



# ARCTIC MARINE TOURISM PROJECT

PASSENGER VESSEL  
TRENDS IN THE ARCTIC  
REGION (2013-2019)

MAY 2021



ARCTIC COUNCIL

**PAME**

Protection of the Arctic Marine Environment

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*Data analysis: Louise Ireland, British Antarctic Survey*

*Project leads: Canada, Iceland, United Kingdom*

*Images: GettyImages, unless otherwise stated*

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# EXECUTIVE SUMMARY

The Arctic Marine Tourism Project: Passenger Vessel Trends in the Arctic Region (2013-2019) (AMTP 2021) expands upon a previous PAME project, the Arctic Marine Tourism Project – Best Practice Guidelines (AMTP 2015). AMTP 2021 is comprised of the following two Work Packages:

## **Work Package 1 (WP1): Compilation of Data on Tourism vessels in the Arctic**

The project has compiled and analyzed information on passenger vessels throughout the Arctic region from 2013-2019 using the Arctic Ship Traffic Database (ASTD) to better understand recent developments, identify gaps in data, and to explore the feasibility of obtaining information on smaller recreational vessels not obligated to carry Automatic Identification System (AIS) transponders. This information has been compiled into an online repository of information.

## **Work Package 2 (WP2): Summary of Existing Site-specific Guidelines for Near-shore and Coastal Areas of the Arctic Visited by Passengers of Passenger Vessels and Pleasure Craft**

The project provides an example of a standardized template that could be used for the development of site-specific guidelines aimed at tourists/vessel operators, and tailored towards, inter alia, mitigating safety and environmental risks, encouraging sustainable use, and educating visitors on ecological, cultural, and historical features unique to particular areas. An explanation of the methodology used and the step-by-step approach to be employed is also included. This work was done in close collaboration with the Association of Arctic Expedition Cruise Operators (AECO).

## WORKING GROUP ON THE PROTECTION OF THE ARCTIC MARINE ENVIRONMENT (PAME)

The Working Group on the Protection of the Arctic Marine Environment (PAME) is one of the Arctic Council's six Working Groups and is at the nexus of the Arctic Council's activities related to the protection and sustainable use of the Arctic marine environment. PAME provides a unique international forum for collaboration amongst a diverse range of stakeholders on a wide range of activities that fall within this regard.

PAME's mandate is focused on addressing non-emergency marine issues throughout the Arctic Region, and in developing related studies, assessments, or recommendatory measures to support the conservation and sustainable use of Arctic marine and coastal environments that are particularly vulnerable to land and sea-based activities. Examples of PAME's wide-ranging output include coordinated strategic plans, programs, assessments, and guidelines; many of which are designed to complement existing efforts within other Arctic-focused regional or international fora and that are anchored in the protection and sustainable use of the Arctic marine environment.

# PAME

Protection of the Arctic Marine Environment



# PROJECT BACKGROUND AND PROCESS

This Arctic Marine Tourism Project – Passenger Vessel Trends in the Arctic Region Report expands upon a previous PAME project, the Arctic Marine Tourism Project – Best Practice Guidelines (AMTP 2015).

In recognition of the wide-ranging management challenges associated with the growth of tourism in the region, the AMTP 2015 project attempted to identify issues or gaps where the Arctic Council could add value and culminated in the creation of a range of voluntary best practice guidelines encouraging action by the Arctic Council, Arctic States, or collaboration between the two.

These guidelines were intended for broad application and not necessarily exclusive to ship operators, but also coastal administrations and local communities directly involved in aspects of Arctic marine tourism.

Moreover, the guidelines were designed to strengthen the range of existing material in place in support of sustainable and responsible Arctic marine tourism issued by levels of government, Indigenous communities, industry, industry associations and the NGO community.

This Arctic Marine Tourism Project (AMTP 2021) is connected to the AMTP 2015 insofar as it responds directly to three of the overall recommendations:

AMTP 2015 Recommendations	AMTP 2021 Response
Compile and regularly update a publicly available repository of circum-Arctic marine tourism information.	This project has compiled and analysed information about passenger vessels from 2013-2019. Data has been filtered and organized and presented in the form of an <a href="#">online repository of information</a> , available for use by all. A key component of AMTP 2021, this repository includes a range of detailed Excel sheets as well as accompanying maps that can be further manipulated for desired ends (e.g. trend analysis). While the focus of this data is on passenger vessel activity specifically within the Arctic as defined within the Polar Code, information on shipping within the Icelandic and Faroese Exclusive Economic Zones (EEZ) is also included.
Support continued and improved access to maritime information.	This project has compiled and analysed historical information about passenger vessels from 2013-2019 and <a href="#">posted it on the PAME website</a> . This information can be further processed for more bespoke trend analyses.
Develop a standardized framework for, and encourage the preparation of, site-specific guidelines for near-shore and coastal areas of the Arctic visited by passengers of marine tourism ships and pleasure craft.	Through close cooperation with the Association of Arctic Expedition Cruise Operators (AECO) this project provides an example of a standardized template that could be used for the development of site-specific guidelines aimed at tourists/vessel operators, and tailored towards, inter alia, mitigating safety and environmental risks, encouraging sustainable use, and educating visitors on ecological, cultural, and historical features unique to particular areas. An explanation of the methodology used and the step-by-step approach to be employed is also included.

The project plan for AMTP 2021 comprised of two Work Packages.

### **Work Package 1 (WP1): Arctic Marine Tourism Data**

Objective - Compile information on vessels engaged in tourism throughout the Arctic Region using PAME's Arctic Shipping Traffic Database (ASTD) to better understand recent developments, to identify gaps in data, and to explore the feasibility of obtaining information on the whereabouts of smaller tourist or recreational vessels not obligated to carry Automatic Identification System (AIS) transponders.

### **Work Package 2 (WP2): Framework for Best Practice Guidelines**

Objective - Summarize existing site-specific guidelines for near-shore and coastal areas of the Arctic visited by passengers of marine tourism vessels and pleasure craft, and develop a standardized template that could be used to assist with the development of any future site-specific guidelines throughout the region.

## **ONLINE REPOSITORY**

*The online repository contains maps and graphics from the report, details on data analysis, Excel sheets with data used in the analysis, and reports from AECO produced for this project.*

[LINK](#)



# TOURISM PROJECT WORKSHOP

The Arctic Marine Tourism Project workshop was held on 3 February 2020, immediately preceding the first PAME Working Group Meeting of the year (PAME I-2020). The overarching aim of the workshop was to bring together a diverse array of perspectives with experience in overseeing or responding to the challenges posed by vessel-based tourism across the Arctic Region, as well as to solicit input and generate discussion on the projects two work packages.

With respect to WP1, the focus of the workshop was to generate discussion on data parameters and how to best present information for public consumption. These discussions built off preliminary analytical work conducted by the British Antarctic Survey prior to the workshop.

Whereas concerning WP2, the overarching objective was to take stock of the existing range of site-specific guidelines throughout the Arctic Region and from this inventory identify commonalities or best practices. WP2 did not consider the development or creation of new guidelines, as this was deemed to be well outside the remit of PAME.

Over 20 participants attended the workshop, including representatives from both the British Antarctic Survey (BAS) and the Association of Arctic Expedition Cruise Operators (AECO) who worked with the project co-leads to complete separate work packages in support of the project.

The workshop meeting report, presentation, the agenda and list of participants is accessible [here](#).



# GEOGRAPHIC RANGE

In an effort to keep the data analysis manageable, the definition of the Arctic as set out by the International Maritime Organization in the context of the Polar Code was used. This definition was selected given the underlying terms of reference of this project, as well as to focus efforts more on higher latitude expedition vessel operations, rather than lower latitude ferry operations not necessarily aligned with more dedicated acts of tourism.

While this was the primary geographic area of focus, some preliminary analysis on passenger vessel trends within both the Icelandic and Faroese Exclusive Economic Zones was also conducted given the niche tourism market between these two maritime zones. This data can be obtained [here](#).

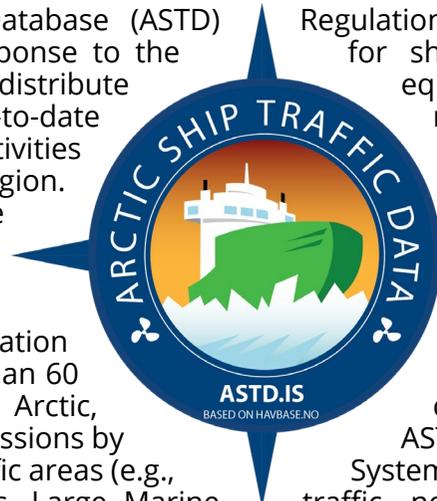
All passenger vessels certified under the International Convention for the Safety of Life at Sea (SOLAS) to carry more than 12 passengers, and operating within the limits of this geographical definition of the Arctic must comply with the relevant safety provisions of the Polar Code. The Polar Code's pollution prevention provisions similarly apply within this area, though are based on the application criteria of the relevant annexes set out under the International Convention for the Prevention of Pollution from Ships (MARPOL).

*Arctic Polar Code Area, as defined by the IMO Polar Code.  
Map provided by IMO.*



# ARCTIC SHIP TRAFFIC DATABASE (ASTD)

PAME's Arctic Ship Traffic Database (ASTD) project was developed in response to the recognized need to collect and distribute accurate, reliable, and up-to-date information on shipping activities throughout the Arctic Region. Launched in February 2019, the ASTD System collects a wide range of historical vessel activity information, including ship tracks by ship type, information on number of ships in more than 60 ports/communities across the Arctic, detailed measurements on emissions by ships, shipping activity in specific areas (e.g., the Exclusive Economic Zones, Large Marine Ecosystems, Polar Code area, etc.), as well as fuel consumption by ships.



Regulation V/19 (Carriage requirements for shipborne navigational systems and equipment) of the SOLAS Convention requires that AIS be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages; cargo ships of 500 gross tonnage and upwards not engaged on international voyages; and all passenger ships regardless of size.

AIS signals from all ships are captured and included within the ASTD. However, AIS data in the ASTD System does not cover 100% of all ship traffic, notably those vessels (e.g. pleasure craft, smaller cargo and fishing vessels) not under obligation to carry transponders. In addition, numerous factors can also affect the quality of AIS messages and therefore the quality of the data within the ASTD, including technical failure due to faulty infrastructure (ship and data flow); erroneous onboard installation (ship infrastructure); problems with data links/networks; AIS signals being manipulated (e.g. being deliberately turned off); data noise; and challenges regarding satellite coverage.

The ASTD collects Automatic Identification System (AIS) data generated onboard ships to provide information about ship type, position (down sampled to every 6 minutes for ASTD), course, speed, navigational status, as well as a range of other safety-related information. The information is then sent automatically to appropriately equipped shore stations, to other ships, and to satellites. This information is fed into the ASTD database.

## TERMINOLOGY

*Only data on AIS carrying passenger ships, cruise ships, and yachts operating within the aforementioned geographic range was collected and analyzed for this project. As the AMTP 2021 leverages ASTD data, an aggregate of IHS Markit StatCode 5 Shiptype Coding is used. The IHS Markit dataset contains seven unique types of passenger vessels (most of which are ferries), two unique types of cruise vessels, and four types of yachts. For ease of reference, these three categories are hereinafter collectively referred to simply as passenger vessels for the purposes of this report.*

# SECTION 1: TREND ANALYSIS

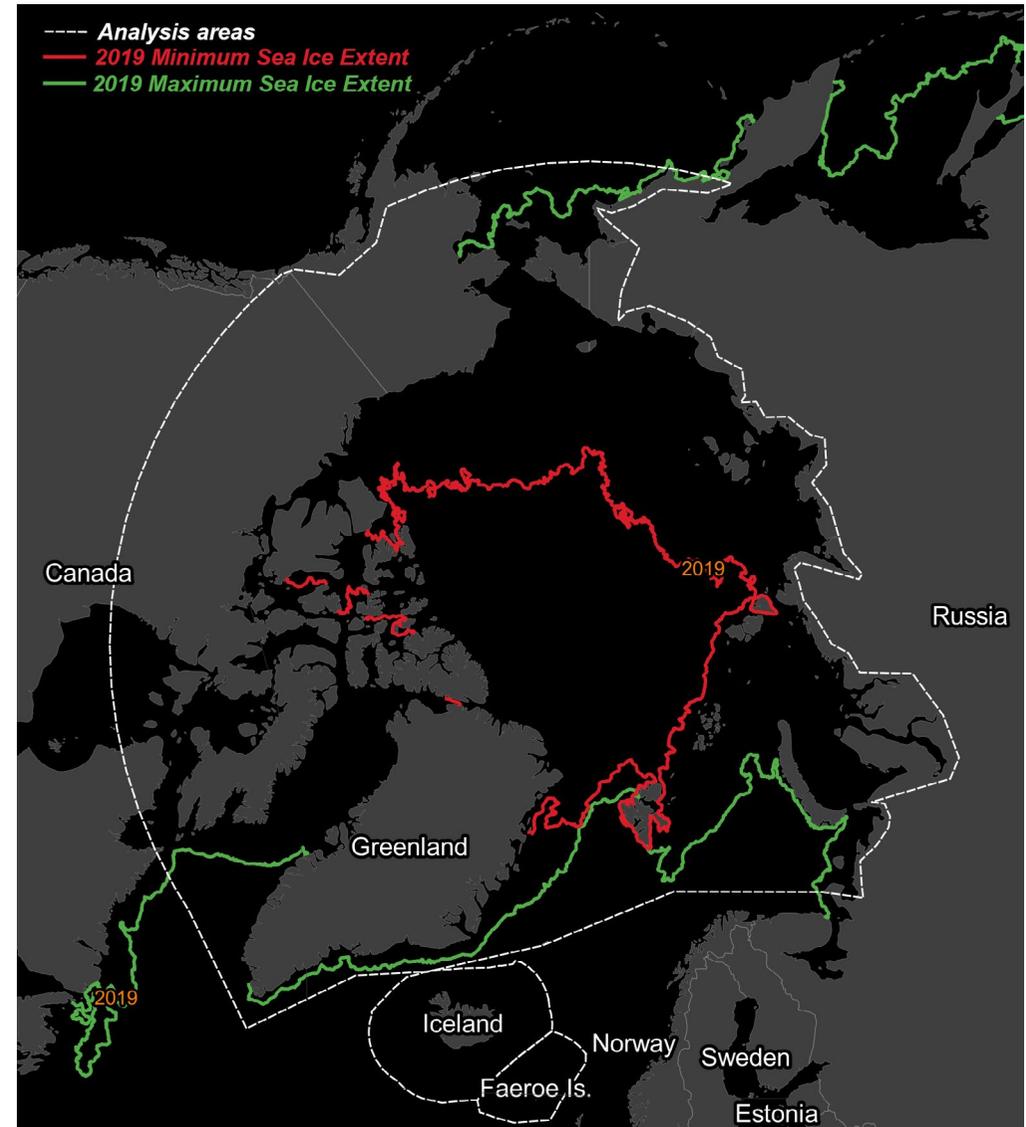
The objective of WP1 was to compile information on vessels engaged in tourism throughout the Arctic Region using the ASTD to better understand recent developments, to identify gaps in data, and to explore the feasibility of obtaining information on the whereabouts of smaller tourist or recreational vessels not obligated to carry AIS transponders.

## DATA ANALYSIS

To facilitate this, the British Antarctic Survey (BAS) was commissioned to conduct an analysis of passenger vessel data contained within the ASTD during the period of 2013 to 2019. In close coordination with co-leads, BAS cleaned, filtered, organized and structured this data in order to focus the scope of the analysis to the defined geographic area (e.g. the Arctic as defined within the Polar Code) as well as the specific ship types (e.g. passenger vessels) set out by the project leads.

*Analysis area in white, sea ice extent from 2019 in green (maximum in 2019) and red (minimum in 2019)*

1: QGIS is a free and open-source cross-platform desktop geographic information system (GIS) tool.



BAS delivered two products, a QGIS analysis, and an accompanying “Report on Geospatial Analysis of Arctic Marine Tourism”, see [online here](#). This report explains in detail the methodology used and includes a variety of maps and spreadsheets that provide a visual representation of information on each ship, including the fuel capacity, fuel used, size and type. BAS analysis provides a curated and user friendly dataset from which subsequent bespoke or more detailed analyses can follow. The data and graphics presented in this report provide only a small representative illustration of how the filtered BAS data can be used for further study.

BAS also overlaid maps with information representing the median minimum and maximum sea ice extent for each year from 2013 – 2019 using data from the National Snow and Ice Data Center. This sea ice information can be used to highlight differences in seasonal travel as well as to indicate proximity of vessel activity to the ice edge, and possible increased levels of navigational risk. The figure on page 9 shows the minimum and maximum sea ice edge positions within the Polar Code’s definition of the Arctic during 2019.

Indeed, if data on sea ice extent is overlaid with ship tracks, it becomes possible to obtain a high-level tabletop indication of whether there is a trend in passenger vessels travelling in close proximity to the ice edge, or in ice regimes outside the operational capabilities for the ice class of the vessel.

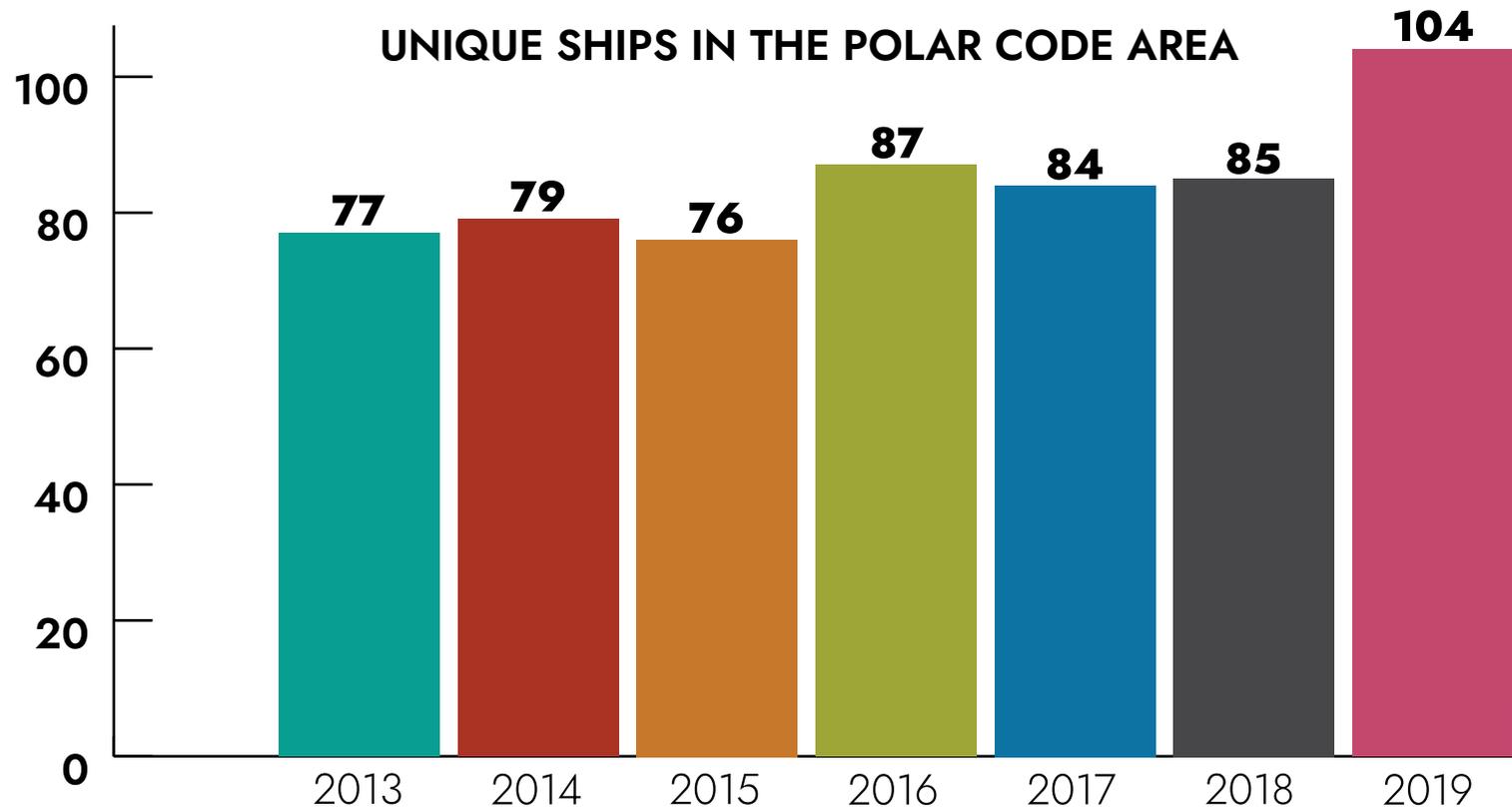
To allow for visualization against the high-resolution ships tracks and density grids BAS generated the final sea ice edges from AMSR2 Sea Ice Concentration grids at 6.25km resolution. Using this data, BAS produced an ice edge defined as 15% concentration.



## NUMBER OF SHIPS IN THE ARCTIC

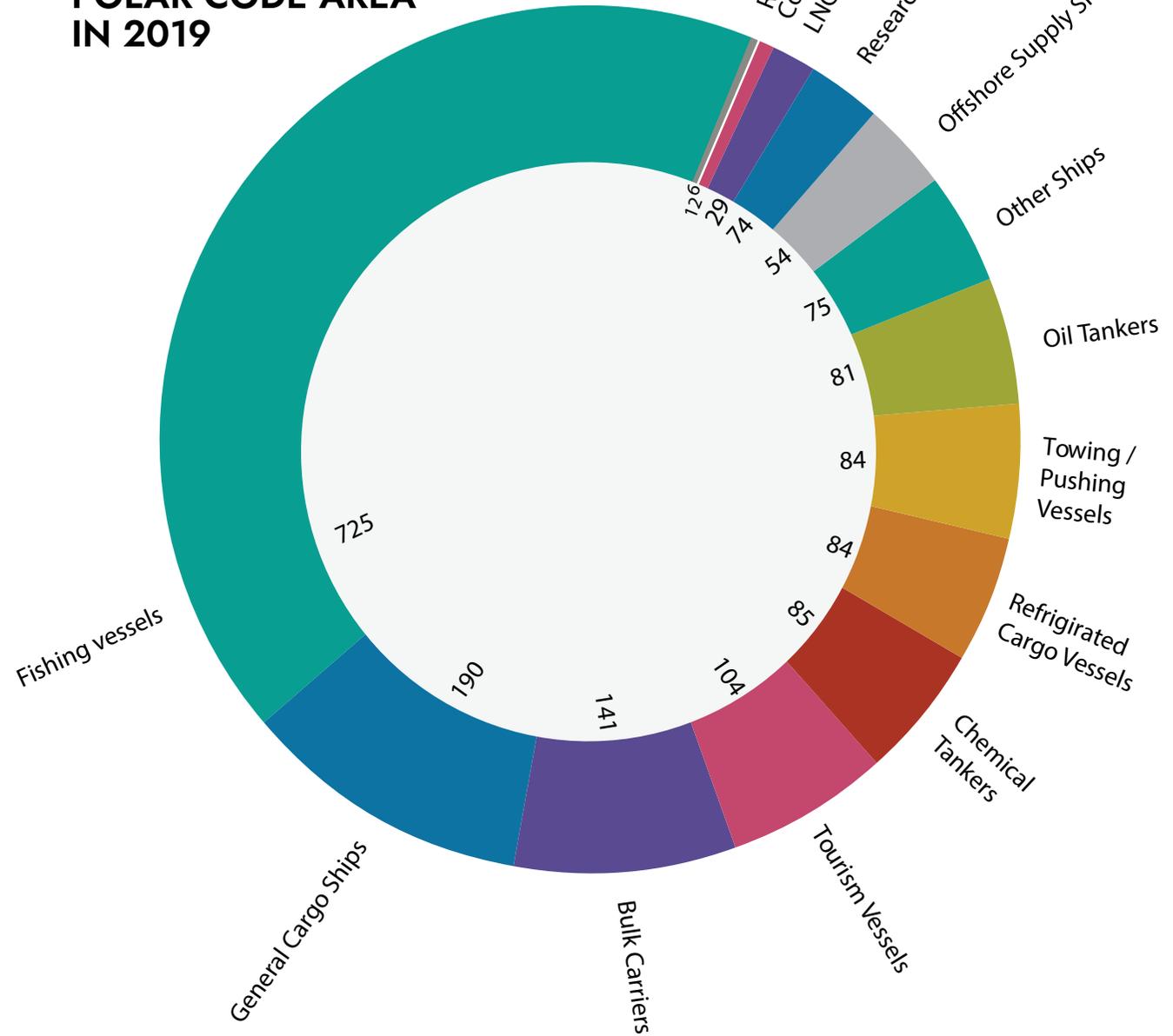
There are multiple ways to frame levels of ship activity within a given geographic area. One common methodology is to tabulate the number of unique or individual ships operating within a specific area - referred to as unique ship count. This method counts each ship only once, regardless of whether there are multiple entries and exits within a preset polygon.

From 2013-2019 there has been a gradual increase in the number of individual passenger vessels operating within the Arctic as defined by the Polar Code. The total increase from 2013 to 2019 is 35%.



To further contextualize this, a high-level snapshot of all types of vessels operating within the Arctic as defined in the Polar Code area shows 1717 unique ships operating in 2019, 104 (6%) of which were tourism or passenger vessels. This is the same relative percentage as in 2013, though the actual number of individual vessels were fewer at the time at 77.

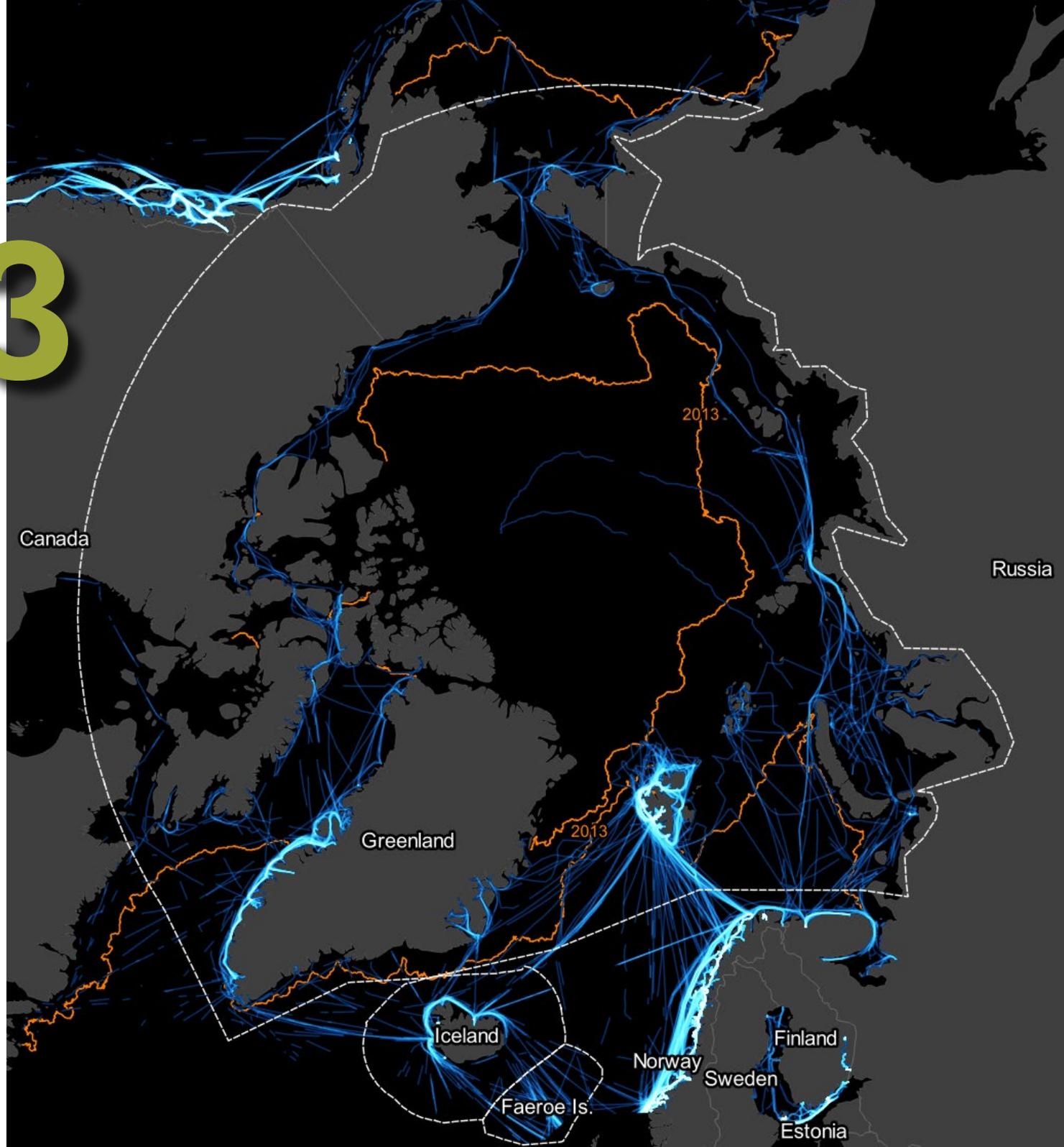
### SHIP TYPES IN THE POLAR CODE AREA IN 2019



# 2013

## TOURISM VESSEL TRAFFIC

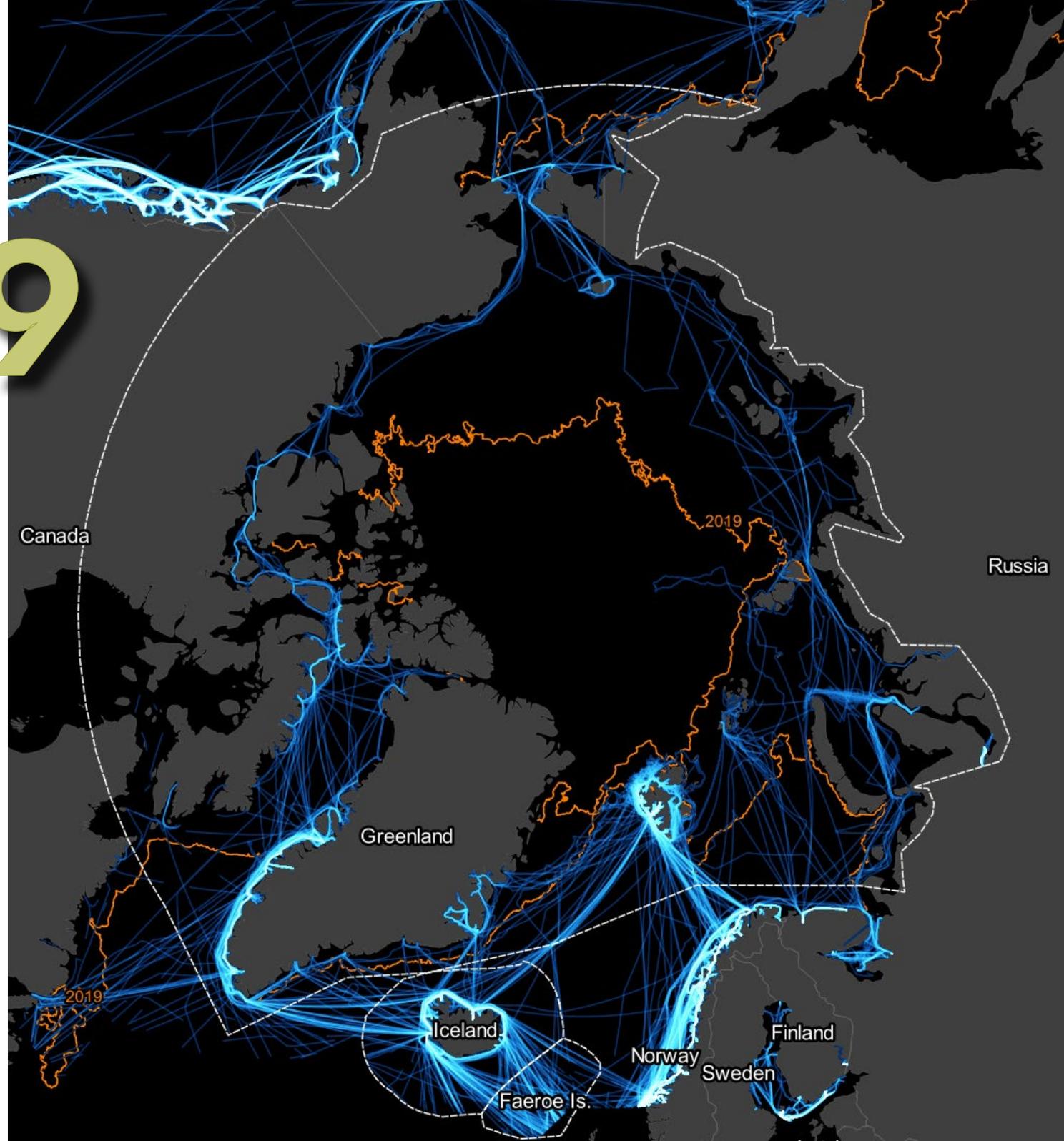
*Tracks of all  
tourism vessels in  
the Arctic in 2013.*



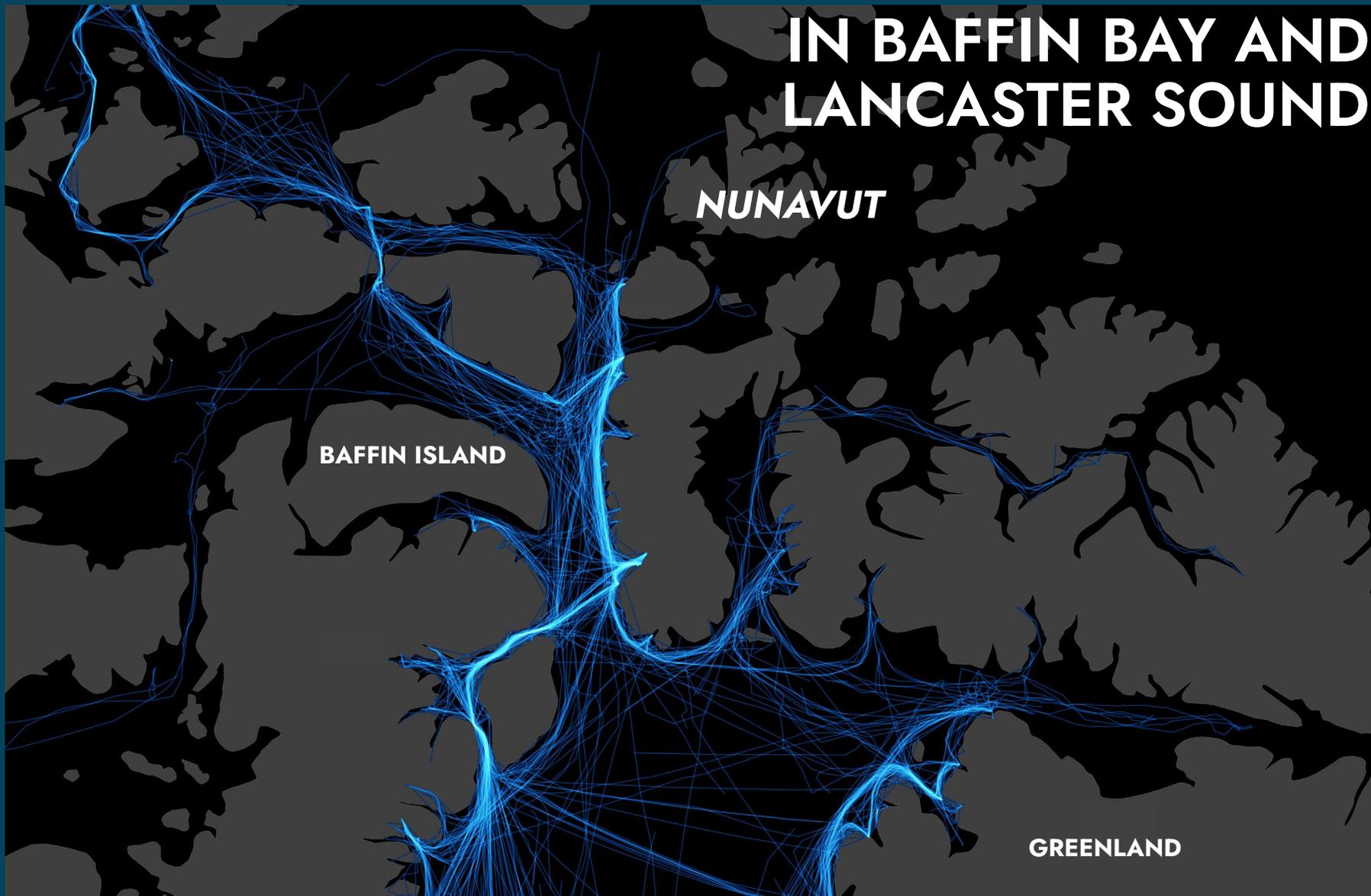
# 2019

## TOURISM VESSEL TRAFFIC

*Tracks of all  
tourism vessels in  
the Arctic in 2019.*



# TOURISM TRAFFIC IN BAFFIN BAY AND LANCASTER SOUND

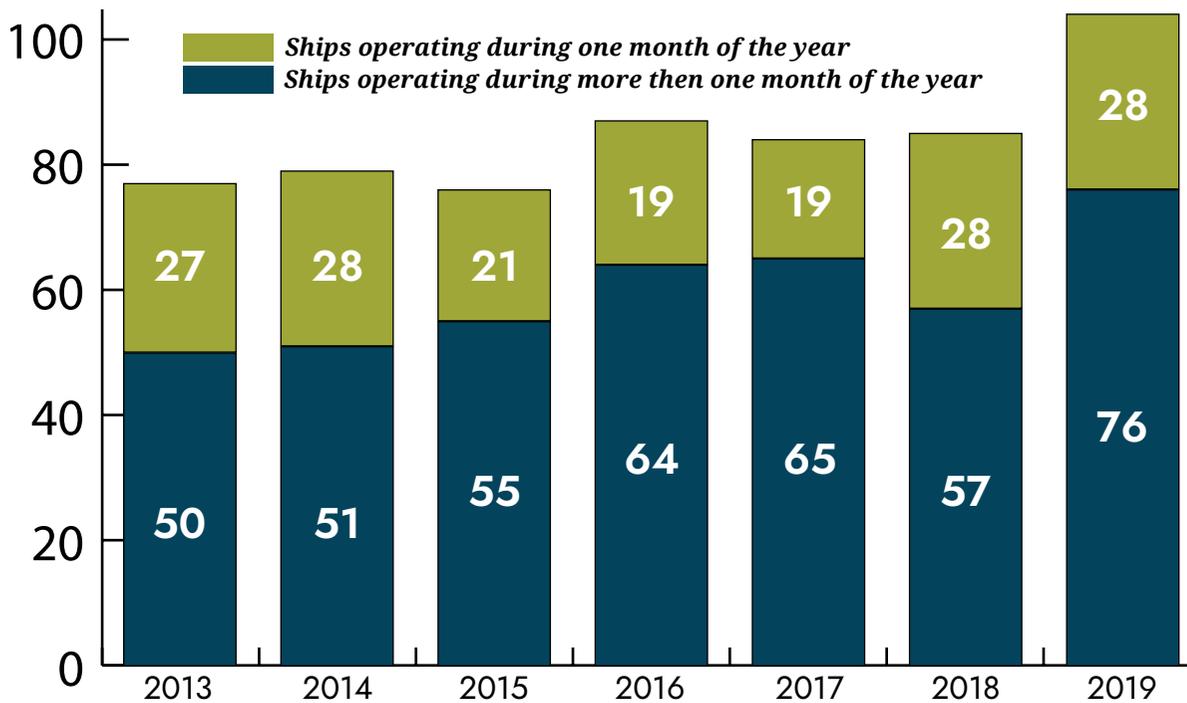


*Tracks of all tourism vessels 2013-2019.*

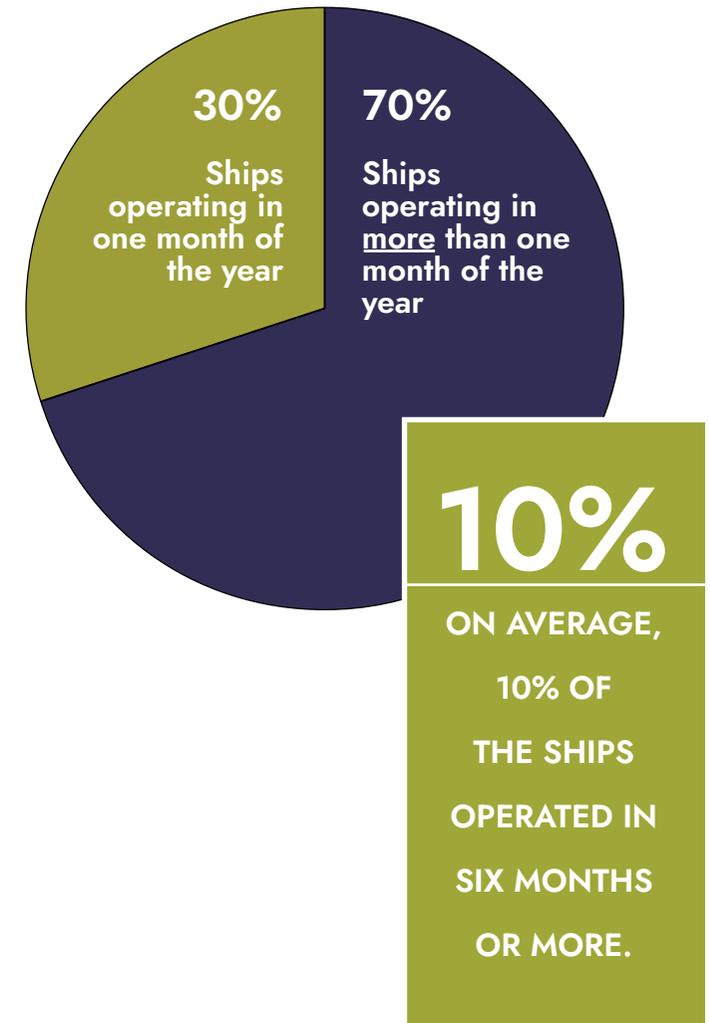
## SHIP FREQUENCY

The percentages noted in the pie chart to the right represent averages for an entire calendar year, over the course of seven years total. More specifically, the column chart below compares the number of individual passenger vessels operating during only a single month of the year, to the number of individual passenger vessels operating during more than one month.

The number of individual ships operating during more than six months is also shown, while in each of the six years analyzed, at least one passenger vessel was shown to have operated in all 12 months of the year.



## 2013-2019 AVERAGE



## CASE STUDY: KISAQ

An example of a tourism vessel operating throughout the year is the Kisaq, a passenger vessel sailing under the flag of Greenland and based in Nuuk. The map illustrates the limited geographical range of the vessel (see yellow track).



*Kisaq: Peter Schmidt Mikkelsen*



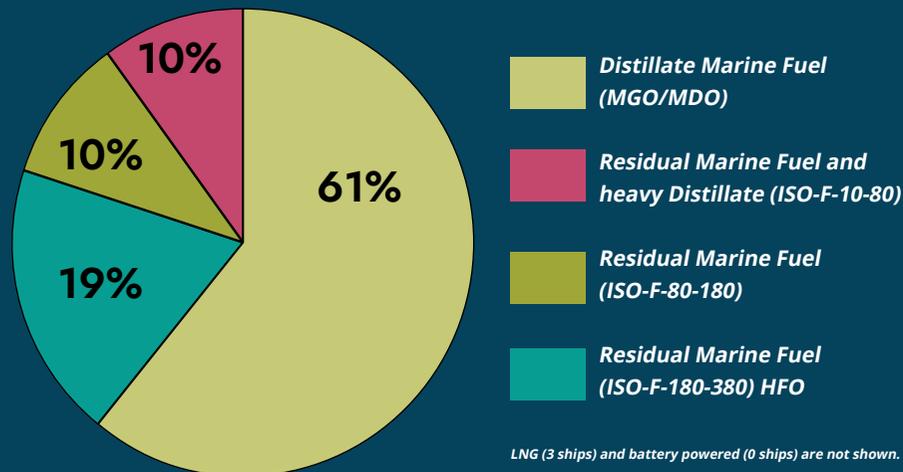
**KISAQ SHIP TRACK IN 2019**

## FUEL USED BY PASSENGER VESSELS

Half of all passenger vessels used distillate marine fuel to navigate in the Polar Code area in 2019, while 24% used Heavy Fuel Oil (HFO). HFO in the context of this report refers to oils that have the characteristics specified in paragraph 1.2 of Regulation 43 of the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I. There, HFO is defined as: "oils, other than crude oils, having a density at 15°C higher than 900 kg/m<sup>3</sup> or a kinematic viscosity at 50°C higher than 180 mm<sup>2</sup>/s."

Most ships operating in Arctic waters use several types of oil as fuel. By far, the most frequently used fuel in the Polar Code area in 2019 was distillate marine fuel oil, though the use of HFO has risen in recent years.

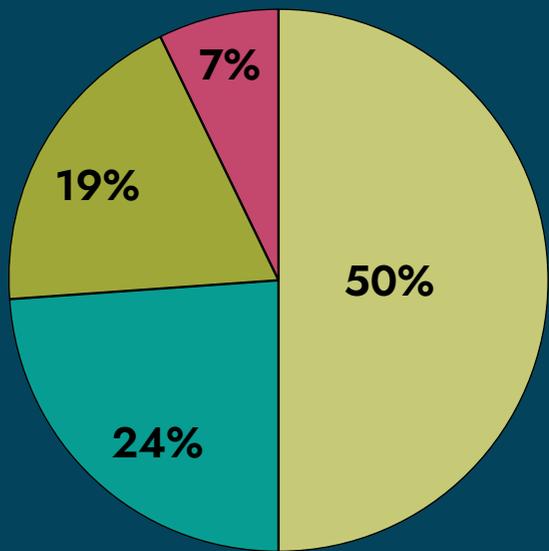
**Fuel use by 1717 ships in the Arctic Polar Code area in 2019.**  
Graph from PAME's Arctic Shipping Status Report.



### **PAME's ASTD database distinguishes between six types of fuel:**

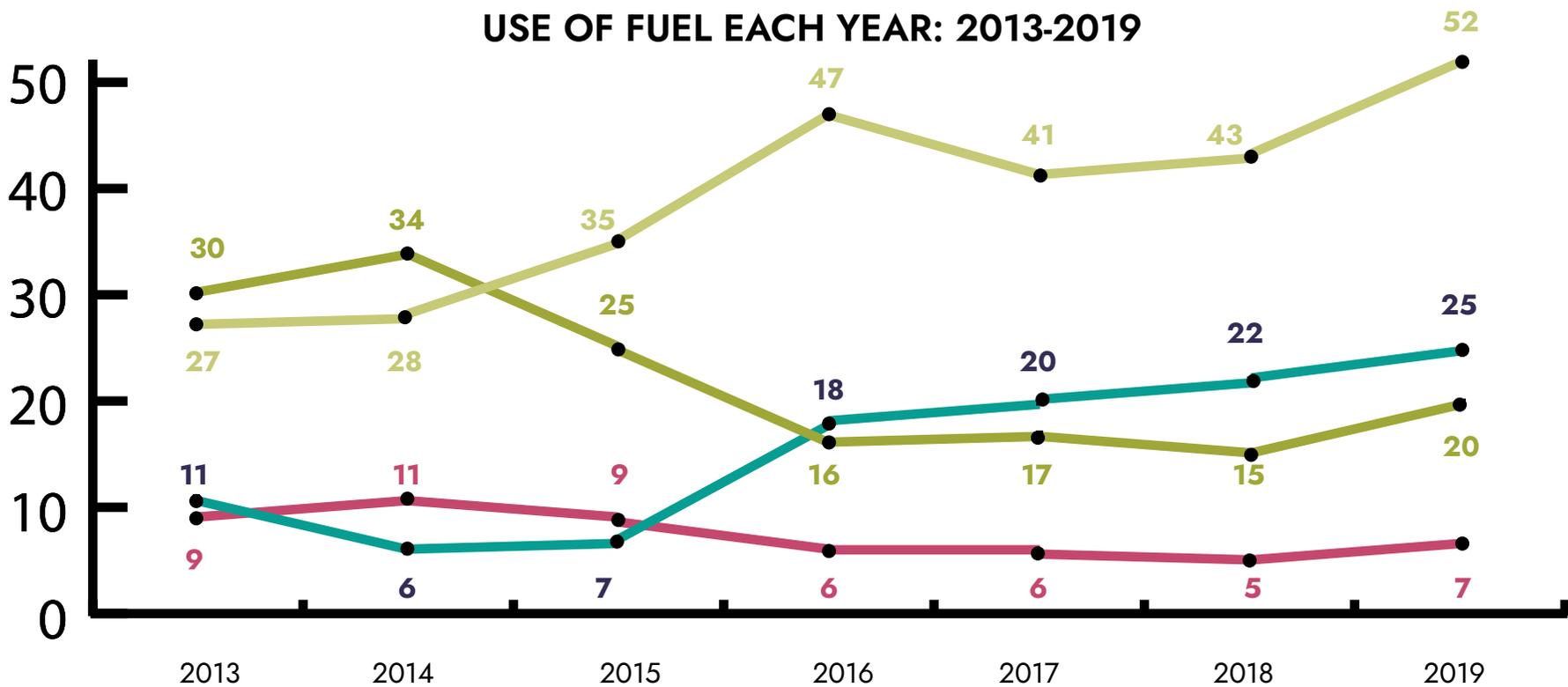
- **Distillate marine fuel:**  
*Light petroleum products that are not residual fuels. These can be either Marine Gas Oils (MGO) or Marine Diesel Oils (MDO).*
- **Residual marine fuel and heavy distillate (ISO-F10-80):** *Residual marine fuel with a viscosity ISO-F10-80. This category refers to light residual marine fuel and heavy distillate (heavier than MGO and MDO).*
- **Residual marine fuel (ISO-F-80 - 180):**  
*Refers to heavier oils with viscosity between 80 and 180.*
- **Residual marine fuel (ISO-F-180 - 380 or above) HFO:**  
*This is Heavy Fuel Oil. The viscosity is between 180 and 380, or above.*
- **Liquefied Natural Gas (LNG):**  
*LNG is a natural gas (predominantly methane), cooled down to liquid form for ease and safety of storage or transport.*
- **Battery Power:**  
*Ships run on 100% electricity.*

**The term HFO in this report refers to oils that have the characteristics specified in paragraph 1.2 of regulation 43 of the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I.**



## 2019 FUEL USE BY TOURISM SHIPS IN THE ARCTIC POLAR CODE AREA

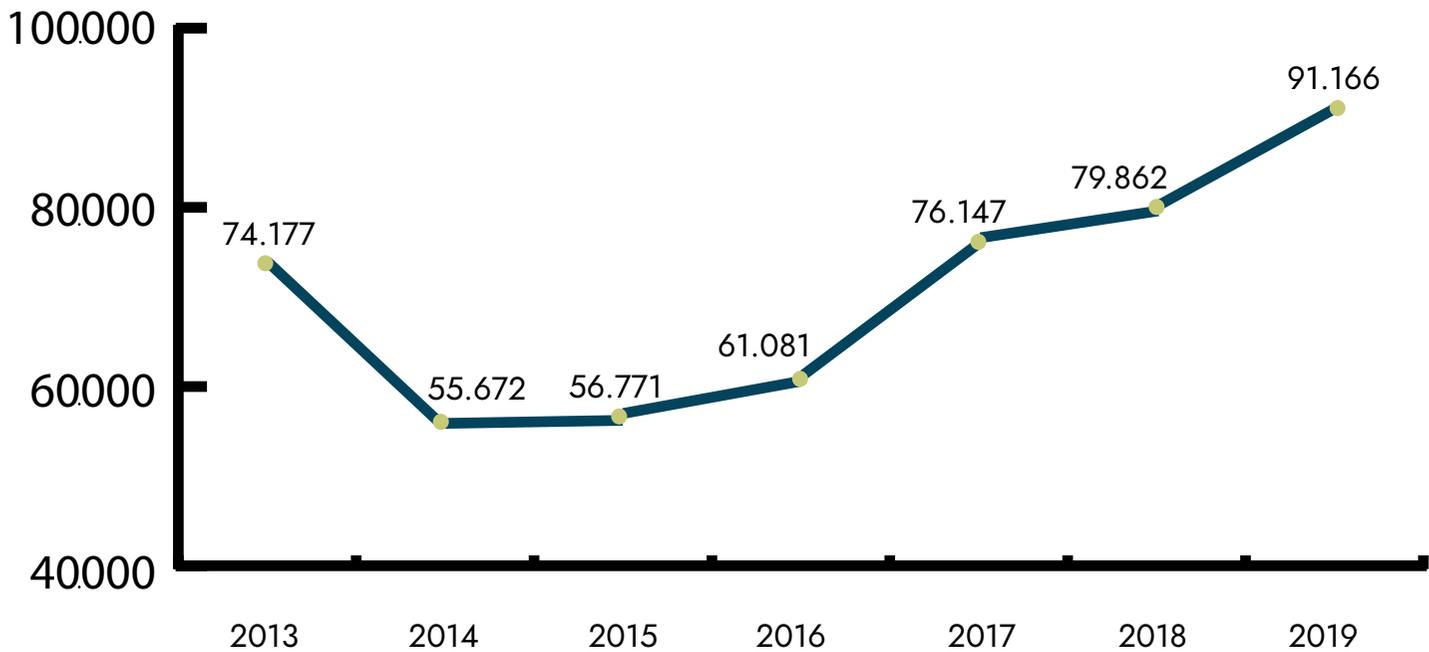
USE OF FUEL EACH YEAR: 2013-2019



## PASSENGER CAPACITY

This section refers to the maximum number of passengers tourism vessels are certified to carry. For the purposes of this report, this figure provides an idea of how many passengers could conceivably be onboard a vessel, within a certain area at a given time assuming full occupancy. AIS data limitations make it impossible to accurately determine numbers of passengers onboard, without access to certain coastal state or industry reporting datasets it is. This results in the highest end estimate calculating the *total number* of passengers (and crew) vessels are allowed to carry.

The graph below indicates that the number of passengers carried by vessels throughout the Arctic Region has increased over time, not only due to an increase in overall numbers of individual passenger vessels operating in the area, but also due to an increase in size and overall passenger occupancy onboard these vessels.



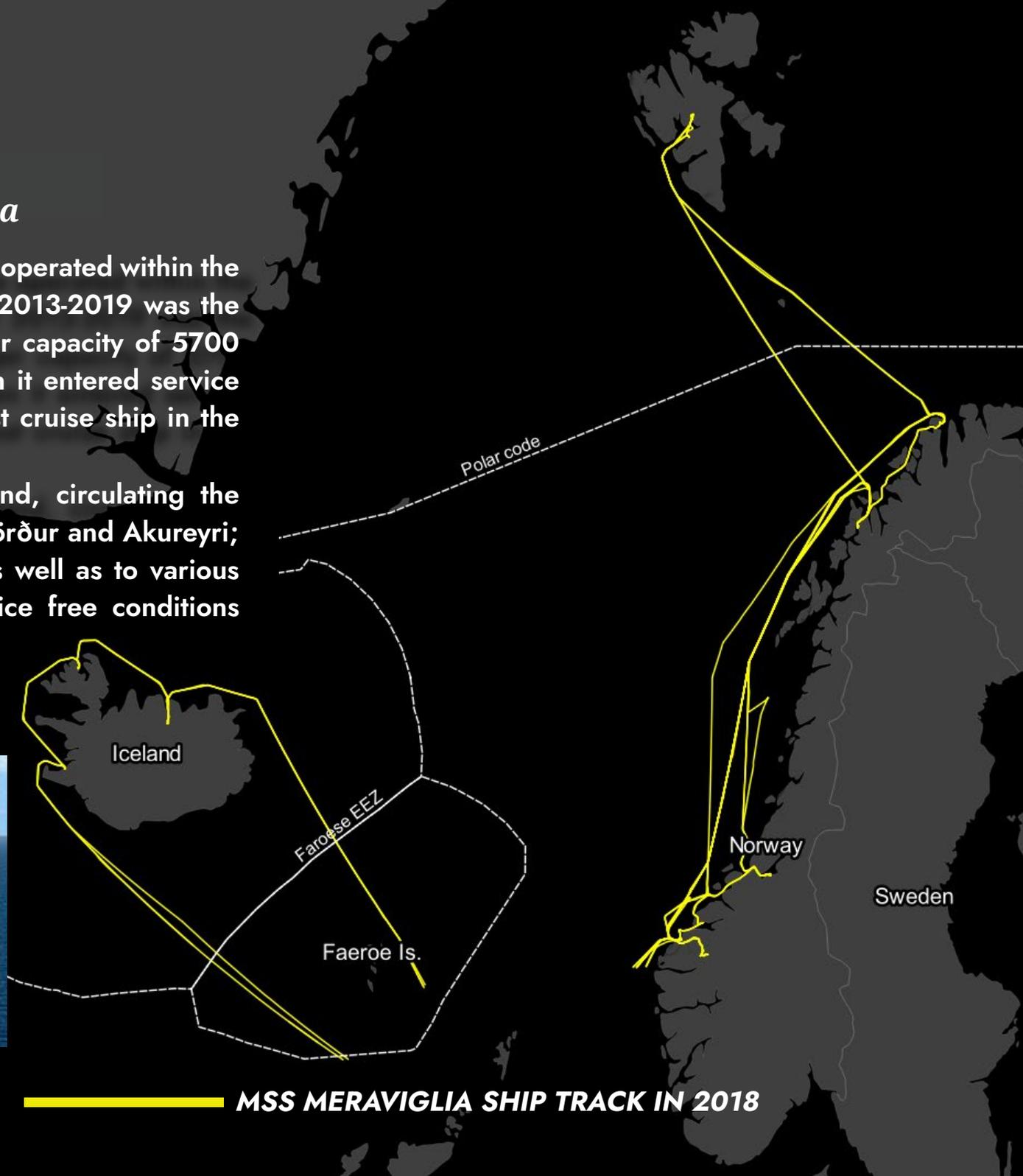
## ***CASE STUDY: MSS Meraviglia***

The largest passenger vessel to have operated within the Arctic Region during the period of 2013-2019 was the MSS Meraviglia, having a passenger capacity of 5700 and a crew capacity of 1536. When it entered service in June 2017, it was the sixth largest cruise ship in the world.

In 2018, it travelled both to Iceland, circulating the country, stopping in Reykjavík, Ísafjörður and Akureyri; and to Longyerbyen in Svalbard, as well as to various places in Norway. It encountered ice free conditions when it sailed to Svalbard.



***MSS Meraviglia***  
***Photo: MSC Cruises***



**MSS MERAVIGLIA SHIP TRACK IN 2018**

## CASE STUDY: S/V NOORDERLICHT

An example of a passenger vessel on the larger end of the tonnage spectrum is the Nautica, registered in the Marshall Islands. It is around 30.000 GT and has a passenger capacity of 777. It only briefly entered the Polar Code area in 2019, sailing close to Kulusuk in Greenland.



**S/V NOORDERLICHT  
SHIP TRACK IN 2018**

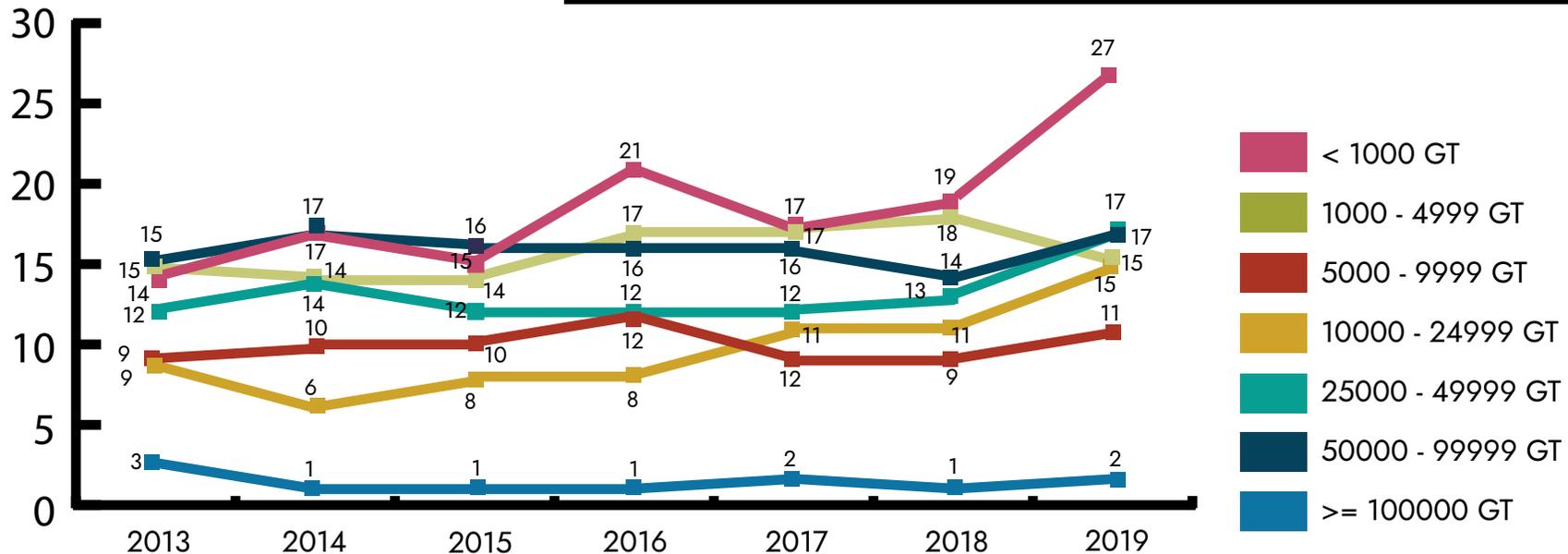


Photo: Wikipedia

On the other hand, an example of a far smaller ship is the S/V Noorderlicht (meaning the Northern Light or Aurora Borealis), a Dutch vessel built in 1910. It has served as an expedition cruise ship in Svalbard for many years, and carries 20 passengers.

## SIZE OF SHIPS

Not many of the world's largest ships travel to the Arctic. Yet the variety and type of passenger vessels engaged in tourism activities does tend to span the size range of spectrum – from pleasure craft, to expedition vessels, to ocean going cruise ship. Around 87% of the passenger vessels operating within the Arctic Region are under 50.000 Gross Tonnes (GT).



## ICE CLASS OF SHIPS

Over the period of this report, approximately 30% of passenger vessels operating in the Arctic have been assigned an Ice Class. This is a notation provided by a Coastal Administration or Recognized Organization on its behalf that provides evidence that the vessel has been designed and constructed to operate within certain sea-ice conditions.

Within the Polar Code, safety requirements are arranged according to categories, which can nominally translate into certain levels of ice strengthening. For example, a Category A vessel can operate in at least medium first year ice that contains old ice inclusions. Vessels assigned a Polar Class (PC) 1-5 ice class fit this category. A Category B vessel can operate in at least thin first year ice that contains old ice inclusions. A vessel with a PC 6 or PC 7 ice class is roughly a Category B. Finally, Category C vessels are vessels that operate in less severe ice conditions than those noted above (including open water), and can also include vessels without any assigned levels of ice strengthening.

In addition to PC notations, vessels can be assigned any number of other difference ice class designations, usually depending on the recognized organization or classification society conducting the survey and issuing the certificate. Given the range of types of ice classes, equivalency table guidance or processes for determining

official equivalency exist within coastal administrations. The table below applies Baltic or Finnish-Swedish Ice Class Rules to passenger vessels operating in the Arctic. For reference, a Baltic 1A Super translates approximately to a PC 6, whereas a 1A is approximately a PC 7.

***ICE CLASS: TOURISM VESSELS IN THE ARCTIC 2013-2019***

Ice class	1A	1A Super	1B	1C	II	Total
2013	2	2	2	13	3	22
2014	2	2	2	11	3	20
2015	2	2	3	11	3	21
2016	3	2	3	12	3	23
2017	2	2	4	13	3	24
2018	2	2	3	14	3	24
2019	3	4	6	14	3	30

## ***CASE STUDY: MS BREMEN***

An example of a ship operating in the Arctic with a particularly high level of ice strengthening (equivalent to a 1A Super) is the ship MS Bremen, renamed Seadventure as of 2020. The ship navigated both the Northern Sea Route and the Northwest Passage in 2019.



*MS Bremen*  
Photo: Wikipedia



**MS BREMEN SHIP TRACK IN 2019**

## SECTION 2: GUIDELINES

### DEVELOPING SITE SPECIFIC GUIDELINES

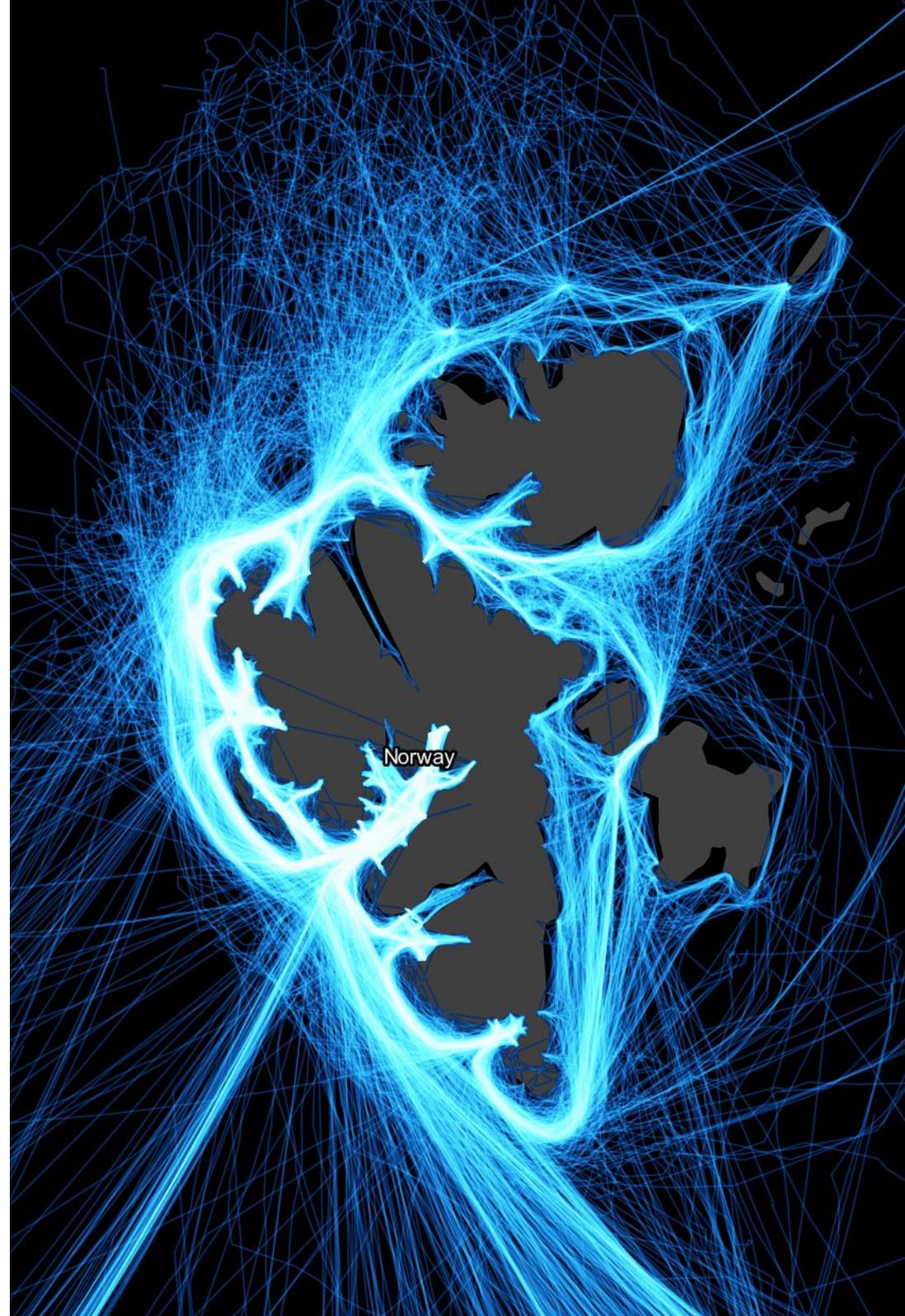
In fulfillment of Work Package two, the AMTP co-leads commissioned the Association of Arctic Expedition Cruise Operators (AECO) to review existing site-specific guidelines and related literature in order to identify commonalities and best practices. This distilled information was then used to develop a universal step-by-step guide for stakeholders on how to apply site-specific guidelines to areas where they are currently lacking.

AECO started developing site specific guidelines in 2010. There are currently 20 in total, and all are limited to sites on the Islands of Svalbard, though the Russian Federation has published site specific guidelines for sites in Franz Joseph Land inspired by the AECO methodology and in collaboration with AECO.

The process of completing a site specific guideline involves multiple steps with input from end users, professional expertise, and local authorities alike. AECO's site specific guidelines have been developed in close cooperation with the Norwegian Institute of Nature Research and employ this institute's unique vulnerability assessment methodology. Experts in the fields of archaeology, botany, and biology, as well as mariners, expedition leaders and local authorities have also been involved in the process.

Section 2 of this report therefore provides a model of how to develop site specific guidelines as a way of contributing to sustainable tourism in the Arctic. The document also explains how multiple entities can work together, and how authorities, science, local communities, and end users (tourist industry) can all potentially benefit from the results. The full report can be found [here](#).

*Ship tracks of all  
tourism vessels  
around Svalbard,  
2013-2019*



## **GUIDELINES – A MANAGEMENT TOOL FOR ARCTIC TOURISM**

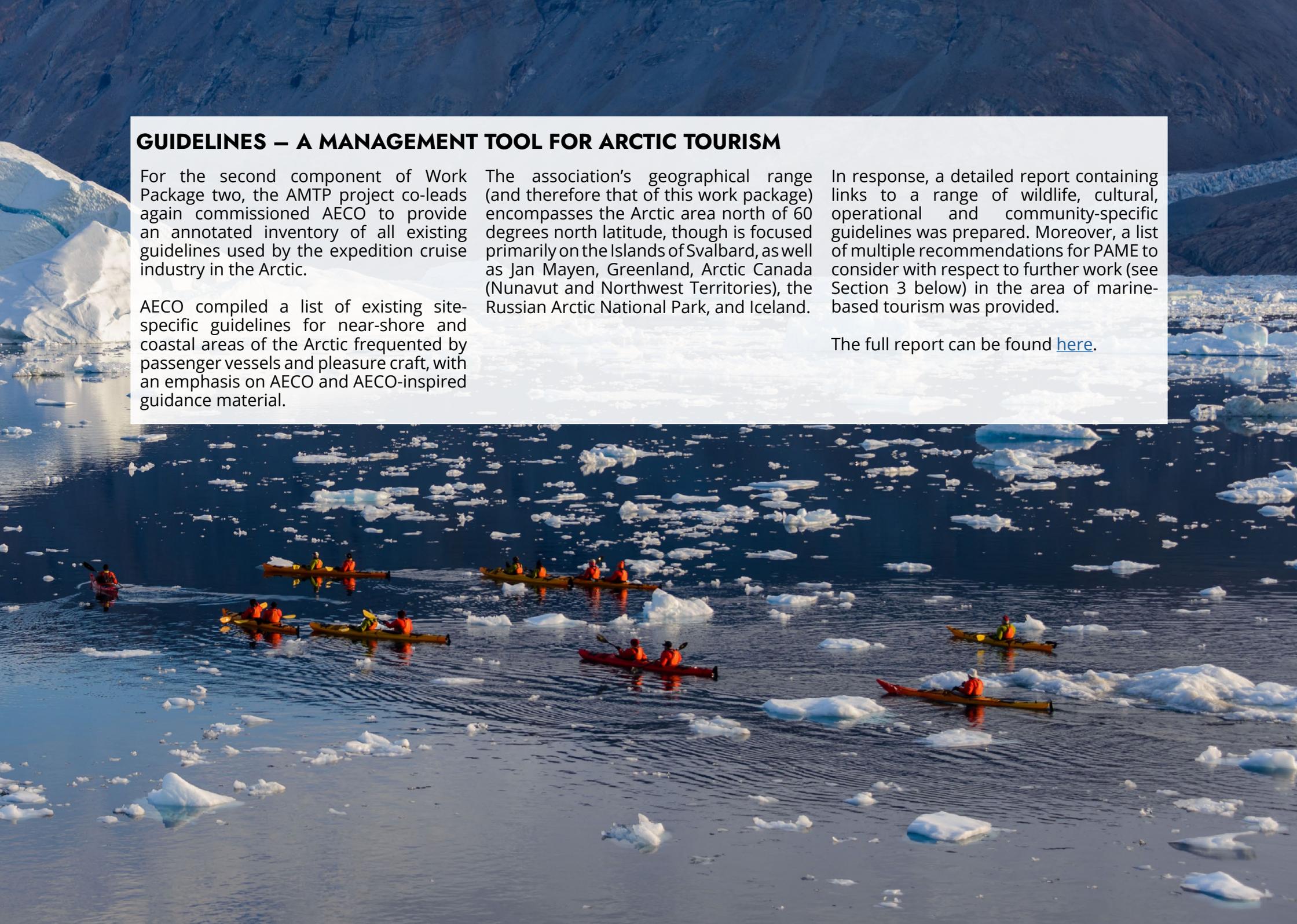
For the second component of Work Package two, the AMTP project co-leads again commissioned AECO to provide an annotated inventory of all existing guidelines used by the expedition cruise industry in the Arctic.

AECO compiled a list of existing site-specific guidelines for near-shore and coastal areas of the Arctic frequented by passenger vessels and pleasure craft, with an emphasis on AECO and AECO-inspired guidance material.

The association's geographical range (and therefore that of this work package) encompasses the Arctic area north of 60 degrees north latitude, though is focused primarily on the Islands of Svalbard, as well as Jan Mayen, Greenland, Arctic Canada (Nunavut and Northwest Territories), the Russian Arctic National Park, and Iceland.

In response, a detailed report containing links to a range of wildlife, cultural, operational and community-specific guidelines was prepared. Moreover, a list of multiple recommendations for PAME to consider with respect to further work (see Section 3 below) in the area of marine-based tourism was provided.

The full report can be found [here](#).



## SECTION 3: FUTURE WORK

These recommendations of future work are for Arctic States, PAME and other Arctic Council Working Groups to consider in the continued advancement of knowledge on the topic of Arctic vessel based tourism:

- *That Arctic governments engage with relevant organizations to identify areas particularly vulnerable to marine based tourism that would benefit from the application of Site-Specific Guidelines.*
- *That PAME continue to examine the filtered ASTD data on passenger vessel activity in the Arctic (2013-2019) used in this report for more detailed trend and gap analyses. Areas of study could include:*
  - » Identification of areas (including specific ports and communities) within the Arctic that receive cruise ships with the greatest number of passengers.
  - » The extent to which passenger vessels are operating in ice conditions with higher levels of risk (vis a vis ice class).
  - » Identification of areas within the Arctic with the most significant growth in passenger vessel activity
- That PAME explore the feasibility of obtaining and analyzing tourism data from smaller vessels operating in the Arctic (e.g. yachts and pleasure craft) not required to carry AIS.



