

Cetus Research & Conservation Society

# Vessel Observations in the Presence of Southern Resident Killer Whales

2018-2020 Straitwatch Report

6-11-2021

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Vessel Observations in the  
Presence of Southern Resident  
Killer Whales 2018-2020

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## Purpose of this report

This report is based on three years of vessel observations in the presence of Southern Resident Killer Whales (SRKWs) during a period of changing federal regulations governing vessel behaviour. The report reviews vessel behavior and boater compliance with the federal regulations developed to protect and aid in the recovery of SRKWs in their legally-protected Critical Habitat. Our intent is to provide information relevant to the evaluation of federal regulations and the relative compliance of boaters with measures intended to reduce physical and acoustical vessel disturbance on endangered whales as observed in Figure 1.



*Figure 1. A private vessel with engines off within metres of a Southern Resident Killer Whale in Haro Strait on July 8th, 2020.*

## About Straitwatch

Straitwatch is a stewardship-based marine mammal monitoring and education program operating in the Canadian and transboundary waters adjacent to Vancouver Island. Straitwatch's goal is to improve the condition of important habitats for cetaceans by reducing the impact of vessels, both acoustically and physically. Straitwatch works proactively on the water to monitor and report on vessel behavior, prevent whale-vessel incidents, and minimize vessel disturbances. We do this by intercepting boats on problematic trajectories and intervening with boats actively engaged in illegal or inappropriate boating behaviour around marine mammals. When necessary, serious incidents are recorded and submitted to the proper authorities to ensure accountability. Straitwatch redirects problem vessels and, when possible, engages vessel operators in conversations about marine species at-risk in BC and about appropriate viewing of and boating around marine mammals. We share with boaters the most up-to-date Marine Mammal Regulations (MMR), Transport Canada Interim Orders under the Species at Risk Act (SARA), and the Be Whale Wise (BWW) Marine Wildlife Viewing Guidelines for Boaters, Paddlers, and Viewers (DFO 2016).

Straitwatch also approaches boaters before they get on the water through land-based education about the regulations and BWW guidelines and other ways of reducing the impact of vessels on marine mammals. In addition to these stewardship activities, Straitwatch monitors vessel activity in the vicinity of marine mammals and the behaviour of the animals around vessels. This monitoring effort contributes to a long-term dataset which illustrates the types and activities of vessels in proximity to marine mammals, and the resulting animal behaviour adjustments to the presence of

vessel traffic. This information provides a better understanding of the disturbance and stress that vessels have on marine mammals, especially species at-risk, and supports appropriate responses on behalf of recovery planners and policy makers.

Straitwatch monitors all cetaceans encountered within its range for the purpose of reducing the impact of vessel disturbances. However, the program has a particular focus on the critically-endangered population of Southern Resident Killer Whales (SRKWs) (*Orcinus orca*), for whom the Salish Sea comprises a large portion of their habitat (Ford *et al.* 2000).

## Focus on SRKWs

SRKWs are a population of Resident Killer Whales listed as endangered under Canada's *Species at Risk Act* (SARA) (2001) and the US *Endangered Species Act* (2005). The most recent analysis by Fisheries and Oceans Canada (DFO) shows SRKWs face a 24% risk of functional extinction within 75-96 years under existing conditions (Murray *et al.* 2019, 2021). Critical habitat identified as necessary for the survival and recovery of the SRKW population was identified in the Resident Killer Whale Recovery Strategy (DFO 2008, 2011, 2018) (see map Appendix C) and designated as protected under SARA (S.58). Designated critical habitat is only a portion of SRKW overall range which spans from California to northern British Columbia. DFO has identified three primary threats to the survival and recovery of SRKWs: environmental contamination (pollution and toxins), reductions in availability and quality of their primary prey (Chinook salmon), and physical and acoustical disturbance from vessels and other human activities (DFO 2008, 2011, 2018).

Straitwatch focuses on the latter of these threats: vessel presence associated with physical and acoustic disturbance. The Straitwatch range covers much of the SRKW designated critical habitat in Canada.

## Regulations governing vessel behavior

This review covers a three-year (2018-2020) period in which several changes were made by management authorities designed to govern vessel behaviour around SRKWs.

### Regulations issued under the Marine Mammal Act (2018)

In 2018, updated measures were put in place under the Marine Mammal Act to aid Killer Whale recovery. In 2018, the 100 metre (m) minimum distance guideline for all marine mammals was updated for Killer whales, requiring all vessels to remain 200m away from all Killer Whales. This regulation was updated for the purpose of improving conditions for all threatened and endangered Killer Whales by reducing vessel traffic directly around them.

### Interim Order issued by Transport Canada (2019 & 2020)

Under the Shipping Act, an interim order can be issued to address risks to the marine environment. Interim Orders (IO) to manage vessel traffic for the protection of Killer Whales off southern BC are issued by Transport Canada. In 2019, the Interim Order required vessel operators to keep a minimum distance of 400m from all Killer Whales while in SRKW critical habitat. The IO issued in 2020 extended the 400m-distance requirement beyond critical habitat, to include the range of Southern Resident Killer Whales in waters up to Campbell River, and made it applicable throughout the year (Appendix C). Additionally, the IOs issued in 2019 and 2020 established Interim Sanctuary Zones (ISZs) in priority SRKW habitat areas at Pender Island, Saturna Island, and Swiftsure Bank, restricting vessel traffic within those zones from June 1 – Nov 30.

#### Transport Canada Sustainable Whale Watch Agreement (SWWA) (2019 & 2020)

The IOs issued in 2019 and 2020 gave commercial whale watch and ecotour operators the opportunity to apply for an exemption to the 400m distance requirement for Transient (Bigg's) Killer Whales, based on the understanding that their staff could differentiate between SRKWs and Transients (DFO 2019). Operators who applied for this exemption were granted an Authorized Vessel (AV) permit and given a flag to indicate that they were allowed to approach up to 200m from Transient Killer Whales. This exemption was granted with an agreement that AV vessels would not follow SRKWs and would take other measures to “reduce the risk of physical and acoustic disturbance to Southern Resident killer whales” (Sustainable Whale Watch Agreement 2019, 2020). Specifically, operators committed to:

*“Focus whale watching tours on populations of Bigg’s killer whales (Transients), Northern Resident killer whales, Humpback, and other Baleen Whales, and will not intentionally offer, plan or promote excursions based on viewing of SRKW. When periodically encountering SRKW in the course of viewing other whales, PWWA vessels will focus on conservation and education of the SRKW, will not approach within 400 metres, will not follow SRKW, will continue following the go-slow-within-1km approach, and will continue transiting as soon as possible.”*

#### AIS

The Shipping Act also governs the use of Automatic Identification System (AIS) which requires vessels carrying more than 12 passengers, or a passenger vessel more than 8 metres long, to be operating their AIS at all times.

#### Washington State Regulations on SRKWs

In 2019, Washington state law concerning SRKWs was also updated, requiring boaters to remain more than 300 yards from SRKWs if parallel, and more than 400 yards if in the path of whales or behind them (WDFW 2021).

## Methods

Straitwatch operates in the waters from Port Renfrew to Campbell River, with the majority of SRKW encounters occurring in the southern portion of this range. Straitwatch also monitors the transboundary waters of the Canada-US border. The Straitwatch monitoring season runs from mid-June to mid-September with the occasional extension based on circumstance. The Straitwatch team is on the water daily throughout the season, with a standard 8-hour monitoring day that is adjusted based on whale presence. Straitwatch uses a variety of equipment including range finders, radar, AIS, and cameras to monitor effectively and accurately on the water.

Straitwatch collects several types of data to provide an accurate analysis of vessel activity around whales. The data collected falls under six categories:

1. Whale Behaviour – a record of surface behaviour and activity states, direction of travel, pod ID, and number of individuals;
2. Vessel Scans – a record of vessels within 1000m of whales, including number of vessels, type of vessel, activity of vessel at time of scan, and vessel distance from whales;
3. Vessel Contacts – a record of number of vessels contacted, location, reason for contact, and response to contact;
4. Incident Scan – a record of incidents occurring around a focal group of whales. Incidents can include violations of the Interim Order, the Marine Mammal Regulations, and/or the Sustainable Whale Watch Agreement, as well as non-compliance with the *Be Whale Wise* Guidelines;
5. Serious Incidents – a record of serious incidents which constitute major violations of the MMR or IOs, or that arise from gross negligence on the part of the vessel operator;
6. Whale Watch Time Log – a record of the duration of time that commercial whale watch vessels remain on-scene with whales.

Data for each category is collected regularly throughout the day with some data categories occurring at specific time intervals. The following three-year analysis draws from each of these data sets to provide insight into how regulations are affecting vessel behaviour in the presence of endangered SRKWs in the Salish Sea.

In US waters, SRKWs are monitored by Washington-based *Soundwatch* with state and federal enforcement provided by vessels from the Washington Department of Fish & Wildlife (WDFW) and the National Ocean and Atmospheric Administration (NOAA).

## Findings

### Whale Presence

Straitwatch operates from locations at Quadra Island and Victoria; however, the SRKW encounters and data presented herein occurred almost exclusively in the range of the Victoria based Straitwatch. In all three years, SRKW encounters were often concentrated off the west side of San Juan Island, primarily in US and transboundary waters.

#### 2018

In 2018, encounters occurred throughout critical habitat, extending from the Juan de Fuca Strait as far west as Port Renfrew, and in Georgia Strait as far east as Point Roberts (Figure 2, blue markers). The field season in 2018 spanned 113 days, comprised of 79 monitoring days, with 45 of those days monitoring SRKWs (Figure 3). Of these 45 days approximately 13 days were in Canadian waters and 9 were split (SRKW monitored in both Canadian and American waters). The 2018 season was extended to October 15<sup>th</sup>.

#### 2019

The field season in 2019 spanned 93 days, comprised of 74 monitoring days, with 15 monitoring days spent with SRKWs. Of these 15 days, 3 days were in Canadian waters and 7 days were split (SRKW monitored in both Canadian and American waters). The majority of the 15 days were in August (Figure 3) and concentrated in the region between Victoria and San Juan Island in US waters (Figure 2, red markers).

#### 2020

In 2020, the field season was 100 days, comprised of 73 monitoring days. Straitwatch spent 24 of those days monitoring SRKWs, with 19 of those days occurring in July and none in August (Figure 3). Of the 24 SRKW monitoring days, 7 were in Canadian waters. Some monitoring days in 2020 were lost due to heavy smoke. In 2020, SRKWs were frequently encountered in the waters off of Sooke, BC and around Hein Bank and Constance Bank in the US (Figure 2, yellow markers).

The SRKW encounters in Figure 2 convey the varied use of their habitat in the summers of 2018-2020. A caveat is that these observations are often affected by limitations of the crew due to weather, fuel limits, and other factors. These encounters contribute to an ongoing and larger data set documenting patterns in SRKWs habitat use within their range and critical habitat.

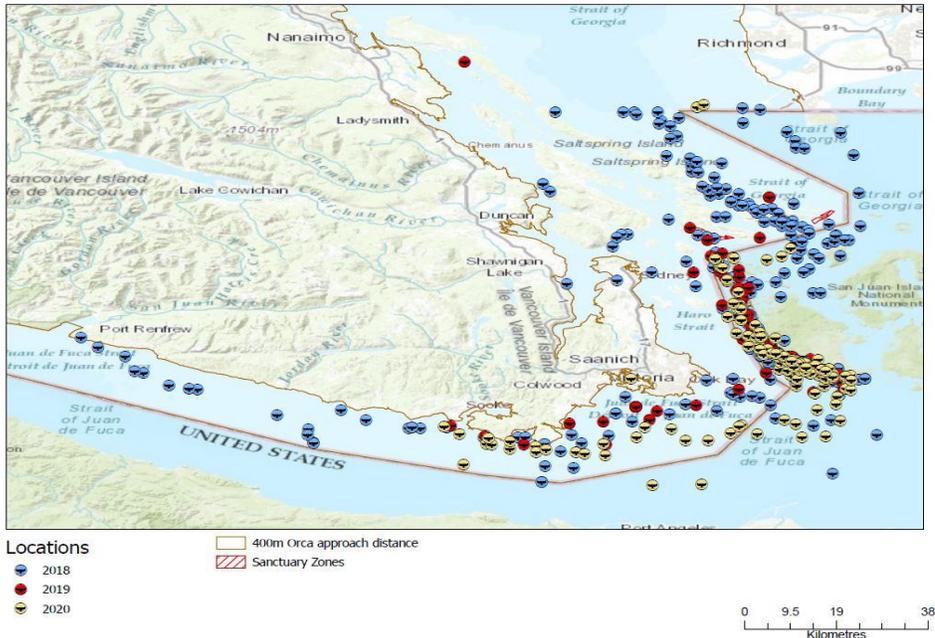


Figure 2. Map of all SRKW observations (encounters by scan) during the Straitwatch summer monitoring season in the years 2018 (blue), 2019 (red), and 2020 (yellow).

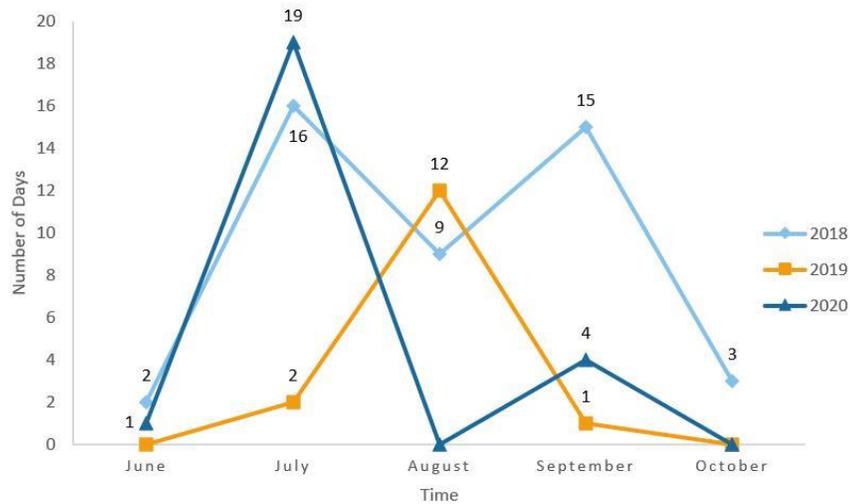


Figure 3. SRKW encounters by days per month during Straitwatch's summer monitoring season 2018-2020. SRKWs were not present in June 2019 or August 2020 (represented by a 0 count). The 2018 season covered June through October 15. Straitwatch was not monitoring in October of 2019 or 2020 (represented by a 0 count).

## Vessel Observations

### Number of vessels within 400m

In 2018, the average number of vessels scanned within 400m of SRKWs was 8.1. (Figure 4). In 2019, this declined to 2.7 vessels scanned within 400m and in 2020 to 2.5 vessels scanned, representing a drop of 69% between 2018 and 2020 (Figure 4).

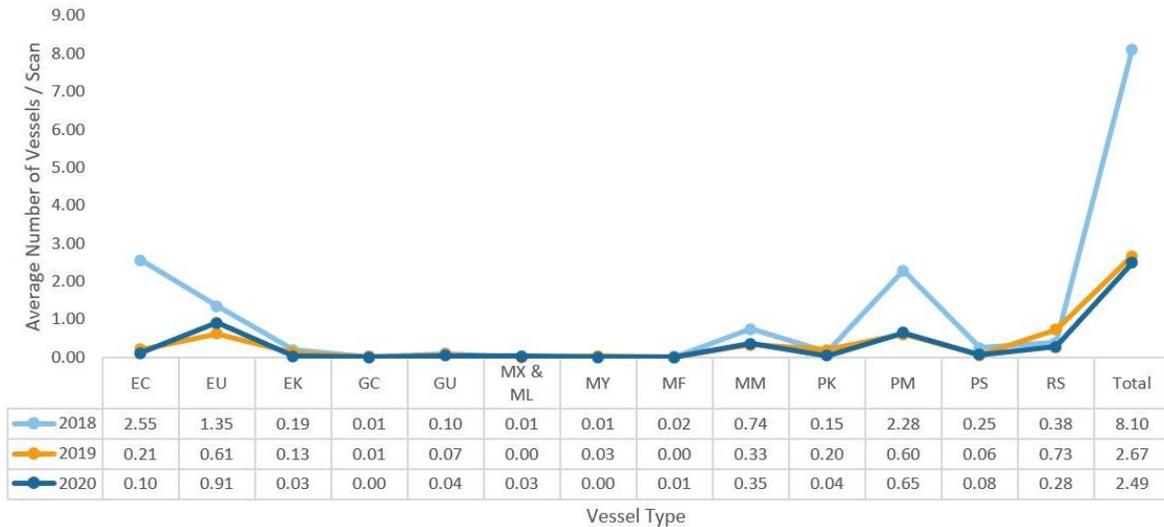
Separating private and commercial vessel types, the number of private motorized vessels viewing SRKWs from within 400m dropped 71% between 2018 and 2020. The number of Canadian commercial whale watch/ecotour vessels viewing SRKWs within 400m dropped by more than 90% relative to 2018 (Figure 4).

### Vessel type within 400m

As regulations governing vessel distance and viewing of SRKWs changed over the three years, so did vessel distribution. The annual proportional distribution of all vessel types per scan within 400m is presented in Figure 4.

In 2018, the most common vessel type observed within 400m of SRKWs was Canadian commercial ecotour/whale watch vessels. In 2019, the most common vessel type within 400m was research vessels. In 2020, the most common vessel type observed within 400m of SRKWs was US commercial ecotour/whale watching operators.

By 2020, the numbers of Canadian commercial ecotour/ whale watch vessels within 400m of SRKWs dropped by more than 90% compared to 2018 (Figure 4). While this is a significant decline, commercial whale watchers were still observed within 400m of SRKWs on 84 occasions (60 instances within 400m, 18 instances within 200m, and 6 instances within 100m) in 2020. Of these observations, 5 occurred in Canadian waters, 8 occurred in transboundary areas and the rest occurred in American waters.



400 m

Figure 4. Comparison of 2018, 2019, and 2020 distribution of vessel types observed (vessels/scan) within 400m of SRKWs. Vessel codes are: Ecotour Canadian (EC); Ecotour US (EU); Ecotour Kayak (EK); Government Coastguard Canada (GC); Government Coastguard US (GU); Marine Cargo (MX); Marine Tug (ML); Marine Ferry (MY); Marine Commercial Fishing (MF); Marine Monitoring (MM); Private Kayak (PK); Private Motor (PM); Private Sail (PS); Research (RS).

Numbers of vessels within 1000m

In 2018, the most consistent vessel traffic, comprising Canadian and US vessels, was observed in Haro Strait along the west side of the US San Juan Island (Figure 5). However, the encounters with the highest vessel counts (up to 86 vessels within 1000m) occurred in August in the waters around East Sooke, BC (Figure 6). August had the highest average numbers of vessels per scan at 17.98 and up to 54 vessels within 1000m (Figure 6).

In 2019 and 2020, the maximum number of vessels recorded on-scene with SRKWs declined significantly. The busiest days of the field season counted 26 and 30 vessels respectively and both occurred off the west side of San Juan Island in the US. The three busiest days in 2018 had a higher vessel count than any of the busiest days in 2019 or 2020. 2019 and 2020 also saw a significant drop in average vessels per scan, with the busiest month occurring in September 2020 with an average of 8.24 vessels per scan (Figure 7).

In 2020, the Covid-19 pandemic significantly reduced vessel traffic on both the Canadian and US sides of the border. Due to the pandemic, US vessels were not allowed to cross into Canadian waters to view SRKWs; however, Canadian vessels were crossing into US waters to view SRKWs. Since US vessels normally comprise a considerable amount of vessel numbers in Canadian waters during the summer, the border closure reduced vessel traffic in the Straitwatch monitoring range throughout the field season.

Overall, numbers of vessels within 1000m of SRKWs dropped by 42% between 2018 and 2020. Factors influencing these observations would include the federal IO and the SWWA put in place in 2019 and 2020, fishing closures in select areas of the Juan de Fuca and the Gulf Islands, the low SRKW presence in 2019, and COVID-19 travel restrictions in 2020.

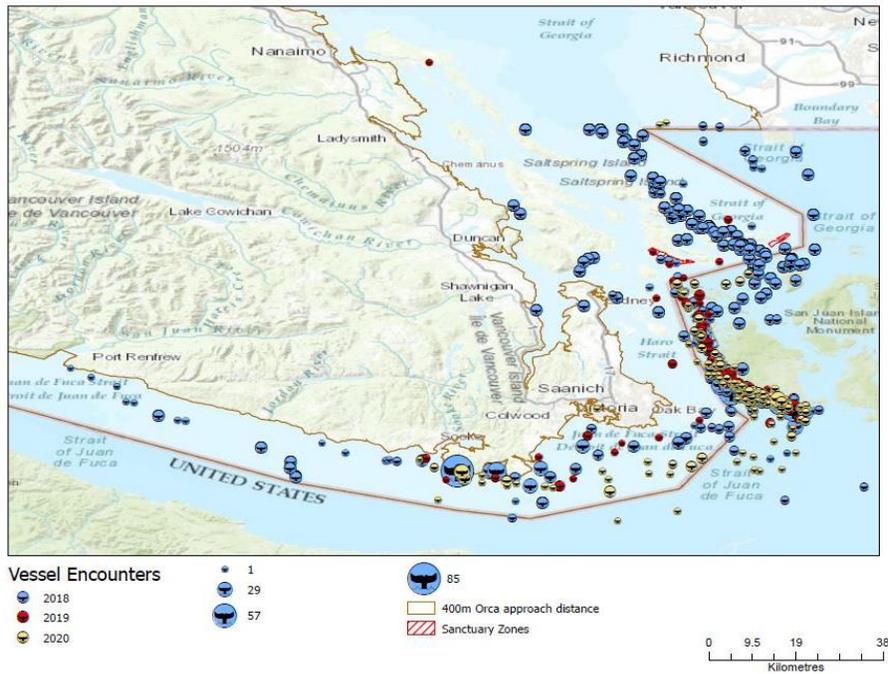


Figure 5. Distribution and number of vessels recorded within 1000m of SRKWs during the Straitwatch summer monitoring seasons 2018 - 2020. The size of the circle indicates the number of vessels recorded in an encounter and the colour indicates the year: 2018 (blue), 2019 (red), and 2020 (yellow).

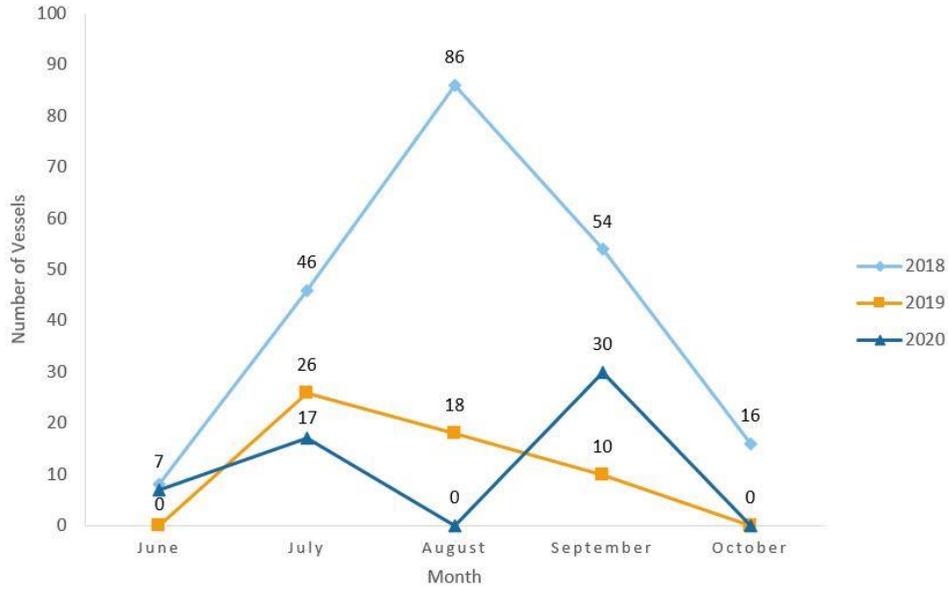


Figure 6. Monthly maximum number of vessels recorded per scan within 1000m of SRKWs during the 2018-2020 monitoring seasons. Straitwatch was not monitoring in October of 2019 or 2020 (represented by a zero count) and SRKWs were not present in June 2019 or August 2020 (represented by a 0 count).

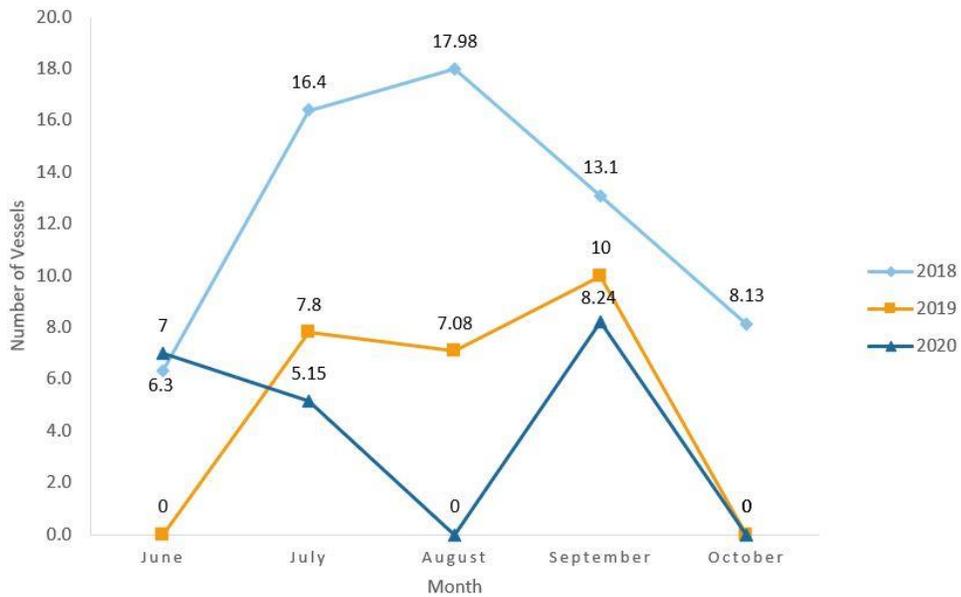
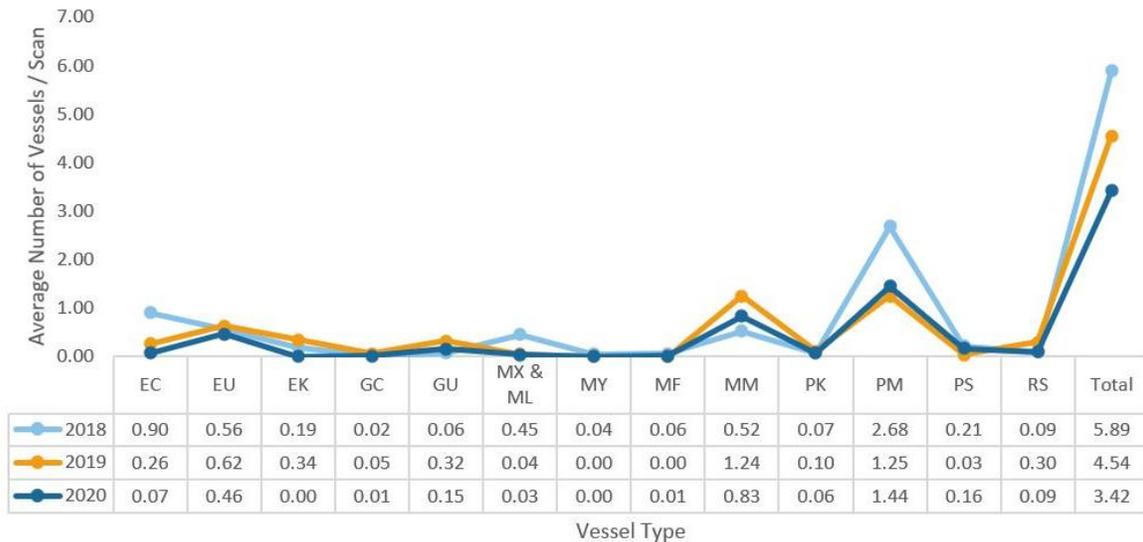


Figure 7. Average number of vessels recorded per scan within 1000m of SRKWs each month for the monitoring seasons 2018-2020. Straitwatch was not monitoring in October of 2019 or 2020 (represented by a 0 count) and SRKWs were not present in June 2019 or August 2020 (represented by a 0 count).

## Vessel type within 1000m

Vessel types within 1000m of SRKWs differed from those at 400m. Private motorized vessels were the most common vessel type within 1000m in all three years. The number of private vessels dropped by 46% between 2018 and 2020 (Figure 8). Canadian whale watch/ecotour vessels declined from being the second most common vessel within 1000m of SRKWs in 2018 to accounting for only 2% of the vessels per scan in 2020 (Figure 8). The number of US whale watch/ecotours within 1000m of SRKWs did not measurably decrease.

Factors affecting the proportion of commercial whale watch vessels would include the SWWA agreement between Transport Canada and Canadian commercial whale watch operators who agreed to not view/follow SRKWs, the low presence of SRKW in 2019, and COVID-19 travel /border restrictions in 2020.



## 1000 m

Figure 8. Comparison of 2018, 2019, and 2020 distribution of vessel types observed within 1000m of SRKWs. Vessel codes are: Ecotour Canadian (EC); Ecotour US (EU); Ecotour Kayak (EK); Government Coastguard Canada (GC); Government Coastguard US (GU); Marine Cargo (MX); Marine Tug (ML); Marine Ferry (MY); Marine Commercial Fishing (MF); Marine Monitoring (MM); Private Kayak (PK); Private Motor (PM); Private Sail (PS); Research (RS).

## Vessel types/activities

Figure 9 shows the type and activity states of vessels observed within 1000m of SRKWs. Whale watching comprises the dominant activity/ vessel type at 40% or higher in all three years.

In 2019, there was a reduction relative to 2018 in fishing activity around SRKWs. The presence of fishing vessels increased in 2020 from 2019 numbers. This may be influenced by the fact that most SRKW encounters in 2019 occurred off the west side of San Juan Island where restrictions on the salmon fishery were in place.

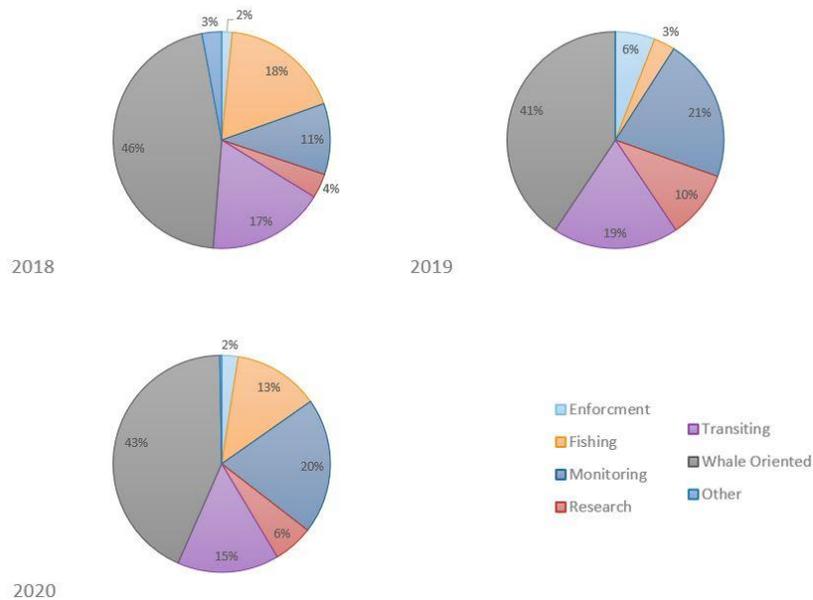


Figure 9. Vessel types observed within 1000m of SRKWs. Activities of all vessel types are included.

## Incidents around SRKWs

Vessel incidents occurring within 1000m of SRKWs are compiled for private and commercial vessel behaviour that are non-compliant either with the Be Whale Wise guidelines and other voluntary measures such as fishing avoidance zones or with both Canadian and American authorities governing distance (Marine Mammal Act, Interim Orders) and restricting commercial whale watch vessels from following SRKWs (Transport Canada SWWAs). Due to frequent surface activity, SRKWs have often been sought out by recreational and commercial whale watchers, resulting in frequent incidents. Appendix F shows a comparison of surface activity between SRKWs relative to Humpback Whales and Transient Killer Whales. A comparison of vessel incidents in the presence of SRKWs relative to Humpbacks and Transient Killer Whales can be found in Appendix F, Table F1.

Incidents recorded over the three years were concentrated on the US side of Haro Strait where most SRKW encounters occurred. (Figure 10). However, incidents in US waters can include Canadian vessels. Incidents have also occurred on the Canadian side of the Juan de Fuca Strait (in all years) and the Canadian waters of Southern Georgia Strait (primarily in 2018) (Figure 10).

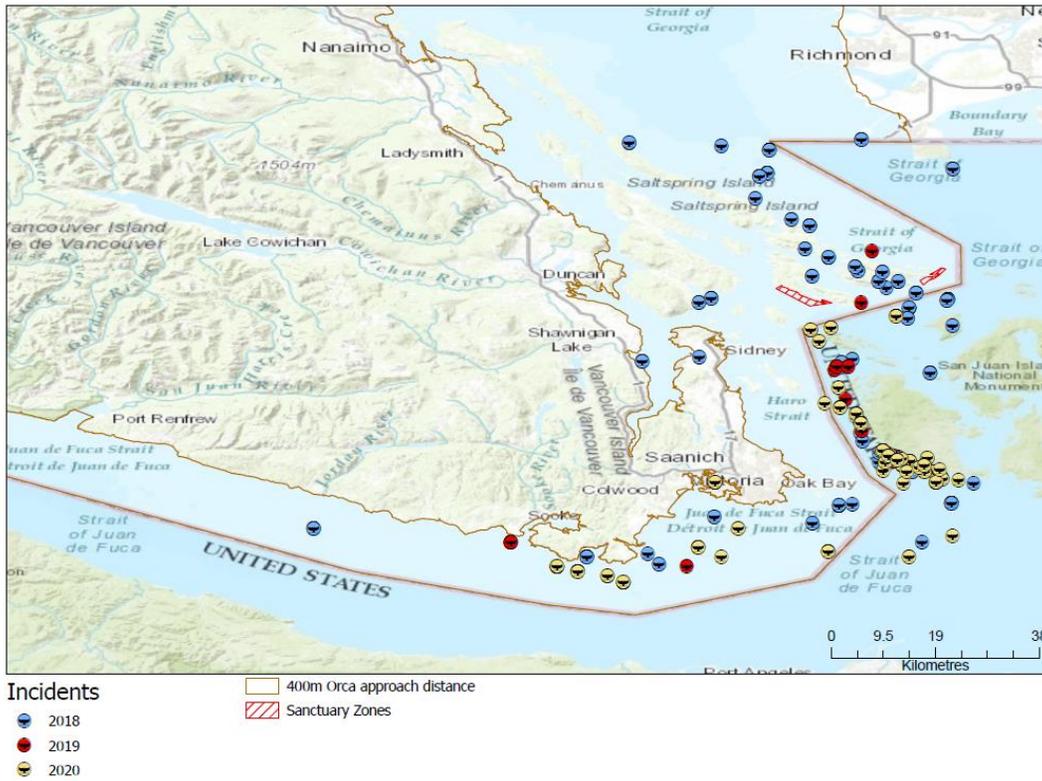


Figure 10. Distribution of incidents recorded within 1000m of SRKW during the years 2018 (blue), 2019 (red), and 2020 (yellow). The colour of the point indicates the year.



*Figure 11. Two recreational vessels viewing a Southern Resident Killer Whale from within 50m on the west side of San Juan Island on July 8th, 2020.*

The rate of total incidents (of guidelines and regulations) was calculated by month for all three years (Figure 12). Incident rates around SRKW were highest in 2018 with a rate of 14.06 incidents/hour, followed by 2020 with 12.56 incidents/hour. 2019 had the lowest rate of incidents of the three years with no SRKW encounters recorded in June or September and very low incidents in July and August (average of 4.88 incidents/hour).

The low rate of incidents recorded in 2019 may have been due to the low SRKW presence and the vessel no-go zone placed off San Juan Island (Appendix G). 2019 was also the first year of the Transport Canada IO and the SWWA with commercial whale watch and ecotour companies.

In 2018 and 2020, more than 50% of incidents were breaches of the voluntary Be Whale Wise guidelines (Figure 13). In 2019, there were an equal number of incidents of non-compliance with the voluntary guidelines and violations of the Marine Mammal Regulations (200m distance).

In 2020, the highest incident rate was in September with 15.82 incidents per hour (Figure 12). This was the highest incident rate recorded over the three years.

Table 1 shows the top incidents for all three years. Vessels within 100m of SRKWs was the top incident type for 2019 and 2020 (violating both the Marine Mammal Act and the IO) and vessels directly in the path of SRKWs was the third most common incident in 2018. This indicates that vessels breaching the minimum distance regulation is still a primary issue. In 2020, with the addition of the new incident categories to reflect the IO and the SWWAs, vessels within 400m were the third most common incident in 2020. Violations of the SWWAs and fishing avoidance zones are discussed below.

*Table 1. Top three incident types recorded around SRKWs for the years 2018, 2019, and 2020.*

Year	1st Incident	Number	2nd incident	Number2	3rd incident	Number3
2018	Inshore of Whales	72	Speed >7knts w/in 400m	34	Vessel in path of whales (100-400m ahead)	23
2019	Within 100m	8	Within 400m for longer than 30min	6	Inshore of whales	3
2020	Within 100m	36	Within 400m	31	Within 400m for longer than 30min	30

#### Non-compliance with Fishing Avoidance Zones

Voluntary measures for fishing vessels within 1000m of SRKWs include lifting fishing gear from the water. In 2020, 131 recreational vessels were observed fishing within 1 km of SRKWs. This included 23 vessels within 400m and 28 vessels within 200m. 15 vessels were asked by Straitwatch to raise their lines; two vessels complied.

#### Non-compliance with SWWAs

Between mid-June and mid-September 2020, Straitwatch observed SRKWs in the Salish Sea on 24 days. Of these 24 days, Canadian commercial whale watch/ecotour companies were recorded watching SRKWs on 12 different days in both US and Canadian waters. There were 47 incidents of viewing between 31-45 minutes, 61 incidents of viewing between 46-60 minutes, and 72 incidents of viewing over 60 minutes. During the seven days that SRKWs were viewed in Canadian waters, the duration of viewing by Canadian commercial whale watch boats included 11 incidents of viewing between 31-45 minutes, 12 incidents of viewing between 46-60 minutes, and 8 incidents of viewing over 60 minutes.

*Table 2 Number of incident scans, incidents, and no /zero incidents in 2018, 2019, and 2020.*

	2018	2019	2020
Incident Scans	51	16	48
Vessel Scans	253	101	177
Incidents	239	26	201
No Incidents	3	5	6

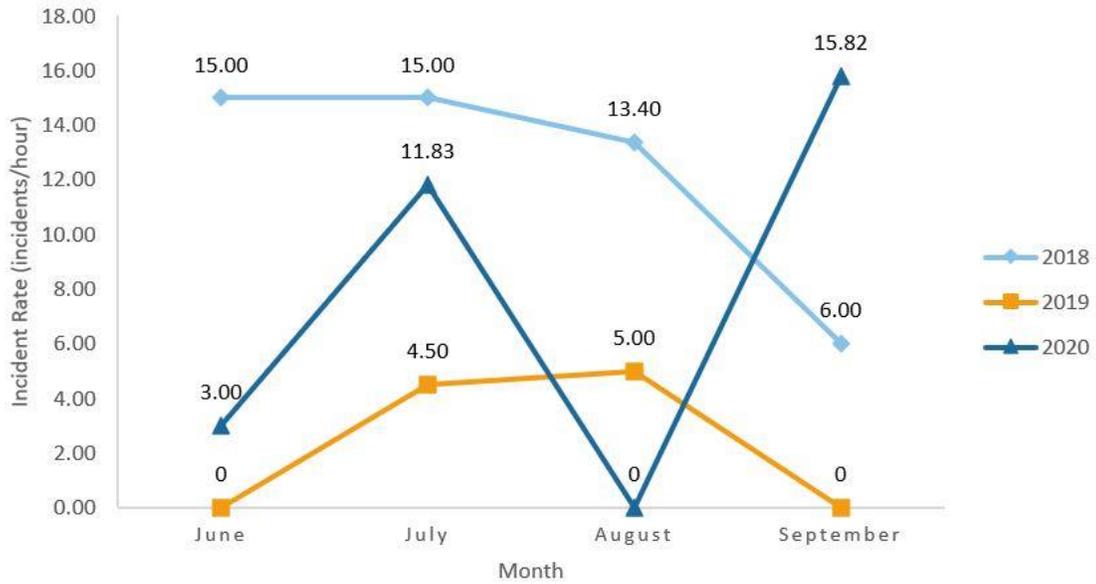


Figure 12. Average number of incidents per hour recorded within 1000m of SRKWs by month for the years 2018, 2019, and 2020. SRKWs were not present in June 2019 or August 2020, (represented by a 0 count). No monitoring occurred in October 2019 or 2020 and no incident scans were recorded in October 2018.

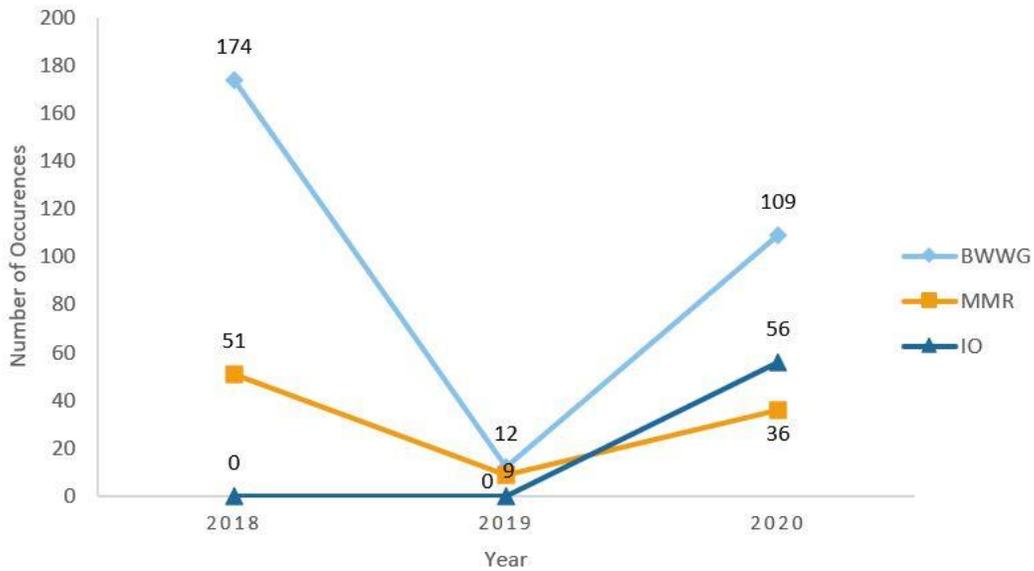


Figure 13. Number of incidents within 1000m of SRKWs violating voluntary measures (Be Whale Wise guidelines) or mandatory regulations (Marine Mammal Regulations or IO) by year. The observation of greater compliance in 2019 relative to 2020 is influenced by Straitwatch's coding/reporting of incidents in 2020 that were not coded/reported in 2019 and by the lower number of encounters with SRKWs in 2019 relative to 2020.

Commercial ecotour vessels were usually (99%) engaged in whale watching when incidents were committed around SRKWs. Private vessels were recorded fishing 40% of the time when committing incidents, whale watching 28% of the time, and transiting 32% of the time when committing incidents (Figure 14).

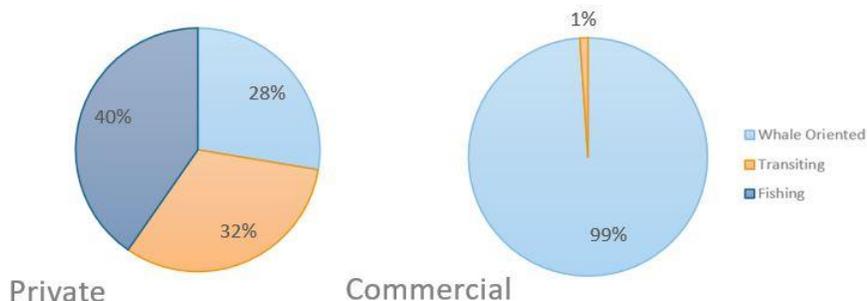


Figure 14. Activities in which private vs. commercial vessels were engaged in at the time of committing an incident around SRKWs.

Private motor vessels were the most common vessel type committing incidents around SRKWs in all years. In 2018, Canadian whale watch /ecotour vessels accounted for 19% of incidents. This dropped 50% in the following two years (to 8% and 10%). US whale watch /ecotour vessel incidents increased in 2020 (Figure 15).

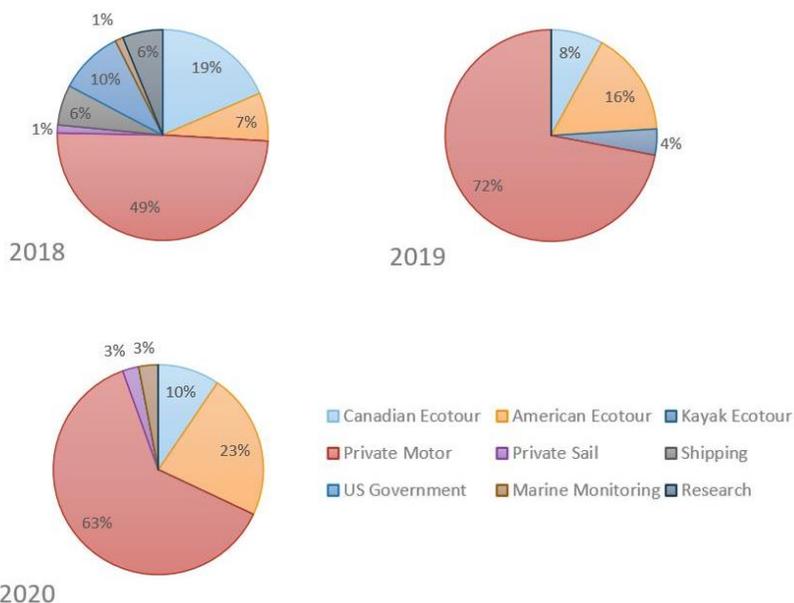


Figure 15. Distribution of incidents committed by vessel types in 2018, 2019, and 2020. Private vessels are responsible for at least half of vessel incidents.

## Whale Watch Time Log

Straitwatch began recording whale watch viewing times in 2018. This data collection allows Straitwatch to monitor compliance of the whale watch industry with the Be Whale Wise guidelines, which recommends limiting viewing times to 30 minutes or less.<sup>1</sup> It also allows Straitwatch to monitor compliance with the SWWAs which restrict commercial vessels following SRKWs.

In all three years, the overall average viewing time for SRKWs was higher than the recommended 30-minute limit. 2018 was the highest at an average of 55 minutes. Average viewing times decreased in 2019 and again in 2020. Each year, the longest average vessel viewing times were recorded in the month of September, despite the fact that September did not always account for the most encounters with SRKWs.

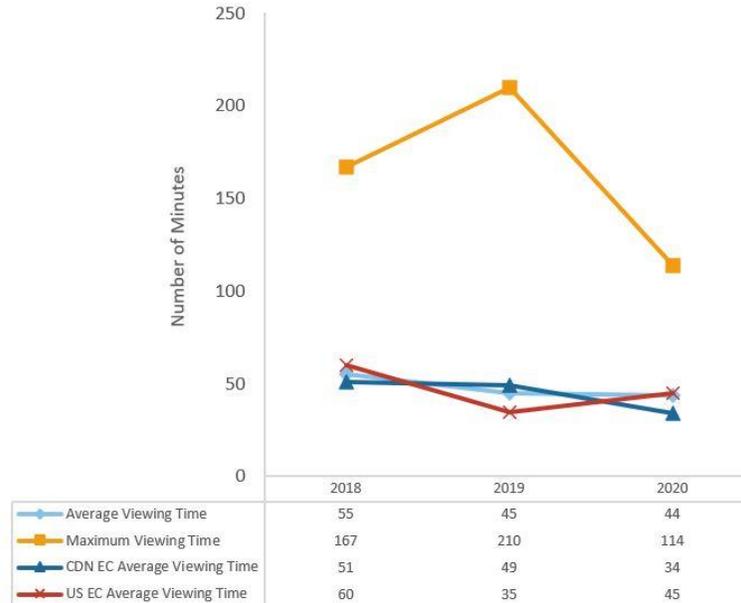


Figure 16. Overall average and maximum whale watch viewing times for the year 2018, 2019, and 2020. Canadian and American average viewing times are separated and indicated by colour.

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<sup>1</sup> Time restrictions for commercial whale watchers are separately endorsed by the Pacific Whale Watching Association (PWWA). Internal guidelines call for vessels to limit viewing to a maximum of 60 min, or 30 min in the vicinity of whales on days when there are more than 9 PWWA vessels within 1 km of that particular group of whales (PWWA 2019).

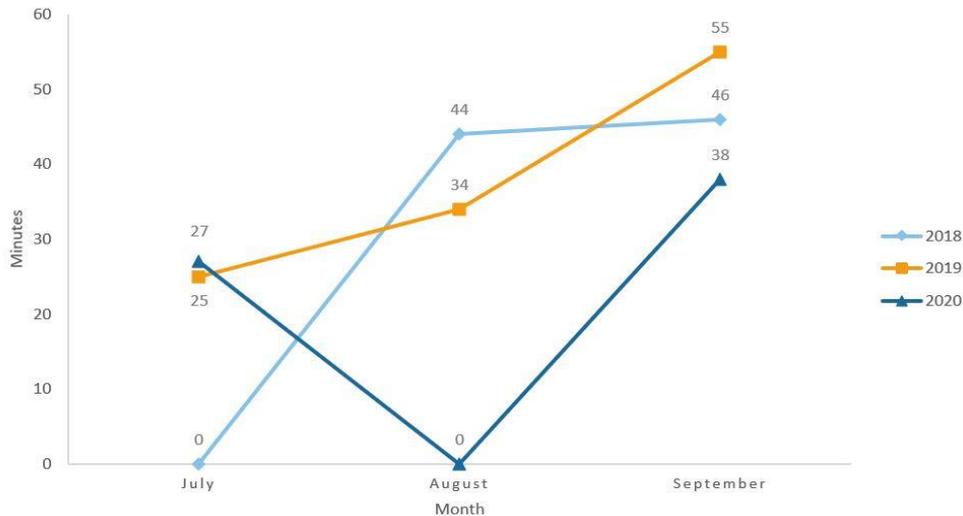


Figure 17. Average time commercial whale watch companies spent viewing SRKWs by month and year. For the months with a 0 average, time logs were not recorded (July 2018) or no encounters with SRKWs occurred (August 2020).

### Use of AIS

Shipping Act regulations in 2020 required most commercial whale watch and ecotour vessels to operate AIS (exceptions apply to vessels less than 8 metres with fewer than 12 passengers). In Straitwatch’s 2020 observations, commercial whale watch and ecotour vessels’ AIS was observed to be off 50% of the time when viewing cetaceans. Operation of AIS was not specific to species being observed and was more specific to company. AIS was recorded off 163 times during the June–Sept 2020 season across 23 companies.

### Enforcement presence

#### US enforcement in US waters

The presence of enforcement vessels from Washington Department of Fish and Wildlife (WDFW) and National Oceanic and Atmospheric Administration (NOAA) on-scene with SRKWs in US waters has been consistent over the three years. NOAA enforcement vessels were recorded in an average of 6% of vessel scans over the past three years. Their highest year was 2019, when they were present in 13% of SRKW scans. WDFW was the most common enforcement vessel in US waters, being present in 19% of the scans with SRKWs. In 2019, WDFW was present in 25% of vessel scans in US waters.

#### Canadian enforcement in Canadian waters

Canadian fisheries enforcement has been present in less than 1% of scans over the last three years. In 2018 and 2020, DFO enforcement was not present with SRKW in any of the scans recorded by Straitwatch. In 2019, DFO enforcement was present in 2% of the scans. Overall, there has not been an increase in enforcement presence recorded in SRKW scans from 2018 to 2020.

## Conclusion

Over the three-year period from 2018 to 2020, SRKW encounters in the Salish Sea have not followed any consistent pattern. Longer-term observations of SRKW presence in these waters indicate they are less predictable in their summer feeding patterns than they were historically, potentially reflecting the dynamics of Chinook salmon populations and potentially other factors, including the loss of a J pod matriarch (J2/Grannie) in 2017.

2018 to 2020 was a period of increasing management of vessel behavior around SRKWs. Straitwatch recorded significant declines in vessel numbers within 400 metres of SRKWs in 2019 and 2020. The number of private motorized vessels viewing SRKWs within 400m dropped 71% and the number of Canadian commercial vessels (whale watch/ecotour) dropped by more than 90% relative to 2018. Straitwatch also documented a decline in the number of commercial and private vessels within 1000m of SRKWs in 2019 and 2020. Between 2018 and 2020, private vessels around SRKWs (1000m) declined by 46% and commercial vessels declined by more than 90%.

While these trends may appear encouraging, it is important to factor in the travel and holiday bans in place through much of the 2020 season including a prohibition against any commercial whale watch/ecotour vessels operating for much of the summer. Additionally, incidents of non-compliance with both voluntary and mandatory measures persisted through 2020. Table 1 shows there were more than 90 incidents of viewing SRKW within 400m (private and commercial vessels), 30 of which were within 100m; moreover, 30 of these incidents were for longer than 30 minutes. While the SWWAs ostensibly committed Canadian whale watch/ecotour companies to not follow SRKWs, Straitwatch observed 180 incidents of Canadian commercial whale watch/ecotour companies viewing SRKWs for more than 30 minutes on 12 different days in both US and Canadian waters. This included 72 incidents of viewing for more than 1 hour. Canadian whale watch companies were also crossing into US waters in order to view SRKWs (18 observations in 2020).

Straitwatch also observed 131 recreational fishing vessels not compliant with the voluntary “bubble” to stop fishing within 1 km of SRKWs. 13 of these continued fishing despite being asked by Straitwatch to raise their fishing lines as recommended.

Lastly, Canadian enforcement around SRKWs is far below the level of US enforcement. Washington State department of Fish & Wildlife were present with SRKWS in US waters about 20% of the time. Canadian enforcement vessels have been present on average 2% of the time with no notable increase in presence with SRKWs.

The data that Straitwatch has collected between 2018 and 2020 offers an overview of vessel compliance/non-compliance with the guidelines, regulations, orders, and agreements that govern commercial whale watching and private vessel activity in the vicinity of marine mammals. It is necessary for Straitwatch to continue collecting data on compliance and activity of vessels as part of the larger efforts to not only determine the role federal management plays in threat reduction and recovery efforts for SRKWs but also in their long-term sustainability as a species.

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## APPENDIX A – SRKW INCIDENT TABLES FOR 2018, 2019, AND 2020

Highlighted incident codes represent incidents codes that were added in the 2020 field season. These incident codes were not used in 2018 and 2019. A few incidents were put into these categories for 2018 when the data was re-entered into the database.

*Table A1 List of vessel incidents by incident category and vessel type for 2018. Vessel codes are: Ecotour Canadian (EC); Ecotour US (EU); Ecotour Kayak (EK); Private Motor (PM); Private Sail (PS); Private Kayak (PK); Marine Ferry (MY); Marine Commercial Fishing (MF); Marine Charter (MC); Marine Cargo (MX); Marine Tug with Log Tow (ML); Government NOAA (GN); Government WDFW (GW); Government Aircraft (GA); Marine Monitoring (MM); Research (RS).*

2018	EC	EU	EK	PM	PS	PK	MY	MF	MC	MX	ML	GN	GW	GA	MM	RS
vessel within 400m for longer than 30min.																
non-compliant approach	5	2														
Other: DEFINE																
No Incidents in Scan																
speed > 7knts w/in 400m	7	2	14				3	2		1	2	3				
vessel in path of whales (100-400m ahead of whale)	8	3		8	2			1				1				
vessel inshore of whales	6	12	2	45	2	1	1						2			1
vessel within 100m - approaching whales																
vessel within 100m - stopped	9			9											1	1
vessel within 100m - under power	7	1		7	1		1					1				2
vessel within 200 meters of whales	2	2		7									1		1	2
Fishing w/in 1km of KW				11												
Fishing w/in 1km of KW-trying to pull up lines				1												
Leap frogging	1															
AV watching SRKW																
non-compliant approach - head on																
non-compliant approach from behind	2		1	2												1
Parked in Path 3.1 and 5.1																
Speed > 7knt w/in 1km								1								
Vessel w/in 400m of KW																
speed > 7knts w/in 400m (coming on scene)	2			1												
speed > 7knts w/in 400m (departing scene)				4												
vessel crossed the path of whales				2						2						
vessel in path & failure to move	2			3												
vessel in path but adjusting to move out of path																
vessel within 100m of whales	1			3												
vessel within 100m - fishing																
aircraft - low flying																
area restriction - Lime Kiln	1			1												1

*Table A2 List of vessel incidents by incident category and vessel type for 2018. Vessel codes are: Ecotour Canadian (EC); Ecotour US (EU); Ecotour Kayak (EK); Private Motor (PM); Private Sail (PS); Marine Ferry (MY); Marine Commercial Fishing (MF); Marine Charter (MC); Marine Cargo (MX); Marine Tug with Log Tow (ML); Government NOAA (GN); Government WDFW (GW); Government Aircraft (GA); Marine Monitoring (MM); Research (RS).*

2019	EC	EU	EK	PM	PS	MY	MF	MC	MX	ML	GN	GW	GA	MM	RS
Vessel within 400m for longer than 30min.	1	4						1							
Non-compliant approach				1											
Other: DEFINE				4											
No Incidents in Scan															
Speed > 7knts w/in 400m				1											
Vessel in path of whales (100-400m ahead of whale)				1											
Vessel inshore of whales			1	2											
Vessel within 100m - approaching whales				1											
Vessel within 100m - stopped				5											
Vessel within 100m - under power				2											
Vessel within 200 meters of whales				1											
Fishing w/in 1km of KW															
Fishing w/in 1km of KW-trying to pull up lines															
Leap frogging															
AV watching SRKW															
Non-compliant approach - head on															
Non-compliant approach from behind															
Parked in Path 3.1 and 5.1															
Speed > 7knt w/in 1km															
Vessel w/in 400m of KW															
Speed > 7knts w/in 400m (coming on scene)															
Speed > 7knts w/in 400m (departing scene)															
Vessel crossed the path of whales															
Vessel in path & failure to move															
Vessel in path but adjusting to move out of path															
Vessel within 100m of whales															
Vessel within 100m - fishing															
Aircraft - low flying															
Area restriction - Lime Kiln															

*Table A3 List of vessel incidents by incident category and vessel type for 2018. Vessel codes are: Ecotour Canadian (EC); Ecotour US (EU); Ecotour Kayak (EK); Private Motor (PM); Private Sail (PS); Private Kayak (PK); Marine Ferry (MY); Marine Commercial Fishing (MF); Marine Charter (MC); Marine Cargo (MX); Marine Tug with Log Tow (ML); Government NOAA (GN); Government WDFW (GW); Government Aircraft (GA); Marine Monitoring (MM); Research (RS).*

2020	EC	EU	EK	PM	PS	MY	MF	MC	MX	ML	GN	GW	GA	MM	RS
Vessel within 400m for longer than 30min.	4	24		1	1										
Non-compliant approach															
Other: DEFINE															
No Incidents in Scan															
Speed > 7knts w/in 400m					10										
Vessel in path of whales (100-400m ahead of whale)	1				1										
Vessel inshore of whales	1	2			6										
Vessel within 100m - approaching whales					2										
Vessel within 100m - stopped					4									1	
Vessel within 100m - under power					9	1									
Vessel within 200 meters of whales		7			8										
Fishing w/in 1km of KW					14										
Fishing w/in 1km of KW-trying to pull up lines					1										
Leap frogging					1										
AV watching SRKW	9														
Non-compliant approach - head on					1										
Non-compliant approach from behind	1	1			2										
Parked in Path 3.1 and 5.1					3										
Speed > 7knt w/in 1km		1			18										
Vessel w/in 400m of KW	1	4			21	2								3	
Speed > 7knts w/in 400m (coming on scene)					2										
Speed > 7knts w/in 400m (departing scene)					2										
Vessel crossed the path of whales	1				4										
Vessel in path & failure to move					3	1									
Vessel in path but adjusting to move out of path					1										
Vessel within 100m of whales	1	1			8									2	
Vessel within 100m - fishing					3										
Aircraft - low flying														1	
Area restriction - Lime Kiln															

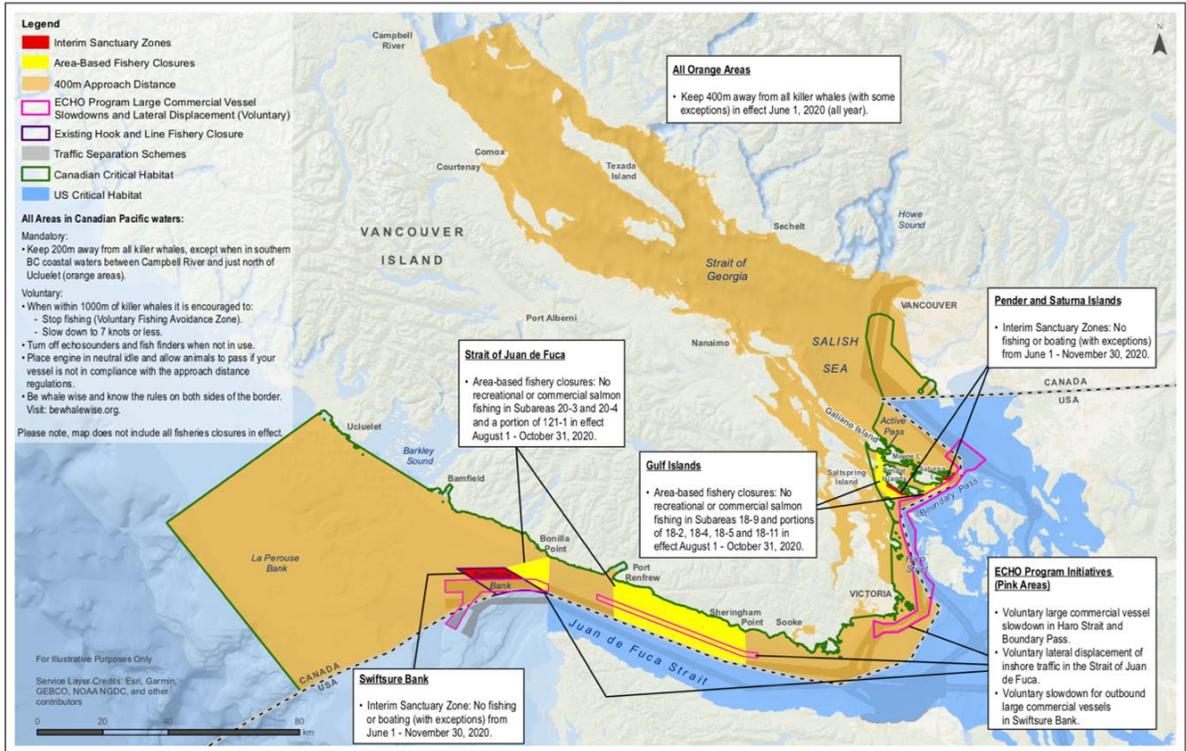
## APPENDIX B – WHALE WATCH ECOTOUR COMPANIES VIEWING SRKWS

*Table B1. List of whale watch companies actively recorded viewing SRKWs during the years 2018, 2019, and 2020.*

2018	2019	2020
BC Whale Watching	All Aboard Sailing	Adventure by hype
Clipper Navigation	BC Whale Watching	All Aboard Sailing
Deer Harbour Charters	Clipper Navigation	Deer Harbour Charters
Eagle Wing	Decpetion Pass Tours	Eagle Wing
Emerald Sea Adventures	Deer Harbour Charters	Five Star
Five Star	Eagle Wing	Island Adventures Whale watching
Island Adventures Whale Watching	Island Adventures Whale Watching	Maya's Legacy Whale Watching
Maya's Legacy Whale Watching	Maya's Legacy Whale Watching	Ocean Ecoventures
Mystic Sea Charters		
Ocean Ecoventure	Ocean Ecoventure	Orca Spirit Adventures
Orca Spirit Adventures	Orca Spirit Adventures	Outer Island Excursions
Outer Island Excursion	Outer Island Excursion	Prince of Whales
Prince of Whales	Puget Sound Express	Puget Sound Express
Puget Sound Express	San Juan Cruises	Salt Spring Adventures
Salt Spring Adventures	San Juan Excursions Whale & Wildlife Tours	San Juan Cruises
San Juan Cruises	San Juan Outfitters	San Juan Excursions Whale & Wildlife Tours
San Juan Excursions Whale & Wildlife Tours	San Juan Safaris	San Juan Outfitters
San Juan Safaris	Sea King Adventures Inc	San Juan Safari
Sea King Adventures Inc	Sidney Whale Watching	Sidney Whale Watching
Sidney Whale Watching	Spirit of Orca Whale Watching & Wildlife	Spirit of Orca Whale Watching & Wildlife
Sooke Whale Watching	Springtide Whale Watching and Eco Tours	Springtide Whale Watching and Eco Tours
Spirit of Orca Whale Watching & Wildlife	Vancouver Whale Watching	Western Adventures Whale Watching
Springtide Whale Watching and Eco Tours	Western Adventures Whale Watching	White Rock Sea Tours
Stevenson Seabreeze Adventures		
Vancouver Whale Watching		
Western Adventures Whale Watching		

The number of whale watch companies engaged in viewing SRKWs decreased from 26 in 2018 to 22 in 2019 and 2020, representing a 15% reduction in commercial whale watch/ecotour companies viewing SRKWs. However, individual companies may have increased their fleet size in this period.

# APPENDIX C – FEDERAL MANAGEMENT MEASURES 2020



Overview of 2020 management measures to protect Southern Resident Killer Whales

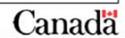


Figure C1 The critical habitat of SRKWs (gold) and 2020 federal management measures including Interim Sanctuary Zones (red), Area-based Fishing Closures (yellow), and large commercial vessel slowdown zones under the ECHO Program.

## APPENDIX D -EXAMINATION OF FEDERAL MEASURES

To determine if this reduction of vessel activity around SRKW is due to the Interim Order and other federal measures put in place in 2019 and 2020, comparing SRKW vessel numbers to that of other species and ecotypes may provide insight.

*Table E1. Average number and maximum number of vessels recorded within 1000m when on-scene with Transient Killer Whales, Southern Resident Killer Whales and Humpback Whales.*

Year	Average Number			Year	Maximum Number		
	SRKW	T	HB		SRKW	T	HB
2018	13.96	10.69	6.47	2018	86	43	46
2019	7.217	8.67	4.26	2019	26	44	21
2020	5.81	6.6	3.05	2020	30	37	10

Table D1 shows the average and maximum number of vessels around SRKWs, Transient Killer Whales, and Humpback Whales declined from 2018, with 2020 being the lowest vessel presence recorded around whales (Covid-19 being a potential factor). From the results in Table 1 all three species and ecotypes of whales experienced a reduction in average and maximum number of vessels recorded on-scene (i.e. within 1 km); SRKWs, however, experienced the greatest reduction in vessel traffic since 2018.

In 2019, the average number of vessels recorded around SRKWs was 48% lower than the average in 2018. In 2020, the average dropped to 58% of that in 2018. Transient Killer Whales and Humpback Whales both had a slight decrease in average vessel traffic in 2019 and again in 2020. This indicates that vessel traffic recorded around all whales has been decreasing, although the reduction in vessel traffic was the greatest around SRKWs. The reduction in vessel traffic in 2020 may be partially attributed to a general reduction in vessel traffic due to COVID-19 rather than a reduction in vessel traffic due to changes in regulations.

In 2019, there were fewer SRKW monitoring days, with a total of only 101 scans, resulting in a smaller sample size. The 2019 data for Humpback Whales and Transient Killer Whales had a greater number of scans, with 426 and 505 scans respectively.

## APPENDIX E –BEHAVIORS RECORDED FOR SRKWS, TRANSIENTS & HUMPBACKS

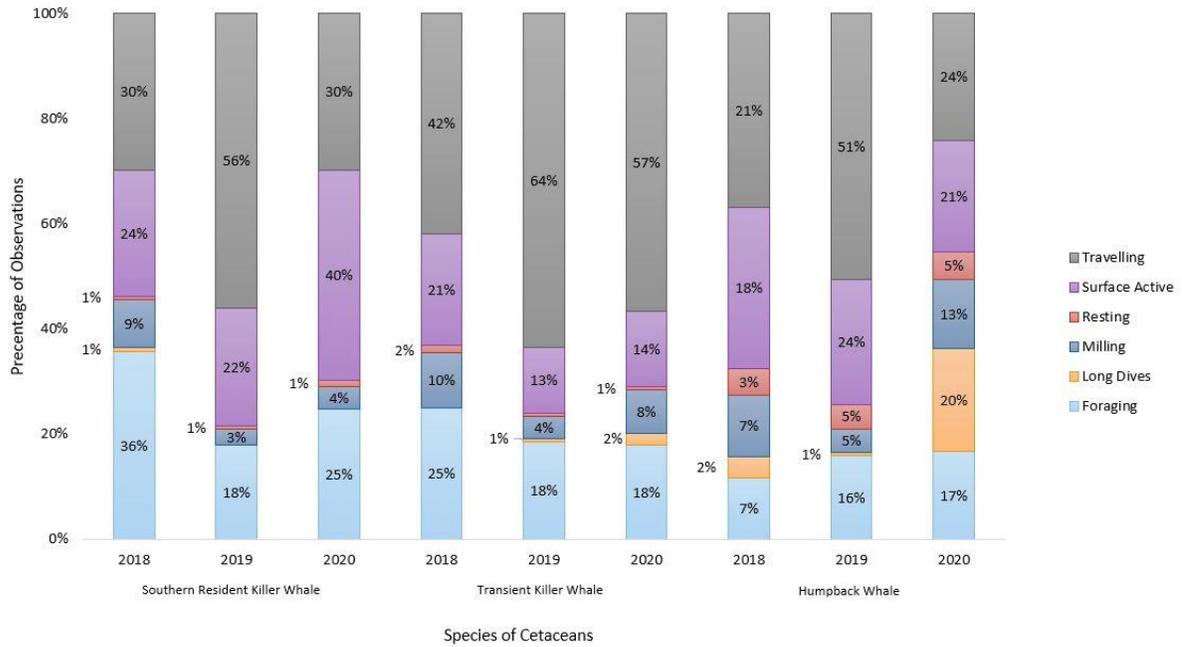


Figure E1. Comparison of three-year distribution of behaviours recorded for SRKWs, Transients, and Humpbacks. The trend over three years shows SRKWs to be more surface active than Transients. Humpbacks in this graph have high surface activity according to the data collected by Straitwatch's Quadra-based team. In the waters around Campbell River, Humpbacks are very frequently observed breaching, pec slapping, and being visibly surface active. Whale watchers in the Quadra area primarily focus on Humpback Whales due to the frequency of encounters and high levels of surface activity. However, in the south, where there is considerably more vessel traffic, Humpback Whales are very rarely surface active and are most frequently observed foraging. Of the three species/ecotypes, SRKWs are by far the most surface active.

## APPENDIX F – INCIDENT REPORTING

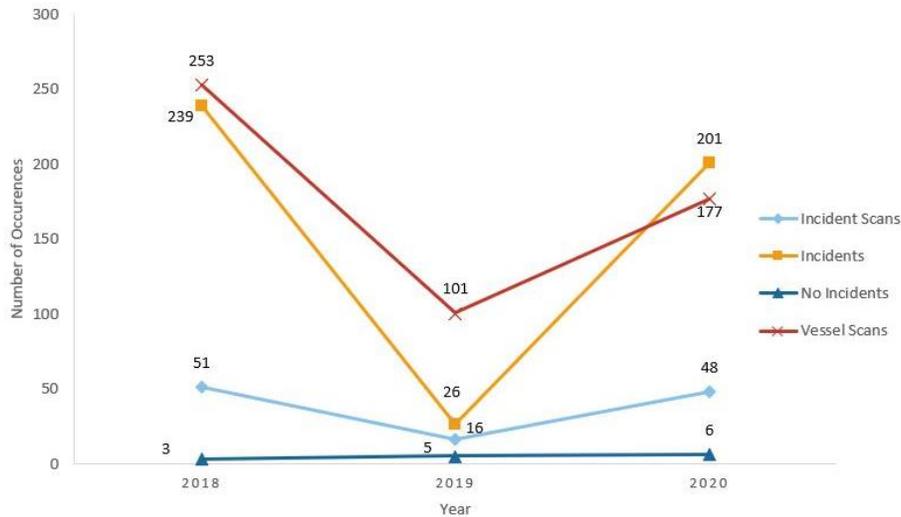


Figure F1. Number of incidents, incident scans, and incident scans without incidents recorded in the years 2018, 2019, and 2020.

### COMPARING SPECIES & ECOTYPES

Table F1. Comparison of vessel- whale Incident Rates between Southern Resident Killer Whales, Transient Killer Whales, and Humpback Whales.

Year	Scans	Incidents	Incident Rate (per hour)
SRKW	115	463	12.08
Transient	243	664	8.2
Humpback	125	134	3.22

Table F1 shows that SRKW experience 32% more incidents than Transient Killer Whales and 73% more incidents than Humpback Whales. It is important, however, to note that vessels must stay 400m away from Killer Whales whereas the distance for Humpback Whales and other marine mammals is 100m.

Table F2. Incident Rate per hour for Humpback Whales and Transient Killer Whales from 2018 to 2019.

Humpback Whale				Transient Killer Whale			
Year	Scans	Incidents	Incident Rate (per hour)	Year	Scans	Incidents	Incident Rate (per hour)
2018	15	32	6.4	2018	51	132	7.76
2019	95	91	2.87	2019	121	268	6.64
2020	15	11	2.2	2020	71	264	11.15

Table F3 shows a decrease in incidents around Humpback Whales with an overall drop of 66% between 2018 and 2020. The Transient Killer Whale data indicates an increase of 30% in incidents between 2018 and 2020. This may be attributed to increased traffic around Transient Killer Whales due to vessels avoiding SRKWs as well as the addition of new incident codes in the 2020 field season to reflect the IOs.

When incidents falling under the new categories were removed, the incident rate for 2020 was 7.5 incidents/hour (Appendix A). This indicates an overall decrease in incidents around SRKWs since the introduction of the IOs; however, COVID-19 influenced the presence of vessel traffic and the level of vessel activity in 2020 and the low SRKW presence influenced incident numbers in 2019.

*Table F3. Average viewing times for SRKWs, Transient Killer Whales, and Humpback Whales for the years 2018, 2019, and 2020.*

Year	SRKW	T	HB
2018	55	31	35
2019	45	34	32
2020	44	41	27

Comparing SRKW viewing averages to Transient Killer Whales and Humpback Whales, Transients had an increase in whale watch viewing times over the three years, which may be due to increased whale watch focus on Transients now that viewing SRKWs is restricted. The average viewing time for Humpback Whales decreased over the three years.

APPENDIX G – VOLUNTARY NO-GO ZONE SAN JUAN ISLAND

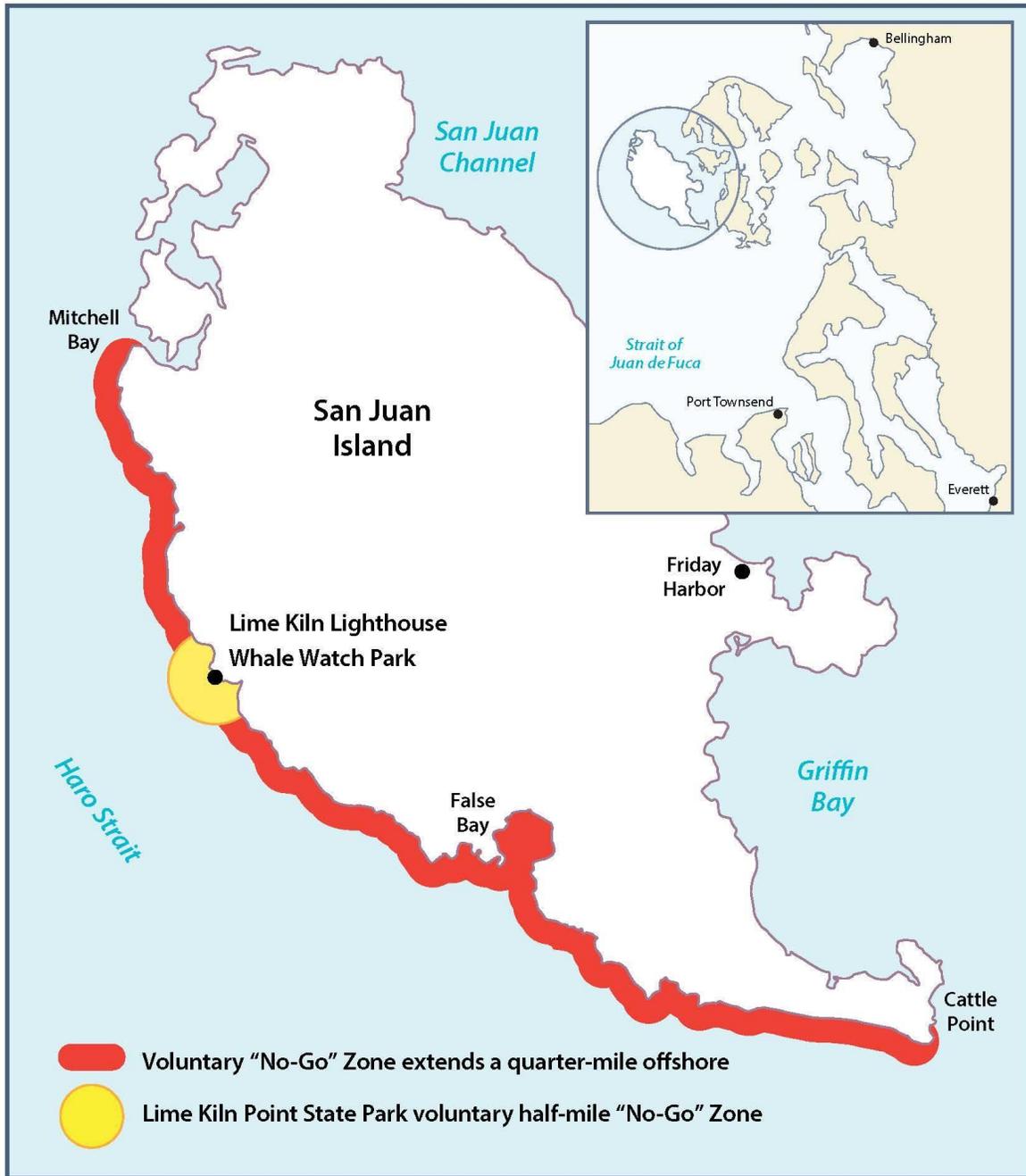


Figure G1. Map of voluntary no-go zone (red) protecting SRKW habitat off the west side of San Juan Island. Lime Kiln voluntary half-mile no-go zone is indicated in yellow.