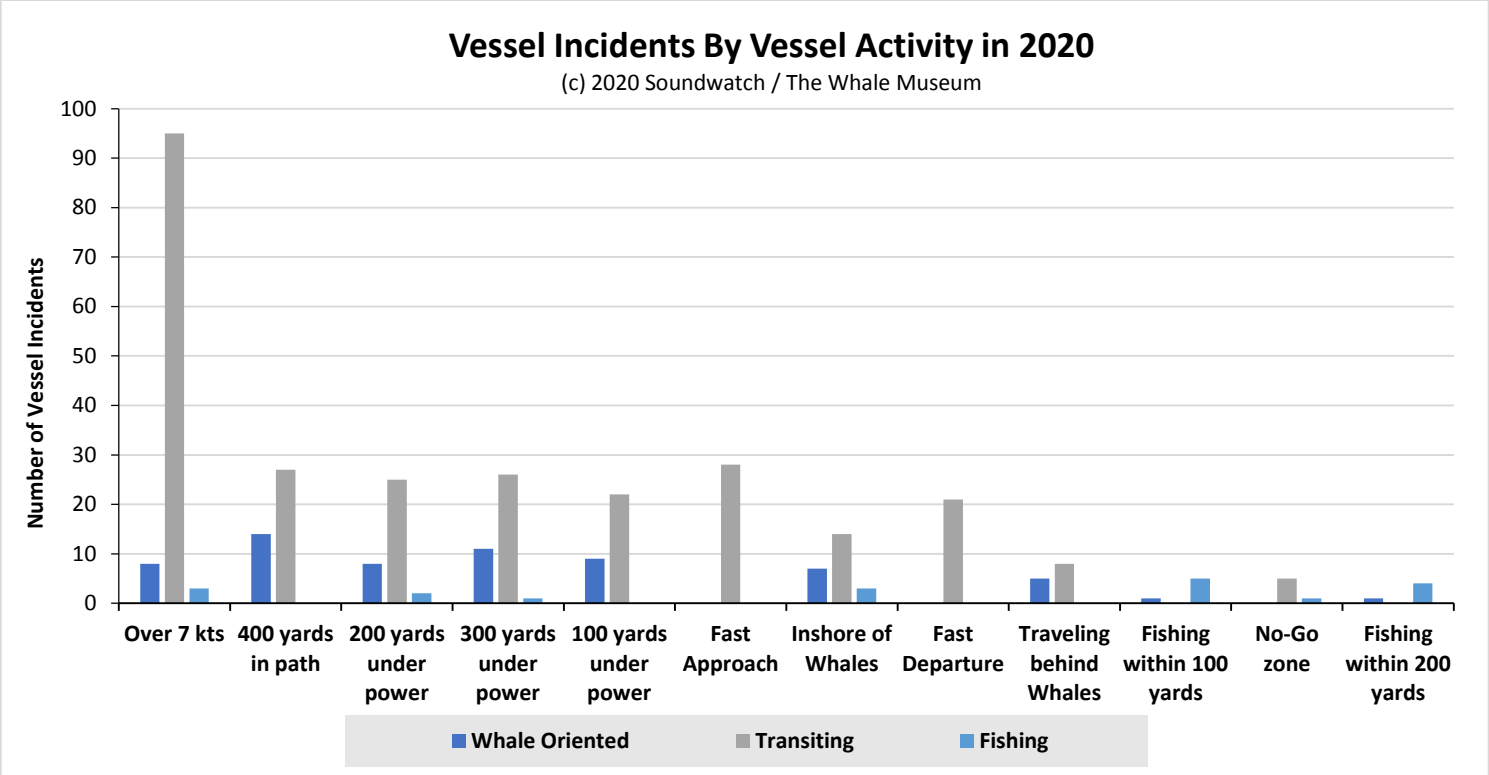

Figure 38: Most frequent vessel incidents observed by Soundwatch from June – October 2020 by incident and vessel activity.

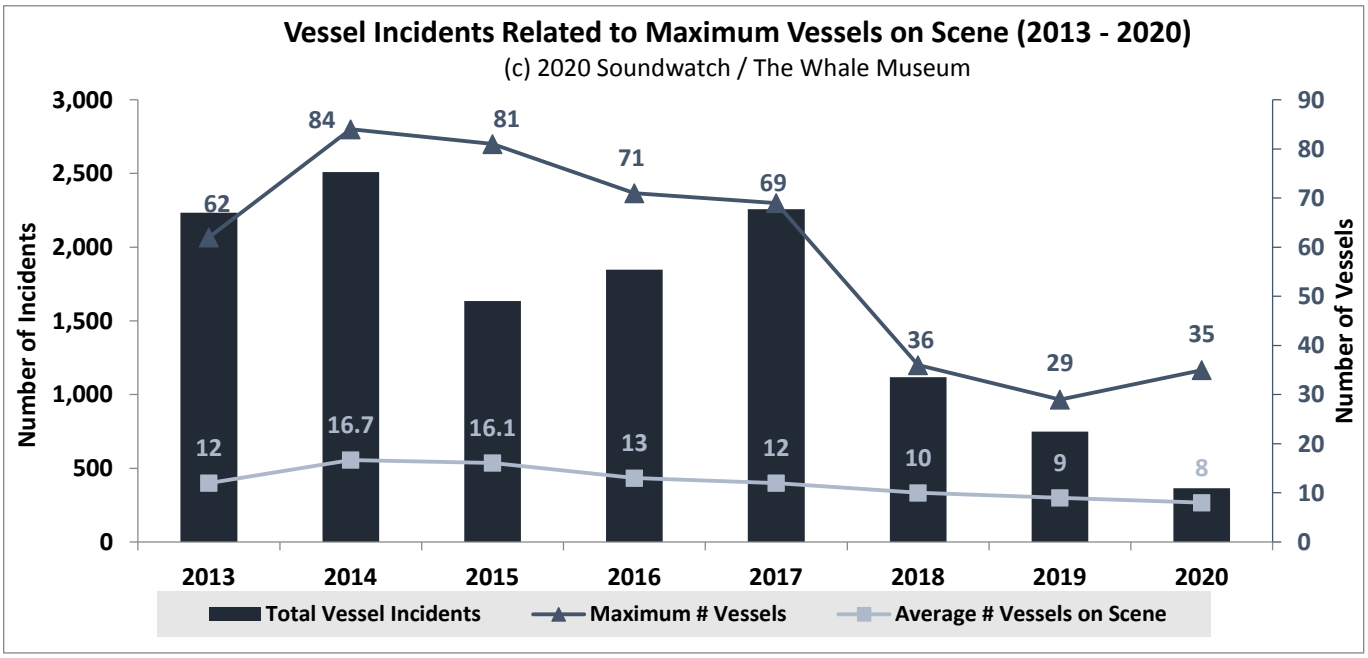

Figure 39: Average, Maximum, and Total number of vessels on scene with killer whales plotted with number of vessel incidents from May-September 2013-2020 observed in the Salish Sea by Soundwatch.

Vessel Type Incident Rates

In 2020, incident data was recorded by Soundwatch for *497* vessel counts with *365* incidents. Therefore, the overall incident rate is: 2 x 365/497 resulting in *1.47* total incidents per hour for the 2020 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. Recreational incident rates were significantly higher than the EcoTour rates (Figure 41).

Incident data specific to SRKWs was recorded by Soundwatch for *199* vessel counts with *234* incidents, yielding *2.35* SRKW-related incidents per hour during the 2020 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). The higher rate of SRKW incidents compared to total incident rate is also reflected by data collected by Cetus Research & Conservation Society's Straitwatch stewardship program. Straitwatch recorded the highest rate of incidents for SRKW (*12.24* per hour) compared to Transient killer whales (*11.28* per hour) and Humpback whales (*2.21* per hour) (Appendix Q5).

From 2009 to present, recreational vessels remain the most likely vessel type to commit all incidents (Figure 40). Private recreational vessel incident rates increased throughout the season, which may be linked to lifted COVID-19 restrictions and fishing activities.

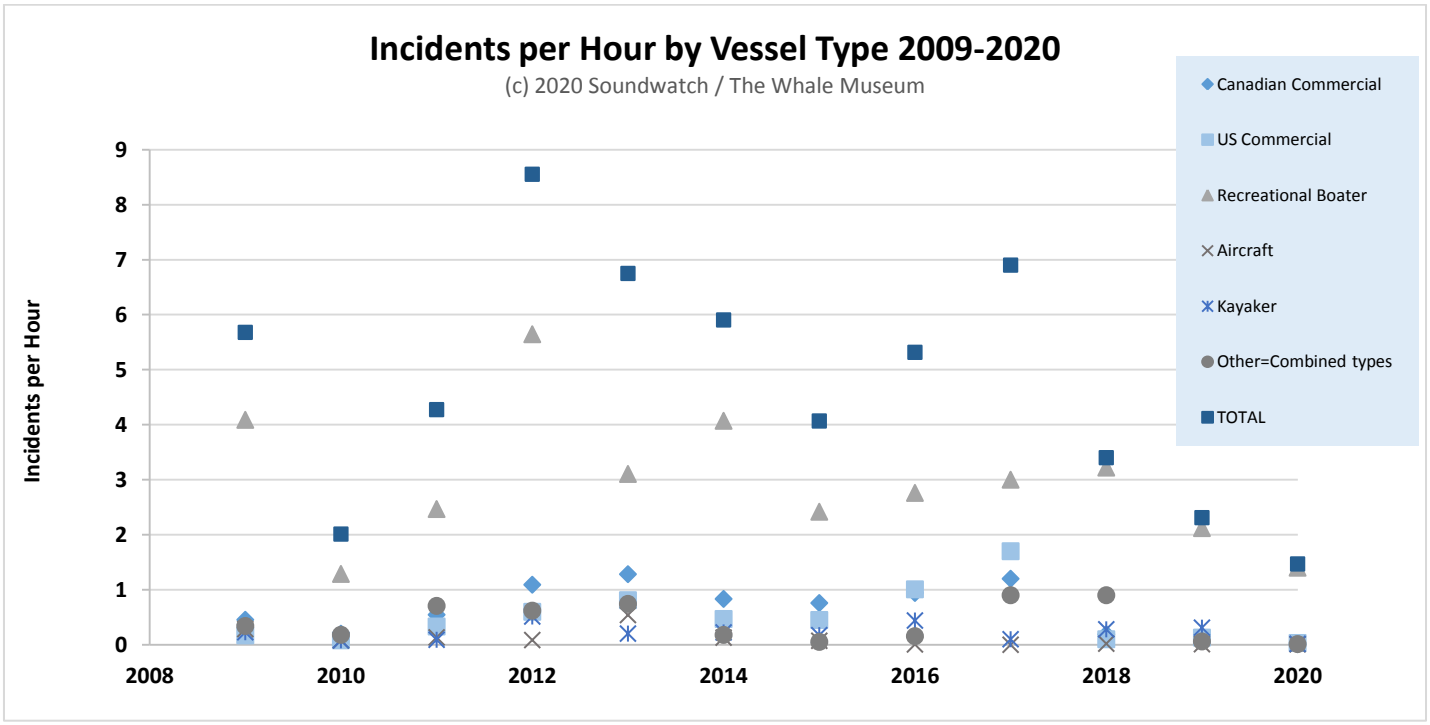

Figure 40: Trend from 2009 – 2020 Guideline and Regulation incidents per hour by vessel type.

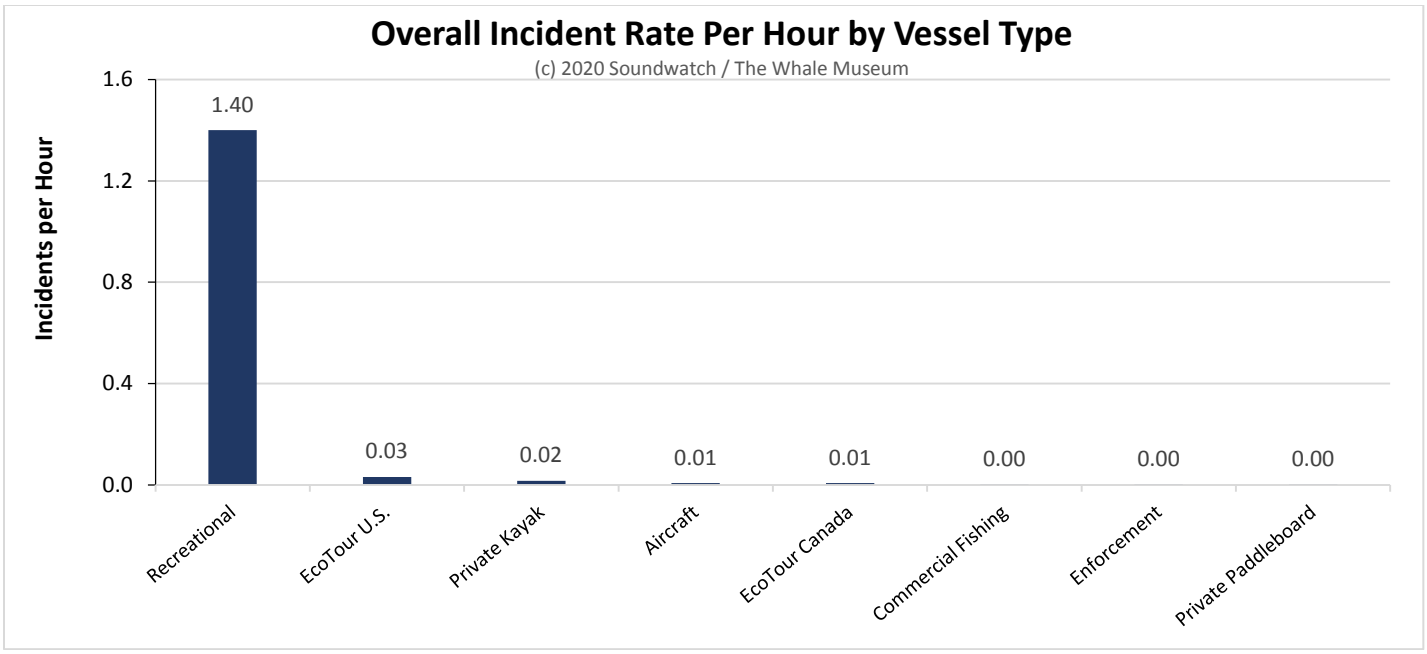

Figure 41: 2020 vessel incidents per hour by all vessel types.

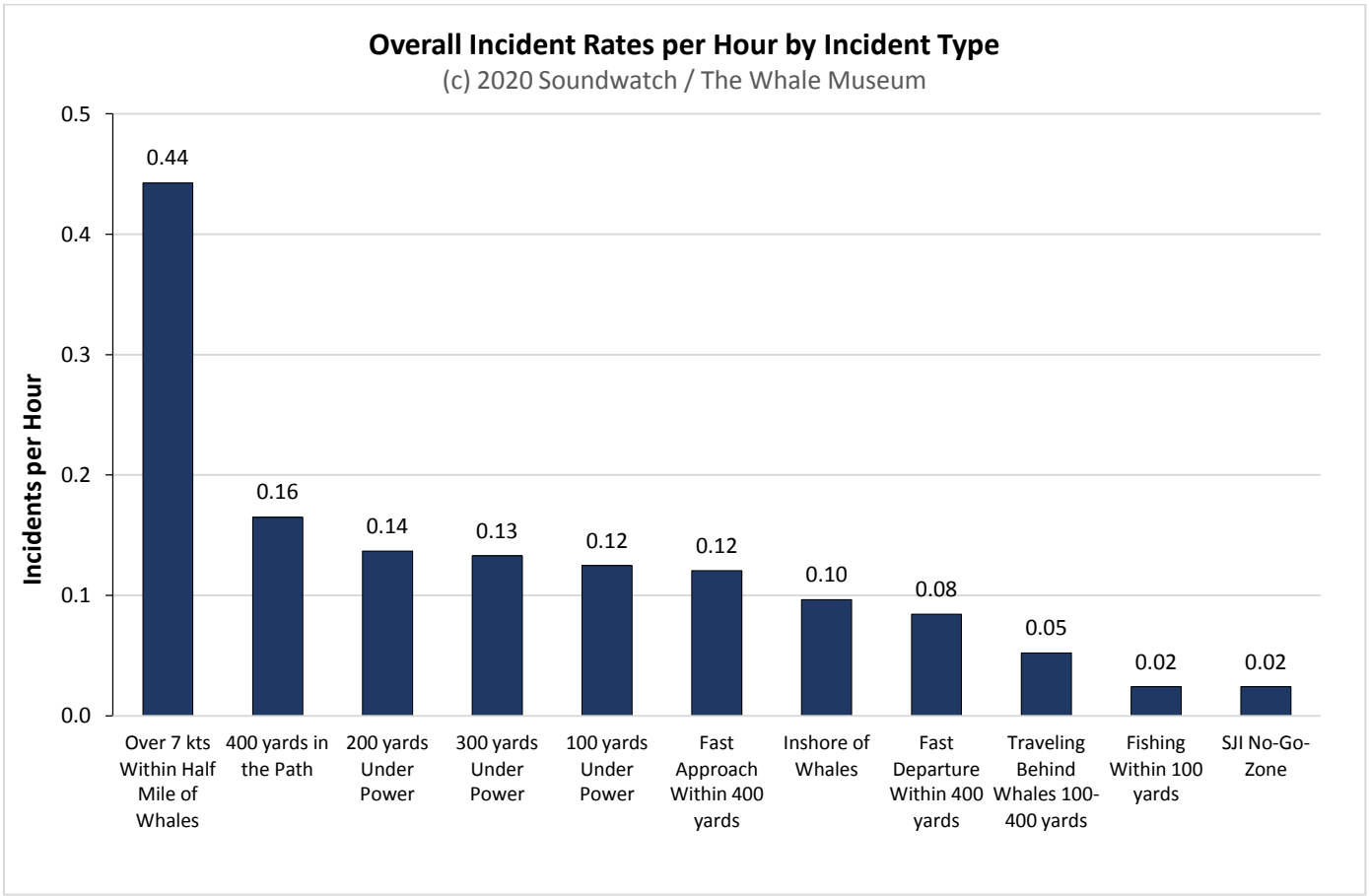

Figure 42a: 2020 vessel incident rates per hour by incident type.

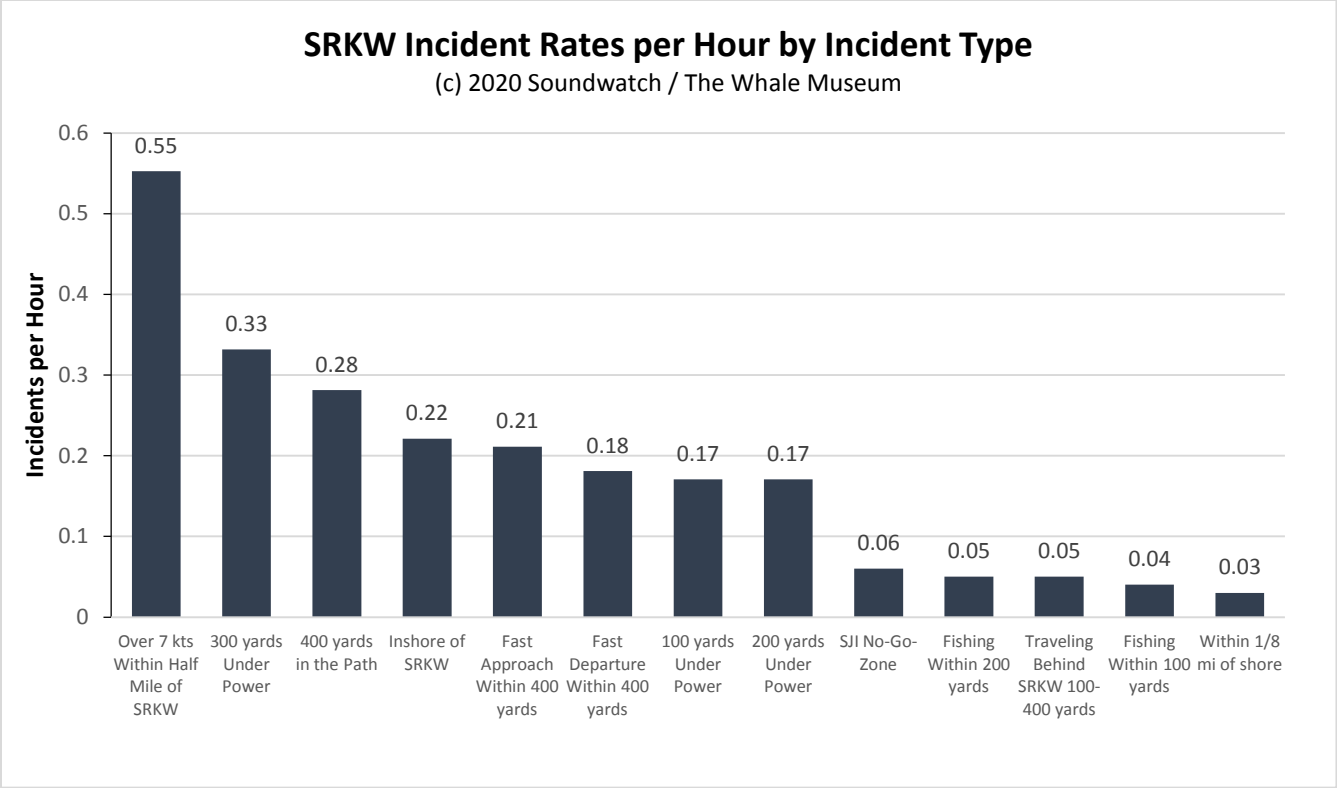

Figure 42b: 2020 SRKW-specific vessel incident rates per hour by incident type.

Enforcement

Soundwatch vessel count data recorded *36.5* hours over *20* days with maritime law enforcement agencies on scene, *4* days of which multiple agencies were present; *0.5* hours with Canadian Coast Guard, *1* hour with Canadian Department of Fisheries and Oceans, *6.5* hours with NOAA Enforcement, *7* hours with USCG, and *21.5* hours with WDFW.

As in previous years, Figures 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.

The original intent for the 2020 field season was to increase Soundwatch operations to regularly include the use of the secondary vessel to better monitor the enforcement role on the water; however, budget and COVID-19 restrictions precluded the intended changes.

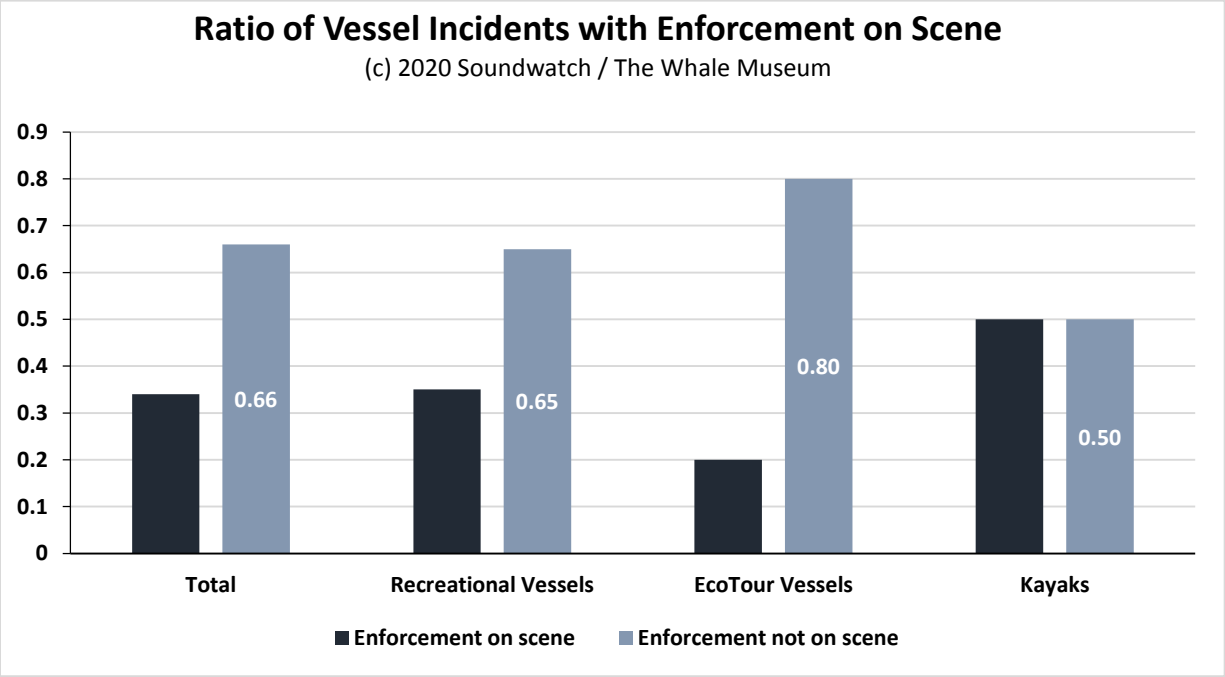

Figure 43: Ratio of incidents recorded with Enforcement on scene vs Enforcement not on scene.

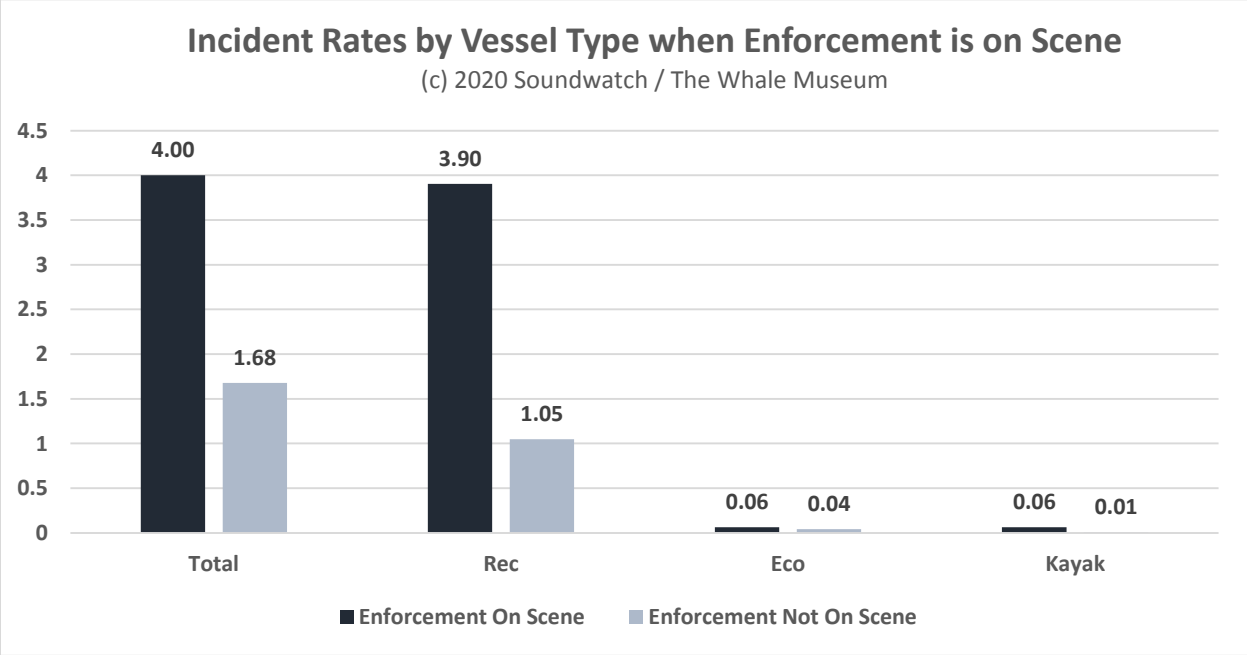

Figure 44: Incident rates by vessel types with Enforcement on scene and with Enforcement not on scene with whales. Although it appears that incident rates increase in the presence of enforcement, this data is a result of enforcement response in the context of SRKW recovery; to focus presence in areas 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.

Over the past six years there has been an overall decrease in average number of vessels present with whales and the max number has fluctuated (Figures 16 and 20). One frequently expressed concern was the flag would act as a means to attract vessels to the whales; however, this 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 an increase in the average number of vessels with the whales.

In 2020, the average number of whale warning flags within a half mile of all whale species was 2.52 flags with a max of 8 flags. Ecotour (Canadian and U.S. commercial wildlife vessels) had the highest average any vessel type at 1.90 flags. Recreational vessels flew an average of 0.16 flags and a max of 2 flags, a decrease from the average of 0.73 flags flown by recreational boats in 2019. Other vessels averaged 1.30 flags and max of 5 (Figure 45).

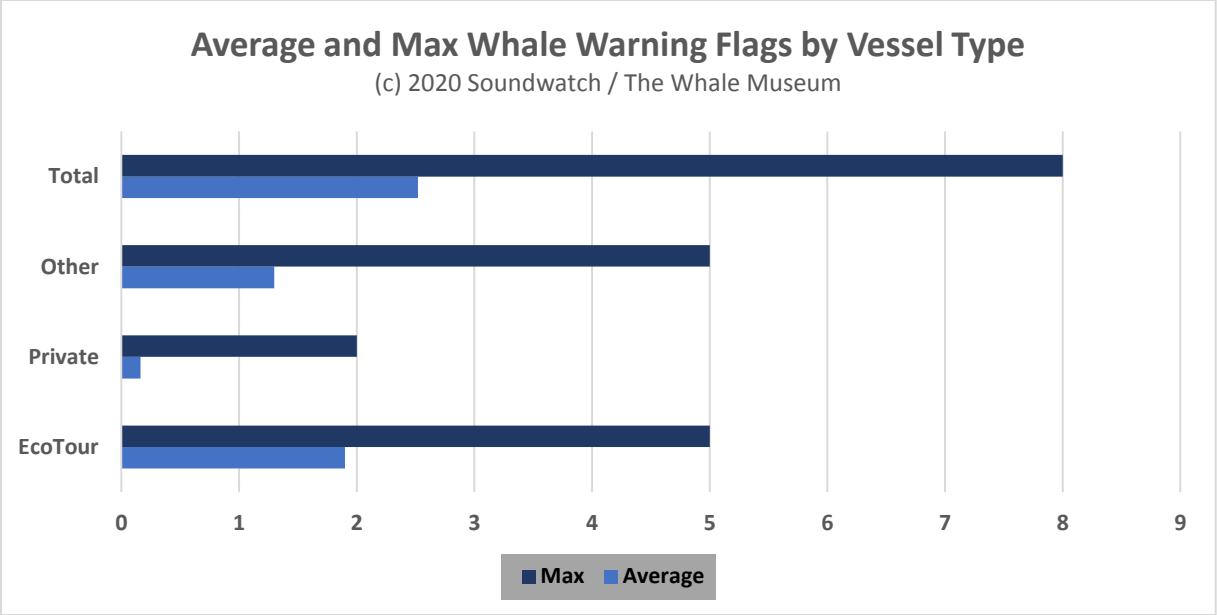

Figure 45: Average and max of Whale Warning Flags within a half mile of whales by vessel type in 2020.

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 33% of boat counts Soundwatch was the only vessel flying a whale warning flag (Figure 46).

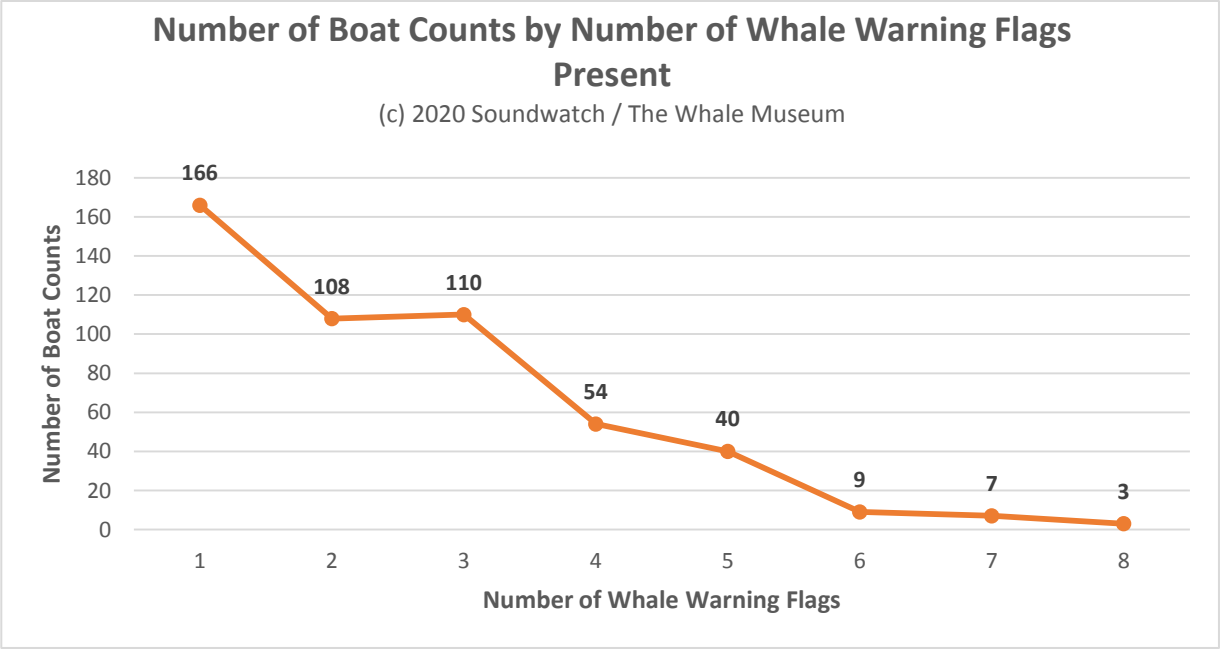

Figure 46: Number of Boat Counts with number of Whale Warning Flags present in 2020.

As stated earlier, Soundwatch recorded *177* individual vessel incidents for *365* total violations in 2020. Since Soundwatch flew a whale warning flag at all times when present with whales, all incidents recorded were when a flag was present. There were 113 (64%) 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 less 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=0.91) (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 companies present in these scenarios, which are historically responsible for fewer incidents overall (Figure 40).

Overall, the rate of vessel incidents has decreased since 2017, but this trend has not been consistent over the last seven years (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. 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 365 incidents recorded by Soundwatch, 10 were committed by EcoTour vessels, and of those, 1 was 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.

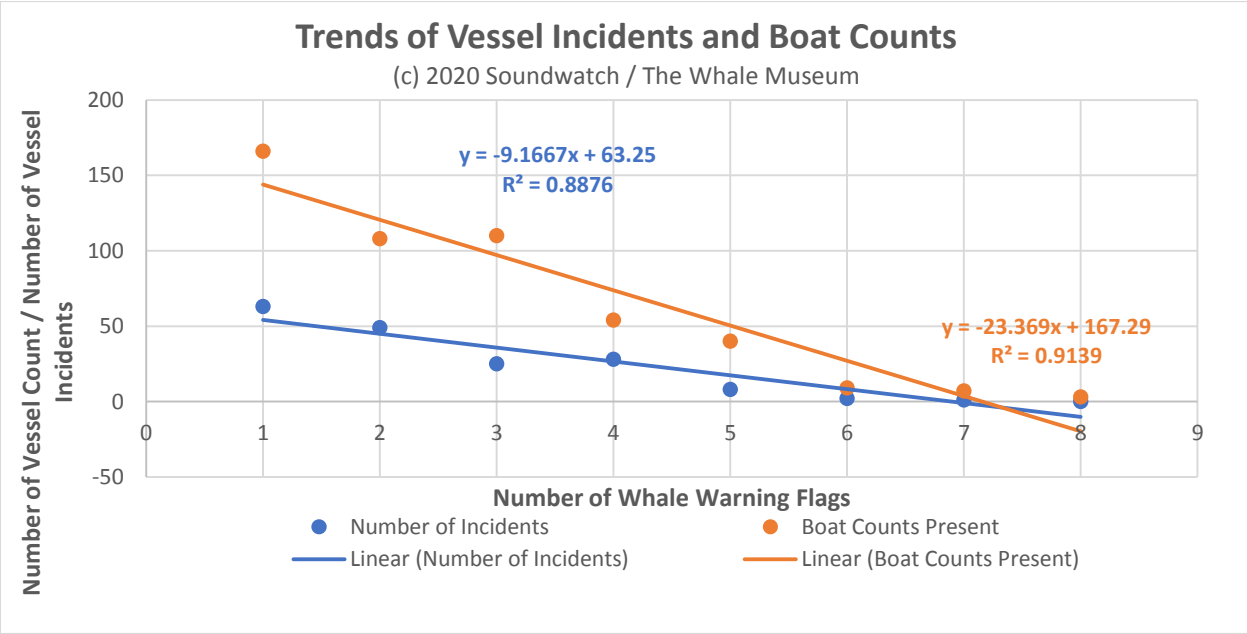

Figure 47: Displays the negative trends of vessel incidents and boat counts as related to number of Whale Warning Flags present.

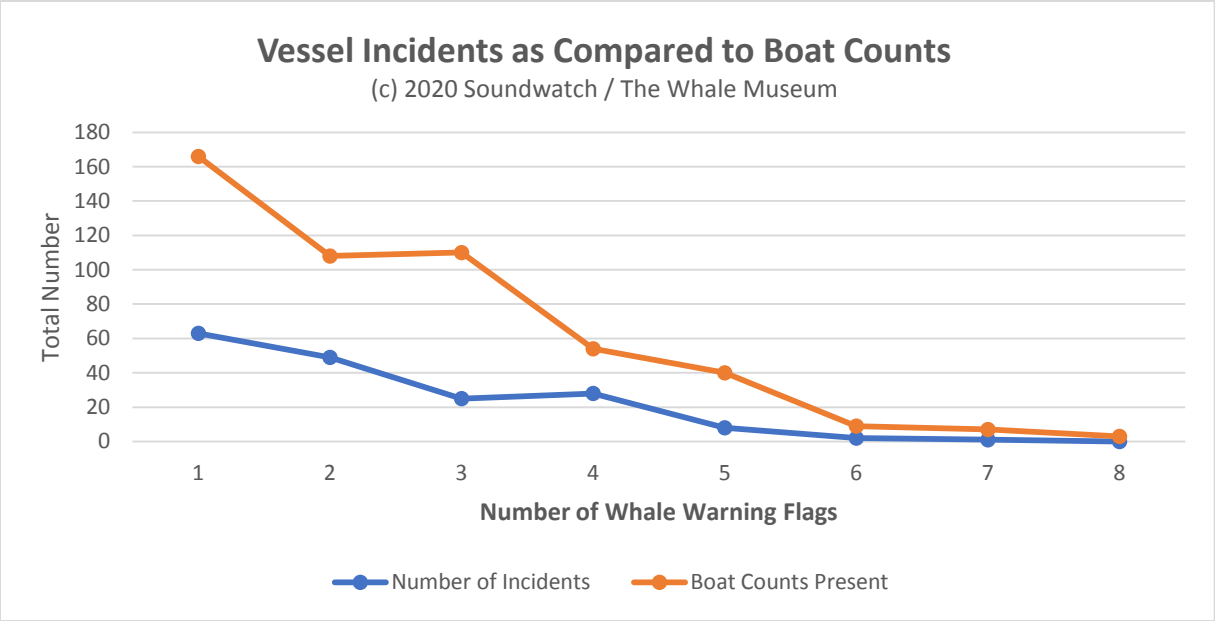

Figure 48: Number of Vessel Incidents and Boat Count by number of WWFs present.

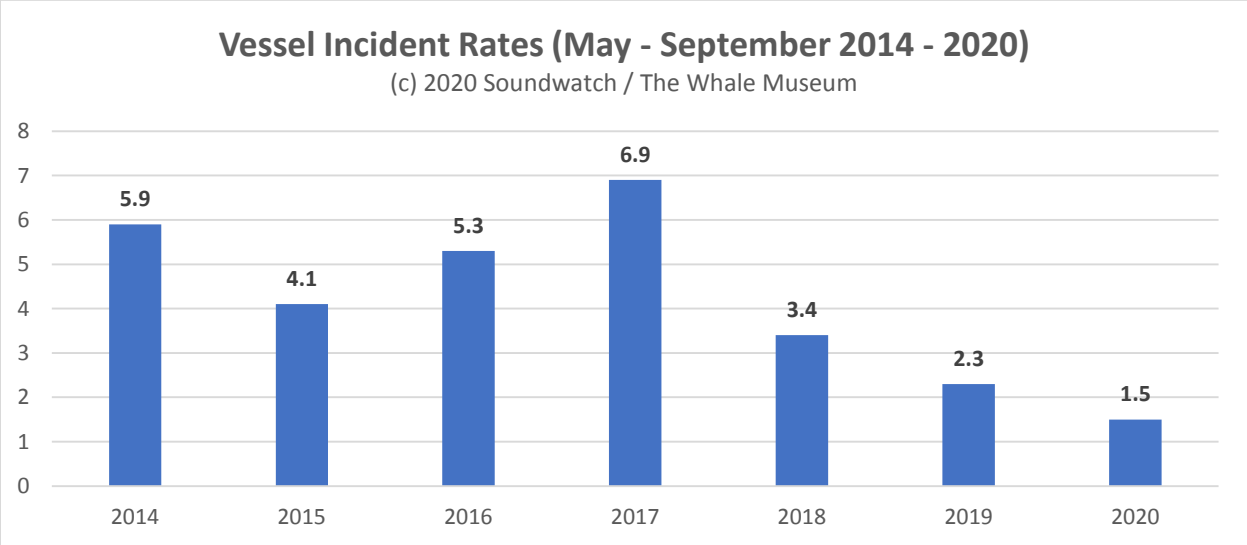

Figure 49: Average vessel incident rate per hour over the past seven years.

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 where 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 wWhale Warning Flags since 2019.

Discussion

Recommendations for SRKW Protection and Recovery

Soundwatch data from 1998-2020 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. Long-term trends show declines in average number of vessels with the whales and some reductions in incidents and incident rates, however, 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 exposes limitations of using the dataset to answer specific questions, such as presence of law enforcement and the sentinel role vs. magnet effect, to be discussed later. Pending sustainable funding, Soundwatch plans to utilize a second vessel to focus more on these specific questions in the 2021 season.

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; broadcast Local Notice to Mariners to alert boaters when killer whales are in the vicinity; create a course on how to safely operate around marine mammals; distribute BWW information with vessel registration and tabs; and add regulations and guidelines to Washington State Boater Education course. Similar efforts to require education at the boater licensing level are currently underway in Canada through Marine Education & Research Society (MERS). Previous 2019 recommendations included the formalization of San Juan Island's west side No-Go-Zone from

voluntary to mandatory. This recommendation was adopted and implemented by WDFW in the Commercial Whale Watching License Program (CWWLP) to be discussed later.

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. These observations are not quantified in 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 program 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 considered the pilot for corresponding Canadian efforts. Notable among the changes instituted by the CWWLP is the formalization of San Juan Island's No-Go-Zone for commercial operators on the west side. During the establishment of the CWWLP rules, officials called for additional study and assessment of the aforementioned sentinel and magnet effect to better allow for accurate, science-based adaptive management of the CWWLP instated January, 2021.

Implications for Other Large Whales

As regulations surrounding killer whales become more stringent and 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 minke whales in particular during the 2020 season. However, due to low sample size it is currently difficult to quantify using Soundwatch data. It will be necessary for large whales to be further monitored in order to determine potential impacts to other species in the Salish Sea.

Summary of 2020 Soundwatch Data

Vessels

- Soundwatch conducted *497* vessel counts within ½ mile (0.8 km) of whales; *24* days (*196* data counts) directly monitoring Southern Residents, *30* (*186* data counts) days with Transient (aka Bigg's) killer whales, *20* days (*70* data counts) opportunistically with Humpback whales, and *10* days (*35* data counts) opportunistically with Minke whales (Figures 2).

- The numbers of vessels observed within ½ mile (0.8 km) of whales (June-October) varies widely by time, date and location with maximum numbers almost three times larger than average numbers (2020 Max. *39,* Avg. *10.5*).
- In 2020 (June-October) the 'peak time of day' does not follow the traditional mid-day lull – instead, average number of vessels held relatively steady throughout the day until late afternoon (Figure 21).
- The highest average vessel count and max number of vessels were both recorded in September; June average *3.1* max *9,* July average *6.2* max *23,* August average *9.2* max *24,* September average *10.6* max *39,* October average *8.1* max *19*.
- Recreational (private) vessels observed within ½ mile (0.8 km) of whales had higher maximum numbers than commercial vessels. Overall average of recreational vessels within ½ of whales was comparable to overall average of commercial vessels in the same vicinity of whales; Recreational vessels average *2.7* max *19* and Commercial vessels average *2.8* max *10*.
- Soundwatch contacted *432* vessels with *1364* people on board, averaging *3.2* people per vessel, around whales for education and prevention purposes.
- An average of 26 % of recreational vessels contacted for educational purposes were correctly aware of the guidelines and laws for boating around killer whales. Therefore, 74% of contacted boaters stated they were unaware or misinformed about the guidelines and laws for boating around marine mammals in the Salish Sea.

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. During 2020, the season start was delayed until late June/early July with some operators suspending operations indefinitely.
- *35* 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 2020 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 *84* vessel/whale days and *497* vessel counts. U.S. EcoTour vessels were observed *72* days and in *475* vessel counts, Recreational *67* days and *494* counts, Canadian EcoTour *29* days and *79* counts, Research *30* and *117* counts,

Monitoring/Enforcement (including Soundwatch presence) *71* days and 467 counts, and kayaks (ecotour and recreational) *17* days and *28* counts.

- A total of *177* vessel incidents were recorded by Soundwatch in 2020, committing a total of *365* violations.
- Of the incidents recorded *35%* were U.S. Vessel Regulation violations; **Vessels Within 200 Yards of Whales** were *23%* and **In the Path of Whales** were *12%*. The greatest number of incidents recorded was under the new Washington State Law of **Under 7 knots within a half mile of SRKWs** at 31%.
- In 2020, **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 (*<1%*) Vessels Under Power Within 100 Yards (9*%*) were made by *93%* recreational vessels and *7%* U.S. commercial vessels.
    - Vessels Under Power Within 200 Yards (*10%*) were made by *97%* recreational vessels and *3%* U.S. commercial vessels.
    - Fishing Within 100 Yards was not observed by Soundwatch during the 2020 season. Fishing Within 200 Yards (*<1%*) was committed by recreational vessels (*100%*).
    - Under Power Following Whales Within 400 Yards (*4%*) was committed by recreational vessels (*100%*).
- In 2020, **In the Path of Whales** incidents (*12%* of all incidents) were made by *95%* recreational vessels and *5%* U.S. commercial vessels.
- In 2020, **Under 7 knots within a half mile of whales** incidents (*31%* of all incidents) were committed by recreational vessels (*95%*), Canadian commercial vessels (*2%*), U.S. commercial vessels (*<1%*), commercial fishing vessels (*<1%*), and enforcement (*<1%*).
- In 2020, *92%* of all incidents were committed by private/recreational motor vessels, *4%* private sailing vessels, *3%* U.S. commercial vessels, *<1%* commercial kayaks, *<1%* Canadian commercial vessels, and *<1%* by commercial fishing vessels. (Table 2). Recorded Canadian EcoTour numbers may be influenced by the maritime border closure.

Direct Takes by Soundwatch under Permit # 21114

- In 2020, Soundwatch made *1* close approach (closer than regulations and guidelines) as authorized under National Marine Fisheries Service Research Permit #21114.
- All takes were directed for prevention and educational purposes due to vessel breaking U.S. Vessel Regulations and not responding to other means of communication. All takes were conducted under discretion of professional vessel drivers to mitigate risk away from whales and maintain safety of vessels and whales.
- Total directed close approaches included *1* with Transient (aka Bigg's) killer whales.

Spatial Trends

- Spatial trends indicate that SRKWs are seen most often along the west side of San Juan Island than other areas in the ESA designated SRKW Core Summer Critical Habitat Areas.
- SRKWs display continued trend of dispersal/lack of social cohesion. SRKWs were not sighted in Soundwatch's area of response during the months of June and August.
- There are spatial trends indicating that the highest concentrations of all vessel types are

along the west side of San Juan Island.

- 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 along the near-shore corridor on the west side of San Juan Island.

Education Materials/Onshore Education

- San Juan County Park suspended requirements to participate in K.E.L.P. 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 K.E.L.P. proficiency.
- An online training video for kayak guides was created and made available at the following link; https://youtu.be/pWMC-7G5sSM.
- Soundwatch increased outreach on social media platform Instagram (@soundwatch_twm) by *69.2%*.
- In 2020, Soundwatch Dock Talks reached *695* guests visiting Port of Friday Harbor on San Juan Island, Washington. *29%* were aware of guidelines and regulations.
- The BWW exhibit at TWM, installed in 2016, has reached over *110,000* 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: Elli Gull 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 (Erin Casellas-Kennedy, Mariana Malki, Jessica Newley), academic interns (Amelia Baker, Cassandra Lozano, Emily Vierling) were responsible for the outreach, monitoring and data collection activities as well as data entry. Thank you to The Sightings Network Coordinator: Salma Abdel-Raheem, for the data analysis support. Thank you to The Stranding Network 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, the help of Lynne Barre from NOAA Fisheries West Coast Region, the help of Russ Mullins, 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, Washington Department of Fish and Wildlife, National Fish and Wildlife Foundation, Straitwatch & Cetus Society, San Juan County's Marine Resource Committee, San Juan County Parks, U.C. Davis, the Center for Whale Research, Orca Network, 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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Ferrara, G.A., T.M. Mongillo, L.M. Barre. 2017. Reducing disturbance from vessels to Southern Resident killer whales: Assessing the effectiveness of the 2011 federal regulations in advancing recovery goals. NOAA Tech. Memo. NMFS-OPR-58, 76 p

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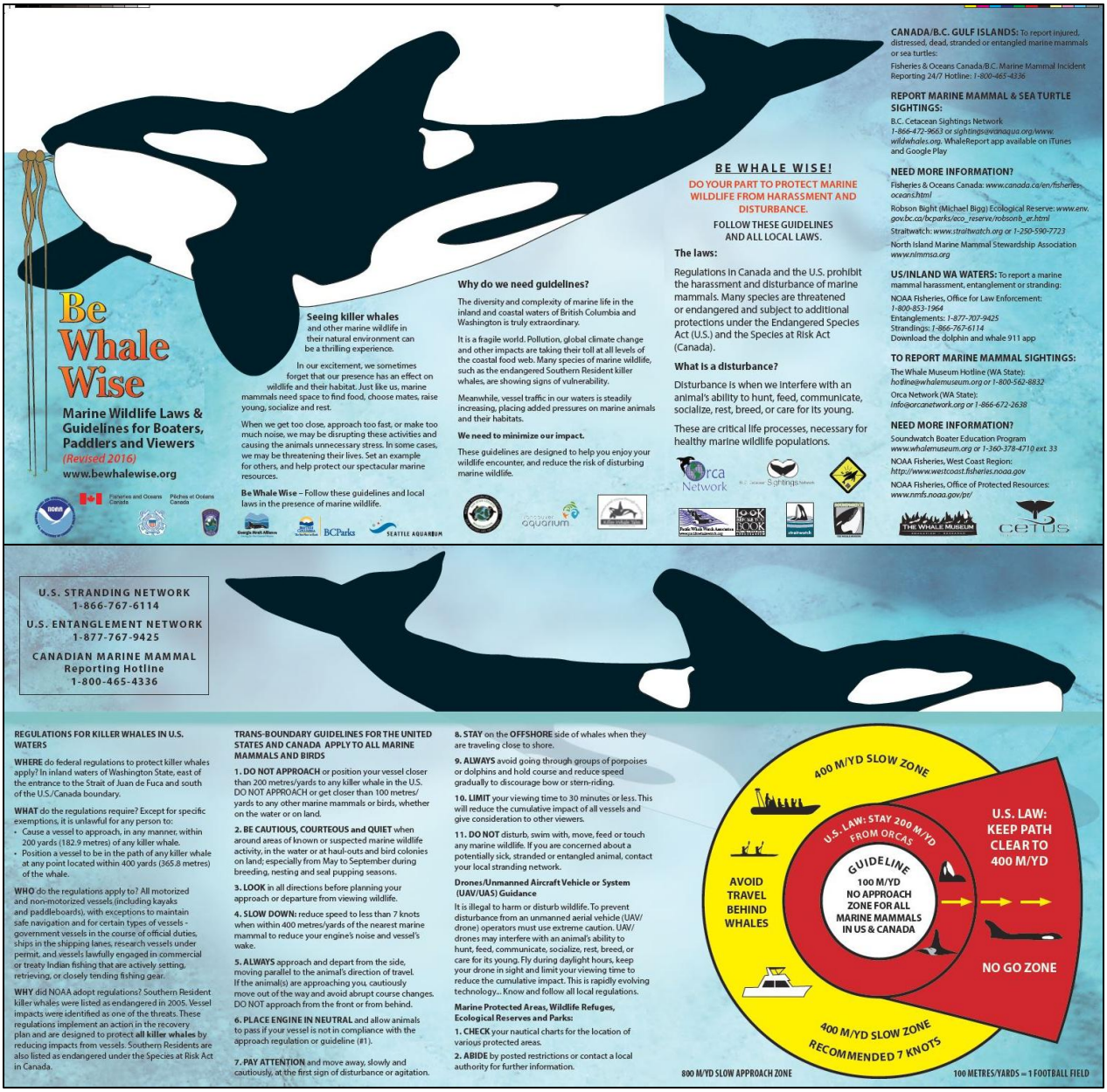
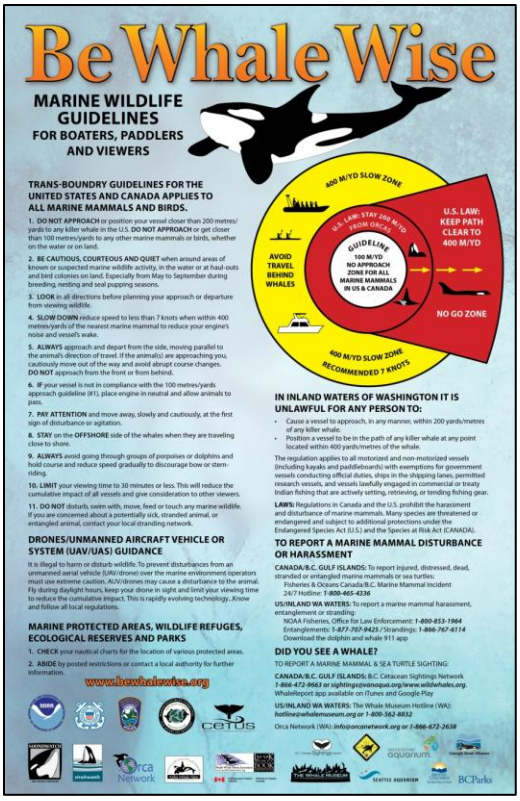
Watson, J. 2020. Commercial whale watching briefing, public hearing. Washington Fish and Wildlife Commission. https://wdfw.wa.gov/sites/default/files/2020-12/6_20201204_cww-fwc_watsonppt_0.pdf

WSAS. 2020. "Summary of Key Research Findings about Underwater Noise and Vessel Disturbance." https://wdfw.wa.gov/sites/default/files/2020-09/reportwsas_srkw_summary.pdf

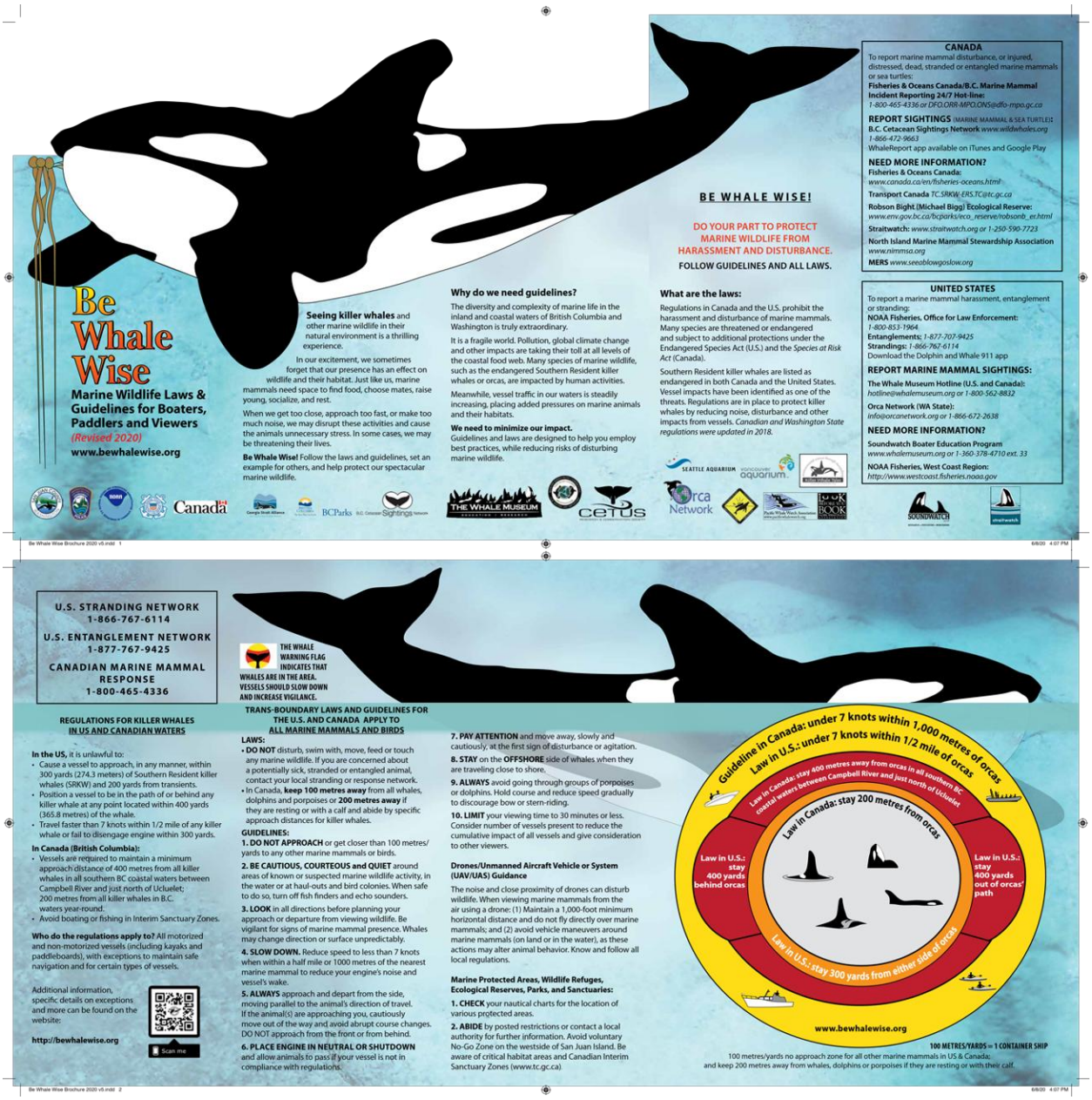
Appendices



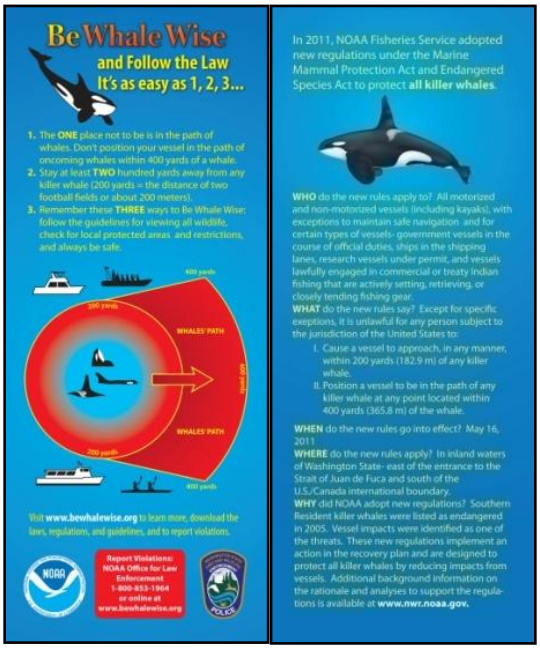
Appendix A1: Be Whale Wise Guidelines and Federal/State Regulations for Boaters, Paddlers and Viewers; Revised 2016.



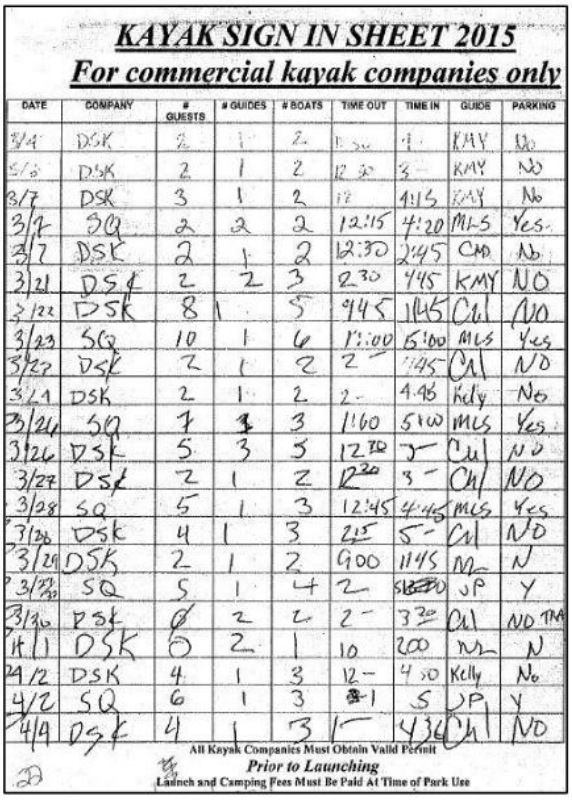
Appendix A2: Be Whale Wise Guidelines and Federal/State Regulations Poster for Boaters, Paddlers and Viewers; Revised 2016



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



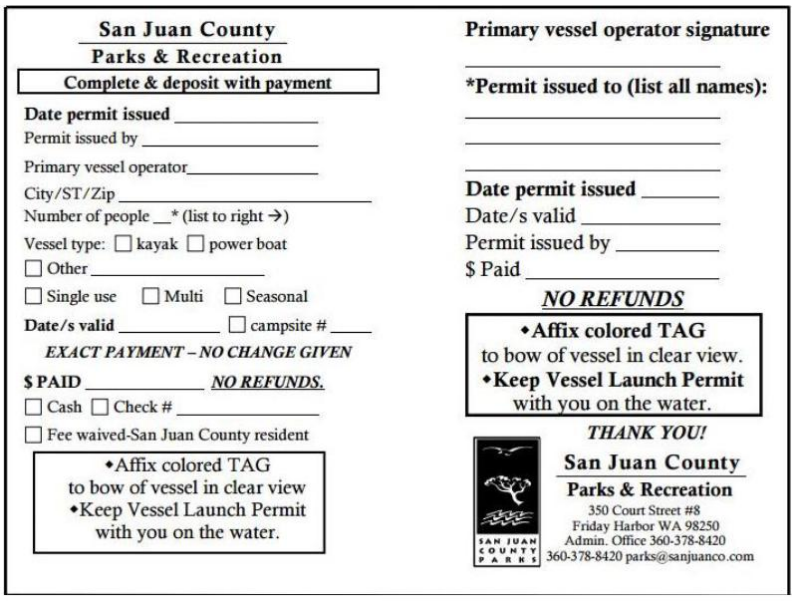
KAYAK SIGN IN SHEET 2015

For commercial kayak companies only

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

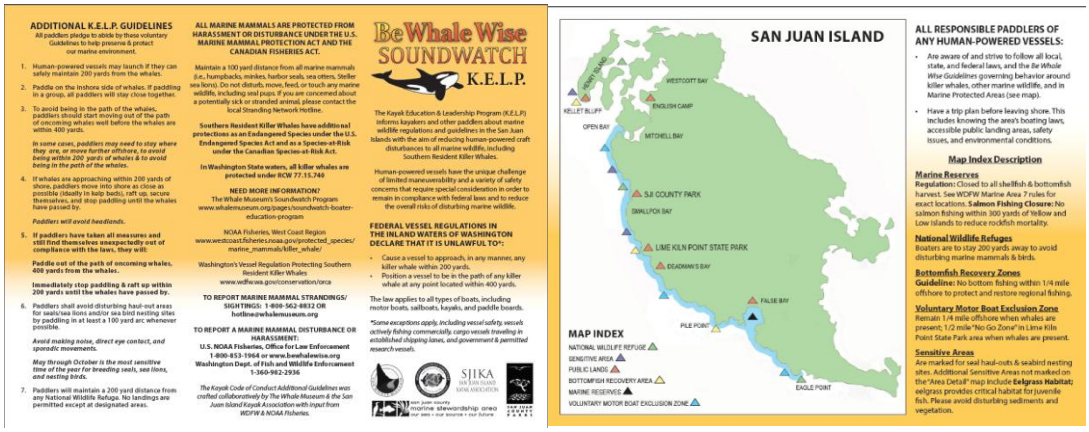
•Affix colored TAG
to bow of vessel in clear view
•Keep Vessel Launch Permit
with you on the water.

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.*

marine stewardship area

SAN JUAN ISLAND

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.

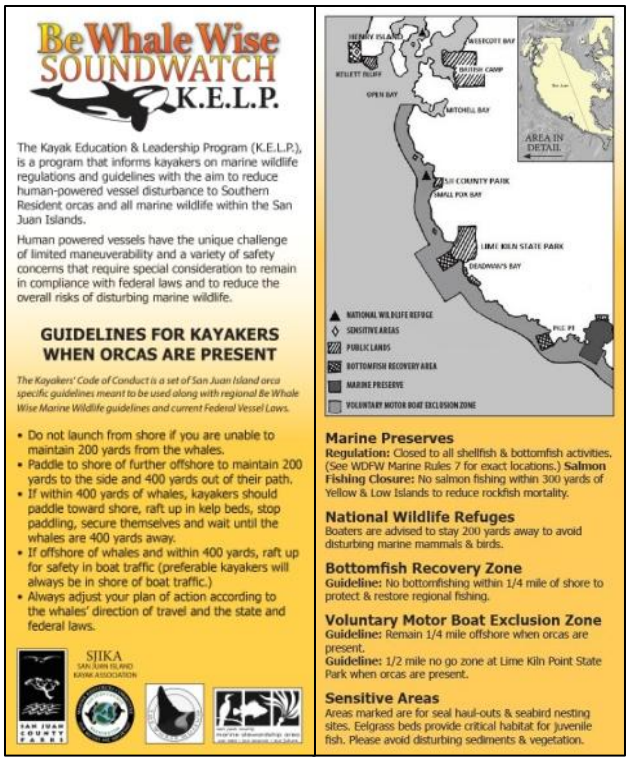
National Wildlife Refuges
Boaters are to stay 200 yards away to avoid disturbing marine mammals & birds.

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

AREA IN DETAIL
LIME KILN STATE PARK
SHADWAN'S BAY
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)

VESSEL CONTACT

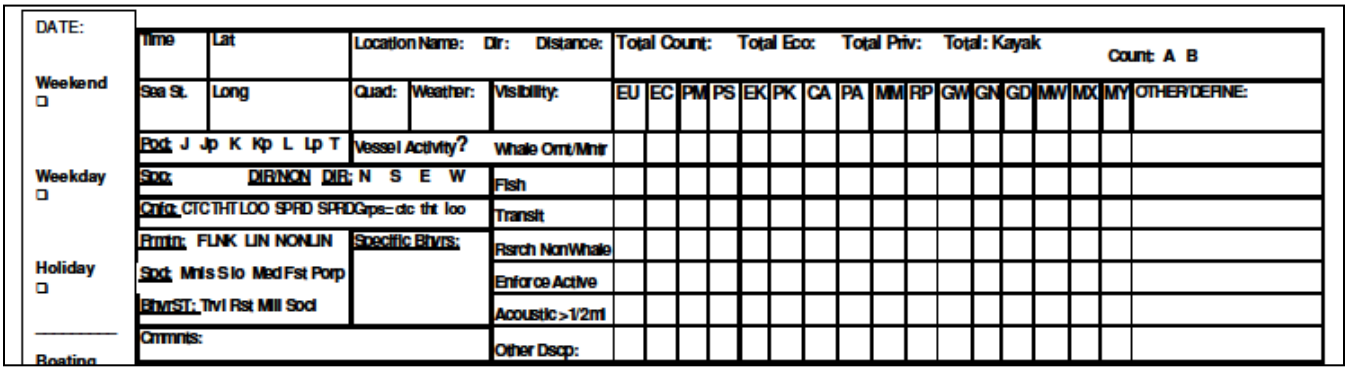
Time	Location	Latitude	Longitude	why contacted?	Took BWW? Why Not?	Prev Cntct?	Redo?	Incident Recorded?
					Y N	Y N	Y N	Time:
Vessel Type	**Vessel Activity**	**Vessel Name**	**Vessel ID**	**Reaction**	**Port**	**# pass**	**Photo?**	**Comments:**

Appendix G: Soundwatch Data Sheet Vessel Contact.

Vessel Incident Log

Time 24hour	General Location Name/Dir/Distance	Lat Decimal Minutes	Long Decimal Minutes	Quad Pick one!	Vessel Codes NOVESSEL ID'S NEEDED		Incident Code #'s	Previous Contact: Yes/No?	Photos? Yes/No?	Comments on Situation:
					TYPE	ACT				

Appendix H: Soundwatch Data Sheet Vessel Incidents.



DATE:

Weekend ☐

Weekday ☐

Holiday ☐

Boating

Time	Lat	Location Name:	Dir:	Distance:	Total Count:	Total Eco:	Total Priv:	Total: Kayak	Count: A B
Sea St.	Long	Quad:	Weather:	Visibility:	EU	EC	PM	PS	EK	PK	CA	PA	MM	RP	GW	GN	GD	MW	MX	MY	OTHER/DEFINE:
Pod: J Jp K Kp L Lp T		Vessel Activity?		Whale Cnt/Mnir																	
Spp: DIR/NON DIR: N S E W				Fish																	
Cnfg: CTC THT LOO SPRD SPRDGps=ctc tht loo				Transit																	
Prmtn: FLNK LIN NONLIN		Specific Bhvrs:		Rsrch NonWhale																	
Spct: Mnls Slo Med Fst Porp				Enforce Active																	
Bhvr/ST: Trvl Rst Mill Socl				Acoustic >1/2mi																	
Cmmnts:				Other Dscp:																	

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 2**00-400y**/183-366m 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 2**00-400y**/181-366m when whales are traveling in a relatively predictable pattern
4.2	approach - behind	vessel approaching/traveling behind a whale/group w/in 2**00-400y/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/91**m 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

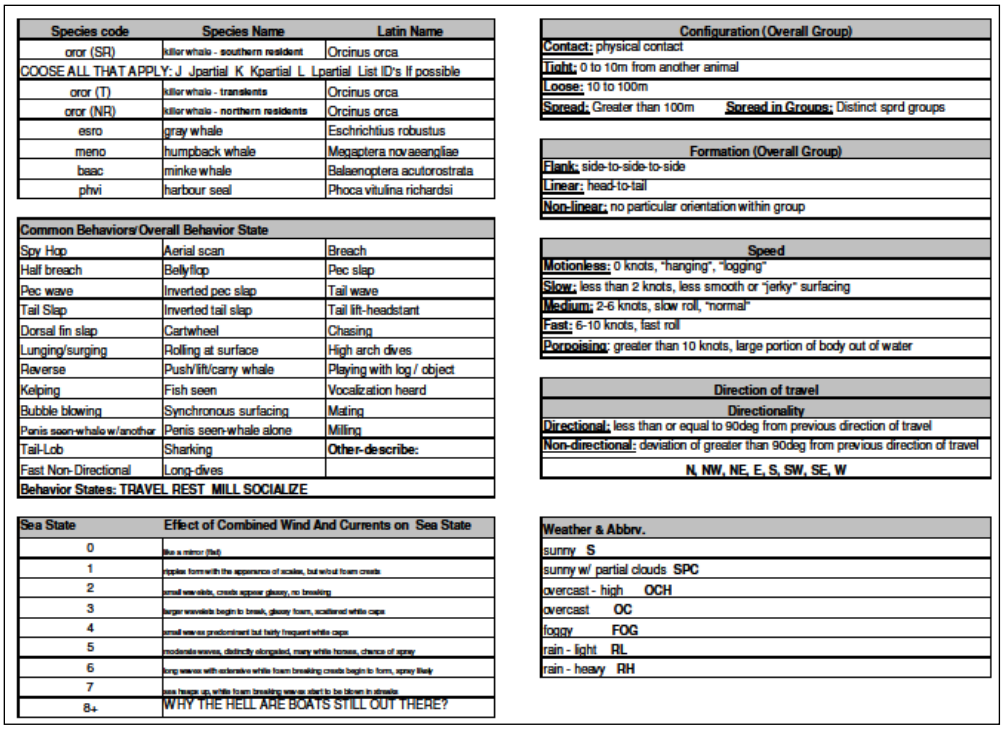
Speed
Motionless: 0 knots, "hanging", "logging"
Slow: less than 2 knots, less smooth or "jerky" surfacing
Medium: 2-6 knots, slow roll, "normal"
Fast: 6-10 knots, fast roll
Porpoising: greater than 10 knots, large portion of body out of water

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 novaeengliae
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 apperance 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	sea 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

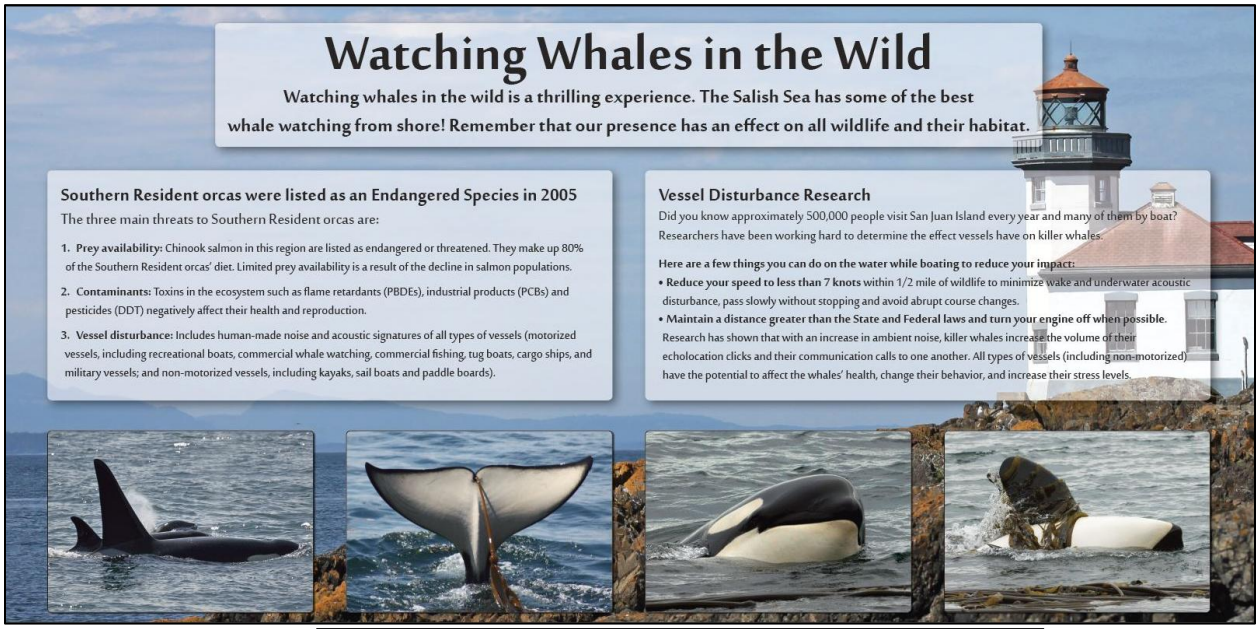
Visibility
none
poor
fair
good
excel

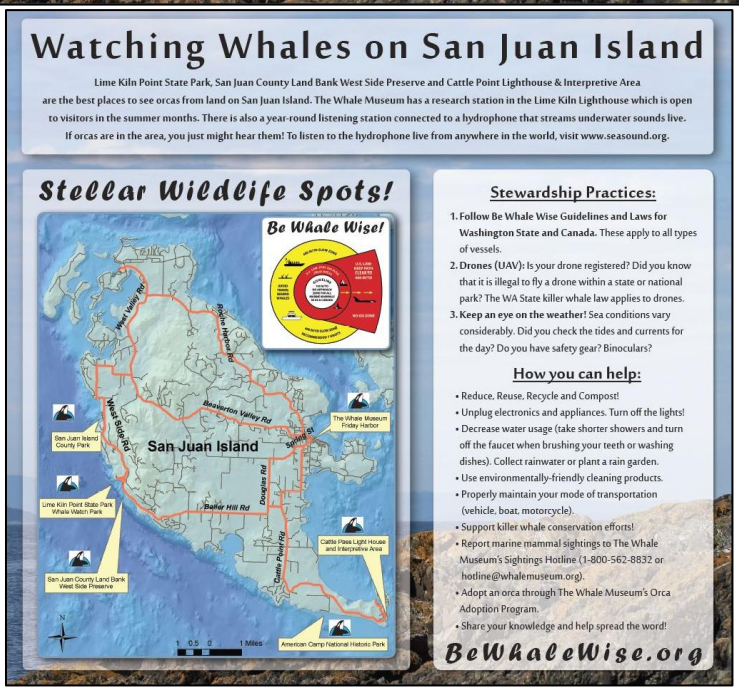
Weather
sunny
sunny w/ partial clouds
overcast - high
overcast
foggy
rain - light
rain - heavy

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

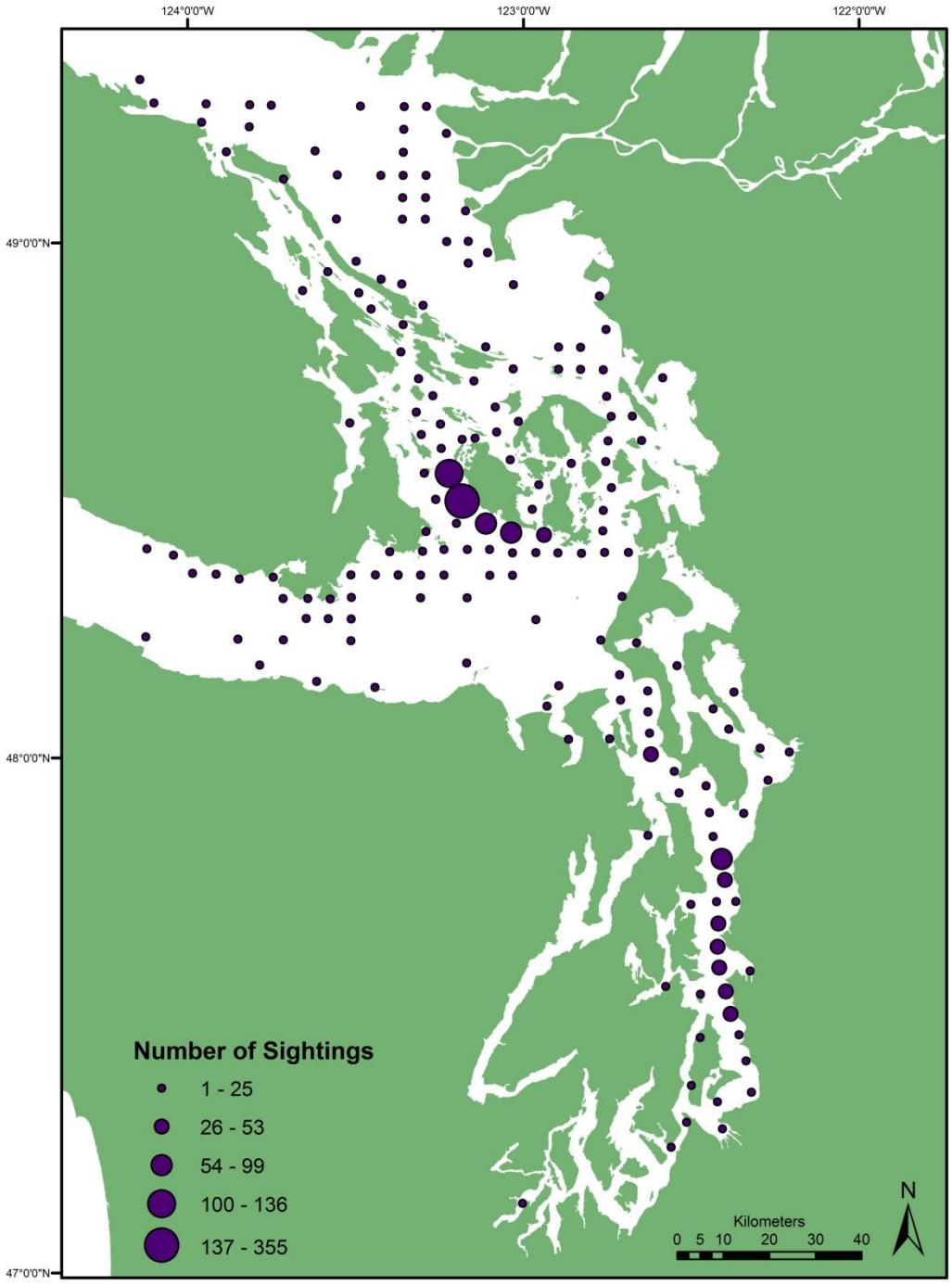
Vessel activity	
W	Whale Oriented
F	Fishing
T	Transiting
R	Research (whale oriented)
E	Enforcement
A	Acoustic Range
O	Other with description

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

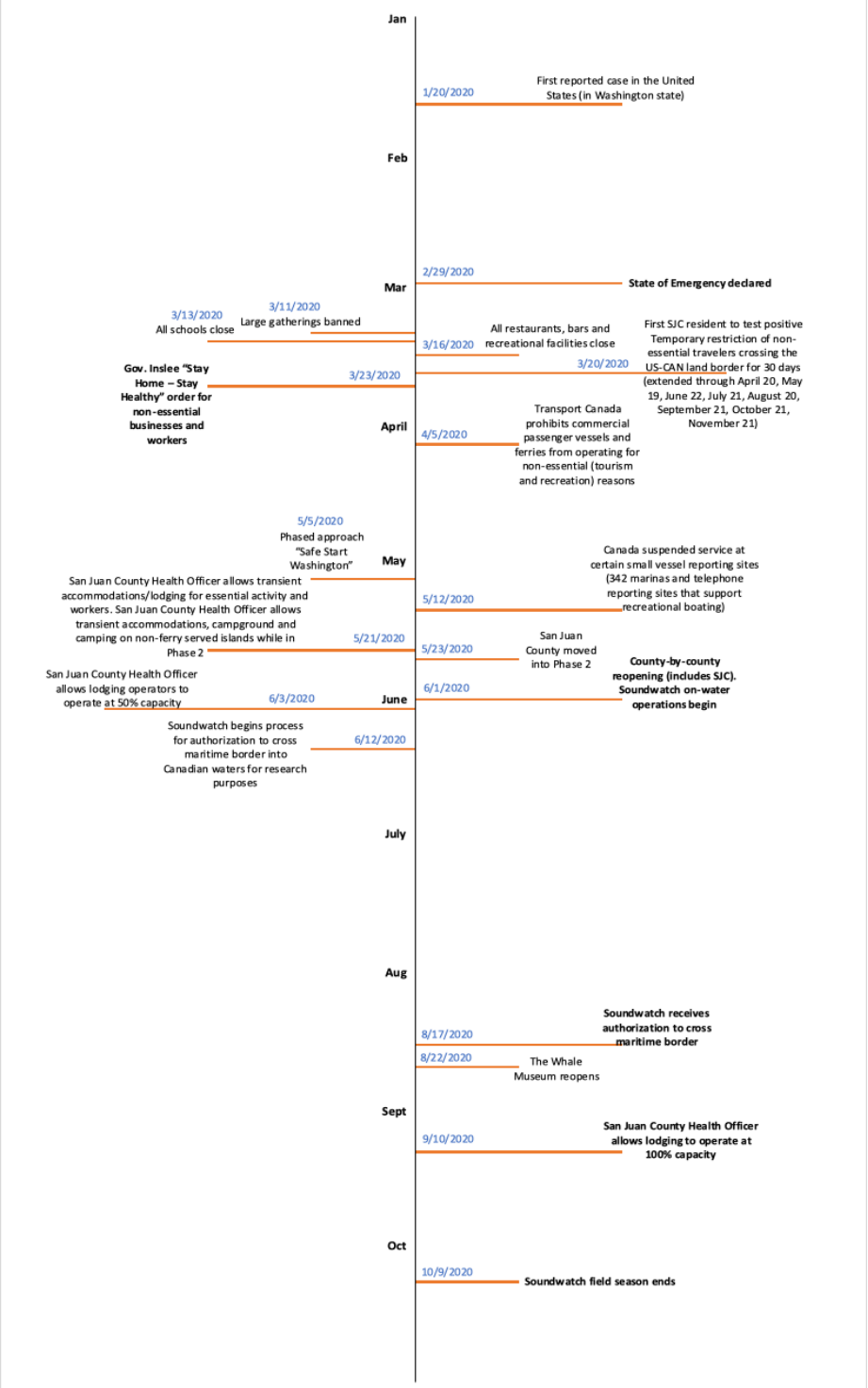




Appendix M: The Whale Museum Watching Whales in the Wild Exhibit Hall Panels.



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.



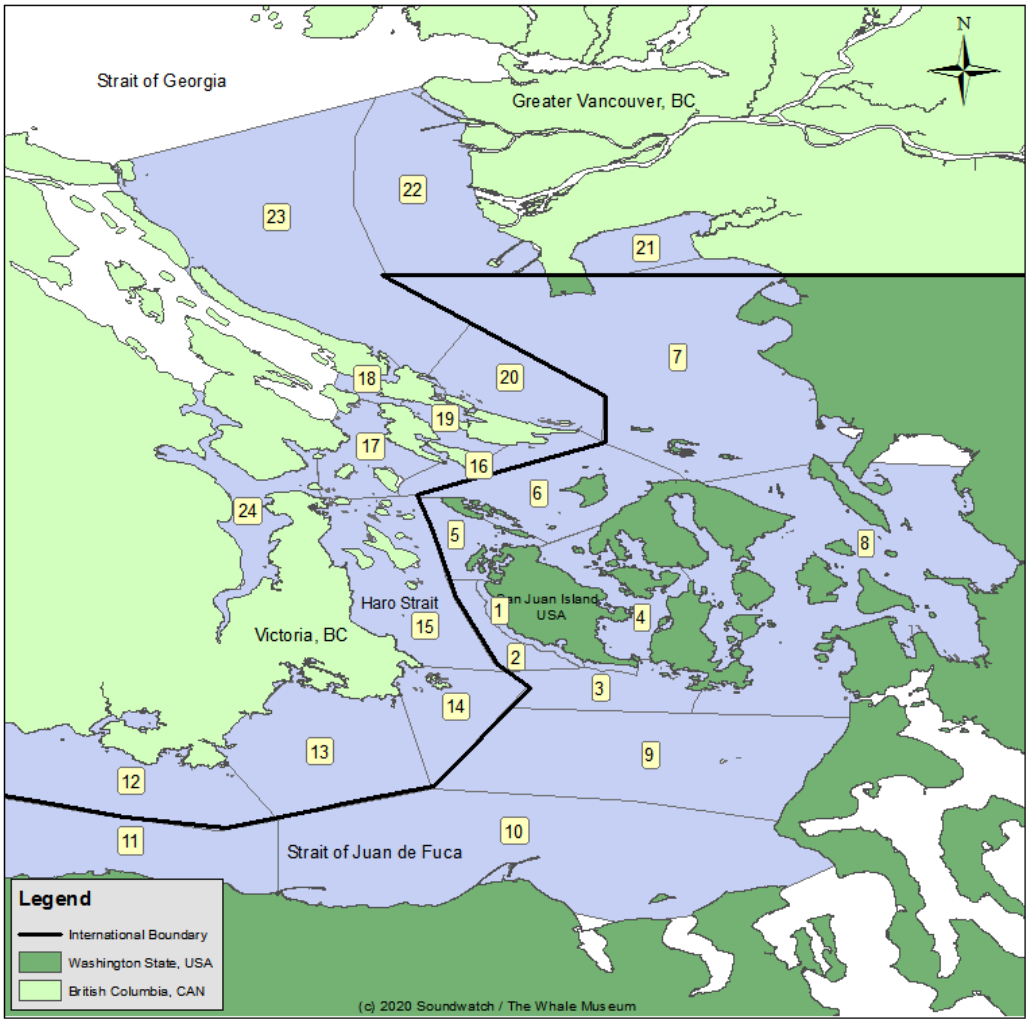
Appendix O: Timeline of COVID-19 related closures and openings pertaining to San Juan County and Soundwatch Program

Appendix O1: Marine Area 7 (San Juan Islands), 2020 fishing/shellfishing seasons*
*daily catch, size, retention limits applied, species-specific
http://www.eregulations.com/wp-content/uploads/2020/06/20WAFW-VLR5-final.pdf
Open year-round: Trout, Steelhead, Sturgeon, Mackerel, Herring/Anchovy/Sardine/Sand Lance/Smelt, Surfperch, Pacific Cod, Pollock, Hake, Wolf Eel
Halibut: May 20, 22, 24, 26, 28, 30, June 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29
Lingcod: May 1-June 15 (hook & line fishing); May 21-June 15 (spearfishing)
Cabezon: May 1-Nov 30
Rockfish, Sixgill, Sevengill, Thresher shark: CLOSED
Salmon***: July 1-31, Aug 1-15, Aug 16-31, Sept 1-30, Aug 16-Sept 30 (Bellingham Bay)

****July 1-Sept 30: Southern Rosario strait/eastern SoJdF CLOSED to salmon fishing*
Southern Rosario Strait/Eastern Strait of Juan de Fuca Closure: Waters of Area 7 in Rosario Strait and the eastern portion of the Strait of Juan de Fuca southerly of a line running true south from the westernmost point on Fidalgo Head to Burrows Island, then westerly and southerly along the shore of Burrows Island to the Burrows Island Lighthouse, then westerly to Bird Rocks, then westerly from Bird Rocks to the southernmost point on Decatur Island, then southerly across Lopez Pass to Lopez Island and following the shore of Lopez Island southerly and westerly to Iceberg Point, then from Iceberg Point to Cattle Point, then south southwest to the Salmon Bank Buoy, and then true south from the Salmon Bank Buoy to the Area 7 boundary

Shrimp (daylight hours):
MA 7 south: May 28, June 1, 11, 15, 26, 28, 30 (all shrimp species including spot shrimp)
MA 7 east: May 28, June 1, 11, 15, 26, 28, 30, Aug 12, 13, 15, 16, Sept 10-24
MA 7 east: July 1-Oct 15 (shrimp, excluding spot shrimp)
MA 7 west: May 28, June 1-13, 18-21, 25-28, July 2-5, Aug 12, 13, 15, 16, 20-23, Sept 10-14 (all shrimp species including spot shrimp)

Dungeness, Red Rock, Tanner Crab (all fishing methods):
MA 7 south: July 16-Sept 28 (Thursdays-Mondays), Oct 1-Dec 31 (7 days/week)
MA 7 north: Aug 13-Sept 28 (Thursdays-Mondays), Oct 1-Dec 31 (7 days/week)

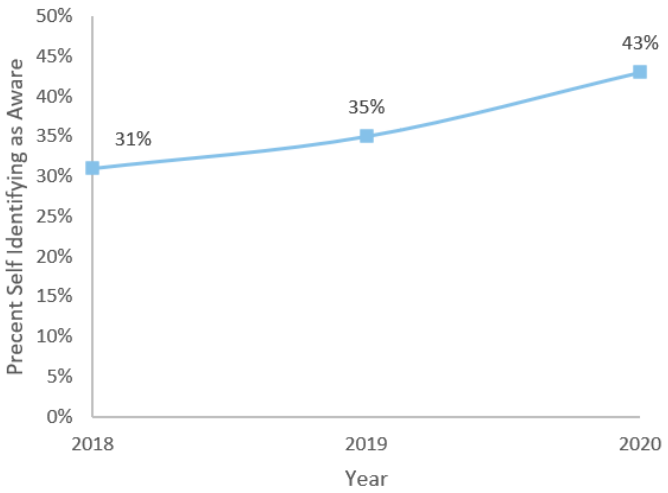


Appendix P: Soundwatch study area numbered zones based on the TWM data quadrants and marine fishing zones for the US and Canada.

APPENDIX Q: CETUS RESEARCH AND EDUCATION SOCIETY STRAITWATCH

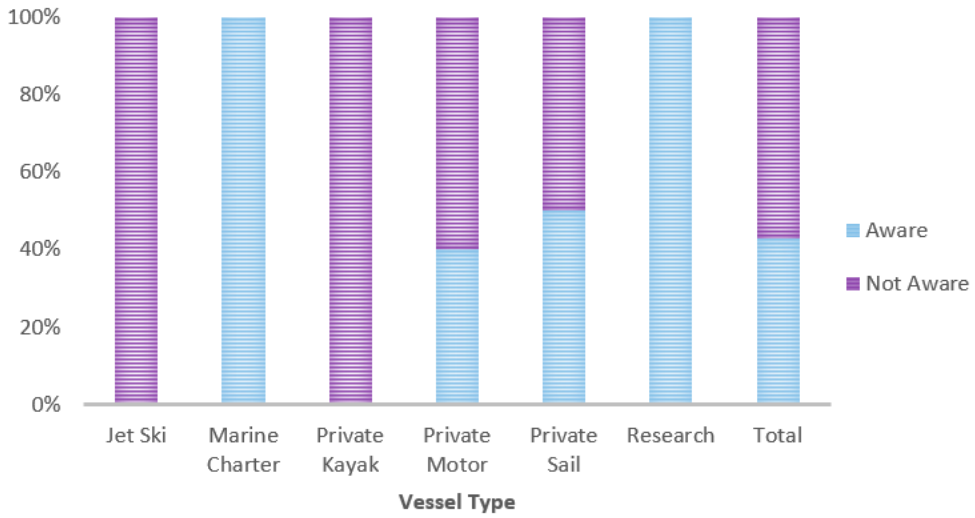
Incident	GA	EC	MM	PM	PK	EU	GB	MX	MC	MY	MF	MW	RS	SR	PS	Total
Aircraft - low flying	1															1
AV watching SRKW		10														10
AV within 200m of KW		6	1													7
Fishing w/in 1km of KW				30												30
Fishing w/in 1km of KW-trying to pull up lines				2												2
Kayak - 100m/yds					2											2
Kayak - offshore 1/4mile					1											1
Leap frogging		1		1												2
Non-compliant approach		1			3											4
Non-compliant approach - head on				2												2
Non-compliant approach - perpendicular to whales				1												1
Non-compliant approach from behind		2		5		1										8
Parked in Path 3.1 and 5.1				3												3
Speed > 7knt w/in 1km		5		61		1	1	1	1	3	1	1	1	1		77
Speed > 7knts w/in 400m				21		1										22
Speed > 7knts w/in 400m (coming on scene)				7												7
Speed > 7knts w/in 400m (departing scene)				8		1	1									10
Vessel within 200 meters of whales				1												1
Vessel crossed the path of whales		2		11	1		1								2	17
Vessel in path & failure to move		1		3		1									1	6
Vessel in path but adjusting to move out of path				1											3	4
Vessel in path of known travel corridor		1														1
Vessel in path of whales (100-400m ahead of whale)		3		3							1			1		8
Vessel inshore of whales		2		11	1	2	1									17
Vessel w/in 400m of KW		2	3	28		5			1	1					5	45
Vessel within 100m - approaching whales				4	3											7
Vessel within 100m - fishing				6												6
Vessel within 100m - stopped		8	2	6		6							1			23
Vessel within 100m - under power		7		17		3									1	28
Vessel within 100m of whales		8	3	16	2	2									1	32
Vessel within 200 meters of whales		3	1	14		11							1		2	32
Vessel within 400m for longer than 30min.		28		2		37							2		2	71
Total	1	90	10	264	13	71	4	1	2	4	2	1	5	2	17	487

Appendix Q1: Distribution of incidents committed by vessel type.



Appendix Q2: Percent of vessels self-identifying as aware of the Marine Mammal Regulations and *Be Whale Wise* guidelines over a three-year comparison.

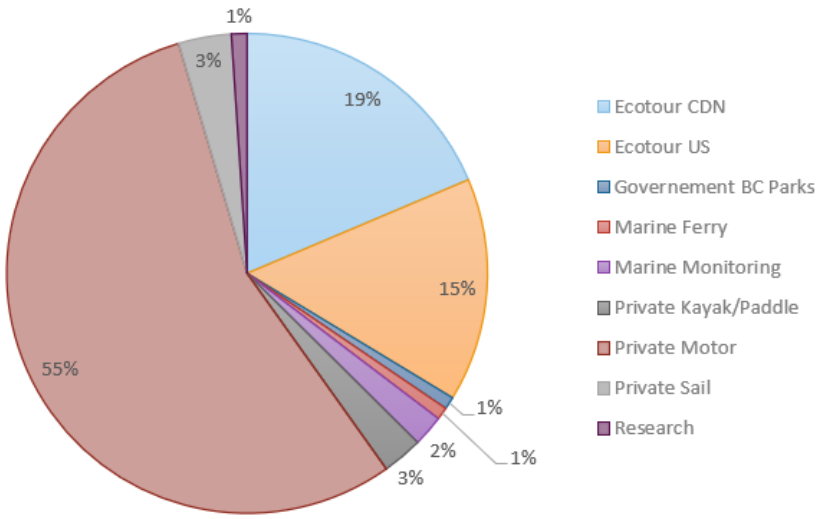
It is important however to note that these numbers may not be 100% accurate. A vessel is only recorded as being aware of the guidelines when they self-identify as being aware. The crew does not always have the opportunity to pose the question to boaters. Additionally, there is not always time to ensure that boaters are aware of the most recent guidelines and for this reason, the Straitwatch team typically restates the regulations and guidelines to boaters to ensure that they are fully updated.



Appendix Q3: Percent of vessels aware of the Marine Mammal Regulations and *Be Whale Wise* guidelines categorized by vessel type. Marine charters and research vessels were the most often aware of regulations and guidelines.

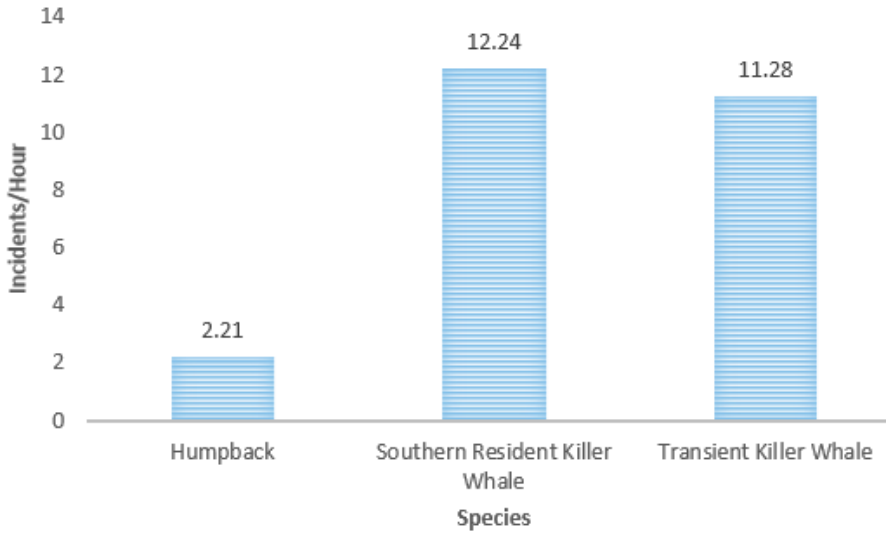
Awareness varied by type of vessel contacted. Research vessels and marine charter vessels contacted were aware 100% of the time. Private motor vessels contacted were aware 40% of the time and private sailboats were aware 50% of the time. Of the jet skis* and private kayaks that were contacted during the 2020 season, 0% were aware of the guidelines and regulations. However, the sample size for jet skis and private kayaks was significantly smaller than those for other vessel types as they are not seen on the water around whales as often. The Straitwatch team has made it a priority to contact all jet skis viewing whales because they are known to be frequently problematic and unaware. Whereas private kayaks are usually only contacted when they are being problematic, and this may account for the fact that 0% of those contacted were aware of the guidelines. This graph can be useful in indicating which sectors should be made a target of future education endeavors in order to increase awareness and thus compliance cross all sectors.

*Jet skis are not permitted in San Juan County, however this vessel type is permitted elsewhere in Straitwatch's study area.



Appendix Q4: Types of vessels by percentage involved in incidents around whales. Private vessels are responsible for more than half of recorded incidents.

Private motor vessels accounted for the most vessel incidents, being responsible for 55% of the incidents recorded around whales. Canadian ecotours accounted for 19% of incidents and US ecotours were responsible for 15% of incidents. All of the remaining vessel types accounted for less than 3% of incident data each. When Canadian and US commercial vessels were combined, ecotour vessels accounted for 34% of incidents recorded around whales. This is 35% less than the 2019 season when ecotour vessels were responsible for 69% of incidents around whales. This may be related to the fact that fewer commercial whale watching vessels were on the water this year than usual, due to COVID impacts on the industry or may also be attributed to improved practice within the whale watching fleet. US ecotours may have accounted for a greater proportion of incidents had they been able to cross into Canadian waters as they would in a regular year.

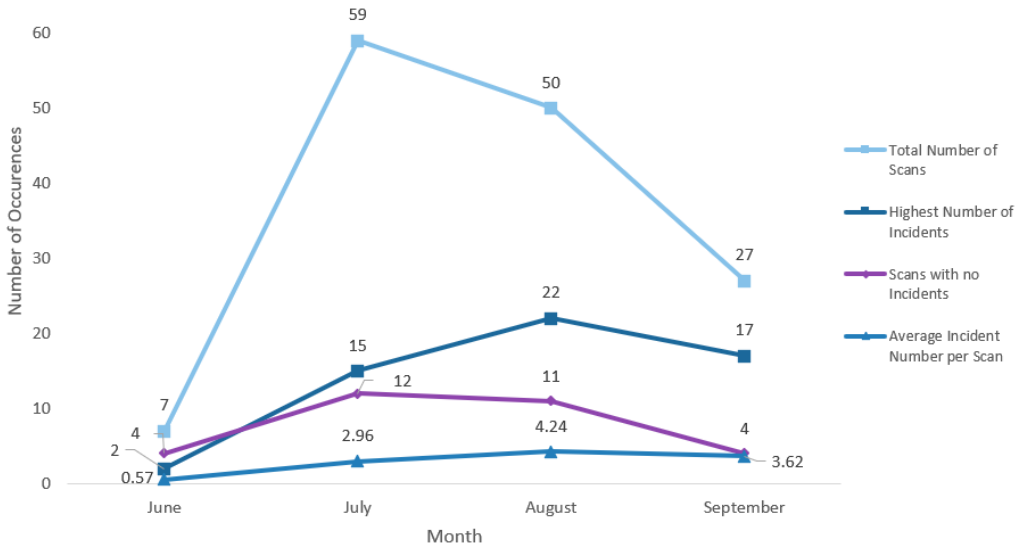


Appendix Q5: Rate of incidents recorded with Humpback whales, Southern Resident killer whales and Transient killer whales. The incident rates for each species of whale were determined

by dividing the number of incidents recorded per species by the number of scans for that species and scaling the number to represent incident number per hour.

Southern Resident killer whales have the highest recorded rate of incidents, with 12.24 per hour. Transient killer whales follow closely behind with 11.28 per hour. Humpback whales have the least with a rate of 2.21 per hour. Southern Resident orcas likely have the highest rate of incidents due to several factors. They have always been highly sought after by both recreational and commercial whale watchers due their tendency to be more visibly social and surface active than Transients. Additionally, Southern Residents have the most regulations and restrictions placed around them both in the US and Canada. The distance regulation in the US for Southern Residents requires vessels to remain 300 yards away whereas for Transients it is 200 yards, resulting in a higher number of incidents recorded around Southern Residents solely based on this variance in distance. In Canada, boaters must remain 400m away from all orcas while in the Southern Resident critical habitat range. This regulation was enacted with the assumption that recreational boaters would not be able to adequately differentiate between Southern Resident and Transient orcas. As such, there is no variance to incidents recorded for recreational boaters based on distance requirements between Southern Residents and Transient orcas in Canada. However, commercial whale watchers have a unique agreement with Transport Canada through the Sustainable Whale Watch Agreement allowing them to go within 200m of Transient orcas with the understanding that they will not view Southern Residents. For this reason, Straitwatch records an incident when Canadian whale watchers with AV standing are viewing SRKWs within 400m, thus disregarding their agreement. These factors influence the rate of incidents around Southern Residents.

Humpback whales typically have a lower rate of incidents than orcas as they are usually encountered in areas of lower vessel traffic in the Straitwatch South range. They are also less often the primary target for the whale watch industry as well as for recreational boaters as orcas are more likely to draw in a large crowd. Humpbacks are often foraging alone but in proximity to other Humpbacks in the area, this means that vessels viewing them are less likely to crowd and will spread out to view different whales, only concentrating on one whale if it’s displaying more surface activity than the others. Additionally, the distance regulation for Humpback whales is 75% closer than that of orcas and will account in part for the lower rate of incidents, as vessels have to be much closer to a Humpback than to an orca for an incident to be recorded.



Appendix Q6: The distribution of average incident number and maximum incident number per scan by month. The total number of incident scans recorded per month and incident scans with no incidents are included for reference.

During the 2020 season, there was an average of 3.4 incidents recorded per scan, translating to an average of 10.2 incidents per hour (increase from 2019 season when they were recorded at an average of 8 per hour). Of the four months on the water, August had the highest average incident number per scan, with an average of 4.24. August also had the highest number of incidents recorded in an incident scan with maximum of 22 recorded. July had the fewest, with a maximum of 4 recorded in a single scan. On a day when 22 incidents are recorded in a 20-minute span of time, it is evident that enforcement presence is needed on the water to deter boats from committing incidents and to follow up with vessels that have.