

# Cruising for Harbor Seals:

## Rerouting conflict between vessel traffic and harbor seals

### ALL ABOARD THE S.S HARBOR SEAL

Alright, so you're ready for your dream cruise to Alaska. Who hasn't dreamed about that? But wait just a minute...



You will be sharing the waters with many other marine animals. Harbor seals (*Phoca vitulina*) live in Alaska too and haul-out every summer to breed and molt. This haul-out coincides with peak tourist season in Alaska, especially in Glacier Bay. Vessel traffic can disturb hauled-out seals that frequent the area either visually or by noise disturbance.

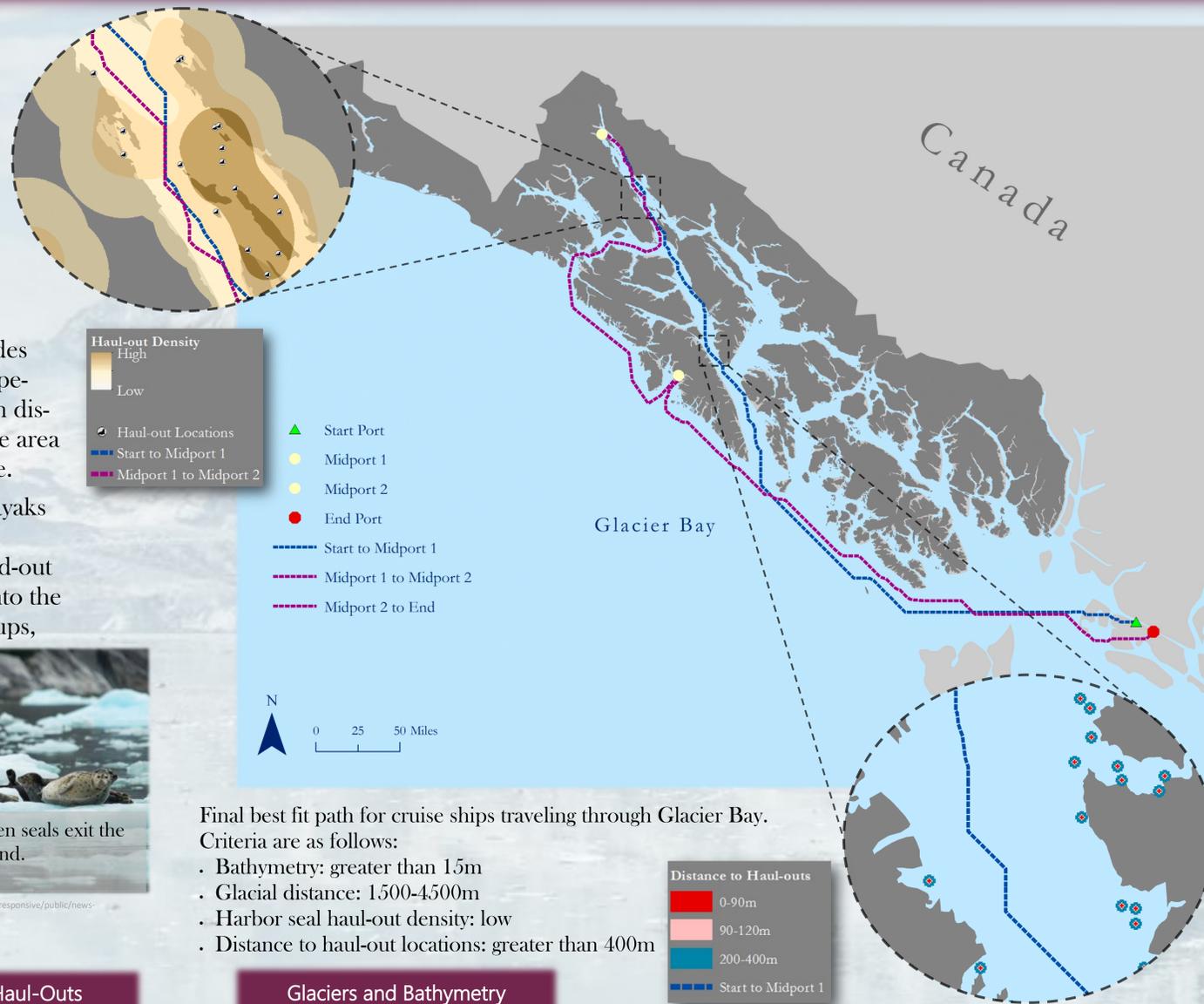
Larger ships such as cruise ships, and really small ships like kayaks (often deployed by cruise ships for excursions) cause the most harm. The presence of these ships within 500 meters of hauled-out seals causes them to flush or escape into the water. Flushing into the water can create energy deficits and stress, especially for the pups, causing a depletion in metabolism.

Currently, regulations mandate that ships do not get within 90 meters of hauled-out seals, but ships at that distance have already disturbed 70% of the hauled-out seals. The purpose of my analysis was to determine the best path for cruise ships through Glacier Bay without disturbing harbor seals.



Hauling out happens when seals exit the water onto land.

<https://alaskafisheries.noaa.gov/sites/default/files/styles/responsive/public/news-release-images/withrow-seals061107.jpg?tok=zvrb-WNJ>

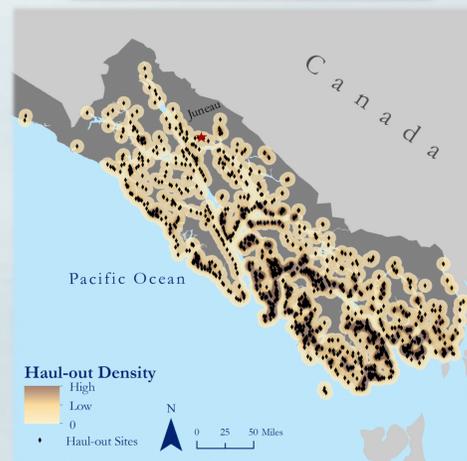


Ships Paths Through Glacier Bay



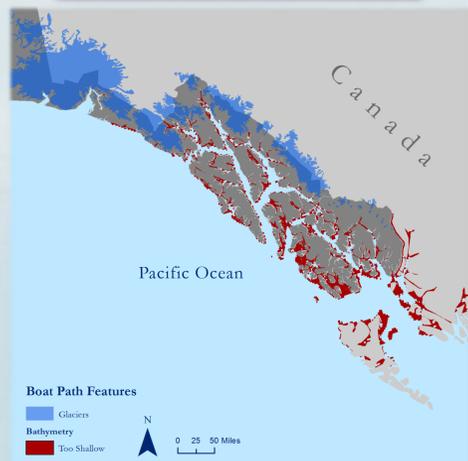
Cruise ship routes are shown for 2014 using AIS positioning technology installed on cruise ships before GIS analyses. Major ports are shown along the route.

Harbor Seal Haul-Outs



Harbor seals were surveyed aerially by NOAA identifying harbor seal haul-out locations. Locations are shown and used to calculate density of haul-out locations.

Glaciers and Bathymetry

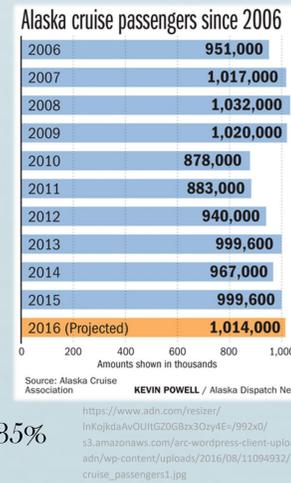


Glaciers present in Alaska are shown for redirecting cruise ships as well as depth of the water.

### METHODS

Cruise ship vessel traffic has been increasing for over a decade causing disturbance to wildlife. Each layer was weighted with raster calculation for the generation of a best path—least cost using the following weights:

- Bathymetry: 20%
- Glacial Distance: 10%
- Distance to haul-outs: 35%
- Harbor seal haul-out density: 35%



### CONCLUSION

Breeding harbor seals hauled out on ice are vulnerable to passing cruise ships and other vessels. If we can make vessel traffic less intrusive, they will likely have less stress transferred to their offspring. Adjusting shipping patterns may also benefit other marine mammals that frequent the area such as humpback and killer whales. If redirection of cruise ships costs more for cruise companies, tours can be advertised as eco-friendly and the increased cost for tickets is benefiting the environment. Below is a mock flyer for a cruise ship company that decided to put seals first. This positive marketing may make the public more aware of such problems and create more support for harbor seals and other marine mammals.

#### WELCOME TO THE 2018-2019 ECO-CRUISE!

*Dedicated to saving the planet one cruise vacation at a time.*

Enjoy your vacation with the knowledge that you are on an environmentally conscious tour.

Travel through Glacier Bay, Alaska, known for its icy blue glaciers and snow capped mountains. Our peak tourist season coincides with harbor seal haul-outs where large populations of seals come onto land to mate and give birth. Conservation scientists have chosen a path through the bay that does not disturb harbor seals during that critical time while still ensuring gorgeous views. Your dream vacation will take place in one of the most peaceful places on Earth.



The whole family will enjoy live performances by the Conservationists, a group of engaging scientists that combine music, storytelling and their own research to deliver a powerful message. Enjoy fine dining at any of our 5 star restaurants boasting endless vegetarian, vegan and gluten free options. After a long day full of adventure, relax in one of our many marine mammal themed rooms.

Wake up in adventure mode and take the family on an excursion to one of the icy-blue glaciers we pass in Glacier Bay.

Wildlife biologists and harbor seals everywhere thank you for choosing Eco-Cruise Tours!



### ANNA PIERCE

Masters of Conservation Medicine  
 Candidate 2018  
 GIS 591

Data Sources: ESRI, Alaska Department of Natural Resources, NOAA, BOEM, US Department of Transportation, NPS

Projection: NAD\_1983\_Alaska\_Albers

Thank you Carolyn for everything!



Cruise Ship:  
[https://thumb1.shutterstock.com/display\\_pic\\_with\\_logo/1141187/44388734/stock-vector-cruise-liner-icon-in-simple-style-isolated-on-white-background-44388734.jpg](https://thumb1.shutterstock.com/display_pic_with_logo/1141187/44388734/stock-vector-cruise-liner-icon-in-simple-style-isolated-on-white-background-44388734.jpg)  
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