



# The Whale Warning Flag

Introducing a social prompt to improve boater behavior around the endangered Southern Resident killer whales.

Whale Warning Flag:

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*Interim Report for the Marine Mammal Commission*

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## Summary

Species around the world are at risk as a result of human behaviors. The critically endangered Southern Resident killer whale presents an ideal case study with which to introduce and test innovative social marketing methods to address impacts from human behaviors that continue to limit the populations' ability to recover. An icon of the Pacific Northwest, the population garnered global attention in 2018 as the world watched a whale carry her dead calf over 1000 miles in apparent mourning. The San Juan Islands are the epicenter of the whales' summer core critical habitat, thus the island-based community has grown increasingly concerned about the health and well-being of these whales and the role that humans play in ensuring their survival. Lack of prey, heavy contaminate loads and disturbance from vessel noise and presence have been identified as the three core threats to the survival of the population. While decreasing prey availability and contaminants both entail complex webs of international, tribal, federal and state management issues reaching back more than a century, the human impacts related to vessel disturbance can be more readily addressed at a local level.

The San Juan Islands are a premier destination for whale watching and recreational boating, thus when the whales are present they are in acoustic range of boats virtually all the time. Despite significant transboundary effort to educate boaters, vessel disturbance remains one of the core threats, thus, San Juan County is in a unique position to lead the way in encouraging behavior modification to help reduce the impact of vessel presence. Our program set out to utilize community-based innovative social marketing approaches in the form of a social prompt to address boater behavior around the endangered SRKW. In 2018 we introduced a whale warning flag as a prompt to alert boaters to the presence of whales with the goal of influencing boater's behavior and attitudes around whales. The flag concept was adopted from British Columbia, however, this is the first study to evaluate whether such a tool is effective at addressing human behaviors that contribute to the struggle of this endangered species. Flags were distributed to vessel operators and a dedicated outreach campaign was initiated to amplify the flags' use. In 2018, 237 flags were distributed between late June and October.

Data were collected through a combination of dedicated vessel counts in collaboration with the Soundwatch Boater Education Program and public surveys. Despite Soundwatch being on the water 67 days (34 of which were with Southern Resident killer whales) they only recorded 9 vessels with the Whale Warning Flag displayed over their whole monitoring period. Due to this low sample size, analysis of the data was inconclusive on the effect of the Whale warning Flag. Surveys were distributed during June (pre-season) and October (post-season) 2018. One hundred and twenty-six usable pre-season surveys were completed and 84 post-season surveys were completed. While >80% of survey respondents reported being aware of and able to follow the vessel regulations only half were able to provide correct distance requirements. Visitors were least likely to know the regulations which supports anecdotal observations reported by enforcement officers. Of the boat operators who received a flag during 2018, 67% reported encountering whales, of these 83% used their flag. Creating new social norms that address human behaviors must be added to our conservation toolboxes if we are to see success in our bid to recover at risk species.

This report provides a summary of year one of our two year pilot project and outlines the lessons learned and how the project is being expanded in the second year of the pilot study.

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## Introduction

The summer core critical habitat of the endangered Southern Resident killer whale (SRKW) is located in the heart of the Salish Sea within the San Juan Islands, Washington State. The island-based community has grown increasingly concerned about the health and well-being of the endangered SRKW and the role we all play in ensuring their survival. Lack of prey, persistent toxic chemicals, and disturbance from anthropogenic noise and vessel presence have been identified as the key threats to this population (Krahn, et al., 2004). While lack of prey and contaminants both entail complex webs of international, Tribal, Federal and State management issues reaching back more than a century, the human impacts related to vessel traffic and noise can be more readily addressed at a local level. During the spring, summer and fall there are vessels within acoustic range of these SRKWs virtually all the time (Shedd, et al., 2019) inhibiting important behaviors necessary for survival such foraging (Noren, et al. 2009, Lusseau, et al. 2009, Williams, Lusseau and Hammond 2006) and hindering the whales' ability to navigate, detect increasingly scarce prey, and communicate (Ferrea, et al., 2017).

NOAA has identified the need to do more to provide greater protection for SRKW from impacts related to vessels, including acoustical and physical impacts (Ferrea, et al., 2017). Southern Resident killer whales must navigate both physical and acoustic barriers resulting from the diverse and expansive vessel activity in their core habitat while in search of increasingly scarce Chinook salmon (listed as threatened under the ESA) around the San Juan Islands. Ocean going commercial and passenger vessel traffic in the Salish Sea averaged 4,698 transits during 2015-2018 (Ecology, 2019) and is expected to further increase with the recently approved Canadian Trans Mountain Pipeline project and the expanded Roberts Bank Terminal by the Fraser Port Authority. In addition to commercial shipping traffic and regular ferry traffic the San Juans attract recreational boaters from all over the region, including from British Columbia, and the diverse marine life (including six commonly encountered cetacean species – SRKW, Transient mammal-eating killer whales, humpback, gray, and minke whales, and harbor porpoise) has resulted in the region becoming known as a premier destination for whale watching with an estimated 500,000 people going whale watching on commercial and/or private recreational vessels in the transboundary waters annually (Seely, et al., 2017).

In 2018 there were 106 active eco-tour vessels operating in the US and Canadian Haro Strait region (Shedd, et al., 2019). This was the second highest number of active vessels since a peak in 2016 (Shedd, et al., 2019). In addition to commercial whale watching outfits many recreational boaters engage in whale watching. Of the recreational vessels contacted by Soundwatch in 2018 41% reported their primary activity to be whale watching (Shedd, et al., 2019), and almost half of the vessels contacted by Soundwatch were unaware of the Be Whale Wise guidelines. According to Washington Department of Fish and Wildlife Enforcement Division, while local boaters are generally aware of SRKW, visiting boaters often are not, and thus are more likely to violate the rules (R. Mullins, *Pers. Comm.*, though it is important to note that local boaters also violate the regulations but often for other reasons). The most effective prompt for boaters to comply with the vessel regulations has been the physical presence of enforcement vessels (Seely, et al., 2017). However, because enforcements' ability to be with the whales is limited in time and space, it is up to the community to find additional measures to change boater behavior around the SRKW.

The San Juan County Marine Resources Committee (MRC) was interested in employing community-based social marketing methods to explore how additional social cues or prompts (McKenzie-Mohr & Smith, 1999), peer pressure to conform, and/or knowledge of potential surveillance might alter boater behavior while in the presence of whales around the San Juan Islands. With recreational boaters, whale watchers, and fisherman visiting the area from throughout Puget Sound and Canada from early spring to late fall, the San Juan MRC is in a unique position to lead the way in encouraging behavior modification to help reduce the impact of vessel presence on the whales. This program set out to utilize innovative social based

marketing approaches as a means to influence boater behavior (McKenzie-Mohr & Smith, 1999). The MRC introduced a social prompt in the form of a Whale Warning Flag to alert boaters to the presence of whales in San Juan County. The flag concept was first introduced in British Columbia (BC) around Northern Vancouver Island by the North Island Marine Mammal Association, however the effectiveness of this type of social prompt has yet to be assessed. Visual prompts of this sort have long been identified as an effective tool with which to remind people to engage in a more sustainable behavior as they remind us to carry out an activity that we might otherwise forget (McKenzie-Mohr & Smith, 1999), in this case reminding us to slow down and be on the lookout for whales.

Through the introduction of the flag to San Juan County, this program set out to determine whether the use of the Whale Warning Flag will improve boater awareness, compliance, and safety in waters frequented by the SRKW, and thus encourage the formation of long lasting new social norms for vessel operators who frequent SRKW core habitat areas in the San Juan Islands and beyond.

## Methods

The Whale Warning Flag program is a two year pilot project and has been implemented following three key steps. These steps are comprised of 1) introducing the Whale Warning Flag, 2) introducing an associated education and outreach campaign, and 3) completing an assessment of the effectiveness of the flag to raise compliance and increase awareness of the Be Whale Wise vessel regulations and guidelines for best boating practices around whales.

### Activity 1: Whale Warning Flag distribution

Whale Warning Flags were widely distributed throughout San Juan County beginning in June 2018. Some flags were also distributed in neighboring counties and to those in Southern British Columbia who requested them. Flags were provided to the commercial whale watch fleet, enforcement and research vessels, and those recreational boaters that agreed to become a whale steward, or social leader. Flags were distributed during dockside outreach efforts in Friday Harbor, from San Juan County Public Works department, through direct contact of whale watch operators, county staff, BC and WA enforcement agencies and opportunistically through meetings, yacht clubs and individual connections. Starting in 2019 two sizes of flags were made available with the first role out at the Seattle Boat Show (January 25 – February 2, 2019). In addition to vessel-based flags, several land-based locations along the west side of San Juan Island were identified to display a large flag to alert boaters from shore. These sites included San Juan County Park, Lime Kiln Point State Park and Eagle Cove.

The Whale Warning Flag is designed like the standardized diver down flag (Figure 1). Users were asked to fly the flag when whales were detected within 1 km of their boat or land station, and then take the flag down once the whales (or the boat) leaves the area. As flag bearers, the boat operators were also asked to ensure that they slowed to 7 knots or less, ensured that they followed the Be Whale Wise guidelines (which include the federal and state regulations on distance requirements) and turned off their fish finders and depth sounders if it was safe to do so. These actions describe the individual protections and social prompts designed to promote hazard awareness and compliance with speed reduction by boaters who may not have realized the whales were in the area.



*Figure 1. The Whale Warning Flag design adopted from British Columbia. Photo by the Marine Education and Research Society.*

## Activity 2: Education and outreach campaign

For the flags to be successful it is necessary to ensure that others know what the flags mean. Thus, we created a communication and outreach campaign to help raise awareness of the flag, its proper use, and what boaters should do in response to seeing the flag when they are on the water.

An instructional flyer, or insert was created for distribution with the standard Be Whale Wise leaflet (Figure 2). These flyers were included with every flag given out and were distributed with all Be Whale Wise leaflets. The flyers were provided to the enforcement and boater education programs that hand off the information while contacting boats on the waters. They were also provided (along with Be Whale Wise leaflets) to local US Customs and Boarder agents on San Juan Island, to local ports and marinas and whale watch companies. A full list of where the leaflets

were placed or handed out is provided in

**WHALE WARNING FLAG**

Learn about the regulations and guidelines in place to help keep you safe and protect marine life.

**THIS FLAG TELLS YOU (AND LETS YOU TELL OTHERS) THAT WHALES ARE NEARBY**

**WHALE AND SALMON SANCTUARY (VOLUNTARY NO GO ZONE)**

**BE WHALE WISE**

**KNOW THE ZONES**

**San Juan County Marine Stewardship Area**

**KNOW THE ZONE**

**WHALE AND SALMON SANCTUARY (VOLUNTARY NO GO ZONE)**

**BE WHALE WISE**

**KNOW THE ZONES**

Figure 2. Examples of the outreach material produced for the Whale Warning Flag campaign. The front and back sides of the instructional insert are shown on the left and the dockside signage is shown on the right.



Figure 3. Example of the dockside signage located at the Port of Friday Harbor.

Table 1.

In addition to the instructional flyer posters and dockside signage (A-frames) were produced (Figure 2 & Figure 3). The dockside signage was displayed at the main ports and marinas around San Juan County, including the Port of Friday Harbor (San Juan Island), Fisherman’s Bay Marina (Lopez Island), and Deer Harbor Marina (Orcas Island). These signs were displayed from late July through to September 30<sup>th</sup>, 2018.

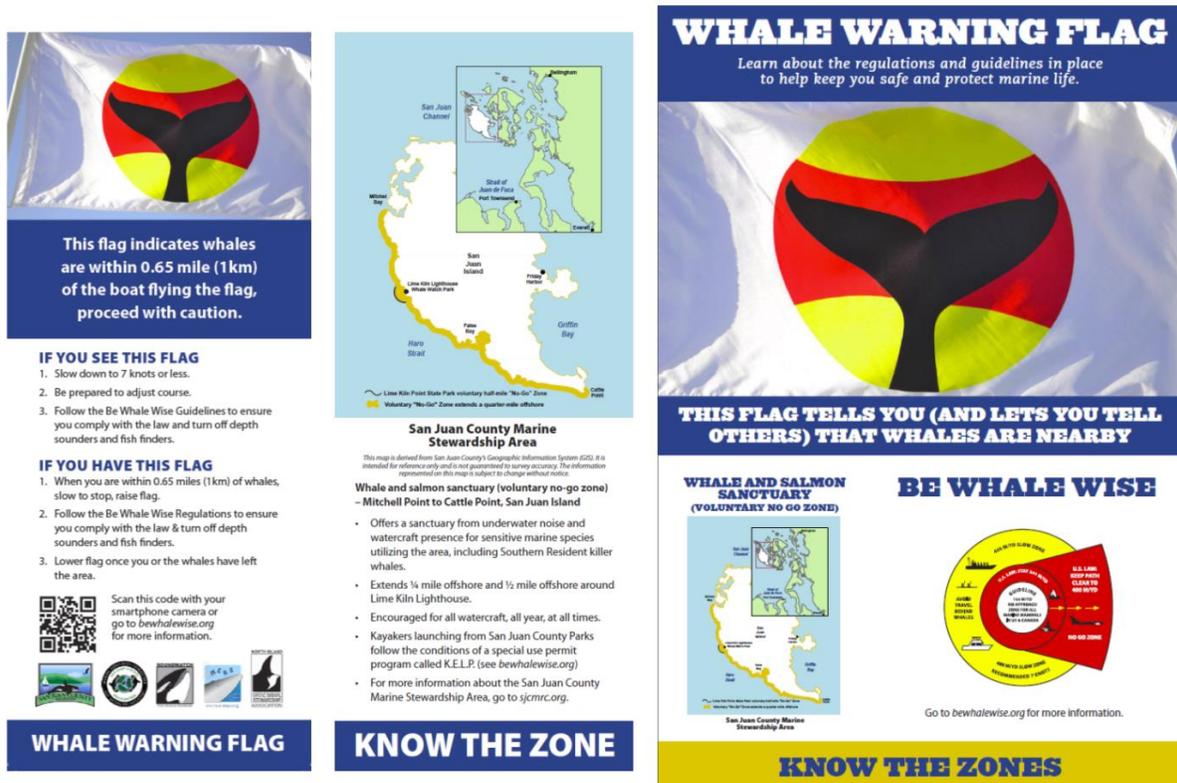


Figure 2. Examples of the outreach material produced for the Whale Warning Flag campaign. The front and back sides of the instructional insert are shown on the left and the dockside signage is shown on the right.



Figure 3. Example of the dockside signage located at the Port of Friday Harbor.

Table 1. Number of Whale Warning Flag and Be Whale Wise leaflets distributed by San Juan County MRC and County Environmental Resources staff in 2018.

<i>Location/Distributor</i>	<i>Number distributed</i>
<i>Whatcom Marine Resources Committee</i>	600
<i>Skagit Marine Resources Committee</i>	600
<i>Port of Anacortes</i>	2000
<i>Soundwatch / Whale Museum</i>	1000
<i>Washington Fish and Wildlife Enforcement</i>	300
<i>WDFW catch monitoring crew – Port of Friday Harbor</i>	10
<i>Department of Fisheries and Oceans, Canada</i>	100
<i>Port of Friday Harbor</i>	50
<i>Roche Harbor</i>	50
<i>Snug Harbor</i>	25
<i>US Customs</i>	70
<i>County Park</i>	100
<i>Lime Kiln Point State Park</i>	100
<i>Visitors Bureau Friday Harbor</i>	10
<i>County Licensing</i>	50
<i>Ace Hardware</i>	25
<i>Kings Marine</i>	25
<i>Victoria Clipper</i>	28
<i>Individuals*</i>	540
Total	5,683

\*Included those given out with flags, and those taken by individuals for distribution on other islands (e.g. Orcas, Waldron and Lummi Islands) and events (e.g. Port Townsend Wooden Boat Festival).

Dockside outreach efforts, public presentations, and local news publications comprised an additional aspect of the outreach and education campaign. Information on the program was also shared with wider audiences throughout the region, for example with the Governor's Orca Task Force vessel's working group, the communications group, and with representatives of local Coast Salish Tribes. Finally, the whale flag material was added to the Be Whale Wise website and to the Kayak Education and Leadership Program (KELP) training course that all kayak guides and private kayakers and boaters launching from County Parks must take.

### Activity 3: Quantify the effectiveness of the whale warning flag social prompt

To assess the effectiveness of the Whale Warning Flag and boater behavior a combination of vessel based and public survey data were collected.

#### Vessel data

Soundwatch has collected information on boater behavior and compliance levels for 20 years. Despite their data pre-dating the implementation of the Be Whale Wise guidelines, they have established a standardized format of data collection that provide a valuable long-term dataset of boater behavior over time and that also tracks the effects of changes in the guidelines and regulations as well as the introduction of new initiatives such as the Whale Warning Flag. In 2018 the Soundwatch boater education program added a suite of questions into their standard data collection protocol (Shedd, et al., 2019) to capture data on the use of the flag and Be Whale Wise compliance. For a detailed description of Soundwatches' data collection protocol please see Shedd et al. (2019).

The flag related data collected by Soundwatch included:

- How many vessels are flying the flag?
- Type of vessel flying the flag?

During data collection surrounding an instance of non-compliance the following data was collected:

- How many flags were present in the vicinity (within 1 km of the non-compliant vessel and the whales)?
- Was the vessel in non-compliance flying a flag?

#### Survey data

Data on boater knowledge and behavior was collected through public surveys. These surveys were conducted both before and after the main boating season. In total four surveys will be conducted over the course of the two-year pilot study, allowing for the opportunity to collect longitudinal data on boater knowledge and behavior.

During 2018 a pre-season and post-season survey were conducted. The pre-season survey was run through June and July 2018 and the post-season survey was run from mid-September to the end of October. The surveys were distributed online and in person. Participants were recruited during the dockside outreach efforts. Links to the online survey were distributed via social media platforms, the Marine Resources Committee webpage ([www.sjcmrc.org](http://www.sjcmrc.org)) and via email lists. The survey was also emailed to yacht clubs in San Juan County and in neighboring counties with a request to distribute it among members.

## Results

### Activity 1: Whale Warning Flag distribution and participation

The distribution of whale warning flags began in late June 2018. Flags were made available for free to anyone with a boat who was willing to participate in the pilot study as a whale steward. Flags were given to members of the Pacific Whale Watch Association in both Washington and British Columbia, made available at the San Juan County Public Works office and advertised through the Marine Resources Committee website and social media platforms. Over the course of July, August and September approximately 200 flags were distributed with a further 37 given out by the end of 2018. Land-based flags were flown at Lime Kiln Point State Park light house, Land Bank's Westside Preserve, Eagle Point and San Juan County park on the west side of San Juan Island. The land based site at which the flag was most consistently flown was Lime Kiln light house where researchers and naturalists displayed the flag during 26 days from July 12 to October 3<sup>rd</sup> on days that Southern Resident killer whales were present.

### Activity 2: Education and outreach campaign

Dockside outreach efforts were initiated in early June to coincide with Orca Awareness month and the launch of our pre-season survey. Dockside efforts took place at the Port of Friday Harbor on June 16<sup>th</sup>, 23<sup>rd</sup>, 30<sup>th</sup> and July 1<sup>st</sup>, and at Roche Harbor on June 24<sup>th</sup> and August 10<sup>th</sup>. Public presentations highlighting the flag program were given on June 9<sup>th</sup> in Friday Harbor during the annual volunteer training for the San Juan Island Naturalist Program, July 27<sup>th</sup> in Friday Harbor as part of The Whale Museum's Marine Naturalist Training Program, on August 2 for The Whale Museum's summer lecture series, at the Northwest Strait's Initiative 20<sup>th</sup> Annual Marine Resources Committee conference in Port Townsend in November 2018 and at the MRC's SRKW community workshop on December 6<sup>th</sup> 2018.

### Activity 3: Quantify the effectiveness of the whale warning flag social prompt

#### Vessel data

The Soundwatch boater education program assisted with data collection focused on flag use by vessels during the 2018 boating season. Over the course of July, August and early September Soundwatch was with whales on 67 days (Figure 4, Shedd et al. 2019), of these 34 were with SRKW. However, Soundwatch only recorded 9 vessels with the Whale Warning Flag displayed over their whole monitoring period. Just 3.8% of the flags distributed. Due to this low sample size analysis of the data was inconclusive on the effect of the Whale warning Flag.

In addition to the Soundwatch vessel count data a land based survey team operating between July 12 and September 24, 2018 recorded vessels flying the Whale Warning Flag. This survey team was collecting data for the Port of Vancouver's shipping slow down trial (Williams, et al., 2019). Williams et al. (2019) recorded the Whale Warning Flag in 88 scans of 2970 scans, or 3% of the observed vessel traffic within 1000m of Southern Residents.

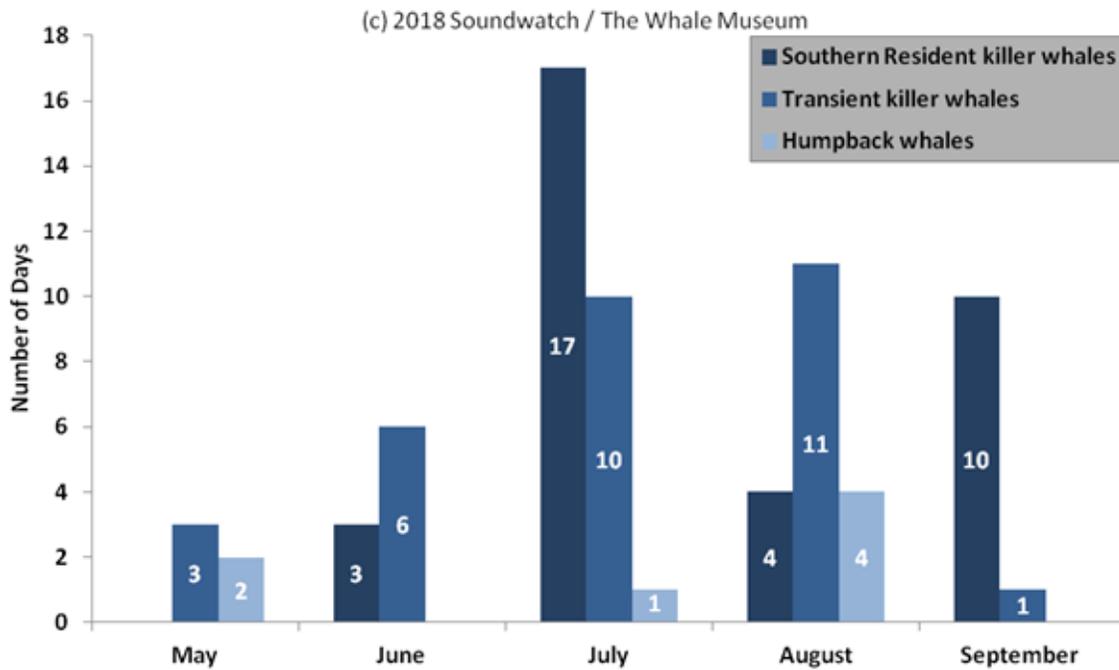


Figure 4. Daily monitoring effort by month and species for Soundwatch in 2018. Figure used with permission from Shedd et al. 2019.

### Survey data

Pre-season and post-season surveys were circulated during 2018. Pre-season survey data were collected from June 8 through July 16, and post-season survey data were collected from October 7 through December 10 2018. In total 127 pre-season and 86 post-season surveys were completed, of 126 pre-season surveys and 84 post-season surveys were useable. The pre- and post-season surveys are included in the appendices (Appendix 1 and Appendix 2).

During both survey periods there were approximately equal responses from local (San Juan County residents) and visitors (non San Juan County residents), with ~10% more locals (55.6%) completed surveys during the summer than visitors (44.4%), but the reverse trend was observed in the fall survey data (44.1% locals and 56% visitors, Figure 5). The majority of non-resident respondents were either from neighboring counties (pre-season = 30.4%, post-season = 40.4%) or from the Seattle/South Puget Sound area (pre-season = 41.1%, post-season = 42.6%). Only 21% (n=18) respondents completed both a pre- and post-season survey.

The majority of respondents reported owning or operating a boat. For those that reported their main boating activities the vast majority of respondents from both the pre-and post-season surveys reported recreation (e.g. visiting other islands) as their main activity (Figure 6), and this trend held true for both local (pre-season = 55.9%, post-season = 62.1%) and visitor (pre-season = 73.6%, post-season = 72.3%) boaters. More visitors reported recreation as their main boating activity than locals.

### Survey respondents' knowledge of whale and boating behavior

Respondents were asked a series of questions to assess their knowledge and awareness of whale and boating behavior. Over 70% of respondents during both the pre- and post-season surveys agreed that groupings of boats on the water could signify that whales were present. Fewer recognized the importance of bird activity as a signal that whales might be present (pre-season = 57.9%, post-season = 58%). But of those that recognized the significance of bird activity and/or groupings of boats 80% of the pre-season

respondents and 91% of the post-season respondents answered that they would adjust their boating to follow the Be Whale Wise guidelines.

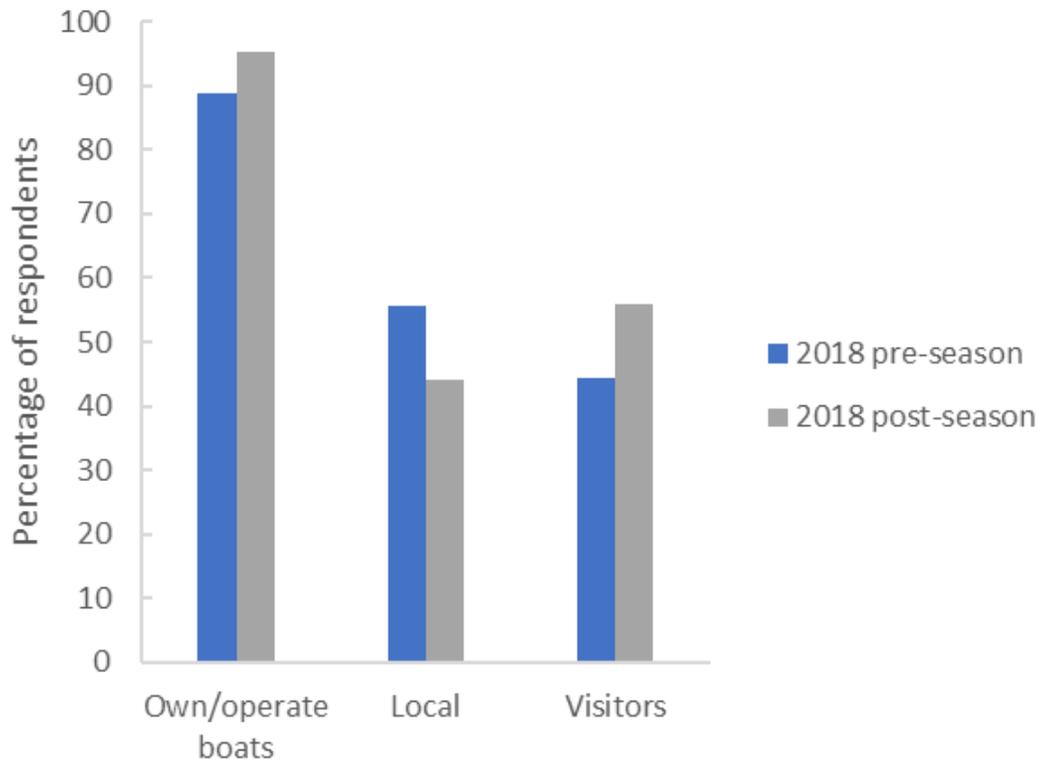


Figure 5. Summary of useable survey respondents to show those that responded that own or operate vessels and those who were either residents of San Juan County (local) or who were not residents (visitors).

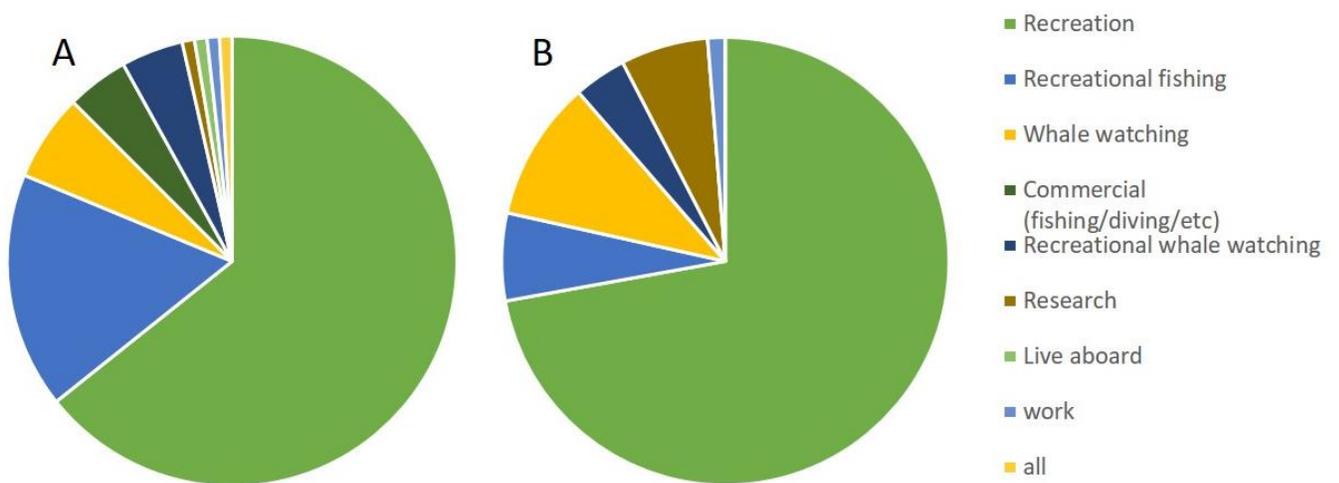


Figure 6. Summary of the main boating activities reported by pre-season respondents (A), and post-season respondents (B).

The majority of respondents from both survey periods also recognized that boat-whale collisions would be dangerous to whales and people, however only ~50% were aware that there have been such collisions in the Northwest Straits in recent times. Overall >90% of the respondents felt a sense of guardianship of whales regardless of whether they were boat owners/operators or not.

For those who identified as boat owners or operators we assessed their overall attitude towards whales. Over 90% indicated that they do enjoy watching whales when out boating and 80% answered yes when asked if they should change their boating behavior when whales were nearby. This response held true across the pre-and post-season data. However, the majority of boat owners and operators indicated that when they are out boating and they find out whales are in the area they continue on rather than seek them out (Figure 7), this trend held for the post-season respondents also. Boat owners and operators did not report that whales got in their way of their task (mode = 5, median = 4, on a scale of 1 = always to 5 = never), but while most also suggested that if whales were around when they were out boating that they would like them to come close and do something spectacular (mode = 1 on a scale of 1 = always to 5 = never), the median response was 3 on the scale of 1 to 5, always to never.

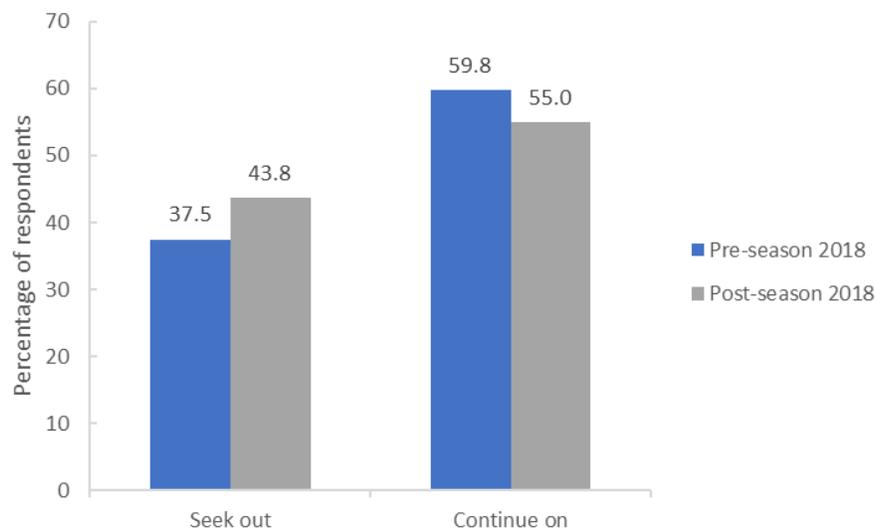


Figure 7. Percentage of pre- and post-season respondents that identified as boat owners or operators that indicated whether they seek whales out or continue on with their primary activity if whales are in the areas.

#### Survey respondents' awareness and knowledge of the Be Whale Wise guidelines

Survey respondents were asked a series of questions regarding the Be Whale Wise guidelines, including whether or not they were aware of them, if they thought they could follow them and what distance they were required to keep from whales. The majority of respondents from both the pre- and post-season surveys reported being aware of the Be Whale Wise guidelines and thought that they would be able to follow them (Figure 8). The same trend was evident regardless of whether the respondents were boat owners/operators and whether they were local or visitor boat owners or operators (Figure 9 and Figure 10).

While the majority of these boat owners and operators indicated that they were aware of the Be Whale Wise guidelines and that they could follow them if they encountered whales, only half were able to correctly state the main distance regulation of 200 yards (Figure 11). This trend held regardless of whether the boaters were local or visitors, however the pre-season survey data suggested that locals were more able to follow the guidelines (62.7%) than visitors (35.8%, Figure 11).

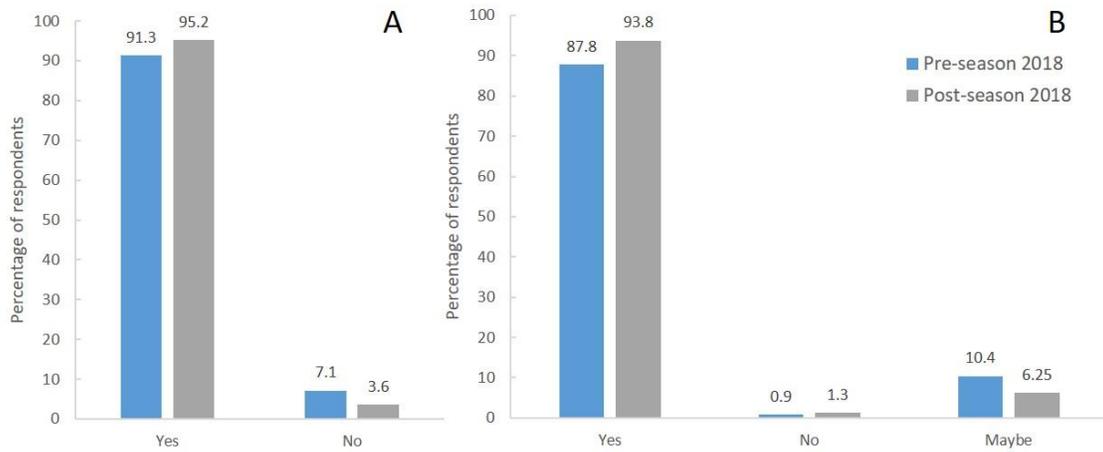


Figure 8. Percentage of respondents that are aware of the Be Whale Wise Guidelines (A) and if yes, were asked if they would be able to follow the guidelines (B). There were 126 useable responses from the pre-season survey where 115 respondents answered that they were familiar with Be Whale Wise and 84 useable responses from the post-season survey, where 80 respondents answered that they were familiar with Be Whale Wise.

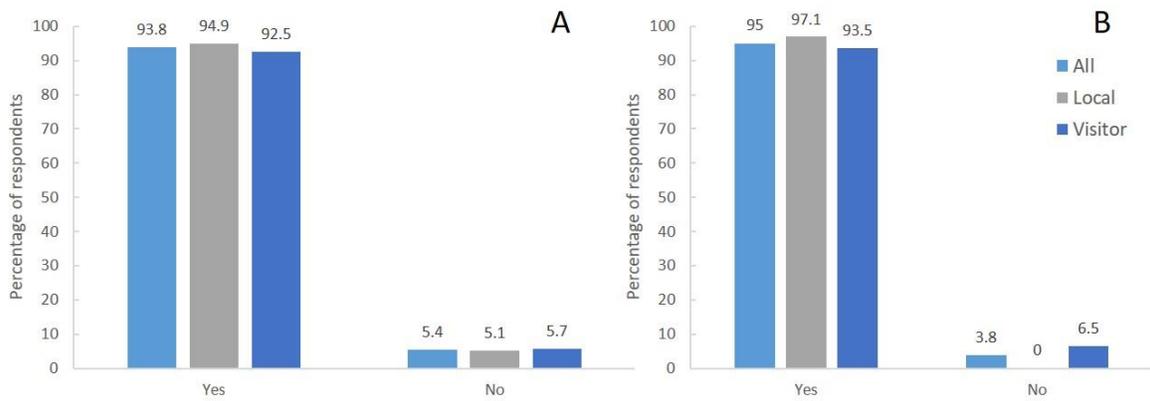


Figure 9. Percentage of 2018 pre-season (A) and post-season (B) respondents that identified as boat owners or operators and are aware of the Be Whale Wise guidelines. There were 112 respondents that identified as boat owners or operators in the pre-season survey, of which 59 were local and 53 were visitors, while 80 respondents identified as boat owners or operators in the post-season survey, of which 34 were local and 46 were visitors.

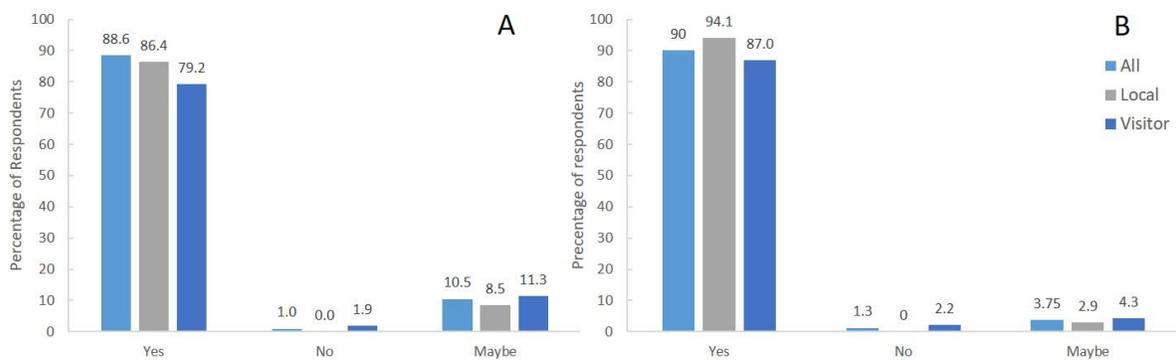


Figure 10. Percentage of 2018 pre-season (A) and post-season (B) respondents that identified as boat owners or operators that were aware of the Be Whale Wise guidelines and were asked if they could follow them.

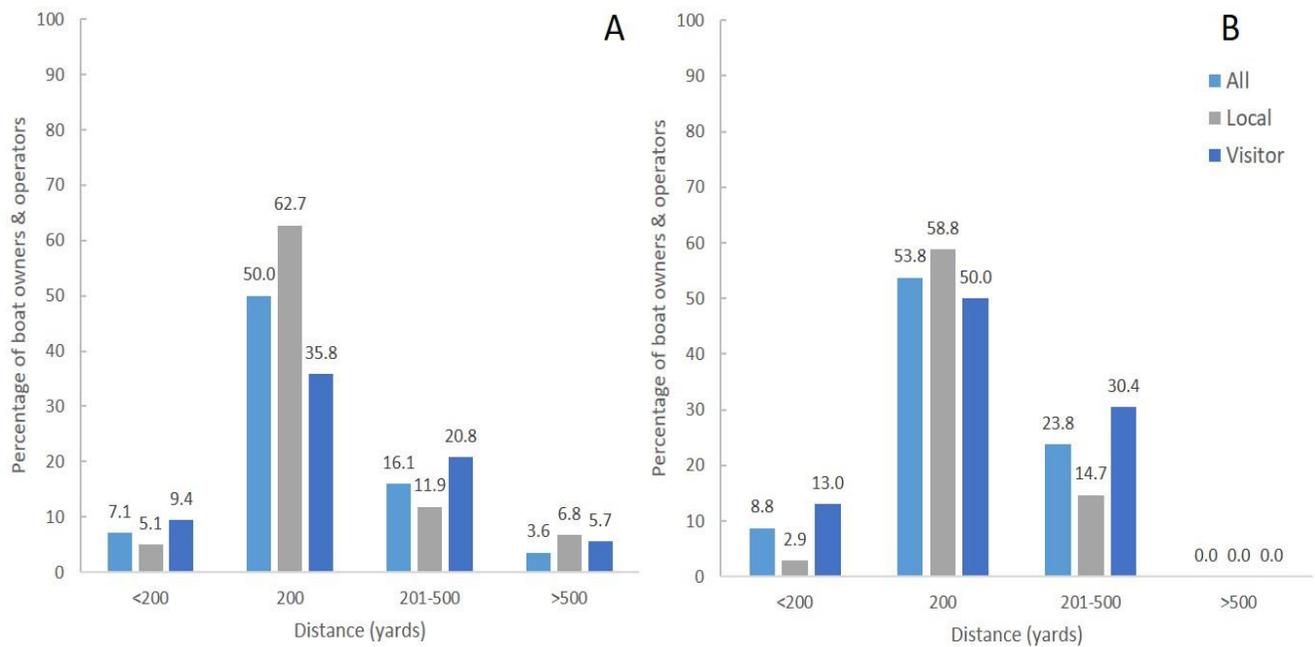


Figure 11. A summary of how many yards should be maintained between a boat and whales for all respondents that identified as boat owners or operators in the pre-season survey (A, n = 112) and during the post-season survey (B, n = 80), and whether or not the respondents were local (pre-season = 59, post-season = 34) or visitors (pre-season = 53, post-season = 46).

#### Survey respondents' assessment of the whale warning flag and knowledge of the flag

In the pre-season survey respondents were asked about what they thought of the whale warning flag, having not been previously exposed to the flag. The overwhelming response was that respondents would know what the flag meant, seeing the flag would affect their boating behavior and if they had a flag they would use it (Both pre- (72.2%, n = 91) and post-season (70.2%, n = 59) respondents said they would see the flag as a warning (Figure 12). However, only 42.1% (n=53) of pre-season and 32.1% (n=27) post-season respondents thought that the introduction of the flag would make a difference in how boaters behave around the whales (Figure 13). A number of respondents felt that the flag would work but only if there was education surrounding its meaning. The same trends were observed in the data of boat owners and operator responses.

Table 2). The same trend was observed for just boaters and across both survey periods.

Both pre- (72.2%, n = 91) and post-season (70.2%, n = 59) respondents said they would see the flag as a warning (Figure 12). However, only 42.1% (n=53) of pre-season and 32.1% (n=27) post-season respondents thought that the introduction of the flag would make a difference in how boaters behave around the whales (Figure 13). A number of respondents felt that the flag would work but only if there was education surrounding its meaning. The same trends were observed in the data of boat owners and operator responses.

Table 2. A summary of the most common and median answers surrounding the use of the whale warning flag for all respondents and just those identified as boat owners and operators during pre- and post-season surveys.

If you saw a boat flying this flag, do you know what it would mean? (1=yes to 5 = no)	If you saw another boat fly a whale warning flag, would this have any effect on how you are boating? (1 = every time to 5 = never)	If you had/have a Whale Warning Flag on your boat, would you raise the flag when you are in the vicinity of whales (1 = 100% to 5 = no)

	Pre-season	Post-season	Pre-season	Post-season	Pre-season	Post-season
<i>All respondents</i>						
<i>N</i>	125	77	121	81	117	79
<i>mode</i>	1	7	1	1	1	1
<i>median</i>	1	7	1	1	1	1
<i>Boat owners/ operators</i>						
<i>N</i>	111	73	108	77	106	75
<i>mode</i>	1	1	1	1	1	1
<i>median</i>	1	1	1	1	1	1

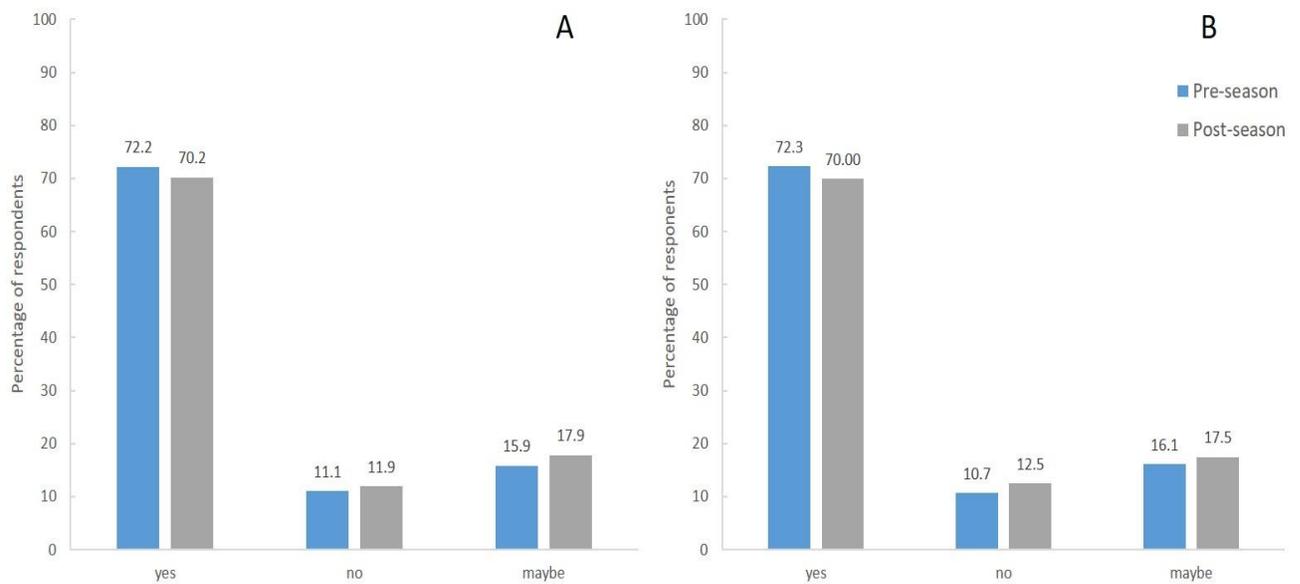


Figure 12. Comparison of pre- and post-season survey data results for all respondents (A) and just boat owners and operators (B) answers to the question asking if they would identify the flag as a warning should they see a boat or land station flying it.

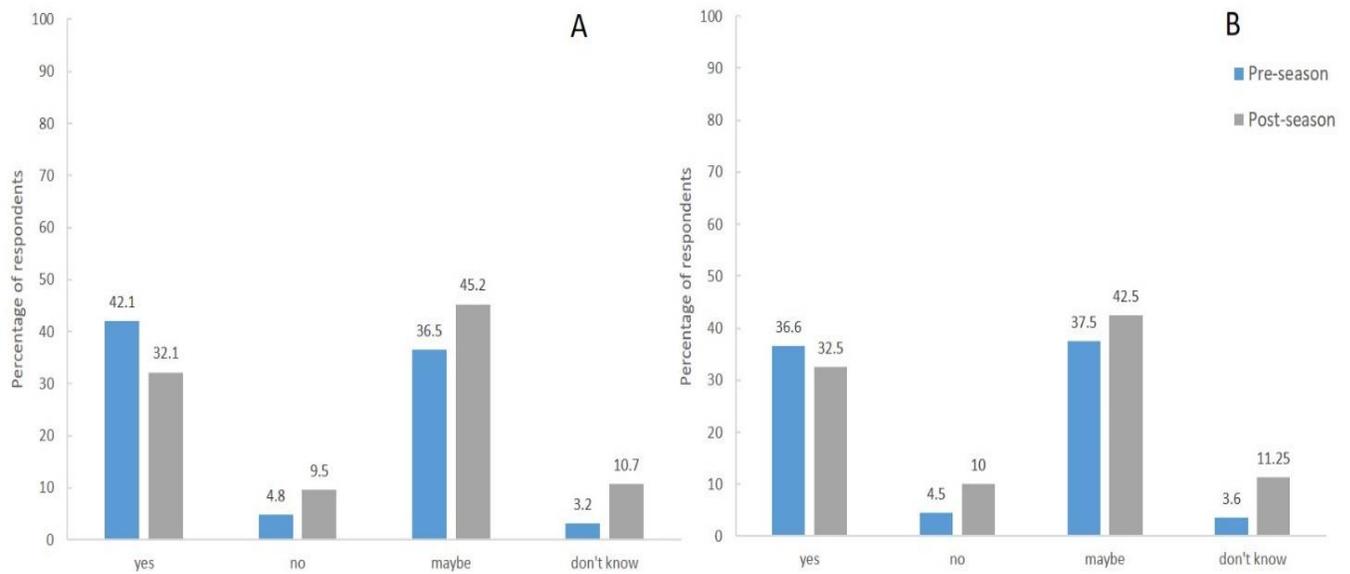


Figure 13. Comparison of pre- and post-season survey data results for all respondents (A) and just boat owners and operators (B) answers to the question asking if they thought the introduction of the whale warning flag would make a difference in how boaters behave around whales.

#### Whale Warning Flag use during 2018

Approximately half of the post-season survey respondents reported seeing the flag during the 2018 boating season (47% did see it and 51.2% did not). Of those that saw it the median response to the question asking if they thought the flag was of sufficient size was 3, on a scale of 1 (yes, the flag could be seen clearly on other boats) to 5 (it was too small and could not be seen clearly on other boats).

Of the 80 respondents who identified as boat owners or operators and completed the post-season survey 36 reported that they had received a whale warning flag. Twenty-four or 66.7% reported that they encountered whales during the 2018 boating season and 83.3% (n = 20) reported that they used their whale warning flag and four did not use it.

In general, most boat owner/operators thought that there should be different sized flags available (46.3%, n = 37), and most indicated that they would be willing to pay a small fee for a flag (56.3%, n = 45).

## Conclusions

### Flag use and vessel behavior

The Whale Warning Flag was introduced in San Juan County in 2018, this report provides a summary of the first year of the two year pilot project. The first year saw the first distribution of Whale Warning Flags to boaters that regularly use San Juan County waters and neighboring waters. We focused on getting flags to those individuals that boat within the operational area of the Soundwatch Boater Education Program (Shedd, et al., 2019) to increase the chances of Soundwatch being able to collect vessel count related data. However, due in part to the late acquisition and distribution of the flags in 2018 the participation of boaters was lower than anticipated and less consistent. The use of the land based flags was more consistent. The flag at Lime Kiln was used during the light-houses' operational hours 8am-5pm and volunteers reported that the flag was effective at causing boats to slow down, though these reports are only anecdotal at present.

The less consistent use of the flag by boaters resulted in limited data collection on vessel numbers and compliance levels by Soundwatch during the 2018 season. However, an unrelated research group (Oceans Initiative) conducting land based vessel-whale behavioral data collection as part of the Fraser Port Authority's ECHO slow down trial (Williams, et al., 2019) were able to provide some opportunistic data on the number of flags detected in their scan samples. They recorded the flag in ~3% of observed vessel traffic within 1 km of the whales. While their scan samples were collected every 5 minutes, and thus the same vessel was likely to have been included in multiple scans Williams et al. (2019) were confident that the sample was not biased with respect to whether the boats were flying flags.

Despite the lack of conclusive data on whether the flags affected the numbers of vessels in the vicinity of the whales, neither Soundwatch nor other observers reported vessels being attracted to the whales when a flag was present. Soundwatch suggests that boaters who do seek out whales know where to find them already (Shedd *pers comm.*). In addition, observers at the Lime Kiln Point State Park lighthouse reported vessels slowing down or even stopping in response to the flag at the lighthouse (J. Hyde, *pers comm.*). Our pre- and post-season survey data also support Soundwatch's observation with most reporting that they continued on with their activity rather than detour to see the whales when they detected them or the presence of the whale watch fleet. However, we look forward to the opportunity to collect further data on vessel counts and compliance levels during the second year of the pilot study to fully address the concerns of whether the flag will be an attractant for vessels and thus increase the numbers of vessels in the vicinity of the whales.

Based solely on anecdotal observations and conversations with boaters the introduction of the flag, and its concept have been well received by boaters.

### Assessing the knowledge and behavior of boaters through pre- and post-season surveys.

Our pre-and post-season surveys received a total of 210 responses with most being collected during the pre-season (n=126). In person dockside efforts appear to have helped obtain the higher number of surveys (126 usable surveys, as opposed to only 84 useable surveys collected during the post season). Due to personnel capacity limitations no in-person dockside efforts were possible during the fall for the post-season survey. This interim report provides a summary of the data collected during 2018 and makes some qualitative comparisons between the survey periods as well as differences between the responses of resident and non-resident boaters. We had also hoped to be able to look at survey data of those respondents that completed surveys during both the pre- and post-seasons in order to look at whether or not there had been any changes in awareness or reported behaviors, however, of the 84 individuals that completed the post-season survey only 18 had also completed the pre-season survey. At present these data are too few to include in the comprehensive summary of the surveys presented in this report, but

will be addressed in the final report were a full analysis will be undertaken once 2019 survey data have been included in the database. The majority of those that completed both pre- and post-season surveys were visitors, however had we been able to conduct in-person survey distribution efforts around the county in the fall the number of individuals who completed both surveys may have been larger as well as the proportion of locals completing both surveys.

Both pre- and post-survey respondents were asked a series of questions that assessed their level of awareness and knowledge of the Be Whale Wise Guidelines (BWW). Over 90% of survey respondents answered that they were aware of the BWW guidelines and of those >80% answered that they could follow them and this pattern was consistent across the two survey periods. This contrasts with the data collected by Soundwatch who reported 44% of contacted recreational vessels were unaware of the guidelines in 2018 (Shedd, et al., 2019). However, when asked what distance boaters should maintain from whales only ~50% provided the correct distance of 200 yards (or combination of distances, e.g. 200 yds for SRKW and 100 yards for all other whales, or 200 yards on the side and 400 yards ahead), indicating that while boaters may be generally aware of the guidelines far fewer would be able to implement and thus comply with them. There will be added challenges going forward into the second year of the pilot study because Washington State has now introduced more restrictive regulations surrounding the distances that vessels can be from Southern Residents and introducing a half-mile go-slow zone bubble around the whales (WA State Senate Bill Report 2SSB 5577). In Canada, starting June 1<sup>st</sup>, vessels will be required to stay 400m away from all killer whales unless in possession of a special viewing permit which allows viewing of Transient killer whales at 200 meters. This only amplifies the need for greater outreach and education efforts surrounding vessel behavior around whales.

The surveys also asked respondents their thoughts on the Whale Warning Flag, and for the post-survey respondents, if they had used the flag. They were asked if they would see the flag as a warning, if the flag would make them want to slow down, and whether the introduction of the flag would make a difference in how boaters behave around whales. The vast majority of pre-season respondents did think the flag was a warning but only around half thought that it would make a difference in how boaters behaved around whales. Interestingly these numbers were even lower for the post-season respondents. Those who did think the flag was a warning were asked to further explain what the flag did indicate to them, a number thought that it was just decorative or indicated that those flying it liked whales, three thought it would draw unwanted attention to the whales, but most did associated it with whales in the area. In addition, the majority (>80%) of survey respondents who had a flag and encountered whales during the first season of the pilot study reported using their flags which is encouraging. Of the four individuals that did not use their flag when with whales one reported that they were unable to rig it; another respondent was concerned that the flag would have the opposite effect and instead of warning boaters, it would attract more boaters to the area. Overall, the response to the flag was positive and many also suggested in their comments that there need to be different sizes of flags available, the commercial whale watch vessels should be required to fly the flag and that there needs to be greater outreach and education surrounding the use of the flag –these are all things that are the focus of the second year of the pilot study.

The flag has the potential to help create new social norms that address the human behaviors impacting the endangered SRKW, if we are to see success in our bid to recover this at-risk species, and others, then utilizing such prompts in a dedicated social-marketing framework must become part of our conservation toolbox.



Figure 14. A composite of images of the Whale Warning Flag in action taken by San Juan Island resident and naturalist Jeanne Hyde.

### Limitations

There were a number of lessons learned during the first year of the pilot study. These included challenges surrounding vessels' ability to fly the flag, the number of flags in operation vs where whales were and where Soundwatch was, and limitations to the education and outreach campaign.

- Some vessels either reported (for example through the post-season survey), or were known to have not used their flags during the 2018 season due to complications in mounting their flags. In addition, the later than expected distribution of the flags meant that it was challenging for some user groups, particularly the whale watch fleet to incorporate the flag use into their operations mid-season. Getting used to having to fly the flag also takes some practice and thus the late distribution of the flags may have impacted captains' and crews' ability to change their behavior accordingly in a systematic fashion.
- Soundwatch only operated one vessel during 2018, and thus was not able to be with all boats and all whales at one time. Had a boat been flying a flag with another group of whales this would not have been recorded by Soundwatch. Early distribution of the flags is key to get them out to core user groups, such as research and whale watch vessels that are with whales on a consistent basis. In addition, Soundwatch was also focused on monitoring the situation around the whale J35 that carried

her dead calf for 17 days and then later on the intervention efforts to help the young whale J50, thus was limited in their ability to monitor vessel traffic around other groups of whales.

- The education and outreach campaign was limited in its scope during 2018. A number of dockside efforts were undertaken at the Port of Friday Harbor and Roche Harbor, however these efforts were limited due to capacity of volunteers. No dockside efforts were conducted in the fall and this was reflected in the numbers of post-season surveys completed. During 2019 dedicated dockside efforts are planned for every weekend throughout June and September with additional efforts over key weekends such as Memorial Day and Fourth of July holidays. These efforts are also planned for all ferry served islands in San Juan County. In addition to dockside outreach efforts there will be a social media campaign and outreach to regional media to highlight the use of the flag and what it means.

### Recommendations going forward

- As we enter year two of the pilot study we have purchased an additional 1,250 flags bring the total available to 1,500 in an effort to create a critical mass of boats with flags. We have also included a larger sized flag –something that post-season survey respondents suggested. We have collaborated with the Pacific Whale Watch Association to ensure that their members are committed to using the flag in 2019 and most have secured flags for their vessels, whether they operate out of BC or WA. The education and outreach campaign is also being ramped up and we will continue to work closely with Soundwatch and the other Be Whale Wise partners to both distribute flags and spread the use of the flag through focused outreach and education efforts. These efforts have included a coordinated effort over 9 days at the Seattle Boat Show in early 2019, and again at the Anacortes Boat Show during 5 days in May 2019 (Appendix 3 c). We have made flags available at the County’s boater licensing and registration renewal center, and have also been invited to present the flag project and provide flags to the Northwest Indian Fisheries Commission members. We hope that many treaty tribal fishermen will participate in the flag program in 2019.
- Deployment of the flag appears to have been a limiting factor in the flags use during the 2018 season. To address this we recommend (and plan on) producing short how-to videos to both explain the use of the flag and provide some ideas of how the flag can be rigged. We are also encouraging flag bearers that have had success to share what has worked on their vessels.
- The data collection procedures will remain the same and already there are indications that the whale watch fleet are regularly using their flag (see Figure 14) suggesting that our vessel count data collection will be more successful this year. We are also amending the pre- and post-season surveys to include some questions that reflect the recent changes to the vessel regulations in Washington State (and expected out of Canada). We also plan to increase the number of dockside outreach efforts in a bid to connect to more boaters using the County’s waters directly.
- The changes in the vessel regulations for SRKW present an unexpected hurdle for the project however, we will be incorporating these changes into our outreach and education efforts. We will also be able to take advantage of the wider regional efforts to educate the boating community on the new regulations. Our surveys should still be able to reflect behavioral changes with regards to the flag use (if such changes do occur) as our study originally intended. There is increasing interest in the flag concept and despite this being just a two year pilot the use of the flag is likely to continue into the future, however should we find evidence that the flag is having undesired effects –such as attracting more boats to whales’ locations then we will have to re-assess its use and whether or not it should become a permanent tool in the Be Whale Wise toolkit to educate and alert boaters to the presence of whales.

## Acknowledgements

There are many organizations and individuals involved in this project.

- This project would not have been possible without the financial support of the following:
  - Northwest Straits Commission through the Marine Resources Committee Annual grant from Puget Sound Partnership and The United States Environmental Protection Agency<sup>1</sup>.
  - Northwest Straits Foundation Opportunity Fund that allowed us to purchase the first batch of flags to seed the system.
  - The Marine Mammal Commission
  - San Juan County
- The idea for the project was brought to the Marine Resources Committee by MRC member and local whale watch operator Ivan Reiff and he continues to champion the use of the flag. We were graciously given permission to use the same design as introduced around northeast Vancouver Island by the Marine Ecology and Research Society and the North Island Marine Mammal Stewardship Association, thank you to both these groups and especially to Jackie Hildering.
- Thank you to Carol Anderson of Seattle Flags who rushed our first orders through and didn't blink when we ordered 1000 more flags! It has been a pleasure working with you and we hope to continue.
- Thank you to all that have supported our efforts to distribute flags and educate boaters in the region. Particularly to Lynne Barre at NOAA, Penny Becker, Sgt Russ Mullins and his team at WDFW, Taylor Shedd and Jenny Atkinson at the Whale Museum, The Pacific Whale Watch Operators Association who made flying the flag a compulsory part of their guidelines for 2019, Rep. Debra Lekanoff for championing the flag during the 2019 legislative session. The volunteers for the San Juan Island Naturalist Program working at the Land Bank's Westside Preserve flew the flag from shore whenever whales were present, as did Bob Otis and the volunteers at the lighthouse who diligently flew the flag when whales were present, and particularly to Jeanne Hyde for both her efforts with the flag at the lighthouse and her enthusiastic documentation of the flag's use –without Jeanne we would have few images to share!
- Thank you to the Soundwatch and Oceans Initiative research teams who collected data for us during the 2018 season. The opportunistic data collected by Oceans Initiative was a valuable addition to our documentation of flag use during the first year of the pilot study. Thank you also to all the individuals who helped us to distribute our surveys and outreach material, both during in person dockside efforts and through posting out on social media and over email lists, including the San Juan Conservation District Youth Conservation Corps, the Northwest Straits Initiative, our partner MRCs (Whatcom, Skagit, Islands, Jefferson, Snohomish, and Clallam), the Salish Sea Ecosystem Advocates, and Be Whale Wise.
- And finally, a huge thank you to the San Juan County Marine Resources Committee and our County Commissioners and County staff for their ongoing support and efforts in getting this project up and running. This project would not have been possible without the Marine Resources Committee and is a testament to their dedication of the County's marine habitats, and species and particularly the Southern Resident killer whale.

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<sup>1</sup> This project has been funded in part by the United States Environmental Protection Agency. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsements or recommendation for use.

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## Appendices

### Appendix 1. Pre-Season survey questions

#### **Boating with Whales in the Salish Sea**

The core critical habitat of the endangered Southern Resident killer whale is located in the heart of the Salish Sea within the San Juan Islands. When Southern Residents are present in the Salish Sea during the spring, summer and fall there are vessels within acoustic range of the whales virtually all the time hindering their ability to navigate, detect increasingly scarce prey, and communicate. In an effort to address vessel impacts around the San Juan Islands the County and the San Juan County Marine Resources Committee are piloting the use of a Whale Warning Flag this summer. This survey is part of this pilot study. The survey aims to measure public knowledge, attitude and actions related to boating with whales in the Salish Sea and surrounding the use of a Whale Warning Flag. The survey is anonymous and open to all interested in participating, but particularly those who are residents and visitors to San Juan County.

Thank you for your time. The survey is in 3 sections and should take approximately 5 minutes to complete.

*1) Are you a resident of San Juan County? \**

Yes or No

*2) If you are a visitor where are you visiting from?*

- A neighboring County (e.g., Whatcom, Skagit, Islands, Jefferson) Seattle and South Puget Sound
- Outside Washington State
- Canada Another Country
- Other:

*3) Do you own a boat?*

Yes or No

*4) If yes, what kind of boat do you own?*

- Small non-motorized (e.g., kayak or row boat) Private small open motorized
- Private medium cabin motorized Private large motorized
- Sail Boat
- Eco-tour kayak Eco-tour - vessel
- Government Agency / Enforcement
- Research Commercial Fishing Tribal Fishing
- Other:

*5) How long have you been boating in the San Juans?*

- 0-1 years
- 2-5 years

- 6-10 years
- 11-20 years
- 21- 30 years
- 31 - 40 years
- 41 - 50 years
- >50 years

6) *What is your main boating purpose?*

- Recreation e.g., visiting other islands Recreational whale watching Recreational fishing
- Commercial fishing Tribal fishing
- Commercial whale watching & wildlife Tours Research
- Government work (e.g., County, State or Federal) Other:

### **Section 1: Knowledge/Perception**

This section asks questions related to your awareness, and the information that you possess about boating around whales in the Salish Sea.

#### WHALE WISE BOATING

7) *Are you familiar with the Be Whale Wise Guidelines and regulations?*

Yes or No

7a) *If yes, do you think you are able to follow them?*

Yes, No, Maybe

7b) *If yes, what are the most important Be Whale Wise Guidelines and Regulations a boater can follow?*

8) *When you see a grouping of boats on the water, could that mean whales are present?*

Yes, No, Maybe

9) *If you see a bait ball, or birds swooping in one area could that mean whales might be in the area?*

Yes, No, Maybe

10) *If you answered yes to Questions 8 and/or 9, do you adjust your boating to follow the guidelines?*

Yes, No, Maybe

11) *If you are in the vicinity of whales how many yards should you maintain between you and the whales?*

#### DANGERS

12) *To the best of your knowledge, have boats collided with whales in this general area in recent times?*

Yes, No, Don't know

13) *Do you think boat-whale collisions are dangerous to whales?*

Yes, No, Don't know

14) *Do you think boat-whale collisions are dangerous to people?*

Yes, No, Don't know

### **Section 2: Attitudes towards whales**

This section addresses the wider sociocultural orientations boaters have – consciously or not – about whales, and their relations with whales, in the water.

15) *When you are boating and whales are in the area, do you seek them out or continue on your way?*

Seek out or Continue on

16) *Do you enjoy watching whales when you are boating?*

Yes or No

17) *Do you think you should change your boating behavior when whales are nearby?*

Yes, No, Maybe, Don't know

18) *When you are boating, is your first concern the task you are out to accomplish - such as fishing, or getting from point A to point B?*

Yes, No, Sometimes

18a) *If yes, do whales being in the area ever get in the way of your task?*

1 (Every time)    2        3        4        5 (Never)

19) *When you are boating near whales, do you hope they will come close or do something spectacular (like breach or tail slap or spyhop)?*

1 (Always)    2        3        4        5 (Never)

20) *Do you feel a sense of guardianship over whales (e.g., do you go out of your way to keep them safe when you are boating)?*

Yes, No, Don't know

### **Section 3: The Whale Warning Flag**

This section addresses your propensity, as a boater, to take an active part in the Whale Warning Flag Program.

Whale Warning Flag



21) *If you saw a boat flying this flag, do you know what it would mean?*

1(Yes) 2 3 4 5 (No)

22) *If you saw a boat flying this flag, would you see the flag as a warning?*

Yes, No, Maybe

22a) *If no, please explain briefly what this flag indicates to you?*

23) *Would seeing the flag make you want to slow down?*

Yes, No, Maybe, Don't know

24) *If you saw another boat fly a whale warning flag, would this have any effect on how you are boating?*

1 (Every time) 2 3 4 5 (Never)

25) *If you had/have a Whale Warning Flag on your boat, would you raise the flag when you are in the vicinity of whales*

1 (100% likely) 2 3 4 5 (I would not)

26) *Do you think the introduction of a Whale Warning Flag will make a difference in how boaters behave around whales?*

Yes, No, Maybe, Don't Know, Other:

Thank you for your time in completing this survey.

Any final comments

## Appendix 2. Post-season survey questions

### Boating with Whales in the Salish Sea: Post Season Survey 2018

The core critical habitat of the endangered Southern Resident killer whale is located in the heart of the Salish Sea within the San Juan Islands. When Southern Residents are present in the Salish Sea during the spring, summer and fall there are vessels within acoustic range of the whales virtually all the time hindering their ability to navigate, detect increasingly scarce prey, and communicate.

In an effort to address vessel impacts around the San Juan Islands the County and the San Juan County Marine Resources Committee are piloting the use of a Whale Warning Flag.

This post-season survey is part of this pilot study. The survey aims to measure public knowledge, attitude and actions related to boating with whales in the Salish Sea and the use of the Whale Warning Flag. The survey is anonymous and open to all interested in participating, but particularly those who are residents and visitors to San Juan County.

Thank you for your time. The survey is in 3 sections and should take approximately 5 minutes to complete.

*1) Did you complete the pre-season survey in 2018?*

Yes, No

*2) Are you a resident of San Juan County? \**

Yes, No

*3) Did you visit San Juan County during the spring, summer or fall of 2018 and partake in boating activities?*

Yes, No

*4) If you visited, where did you visit from?*

- A neighboring County (e.g., Whatcom, Skagit, Islands, Jefferson) Seattle and South Puget Sound
- Outside Washington State Canada
- Another Country Other:

*5) Do you own a boat?*

Yes, No

*6) If yes, what kind of boat do you own?*

- Small non-motorized (e.g., kayak or row boat) Private small open motorized
- Private medium cabin motorized
- Private large motorized Sail Boat
- Eco-tour kayak Eco-tour - vessel
- Government Agency / Enforcement Research
- Commercial Fishing Tribal Fishing

*7) How long have you been boating in the San Juans?*

- 0-1 years
- 2-5 years
- 6-10 years
- 11-20 years
- 21- 30 years
- 31 - 40 years
- 41 - 50 years
- >50 years

8) *What is your main boating purpose?*

- Recreation e.g., visiting other islands Recreational whale watching Recreational fishing
- Commercial fishing Tribal fishing
- Commercial whale watching & wildlife Tours Research
- Government work (e.g., County, State or Federal)

### **Section 1: Knowledge/Perception**

This section asks questions related to your awareness, and the information that you possess about boating around whales in the Salish Sea.

#### WHALE WISE BOATING

9) *Are you familiar with the Be Whale Wise Guidelines and regulations?*

Yes, No

9a) *If yes, do you think you are able to follow them?*

Yes, No, Maybe

9b) *If yes, what are the most important Be Whale Wise Guidelines and Regulations a boater can follow?*

10) *When you see a grouping of boats on the water, could that mean whales are present?*

Yes, No, Maybe

11) *If you see a bait ball, or birds swooping in one area could that mean whales might be in the area?*

Yes, No, Maybe

12) *If you answered yes to Questions 8 and/or 9, do you adjust your boating to follow the guidelines?*

Yes, No, Maybe

13) *If you are in the vicinity of whales how many yards should you maintain between you and the whales?*

#### DANGERS

14) *To the best of your knowledge, have boats collided with whales in this general area in recent times?*

Yes, No, Don't know

15) *Do you think boat-whale collisions are dangerous to whales?*

Yes, No, Don't know

16) *Do you think boat-whale collisions are dangerous to people?*

Yes, No, Don't know

## **Section 2: Attitudes towards whales**

This section addresses the wider sociocultural orientations boaters have – consciously or not – about whales, and their relations with whales, in the water.

17) *When you are boating and whales are in the area, do you seek them out or continue on your way?*

Seek out or Continue on

18) *Do you enjoy watching whales when you are boating?*

Yes, No,

19) *Do you think you should change your boating behavior when whales are nearby?*

Yes, No, Maybe, Don't know

20) *When you are boating, is your first concern the task you are out to accomplish - such as fishing, or getting from point A to point B?*

Yes, No, Sometimes

20a) *If yes, do whales being in the area ever get in the way of your task?*

1 (Every time) 2 3 4 5 (Never)

21) *When you are boating near whales, do you hope they will come close or do something spectacular (like breach or tail slap or spyhop)?*

1 (Always) 2 3 4 5 (Never)

22) *Do you feel a sense of guardianship over whales (e.g., do you go out of your way to keep them safe when you are boating)?*

Yes, No, Don't know

## **Section 3a: The Whale Warning Flag**

This section addresses your knowledge of the Whale Warning Flag.

Whale Warning Flag



23) Did you see this flag flying this summer?

Yes, No

23a) If yes, did you think the flag was of sufficient size?

1 (Yes I could see it clearly on other boats) 2 3 4 5 (IT was too small and I could not see it clearly on other boats)

24) If you saw a boat or land station flying this flag, do you know what it means?

1 (yes) 2 3 4 5 (no)

25) If you saw a boat or land station flying this flag, would you see the flag as a warning?

Yes, No, Maybe

25a) If no, please explain briefly what this flag indicates to you?

26) What are the 3 key things you should do if you see the flag?

27) If you saw a boat or land station flying a whale warning flag, would this have any effect on how you are boating? e.g. would you slow down?

1 (Every Time) 2 3 4 5 (Never)

28) If you had a Whale Warning Flag on your boat, would you raise the flag when you are in the vicinity of whales?

1 (100% likely) 2 3 4 5 (I would not)

29) Do you think the introduction of a Whale Warning Flag will make a difference in how boaters behave around whales?

Yes, No, Maybe, Don't Know, Other:

### **Section 3b: Using the Whale Warning Flag**

This section is for those that received a Whale Warning Flag in 2018

30) Did you receive a flag this summer?

Yes, No

*31) Did you encounter whales when boating this summer?*

Yes, No

*31a) If yes, did you fly the flag?*

Yes, No

*32) If you did encounter whales but did not fly the flag why not?*

- Unable to rig the flag on my boat
- Forgot to raise the flag
- Did not want to raise the flag
- Other

*33) Did you find the flag challenging to use?*

Yes, No, Maybe

*34) Should there be different size flags available depending on the size of your vessel?*

Yes, No, other:

*35) In the future would you be willing to pay a small fee for the flag?*

Yes No Maybe

*36) Do you have additional comments to share regarding the Whale Warning Flag? e.g. Can we improve the flag? Where else should we share the information on the flag?*

Thank you for your time in completing this survey.

Any final comments

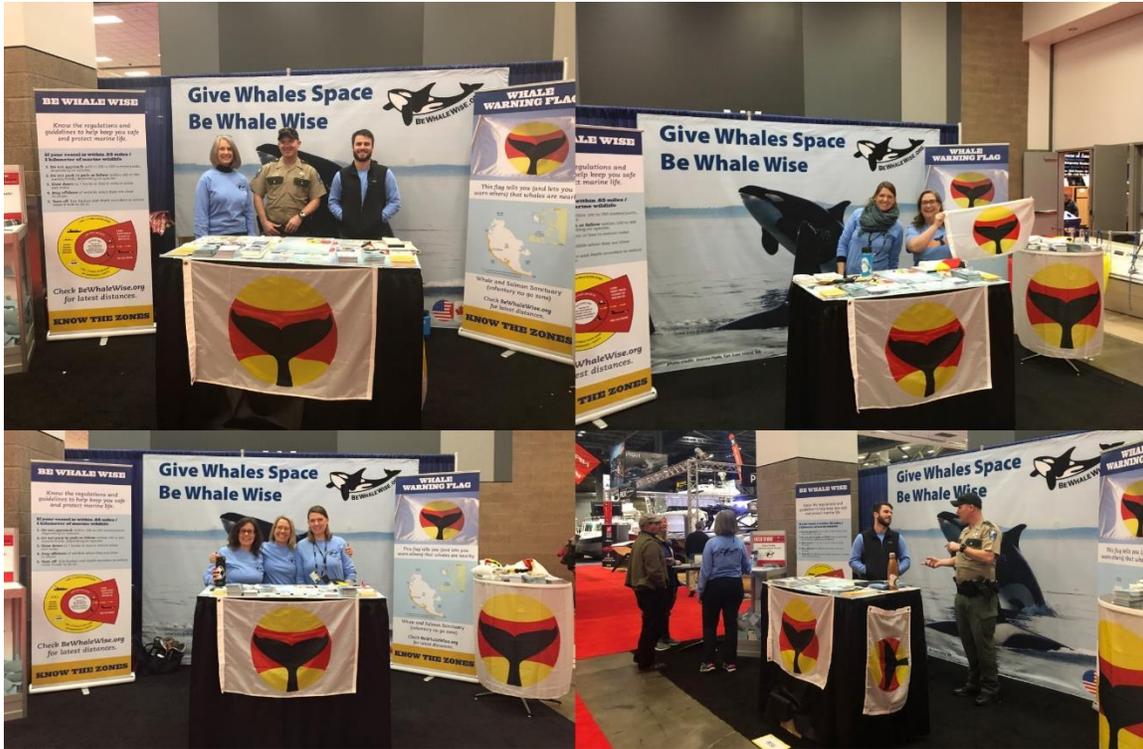
Appendix 3. Photographs of the flag in action and outreach efforts from dockside efforts to the Seattle Boat Show.



Appendix 3 a. Examples of vessels flying the whale warning flag. Photos courtesy of Jeanne Hyde, The Whale Museum, John Boyd, and Five Star Whale Watching.



Appendix 3 b Examples of the whale warning flag in action at Lime Kiln Point State Park, photos courtesy of Jeanne Hyde.



Appendix 3 c. Photos of the outreach effort at the Seattle Boat Show, volunteers included members of Soundwatch, San Juan County, The Governor's Orca Task Force, NOAA, WDFW and non-profits Orca and Whale Scout.



Appendix 3 d. Examples of the dockside outreach efforts conducted on San Juan Island during summer 2018.