

# Investigating whale-watching activities using quantitative and qualitative approaches

WAVE (Whale-watching AIS Vessel movement Evaluation)

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Funded by:



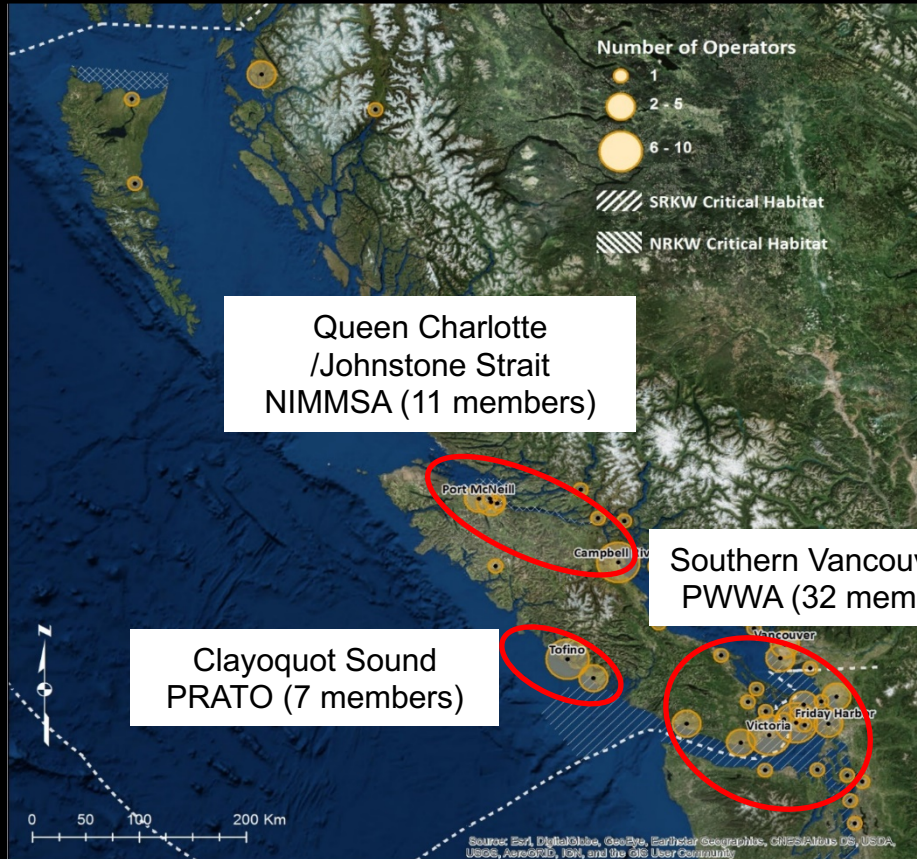
**CMSRF Workshop**  
December 2, 2019



# Project Objectives

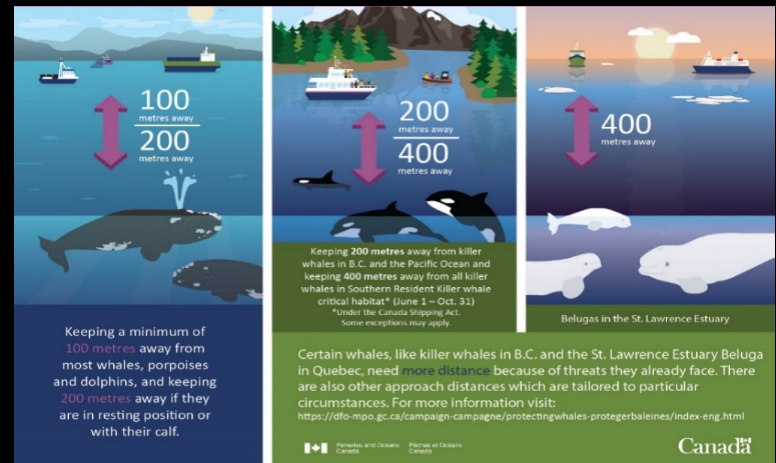
1. To increase the understanding of whale watching activities in Canada's west coast by collecting and modelling vessel track data derived from AIS and other sources.
2. To determine if AIS can be used to inform whale watching operations, conservation policies and regulations

# Whale watching industry in British Columbia



- 47 operators in BC (based on 2019)
- 3 main whale watching centres
- Guidelines developed by the whale watching industry have existed since early 1990's

→ In 2018, DFO released Marine Mammal Regulations which include whale watching regulations



# AIS carriage regulations in Canada

## (as per April 2019)



Transports  
Canada

Transport  
Canada

**65 (1)** Every vessel of 150 gross tonnage or more that is carrying more than 12 passengers and engaged on an international voyage shall be fitted with an Automatic Identification System (AIS) Class A.

**(2)** Every vessel, other than a fishing vessel, of 300 gross tonnage or more that is engaged on an international voyage shall be fitted with an AIS Class A.

**(3)** Every vessel, other than a fishing vessel, of 500 gross tonnage or more that is not engaged on an international voyage shall be fitted with an AIS Class A.

**(4)** Every vessel, other than a vessel subject to subsections (1) to (3), that is engaged on a voyage other than a sheltered waters voyage shall be fitted with an AIS Class A that meets the standards specified at item 15 of Schedule 1 or an AIS Class B if

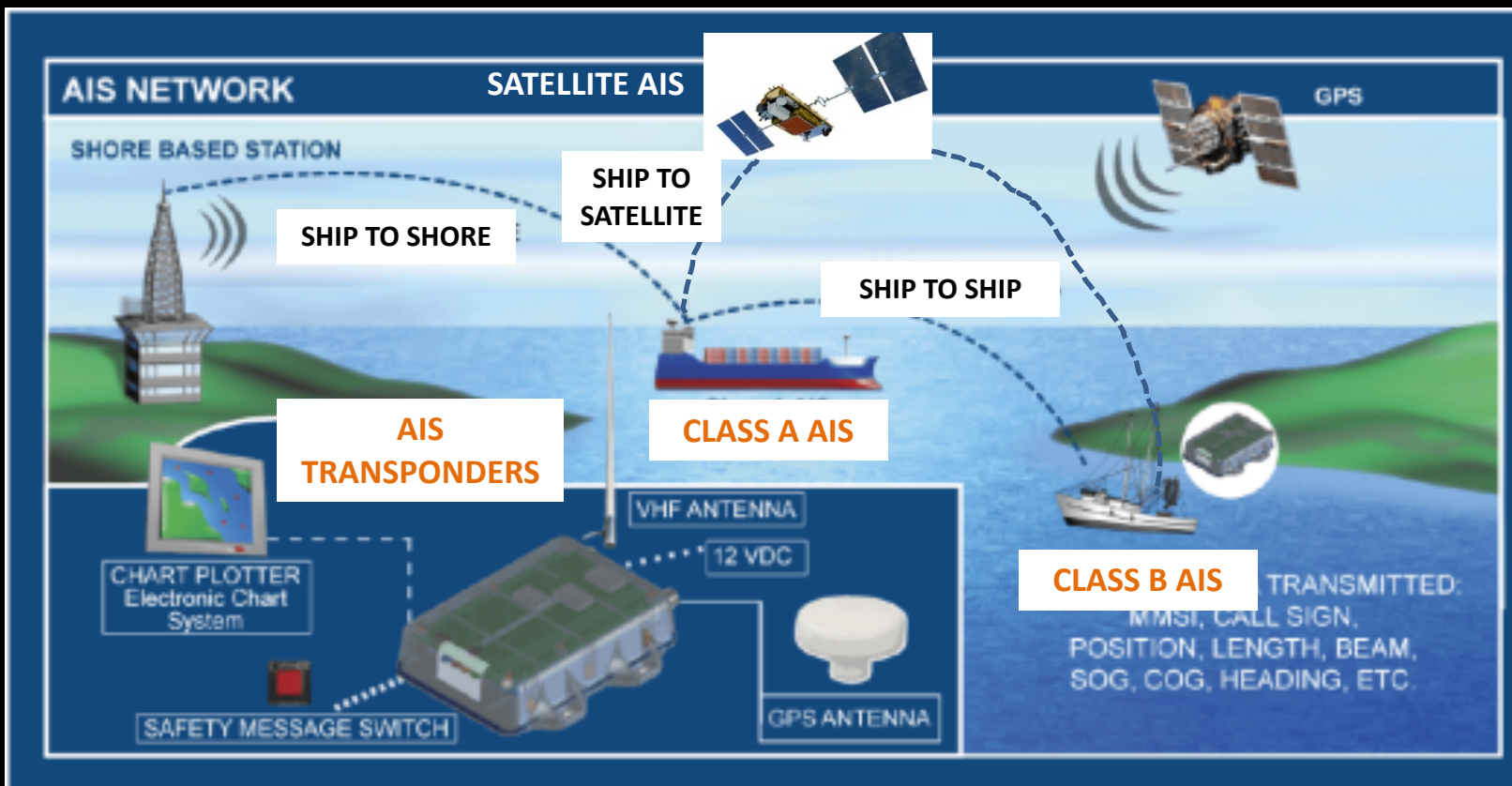
**(a)** the vessel is certified to carry more than 12 passengers; or

**(b)** the vessel is eight metres or more in length and is carrying passengers.

SOR/2019-100 April 15, 2019



# In-depth understanding of the system: transponders, receivers, data and data modelling (quantitative approaches)



Modified from ACR Electronics Inc.

## Class-B transponders provided by exactEarth



With  
**exactTrax**  
technology  
by



### Camino-108



- ✓ 2W
- ✓ CSTDMA device
- ✓ Ship to ship
- ✓ T-AIS
- ✓ S-AIS (poor detection rate in Canada)

### B600 - WideLink



- ✓ 5W
- ✓ SOTDMA device
- ✓ transmits 'Message 27 Long Range' position reports
- ✓ Ship to ship
- ✓ T-AIS
- ✓ S-AIS (better detection rate than Caminos)

# Participating whale watching companies in BC (so far)



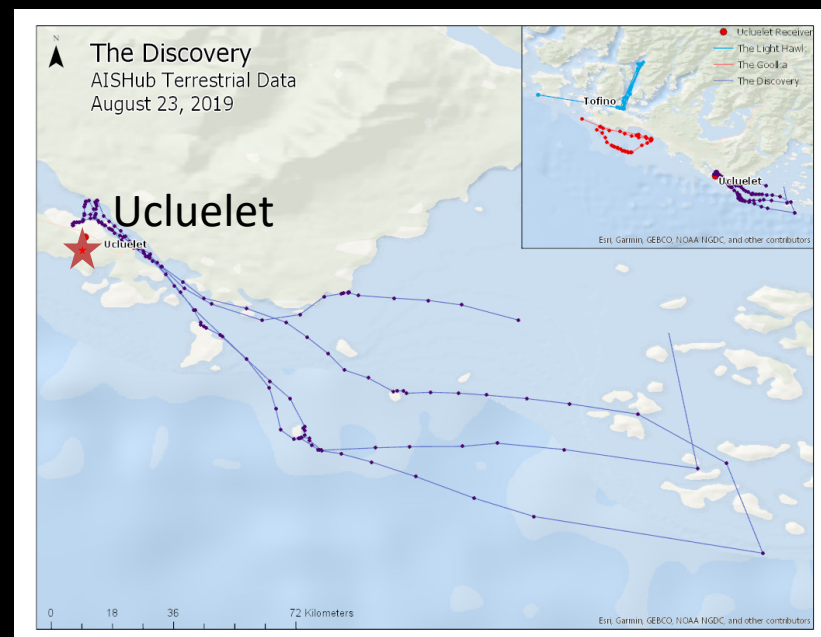
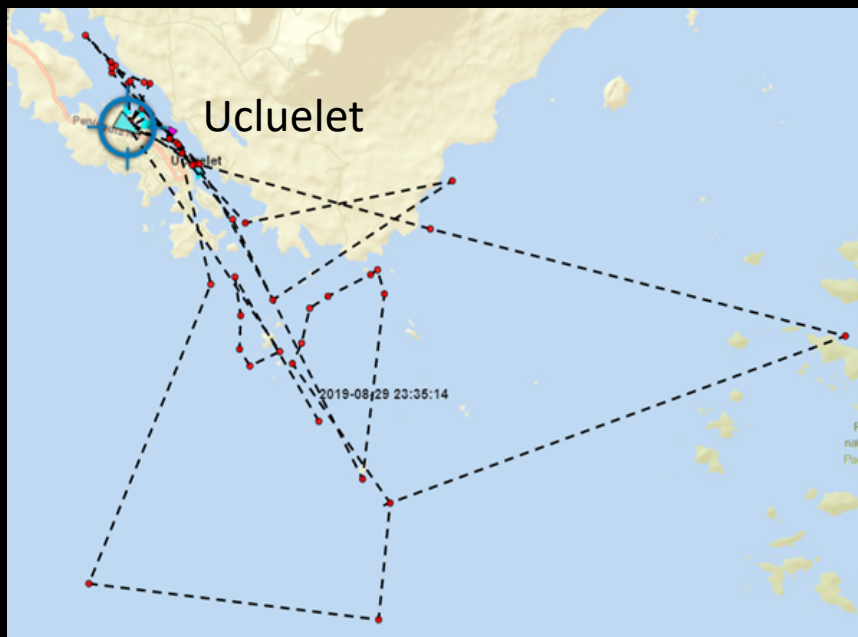
# Comparing AIS data sources



RHIB fitted with Camino - 108 w/exactTrax (2W)

S-AIS + Fleetmont T-AIS provided by exactEarth (Date Aug 29<sup>th</sup>, 2019)

T-AIS (Ucluelet Station) provided by AISHub (Date Aug 23<sup>rd</sup>, 2019)





# AIS situation currently in Tofino

- **Satellite AIS:** the number of hits and the update rate are both poor from a satellite point of view.
  - This is mostly due to the high noise floor on these frequencies in Canada, particularly on ASM, and
  - also the low transmit power of the trial units (all 2W devices).
- **Terrestrial AIS**
  - CCG not accessible to researchers (although working on it) or whale watching operators
  - Receiver in Ucluelet feeding to public accessible platforms such as Marine Traffic and accessible to researchers via AISHub
    - Not enough coverage to cover entire area – mainly waters near Ucluelet



# How and why are we engaging with the whale-watching industry?

## (Qualitative approaches)

### 1. Interviews

- To gather information about their operations (number of trips, duration of trips, etc...)
- Type of navigation equipment have in their vessels
- What information they use to inform their operations
- Gain an understanding of their needs from an operations perspective

### 2. Workshops (first one in Tofino, Nov 27, 2019)

- Presentation on AIS and what we learnt so far about how it performs in their region
- Go over possible solutions to overcome limitations and meet their needs
- Gain trust and continue engagement



## Whale watching industry needs...

- A tracking system that provides “real time” vessel tracking data
  - For safety
  - For operations management (vessel and fleet level)
  - To avoid overcrowding (leads to less disturbance to whales and better client experience)
  - For industry self-monitoring to comply with government and association guidelines
- A system that is not disruptive to whale watching operations (often the person operating the vessel is also the guide)
- A system that is reliable and inexpensive
- A system that can be integrated with other information (e.g., weather, sea state, whale sighting data, management areas, etc...)



## Next steps ...

- Increase Terrestrial AIS coverage in the area (particularly near Tofino) by adding one or more receivers
- Keep monitoring the performance of B600 transponders and provide feedback to whale-watching operators
- Analyze vessel tracking data and whale watching vessel behavior using deep-learning modelling approaches





# Outputs of this project hope to...

1. To inform marine safety
2. To assist industry in their daily operations and fleet management
3. To inform different risk assessments and models; e.g., noise models, oil spill risk, risk of whale strikes ..
4. To inform marine spatial planning
5. And more...



# Thank you to...

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**exactEarth**

**Leah Syme and Aislinn Sirk,**  
**Research Services, Uvic**

**Mike Shepherd,**  
**CCG MCTS Officer, HAM Radio**  
**Operator and AIS Enthusiasm**



## Whale-watching operators:



**To learn more about the project:**

Visit project website:  
[www.waveproject.ca](http://www.waveproject.ca)

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