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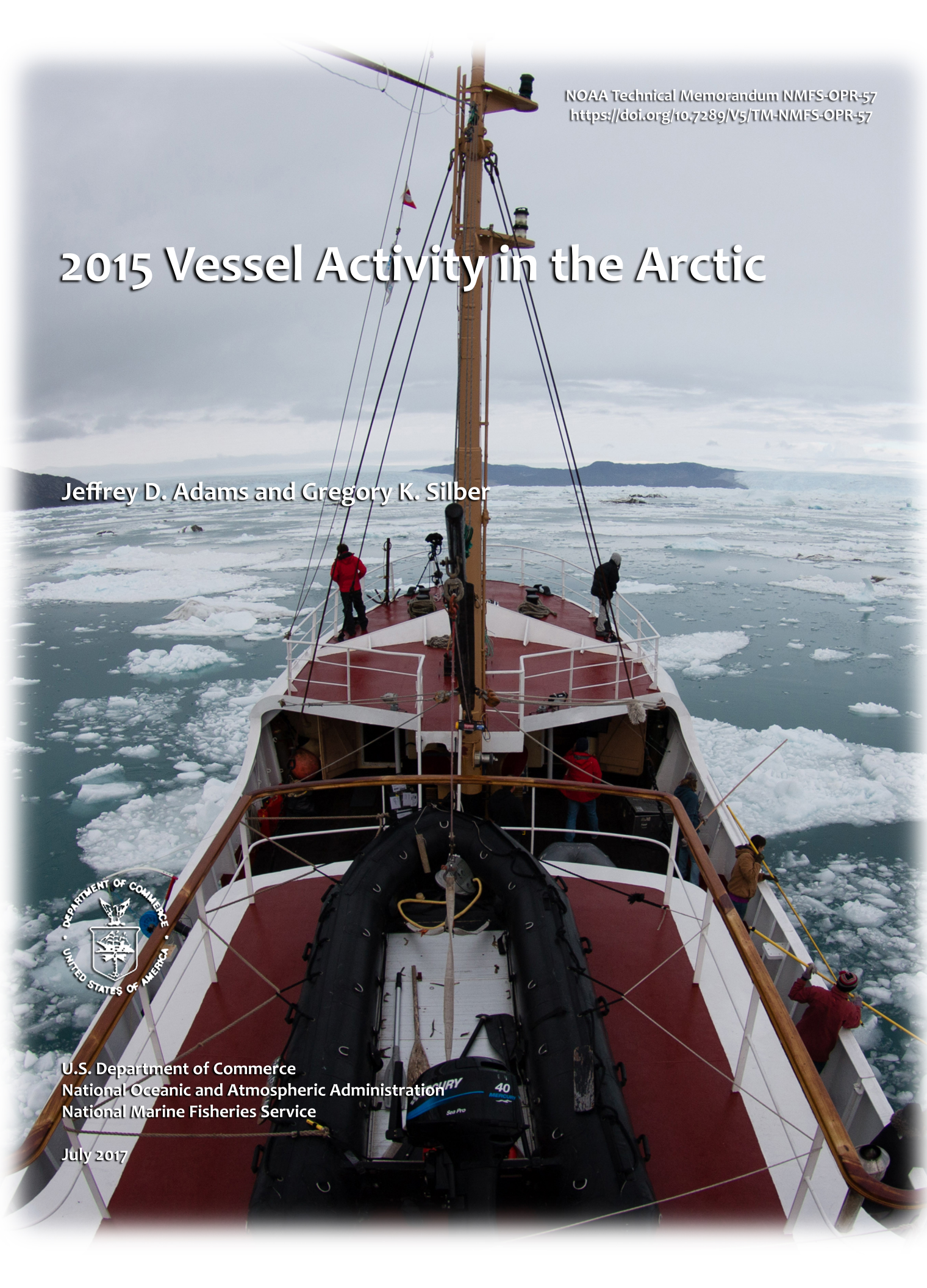

U.S. Department of Commerce
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Table of Contents

List of Appendices

Executive Summary

The marine environment in the Arctic is changing rapidly. Continued expansion of the duration and extent of seasonal ice-free waters is projected to occur over the coming decades, resulting in new opportunities for the utilization of marine resources and increased availability of technically navigable waters. This, in turn, is projected to bring increased levels of maritime activity to the region. It is believed that this increased vessel activity will lead to the degradation of Arctic marine ecosystems, adversely impacting fish and marine mammal populations, as well as the region's indigenous people. While many studies have advanced the idea of increased Arctic vessel activity and the potential impacts, little to no effort has been undertaken to provide a comprehensive baseline of vessel operations in the region to monitor trends.

In an effort to establish a baseline for maritime operations for Arctic waters, we analyzed satellite Automatic Identification System (AIS) data from 1 January 2015 through 31 December 2015. We quantified vessel activities using a set of metrics that includes the number of vessels, number of transits, distance traveled, hours of operation and transit density. These vessel activity metrics are presented for the Arctic as a whole and for the different oceans and seas located within the region using an objective, standardized reporting template. This template provides a detailed accounting of the magnitude, spatial distribution, and seasonal aspects of vessel activities within the region that can be used to monitor trends as AIS data for subsequent years becomes available. We also provide a relatively detailed description of our AIS analysis methodology to facilitate the comparison of the information presented herein to results from similar studies examining vessel operations in the region.

Our analysis of the AIS data resulted in the identification of 116,317 trips made by 5,437 individual vessels. Vessel activity metrics for these transits were calculated, parsed by vessel type and size, and presented on annual and monthly bases for the Arctic as a whole, as well as the following oceans and seas in the region: the Arctic Ocean, Baffin Bay, Barents Sea, Beaufort Sea, Bering Sea, Chukchi Sea, Davis Strait, East Siberian Sea, Greenland Sea, Kara Sea, Laptev Sea, Northwestern Passages, Norwegian Sea, and White Sea. We calculated vessel transit density surfaces to both visualize and quantify the degree to which surface waters in the Arctic marine environment had been exposed to vessel traffic in 2015. In addition, we analyzed and presented monthly sea ice extent data to highlight the relationship between seasonal ice extent and the observed vessel traffic.

Density analysis indicated that approximately 63% of the Arctic marine environment had been exposed to vessel traffic during 2015. For the Arctic as a whole, transits counts averaged 10,057/month, with counts ranging from a low of 6,787 in December to 13,671 in July. Nearly half (n=51,093) of the transits were made by the 1,257 fishing vessels operating in the region. The Bulk Carrier vessel type class had one of the highest counts of unique vessels (n=1,595) operating in the Arctic during 2015, however, these vessels only accounted for less than 5% of the total transits logged in the region. While Bulk Carrier transits were relatively few in number, the distances associated with Bulk Carrier transits were some of the longest, averaging 568 nautical

miles (nm). Density analysis further revealed that traffic associated with vessels in the Bulk Carrier and Dry Cargo/Passenger vessel type classes was concentrated into a limited set of well-used routes, while fishing vessels displayed a much more diffuse pattern of activity.

The sea areas with the highest levels of vessel activity for 2015 were the Barents, Bering, and Norwegian Seas. Of the 14 oceans and seas examined, the Norwegian Sea possessed the highest transit count (n=56,952). While the majority of the transits in the Norwegian Sea belonged to fishing vessels (n=29,712), vessels in the Dry Cargo/Passenger vessel type class accounted for the highest number of operational hours (n=175,168) and distance travelled (n=3,002,488 nm) in the sea area. The Norwegian Sea also had the highest average (12.07 km/km^2) and maximum (581.44 km/km^2) transit densities of the 14 sea areas examined, and over 99% of the water surface area had been exposed to vessel traffic during 2015. The high level of activity in the Norwegian Sea is most likely attributable to its year round ice-free waters, proximity to population centers, and active fisheries. Despite the presence of seasonal sea ice in the Barents and Bering Seas, year-round, active fisheries in these sea areas also led to high levels of activity. In fact, the Barents Sea possessed the highest number of total operational hours (n=1,131,267), the majority of which (n=864,458) were logged by fishing vessels. Similarly, the Bering Sea possessed the highest total transit distance (n=8,106,124 nm), 39% of which was logged by fishing vessels. The Bering Sea also had the second highest maximum transit density (479.94 km/km^2), attributable to the frequent use of the North Pacific Ocean Great Circle Route by bulk carrier vessels to transport goods to and from major ports in the United States and Asia.

While high levels of vessel activity were maintained throughout 2015 in some of the region's sea areas, others were characterized by little to no vessel activity for the better part of 2015. For example, no vessel activity was observed in the Beaufort Sea for 7 of the 12 months in 2015. This is most likely due to the remote location of the sea area and the fact that over 75% of the water surface area of the Beaufort Sea was covered by ice for nine of the 12 months in 2015. In total, only 483 transits were observed in the Beaufort Sea during 2015. Similar low levels of activity were observed in the Arctic Ocean, East Siberian Sea and the Northwestern Passages, where extensive ice coverage was also present for the majority of 2015. At 22.3 and 37.2%, the surface waters of the Arctic Ocean and the Northwestern Passages had the lowest exposure to vessel traffic in 2015.

The above observations, as well as those found in the text that follows, highlight a few of the many conclusions that can be drawn from the vessel activity data presented herein. We provide these observations merely to guide the reader in the interpretation of the content and utility of the data. Again, the overarching goal of this work is to provide a baseline of vessel activity in the Arctic to monitor trends as the marine environment of the region becomes more hospitable to vessel operations. To this end, we have provided a comprehensive, objective one-year snapshot of current levels and locations of vessel activity.

Background

The climate in the Arctic is changing rapidly. Surface air temperature in the region is increasing at double the rate of the global average and, amid other observations of warming trends, the lowest recorded Arctic sea ice extent occurred in September 2012 (USCG 2016a), the September 2015 Arctic sea ice minimum was the fourth lowest value in satellite records (1979-2015), and a new record low for winter sea ice extent occurred January 2016 (Richter-Menge et al. 2016). The rapidly warming climate and resulting reductions in sea ice extent and volume are expected to bring about changes in both the quantity and character of maritime activity in the region.

As the temporal duration and spatial extent of seasonal ice-free water increases, so too will the navigation season and the economic feasibility of the intercontinental commercial transport of goods, services, and people (Khon et al. 2010; Smith and Stephenson, 2013; Zheng et al., 2016) along historically inaccessible trade routes, such as the Northwest Passage (Guy, E. 2006; Buixadé Farré, et al., 2014) and Russia's Northern Sea Route (Liu and Kronbak, 2010; Stephenson et al., 2014). The availability of these trans-Arctic routes as economically viable alternatives is forecasted to occur during this century (Stroeve, et al., 2012; Melia et al. 2016); however, the predicted timing has ranged from within a few decades (Holland et al., 2006; Overland and Wang, 2013), to mid-century, (Smith and Stephenson, 2013), to as late as 2100 (Boé et al., 2009, Melia et al. 2016). The extension of the navigation season and opening of trans-Arctic passages will bring increased opportunities for the utilization of marine resources and increased marine vessel activity to the region. One assessment predicts a 100-500 percent increase in number of trips and ship transit distances in some Arctic areas by 2025 relative to 2015 levels (US CMTS 2015).

Impacts to the Arctic's marine environment and ecosystems are likely to occur as the types and quantity of marine vessel activity increase (Arctic Council, 2009; IMO, 2015). Increases in international vessel activity via trans-Arctic passages will introduce non-native species from hull fouling and ballast water discharge (Miller and Ruiz, 2014). Increases in both local and international vessel activity will generate increases in underwater noise (Finley et al., 1990). The likelihood of ship strikes, one of the primary threats to marine mammals, is expected to escalate as vessel activity increases in the region (Laist et al., 2001; Neilson, et al., 2014). These and other changes to the marine environment are expected to adversely impact the region's fish and marine mammal populations (Simpkins, et al. 2009; Reeves et al., 2014). Likewise, adverse impacts are also expected for the indigenous people of the Arctic that rely on the region's healthy marine ecosystems (Robards, 2013; Huntington et al., 2015 USCG, 2015b).

Assumptions about increasing vessel activity and associated threats to marine ecosystems are reasonable, however, little work has been done to quantify this growth (Smith and Stephenson, 2013; Eguíluz et al., 2016). Before increases in activity can be measured, it is first necessary to establish a baseline of vessel activity for the region. We used 2015 satellite Automatic

Identification System (AIS) data to quantify vessel activity in the Arctic. With considerable specificity, we provide information on the quantity, spatial distribution, and seasonal variability of the activity. Because different AIS analysis techniques can potentially lead to significantly different outcomes, we provide a detailed description of our data analysis techniques to facilitate comparisons between our findings and those of similar efforts to examine vessel activity in the region. To help monitor trends as new vessel activity data becomes available, we present our results using an objective, standardized reporting template.

Data Sources

Automatic Identification System (AIS)

Automatic Identification System (AIS) is a maritime safety technology in which vessels broadcast messages containing information about their identity, position, speed and direction of travel using low power, very high frequency (VHF) radio signals (Tetrault, 2005, Robards, et al. 2016). These messages are broadcast every 2-10 seconds and are used by nearby vessels to avoid at-sea collisions. The International Maritime Organization (IMO) requires AIS capabilities on all 300+ gross tonnage (GT) vessels making international voyages and all 150+ GT vessels when carrying 12 or more passengers on an international voyage. The U.S. Coast Guard (USCG) expanded the IMO mandate by requiring the use of AIS for vessels operating in U.S. waters that meet the following criteria: self-propelled vessels 65+ feet in length engaging in commercial service, towing vessels 26+ feet with more than 600 horsepower (HP) engaged in commercial service, and self-propelled vessels certified to carry more than 150 passengers (33 C.F.R. § 164.46).

Though initially conceived as a collision-avoidance technology, AIS data has been used for a variety of other maritime safety, environmental protection, and conservation applications (Robards, et al. 2016). Some examples include search-and-rescue operations, piracy monitoring, vessel routing analyses, and maritime regulatory compliance. AIS data used in these types of applications are typically collected by land-based receivers. In the US, the USCG has established a national network of approximately 200 land-based receivers located along the coast of the continental United States, as well as the inland rivers, Alaska, Hawaii and Guam. Land-based networks can collect and process large volumes of AIS data, however, coverage is limited to near-shore transmissions. More recently, a handful of companies like exactEarth® and ORBCOMM™ have established constellations of low-orbiting microsatellites, capable of receiving AIS transmissions from anywhere on the globe. Though satellite AIS systems currently struggle to process the totality of AIS transmissions within their range, they do collect and process enough AIS messages to provide a dataset suitable for most vessel movement applications.

To characterize vessel activity in the Arctic region, we used 2015 global exactEarth® satellite AIS data (copyrighted material of exactEarth Ltd. All Rights Reserved). The Transview (TV32) software application, developed by the Department of Transportation's VOLPE Data Center, was used to decode raw, monthly, global AIS data into comma separated value (CSV) files. The

decoded AIS data written to the CSV files by TV32 included the following information: Maritime Mobile Service Identity (MMSI), IMO ship identification number, vessel name, radio callsign, vessel type, speed over ground (SOG), heading, and course over ground (COG). TV32 also appends a timestamp to each record indicating when the AIS message was broadcast. The monthly CSV files were imported into a spatially-enabled PostgreSQL/PostGIS database.

Vessel Size, Vessel Type and Vessel Flag Country

The vessel type information coded directly into AIS messages is limited to a small set of broad vessel categories manually entered by vessel crews. Previous analyses of AIS data have indicated that vessel type information, like other manually-entered vessel identification information, is subject to varying degrees of data entry error. In an effort to reduce the impact of these entry errors and to include more detailed vessel type and vessel size (gross tonnage) information in our analyses, we used a third-party, enhanced vessel database (IHS Markit, 2015). Vessel type, gross tonnage and country of origin (flag country) data from the enhanced vessel database were imported into the spatially-enabled PostgreSQL/PostGIS database and linked to the AIS records using a combination of the following vessel identifiers: IMO number, MMSI, and vessel name. If vessel information in the AIS record could not be matched to a record in the enhanced vessel database, data belonging to the vessel were not included in the analysis.

Arctic Boundary

For the purposes of this study, we adopted the Arctic boundary defined in Arctic Research and Policy Act (ARPA) of 1984 (amended 1990) that includes "...all United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering and Chukchi Seas; and the Aleutian chain" (Farrell et al., 2009). Spatial data representing the Arctic region boundary was downloaded from ArcGIS Online and imported into the spatially-enabled PostgreSQL/PostGIS database.

International Hydrographic Organization (IHO) Sea Areas

To examine the spatial distribution of vessel activity within the Arctic, we partitioned the region using the spatial boundaries of the world's oceans and seas as defined in the International Hydrographic Organization (IHO) Sea Areas data set (VLIZ, 2005). The spatial data depicting these boundaries were downloaded from the MarineRegions.org website and imported into the spatially-enabled PostgreSQL/PostGIS database.

Sea Ice Extent

To examine the relationship between vessel activity and the seasonal accumulation and retreat of sea ice in the study area, we used 2015 sea ice extent data produced by the National Snow and Ice Data Center (Fetterer et al., 2002). Monthly sea ice extent shapefiles depicting average

monthly sea ice coverage were downloaded and imported into the spatially-enabled PostgreSQL/PostGIS database.

Data Processing

Global satellite AIS data were overlaid with the Arctic region boundary (pg. 10) to extract vessel operation data for our study area. For the full calendar year of 2015, a total of 127,045,233 satellite AIS records were located within the Arctic boundary. Often, vessels continue to transmit AIS signals when anchored or otherwise not in service. Because we were interested in reporting data for vessels actively engaged in travel, we filtered the data to include only those records with SOG values of 2 knots (kt) or greater. Likewise, AIS records with SOG values greater than 50 kt were considered suspect and were removed. Filtering the 127,045,233 satellite AIS records based on these lower and upper SOG limits reduced the total number of 2015 satellite AIS records within the Arctic boundary to 80,394,498.

AIS records for individual vessels were grouped and sorted in ascending order based on their timestamp and then aggregated into transits (i.e., individual trips made by vessels) by examining the time elapsed between successive records. If time elapsed between successive AIS records for a given vessel was less than 4 hours, they were aggregated into the same transit. If the time elapsed between successive records was 4 hours or more, a new transit was started for the vessel. Because vessel transits formed from a minimal amount of AIS data often represent partial transits and can lead to spatially inaccurate representations of vessel activity, especially when the time elapsed between successive records is substantial, any data belonging to transits with less than 5 AIS records were removed. With the transit minimum record count criteria applied, the total number of AIS records was reduced to 80,217,947.

Data within the transit groupings containing five or more AIS records were then analyzed to identify and remove any records that exhibited potential timestamp and/or position errors. While the relative proportion of AIS records containing spatial and/or temporal errors is very small, the inclusion of these erroneous records can have an impact on the computation of vessel activity metrics such as operational hours or distance travelled. Each AIS record contains a speed, position and timestamp. As such, it is possible to assess the spatial and temporal integrity of a given record using temporally adjacent AIS records logged by the same vessel. For example, if the spatially-computed distance (geodesic distance between the two point locations) differs significantly from the distance calculated by multiplying the speed by the time elapsed between the two records (speed-time distance), one of the AIS records contains either faulty position, speed or timestamp data. Meteorological conditions, ocean currents and the character of the travel between successive AIS point locations can impact the correspondence of their computed geographic and speed-time distances, especially when the time elapsed between the two AIS records is large. As such, we took a somewhat conservative approach and only flagged records as suspect when their computed geographic and speed-time distances differed by more than 5

nm. When successive AIS point locations were flagged, distance-based computational checks for the two records were made using other temporally adjacent AIS records in the vessel transit grouping to identify which of the two AIS records contained the suspect position, speed or timestamp data. Once identified, AIS records containing suspect position, speed or timestamp data were removed. Of the 80,217,947 AIS records examined for potential errors, 96,951 (0.1%) from 6,085 different transit groupings were identified as suspect and were removed. The 6,085 transit groupings were again checked to determine if they met the minimum transit record count constraint. 136 of the 6,085 transit groupings did not meet the minimum transit record count criteria after the removal of suspect records. The 395 records associated with these transit groupings were removed.

The remaining 80,120,601 records in the different transit groupings were then joined to create 194,909 linear features representing vessel transits. In addition to the minimum transit record count constraint described above, we also imposed a five nm minimum transit length constraint to minimize the impact of partial transit features on reported vessel activity aggregates such as transit length and operational hours. 33,156 of the 194,909 total transits were found to have lengths less than 5 nm and were removed.

Because we were interested in aggregating vessel activity by sea area and month, it was necessary to segment transits whose spatial extent stretched across multiple sea areas and whose temporal extent stretched across multiple months. To segment the transits by sea area, we first clipped the IHO sea area data using the Arctic boundary data. We then intersected the transits with the clipped sea area polygons to segment the transits. During the intersect analysis, 1,698 of the 161,753 transits were found to be located completely outside of the water features contained in the clipped sea areas and were removed. Transits whose temporal extent stretched across multiple months were split at the temporal boundary between the different months using interpolation.

Using the AIS vessel information manually entered by the vessel crew, we attempted to link the enhanced vessel database to our 160,055 remaining transits. Of the 160,055 transits, 117,860 (73.6%) were successfully linked, providing vessel size (gross tonnage), vessel type and flag country data for 5,530 unique vessels. Because we were interested in activity associated with seagoing vessels, we filtered our linked 117,860 transits further, removing 472 transits associated with 44 vessels identified in the enhanced vessel database as non-propelled, non-seagoing merchant ships, and non-ship structures.

Lastly, while the clipped sea areas data contained features representing the North Atlantic Ocean, Pacific Ocean and Gulf of Alaska, the polygons associated with these bodies of water were insignificant in size due to their proximity to the outer boundary of the Arctic. Because the polygons represented such a small portion of their respective bodies of water and the Arctic region as a whole, transits located exclusively in these areas were removed from the reporting. Additionally, there was only a single transit (8.7 nm in length) located in the Lincoln Sea. As such,

this transit and the Lincoln Sea itself were omitted from the reporting. In total, 116,317 transits by 5437 unique vessels were included in the final reporting of vessel activity for the Arctic region.

Data Reporting

To establish a baseline of vessel activity for the Arctic as a whole as well as the different sea areas located within the region, we provide a synoptic accounting of the following physiographic and vessel activity components: water surface area, sea ice extent, transit density, and a set of vessel activity metrics that includes unique vessel counts, transit counts, operational hours, and transit distance. As was mentioned in the previous section, the single transit located within the Lincoln Sea is omitted from our reporting. Likewise, data for those portions of transits located in the northern reaches of the North Atlantic Ocean, Pacific Ocean and Gulf of Alaska that extend inside the southern boundary of the region were omitted. The sea areas contained in our reporting include the Arctic Ocean, Baffin Bay, Barents Sea, Beaufort Sea, Bering Sea, Chukchi Sea, Davis Strait, East Siberian Sea, Greenland Sea, Kara Sea, Laptev Sea, Northwestern Passages, Norwegian Sea, and White Sea (pg. 21). The following sections describe the different physiographic and vessel activity components reported, as well as the template used to present the information.

Water Surface Area and Sea Ice Extent

We computed water surface area for the Arctic as a whole and for the different sea areas using a 5 x 5 kilometer (km) raster grid created from the clipped sea areas dataset. While calculating areas from the 5x5 km grid produces less accurate estimates of area than can be calculated directly from the polygon features in the clipped sea areas dataset, we wanted to ensure that calculations of water surface area were compatible with area values generated in the transit density analyses (described below). Consequently, the water surface areas included in the reporting should be considered rough approximations. While vessel activity is not reported for the Lincoln Sea and the portions of North Atlantic Ocean, Pacific Ocean and Gulf of Alaska that stretch into the southern boundary of the region, these sea areas are included in the calculation of water surface area for the Arctic as a whole. Lastly, the reported water surface area estimates for the different sea areas only account for those portions of the oceans and seas that are located within the Arctic boundary (i.e. portions of the sea areas that extend outside of the Arctic boundary as defined by the ARPA are not included in the water surface area estimates).

Areas for the monthly sea ice extent were also calculated for the Arctic as a whole and for the different sea areas. For consistency and compatibility purposes, sea ice extent areas were also computed using a 5 x 5 kilometer (km) grid created from the 2015 monthly sea ice extent polygon features, and should be considered rough estimates. Monthly sea ice extents are reported as percentages of total water surface area and can be found in Appendix 13, as well as summarized in the one-page synopses described in the Reporting Template section.

Vessel Activity Metrics

Vessel activity metrics reported for the Arctic as a whole and the different seas areas listed above include the number of unique vessels, number of transits, number of operational hours, and the distance (nm) travelled. For most of the reporting, vessel activity metrics are aggregated by vessel type class and/or vessel size class. Vessel type classes used in the reporting include Bulk Carriers, Dry Cargo/Passenger, Fishing, Miscellaneous, Offshore and Tankers. Appendix 1 contains a listing of the individual vessel types included in each of the six different vessel type classes. Vessel activity metrics aggregated by individual vessel type are also provided for the Arctic region in Appendices 14-21. Vessel size classes used in the reporting are based on gross tonnage (GT), which is a measure of a vessel's total internal volume (1 GT = 100 $ft^3 \approx 2.83\ m^3$). Vessel size classes included <1000 GT, 1000-4999 GT, 5000-9999 GT, 10000-24999 GT, 50000-99999 GT, and ≥100000 GT. Appendix 1 also contains the average, minimum and maximum GT associated with the different vessel types operating in the Arctic during 2015.

Transit Density

Spatial density analyses produce gridded surfaces containing cell values representing the concentration of features. To identify areas of high (and low) traffic density within the Arctic region, we conducted density analyses using the linear vessel transit features. The analyses were conducted using the Line Density tool in ArcGIS for Desktop, with a search radius of 10 km and an output cell size of 5 km. For the reporting contained herein, we generated a density surface using the transits from all vessels, as well as density surfaces for transits belonging to the different vessel type classes (i.e., Bulk Carrier, Dry Cargo/Passenger, Fishing, Miscellaneous, Offshore, and Tankers). The cell values in the density surfaces represent the km of vessel transit distance travelled in 2015 per square km of water surface area (km/km^2).

Individual density values can be difficult to conceptualize, so the interpretation of density analysis output typically relies on the visual inspection of the density surface, symbolized with a color ramp that highlights areas of low and high density. Appendices 8-10 contain maps depicting the density surfaces created using 2015 transits belonging to the different vessel type classes. Visual inspection of these surfaces reveal the different spatial-use patterns associated with the different vessel types. In the density surfaces provided in Appendices 8-10, grid cells with the highest density values (areas that experienced higher concentrations of traffic during 2015) are colored red. Grid cells with density values of 0, which indicated that no 2015 transits could be located within the 10 km (search radius), are colored white.

Because the visual inspection of density surfaces is somewhat subjective and we wanted to monitor trends in vessel activity, we also computed density summary statistics from the density analysis surface generated using the transits from all vessels (n= 116,317 transits). The computed summary statistics included the average and maximum density values (using non-zero density values only), as well as the percent of the total water surface area with non-zero density values.

We refer to the latter as the percent of water surface area exposed to vessel traffic. These density statistics are provided for the region as a whole, as well as the different sea areas.

Reporting Template

In addition to establishing a baseline of vessel activity in the Arctic, we were also interested developing analytic and reporting procedures that would facilitate the monitoring of trends as new data becomes available. To this end, we designed an objective, repeatable template to characterize and report the physiographic and vessel activity metrics described above. This template consists of the following three components: a one-page synopsis, a series of annotated bar charts, and a collection of appendices.

One-page Synopses:

The one-page synopses present high-level information on water surface area, sea ice extent, transit density, and the vessel activity metrics. The majority of the vessel activity information presented in the synopses is aggregated by vessel type and size classes, however, some data based on individual vessel type is included. To help compare and contrast water surface area, transit density and the vessel activity metrics for the 14 different sea areas, relative ranks accompany many of the reported values in the synopses. For example, in addition to reporting the total transit count for the Bering Sea (n=28,302), we also indicate that the Bering Sea had the second highest (2 of 14) transit count out of the different sea areas analyzed.

Vessel Activity Bar Charts:

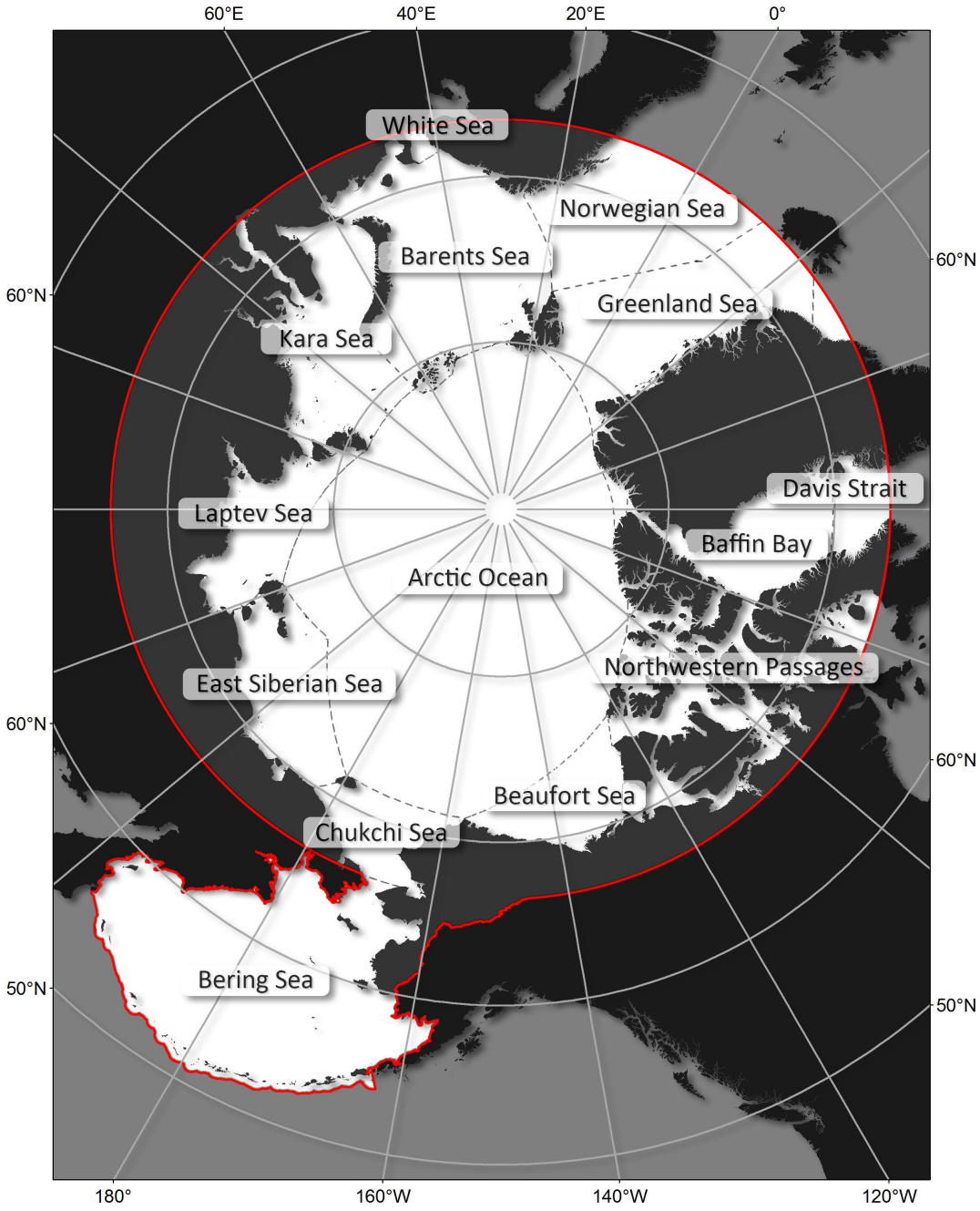
The one-page synopses are followed by a series of annotated bar charts that include: Vessel Counts by Vessel Type and Gross Tonnage Classes (Arctic only), Transit Count by Vessel Type and Gross Tonnage Classes, Operational Hours by Vessel Type and Gross Tonnage Classes, Transit Distance by Vessel Type and Gross Tonnage Classes, Transit Count by Vessel Type Class and Month, Operational Hours by Vessel Type Class and Month, and Transit Distance by Vessel Type Class and Month. These charts are annotated with high-level, objective information generated from the chart data and associated appendices (described below). In the information provided above the bar charts depicting monthly vessel activity metrics for the different oceans and seas, we included coefficients of variation (CV) computed from the monthly metric values. CVs are unitless measures that indicate the degree of variability in the values being measured. Lower CVs indicate less variability and higher CVs indicate more variability. We used the computed CVs as a measure of seasonality. Sea areas with relatively consistent levels of vessel activity throughout the year will have low CVs for the different metrics, while those sea areas whose window of vessel activity is confined only to the warmer months will have higher CVs.

Appendices:

Counts of unique vessels by vessel flag country and the number of transits by vessel flag country for the Arctic region are provided in Appendices 11 and 12, respectively. In addition to the reporting of metrics aggregated by vessel type class (i.e., Bulk Carrier, Dry Cargo/Passenger,

Fishing, Miscellaneous, Offshore, and Tankers) contained in the body of this report, we include appendices (Appendices 14-21) with the metrics aggregated by individual vessel types (e.g., Ore/Oil Carrier, Open Hatch Cargo Ship, Fish Farm Support Vessel, Buoy Tender, Platform Supply Ship, Chemical/Products Tanker, etc.). Because of space constraints, this report only provides appendices with vessel activity metrics aggregated by individual vessel types for the Arctic region. A supplementary document containing similar appendices for the different sea areas is located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm.

Regional Vessel Activity in the Arctic



Overview of Regional Vessel Activity in the Arctic

Below, we make observations about regional vessel activity data in the Arctic during 2015. These observations highlight a few of the conclusions that can be drawn from the data and are not meant to represent a comprehensive discussion of region-wide activity. The intent is merely to illustrate the utility of the data and assist the reader in its interpretation. Most of the data in the synopsis and bar charts that follow are aggregated by vessel type class. Tables listing the different vessel activity metrics by individual vessel types can be found in Appendices 14-21.

Our analyses of the satellite AIS data identified a total of 5,437 unique vessels operating within the Arctic region during 2015. While the majority of these vessels were in the Dry Cargo/Passenger vessel type class (n=1,771 vessels), the highest number of transits belonged to vessels in the Fishing vessel type class (n=51,093 transits). Fishing vessels, most of which belong to the <1000 GT (n=754) and 1000-4999 GT (n=465) vessel size classes, accounted for nearly half of the 116,317 transits logged in the region during 2015. On average, individual fishing vessels operating in the Arctic region during 2015 logged 41 different transits. This is almost twice as many transits logged by individual Dry Cargo/Passenger vessels, which averaged 23 transits per vessel. The Bulk Carriers vessel type class possessed the second highest number of unique vessels operating in the Arctic region during 2015 (n=1,595 vessels), however, the number of transits logged by vessels in the Bulk Carriers vessel type class was relatively low (n=5,006 transits). On average, individual vessels in the Bulk Carriers vessel type class logged only 3 transits in the region during 2015.

Average transit distances and number of operational hours also varied among vessel type classes operating in the region. For example, the average transit distance and number of operational hours for vessels in the Offshore vessel type class were 140 nm and 20 hrs, respectively. In contrast, Bulk Carrier vessels had much higher average transit distance and number of operational hours at 568 nm and 52 hrs, respectively. Observed differences in operations are indicative of the ships' primary purpose. Bulk Carriers are primarily engaged in the international and long distance transport of goods. Accordingly, transits associated with vessels in the Bulk Carrier vessel type class were longer in distance and duration while transits made by vessels in the Offshore type class, which were likely supporting oil exploration and related industrial activities.

These differences in vessel operations are further alluded to in Appendices 2-7, which contains maps depicting monthly transits by the vessels in the different vessel type classes, and Appendices 8-10, which contains maps depicting density surfaces generated from the transits of vessels in the different vessel type classes. The maps indicate differences in the magnitude of the vessel activity associated with the different vessel type classes, as well as highlight differences in the temporal extent and spatial location of the activity. For example, the transits associated with the Bulk Carriers vessel type class are located primarily in the southern Bering Sea along the North Pacific Great Circle Route and directly off the coast of Norway (Appendix 8). Both the southern Bering Sea and the Norwegian Sea are characterized by relatively low ice coverage

throughout the year (Appendix 13). In both of these areas, the routes belonging to vessels in the Bulk Carriers vessel type class appear to be both simple and direct, a reflection of the effort to minimize costs associated with the maritime transport of goods. Similar patterns are observed for the Dry Cargo/Passenger (Appendix 8) and Tankers (Appendix 10) vessel type classes. While the transits logged by vessels in the Fishing vessel type class are also located primarily in the Bering Sea and off the coast of Norway, the density surface generated from transits by vessels in the Fishing vessel type class reveals a much more diffuse pattern of travel, indicative of much more numerous and complex routes scattered about fishing grounds found in the two areas. The spatial distribution of vessel activity throughout the region will be further discussed in the next section.

The annotated charts characterizing the vessel activity metrics within the Arctic region by month (pgs. 18-20) illustrate the seasonality of vessel activity within the Arctic region. As would be expected, vessel activity in the region is greatest when the extent of sea ice is at its lowest. While this is evident in the abovementioned charts, it should be noted certain areas within the region experience relatively heavy ice coverage throughout the entire year while others do not. So, while vessel activity in the region as a whole peaks in August and September, different areas within the region experience much different patterns of activities throughout the year. These different temporal patterns are illustrated in the synopses and annotated charts of vessel activity for the different sea areas.

Regional Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 15,663,725 km^2 of water surface area
- average monthly sea ice extent ranged from 29% of the water surface area in September to 72% in February; average monthly sea ice extent exceeded 25% of the water surface area for 12 months, 50% for 9 months, and 75% for 0 months

Unique Vessels:

- 5,437 unique vessels
- vessel type class with the highest count of unique vessels (1,771 vessels) was Dry Cargo/Passenger (see Appendix 14 for total unique vessel counts by vessel type)

Transit Counts:

- 116,317 total transits
- vessel type class with the highest number of transits (51,093 transits) was Fishing (see Appendix 14 for total transit counts by vessel type)
- vessel size class with the highest number of transits (60,635 transits) was <1000 GT (see Appendix 15 for total transit counts by vessel size class)
- transit counts averaged 10,057 transits/month, with a range of 6,787 transits in December to 13,671 transits in July (see Appendix 19 for monthly transit counts by vessel type)

Operational Hours:

- 3,752,055 total operational hours
- vessel type class with the highest number of operational hours (625,342 hrs) was Fishing (see Appendix 16 for total operational hours by vessel type)
- operational hours averaged 312,671 hrs/month, with a range of 246,845 hours in December to 400,684 hours in September (see Appendix 20 for monthly operational hours by vessel type)

Transit Distance:

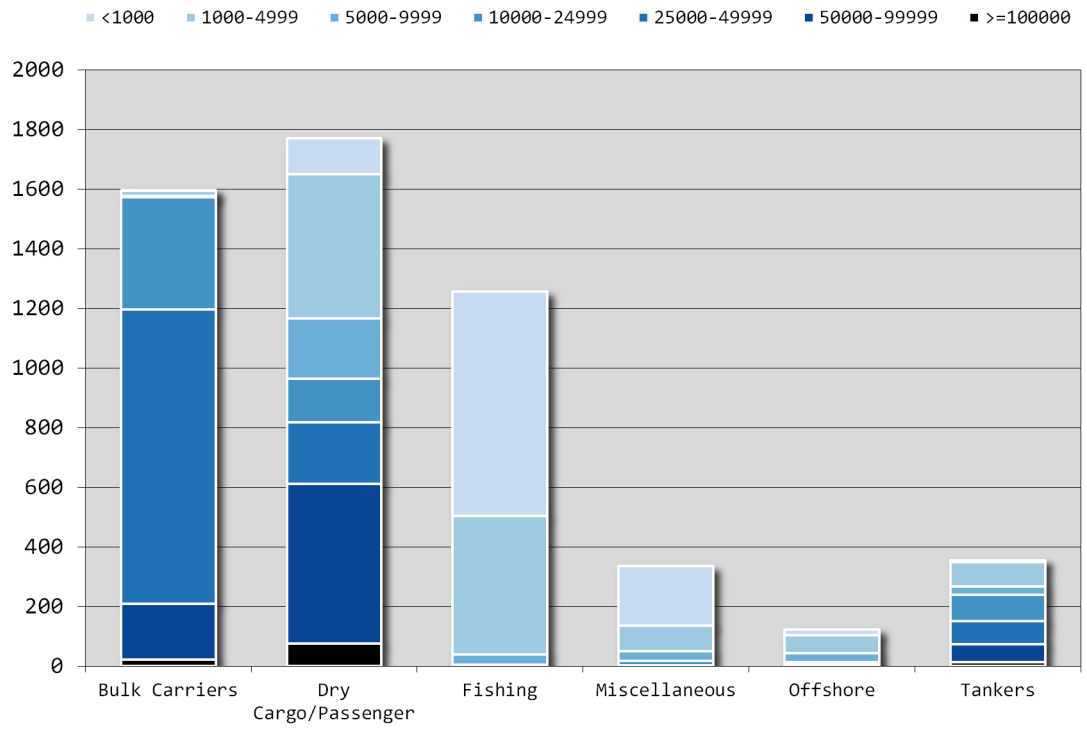
- 24,536,244 nm total transit distance
- vessel type class with the highest amount of transit distance (10,774,504 nm) was Fishing (see Appendix 17 for total transit distance by vessel type)
- transit distance averaged 2,044,687 nm/month, with a range of 1,560,218 nm in February to 2,659,064 nm in August (see Appendix 21 for monthly transit distance by vessel type)

Transit Density:

- 63.3% of water surface area exposed to vessel traffic
- 4.35 km/km^2 average transit density
- 581.44 km/km^2 maximum transit density

Regional Vessel Counts
by Vessel Type Class and Gross Tonnage Class

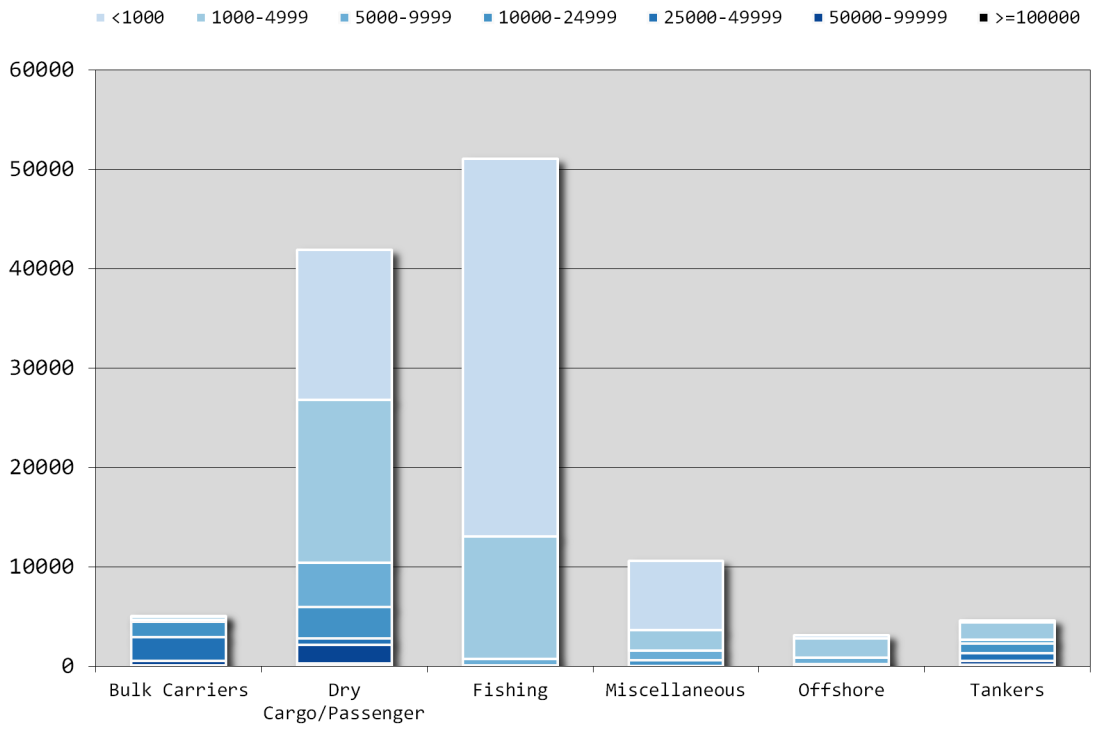
As an aggregate, the Dry Cargo/Passenger vessel type class had the highest number of unique vessels (1,771 vessels) operating in the Arctic during 2015. The vessel types with the highest counts of unique vessels were Bulk Carrier, Container Ship (Fully Cellular), and General Cargo Ship with 1,555; 598; and 558 vessels, respectively (Appendix 14). Of the 5,437 unique vessels, the highest number (1,274 vessels) were in the 25000-49999 GT vessel size class (Appendix 14). Vessels with a gross tonnage ≥ 10,000 accounted for 52% of the total vessels. The flag countries that had the highest number of unique vessels operating in the Arctic during 2015 were Panama, Russia, and Norway with 754, 743, and 639 vessels, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	1	17	5	376	987	188	21	**1595**
Dry Cargo/Passenger	120	485	203	146	206	536	75	**1771**
Fishing	754	465	33	4	1	0	0	**1257**
Miscellaneous	200	86	31	16	2	0	0	**335**
Offshore	19	60	31	9	1	1	2	**123**
Tankers	7	82	28	89	77	59	14	**356**
Totals:	**1101**	**1195**	**331**	**640**	**1274**	**784**	**112**	**5437**

Regional Transit Counts
by Vessel Type Class and Gross Tonnage Class

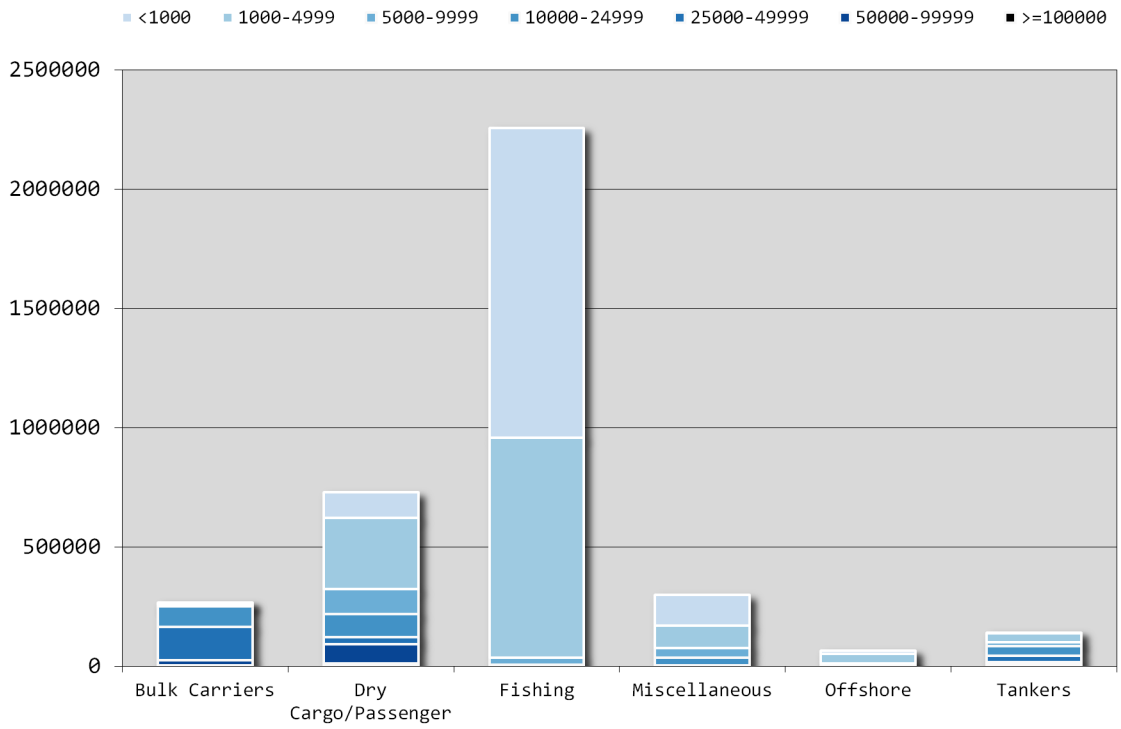
As an aggregate, the Fishing vessel type class logged the highest number of transits (51,093 transits) in the Arctic during 2015. The vessel types with the highest number of transits were Fishing Vessel, Stern Trawler, and Passenger/Ro-Ro Ship (Vehicles) with 25,564; 14,258; and 11,990 transits, respectively (Appendix 15). Of the 116,317 total transits, the highest number (60,635 transits) was logged by vessels in the <1000 GT vessel size class (Appendix 15). Vessels with a gross tonnage ≥ 10,000 accounted for 12% of the total transits. The flag countries that logged the highest number of transits in the Arctic during 2015 were Norway, Russia, and United States Of America with 49,394; 21,008; and 17,445 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	6	359	195	1565	2348	466	67	**5006**
Dry Cargo/Passenger	15149	16384	4420	3167	695	1845	263	**41923**
Fishing	38027	12325	673	48	20	0	0	**51093**
Miscellaneous	6916	2078	983	561	21	0	0	**10559**
Offshore	353	1910	681	167	11	3	8	**3133**
Tankers	184	1791	383	966	761	372	146	**4603**
Totals:	**60635**	**34847**	**7335**	**6474**	**3856**	**2686**	**484**	**116317**

Regional Operational Hours
by Vessel Type Class and Gross Tonnage Class

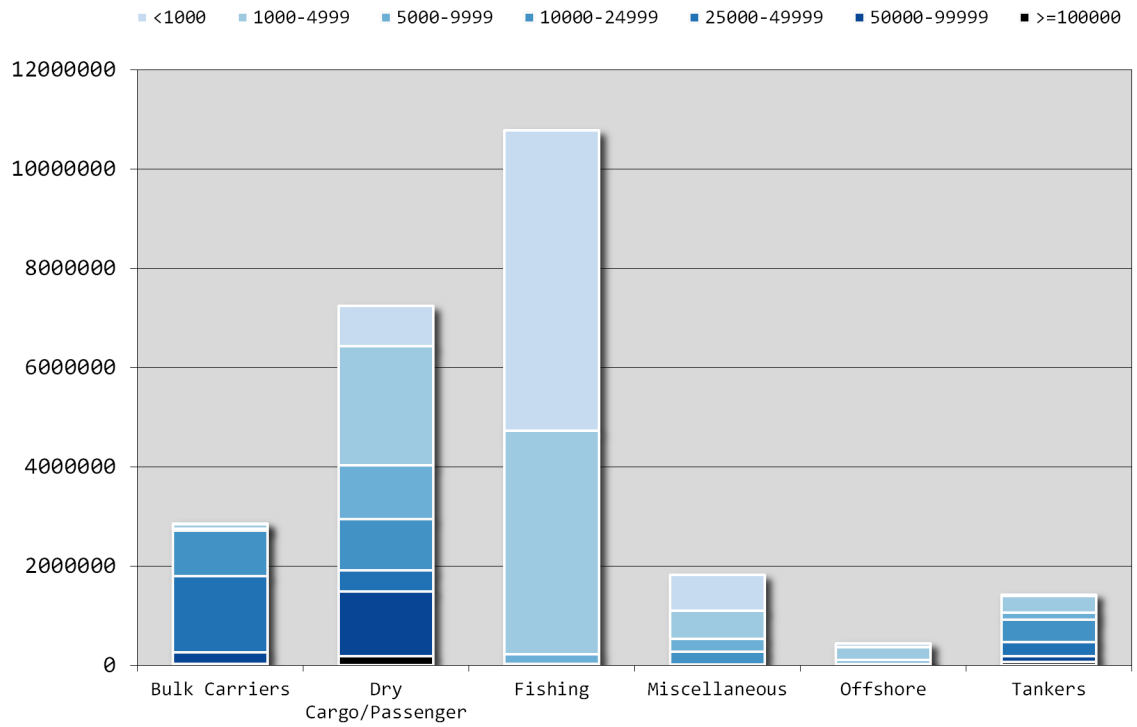
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (2,257,210 hrs) in the Arctic during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Fishing Vessel, and Factory Stern Trawler with 975,728; 782,538; and 346,856 hours, respectively (Appendix 16). Of the 3,752,055 total operational hours, the highest number (1,551,723 hrs) was logged by vessels in the <1000 GT vessel size class (Appendix 16). Vessels with a gross tonnage ≥ 10,000 accounted for 16% of the total operational hours. The flag countries that logged the highest number of operational hours in the Arctic during 2015 were Russia, Norway, and United States Of America with 1,137,725; 888,608; and 549,762 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	111	10709	3029	84716	140551	21170	2586	**262871**
Dry Cargo/Passenger	107850	299131	105801	95376	29646	80720	10954	**729478**
Fishing	1300833	920398	31553	4222	203	0	0	**2257210**
Miscellaneous	127987	95628	39590	32863	2483	0	0	**298551**
Offshore	12088	40129	8933	2755	234	10	115	**64263**
Tankers	2855	38487	13967	40190	26631	11707	5844	**139681**
Totals:	**1551723**	**1404483**	**202874**	**260121**	**199747**	**113607**	**19498**	**3752055**

Regional Transit Distance
by Vessel Type Class and Gross Tonnage Class

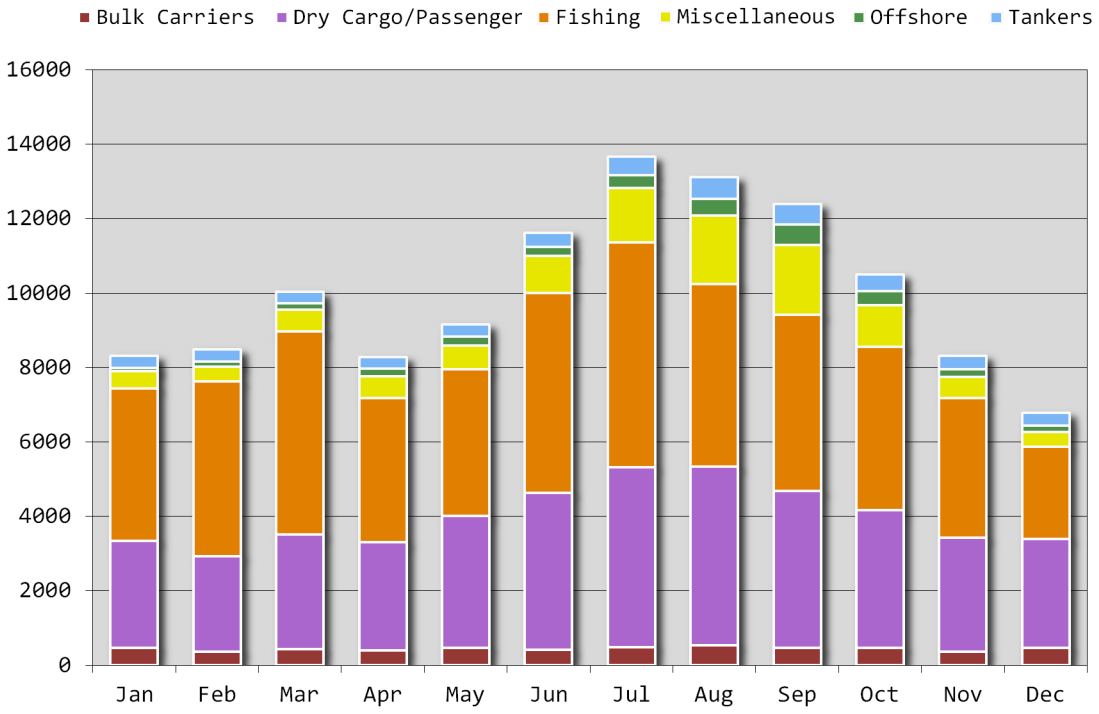
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (10,774,504 nm) in the Arctic during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Fishing Vessel, and Bulk Carrier with 4,498,323; 3,563,198; and 2,741,683 nm, respectively (Appendix 17). Of the 24,536,244 nm of total transit distance, the highest amount (8,185,221 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix 17). Vessels with a gross tonnage ≥ 10,000 accounted for 28% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Arctic during 2015 were Russia, Norway, and United States Of America with 6,583,989; 5,169,869; and 2,880,015 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	1017	96371	35497	912388	1541667	225610	30062	**2842612**
Dry Cargo/Passenger	807826	2408172	1080818	1039735	416210	1311591	178842	**7243194**
Fishing	6049046	4506132	193298	24688	1339	0	0	**10774504**
Miscellaneous	724553	565539	252985	255299	18308	0	0	**1816684**
Offshore	70830	265314	79501	20142	1351	103	981	**438222**
Tankers	22629	343693	136710	457931	282227	108594	69244	**1421028**
Totals:	**7675901**	**8185221**	**1778809**	**2710183**	**2261103**	**1645897**	**279129**	**24536244**

Regional Transit Counts
by Vessel Type Class and Month

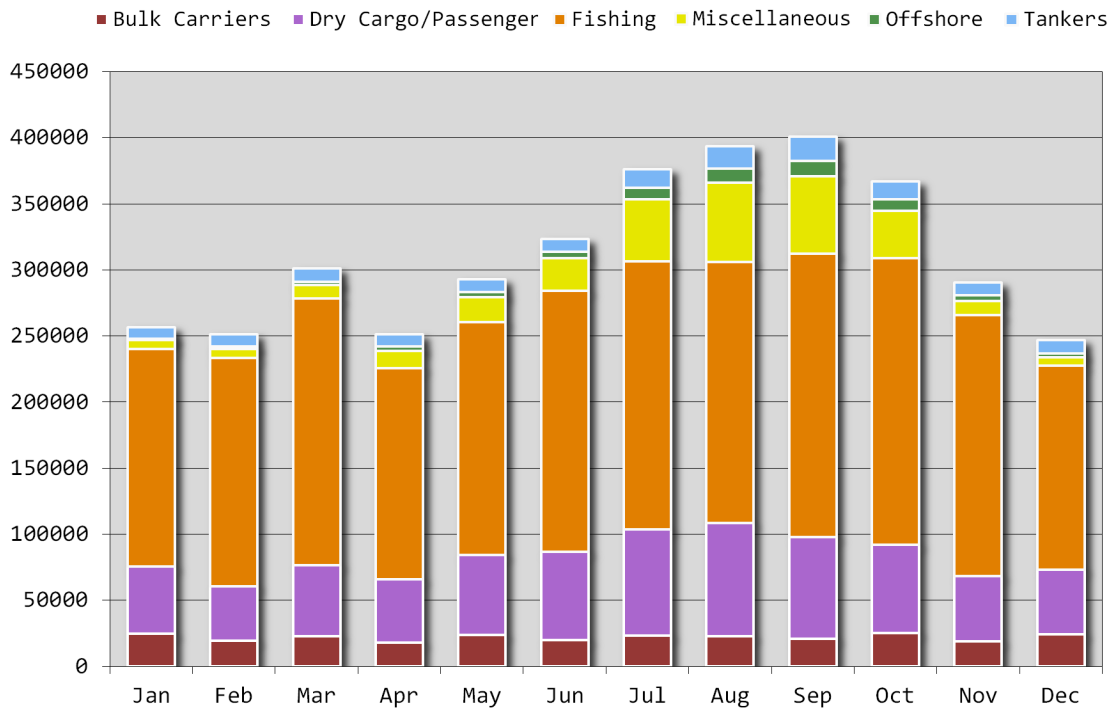
Transit counts for the Arctic in 2015 averaged 10,057 transits/month, with a range of 6,787 transits in December to 13,671 transits in July (see Appendix 19 for monthly transit counts by vessel type).



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	468	2873	4093	468	94	317	**8313**
Feb	362	2568	4693	398	146	320	**8487**
Mar	430	3090	5452	584	163	309	**10028**
Apr	395	2911	3872	591	193	310	**8272**
May	470	3541	3946	632	248	327	**9164**
Jun	414	4217	5376	997	244	379	**11627**
Jul	488	4829	6049	1456	341	508	**13671**
Aug	532	4812	4891	1845	450	582	**13112**
Sep	464	4222	4733	1867	566	550	**12402**
Oct	465	3701	4386	1131	371	450	**10504**
Nov	371	3053	3763	554	215	362	**8318**
Dec	465	2923	2479	404	174	342	**6787**

Regional Operational Hours
by Vessel Type Class and Month

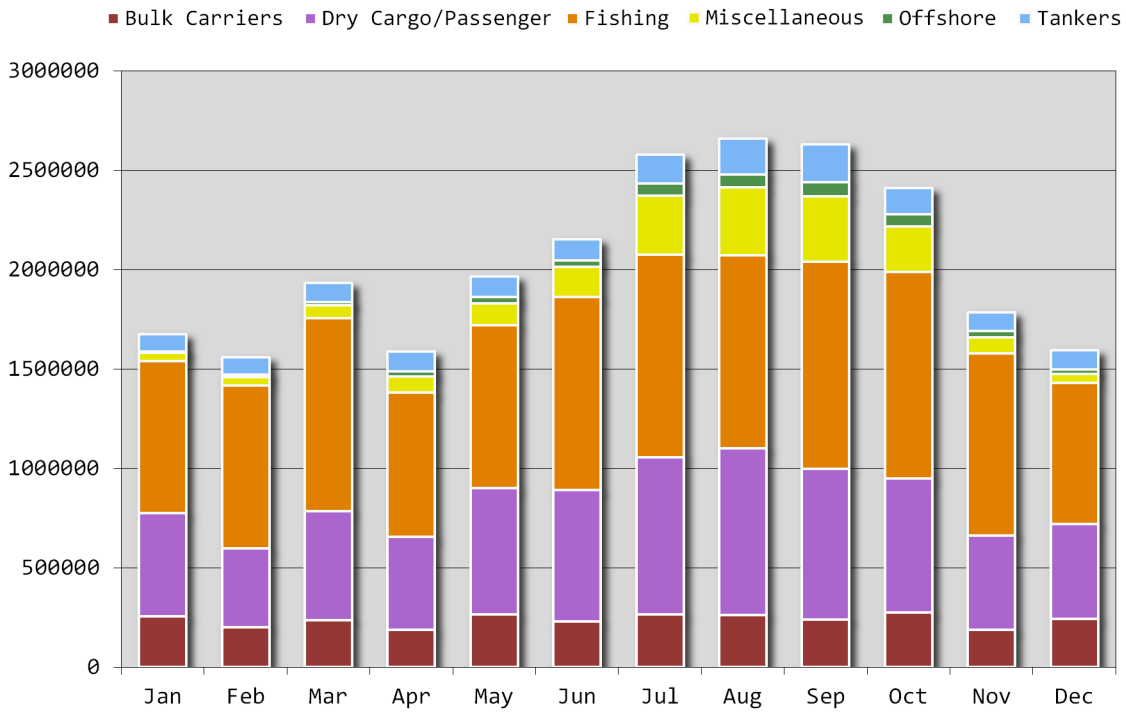
Operational hours for the Arctic in 2015 averaged 312,671 hrs/month, with a range of 246,845 hours in December to 400,684 hours in September (see Appendix 20 for monthly operational hours by vessel type).



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	24562	50907	164499	6796	1007	8633	**256404**
Feb	19317	41458	172586	6786	1828	9508	**251483**
Mar	22584	53845	202034	10131	2260	10366	**301220**
Apr	17956	48018	159595	12984	3455	9227	**251236**
May	23674	60420	176361	18991	3974	9683	**293104**
Jun	19879	66642	197730	24778	4646	9978	**323653**
Jul	23098	80289	202888	47100	9010	13946	**376332**
Aug	22761	85820	197446	59879	10597	16985	**393488**
Sep	20916	77117	214471	58343	11810	18027	**400684**
Oct	25229	66604	217159	35687	8726	13770	**367176**
Nov	18805	49430	197718	10739	4075	9665	**290431**
Dec	24090	48927	154722	6337	2876	9893	**246845**

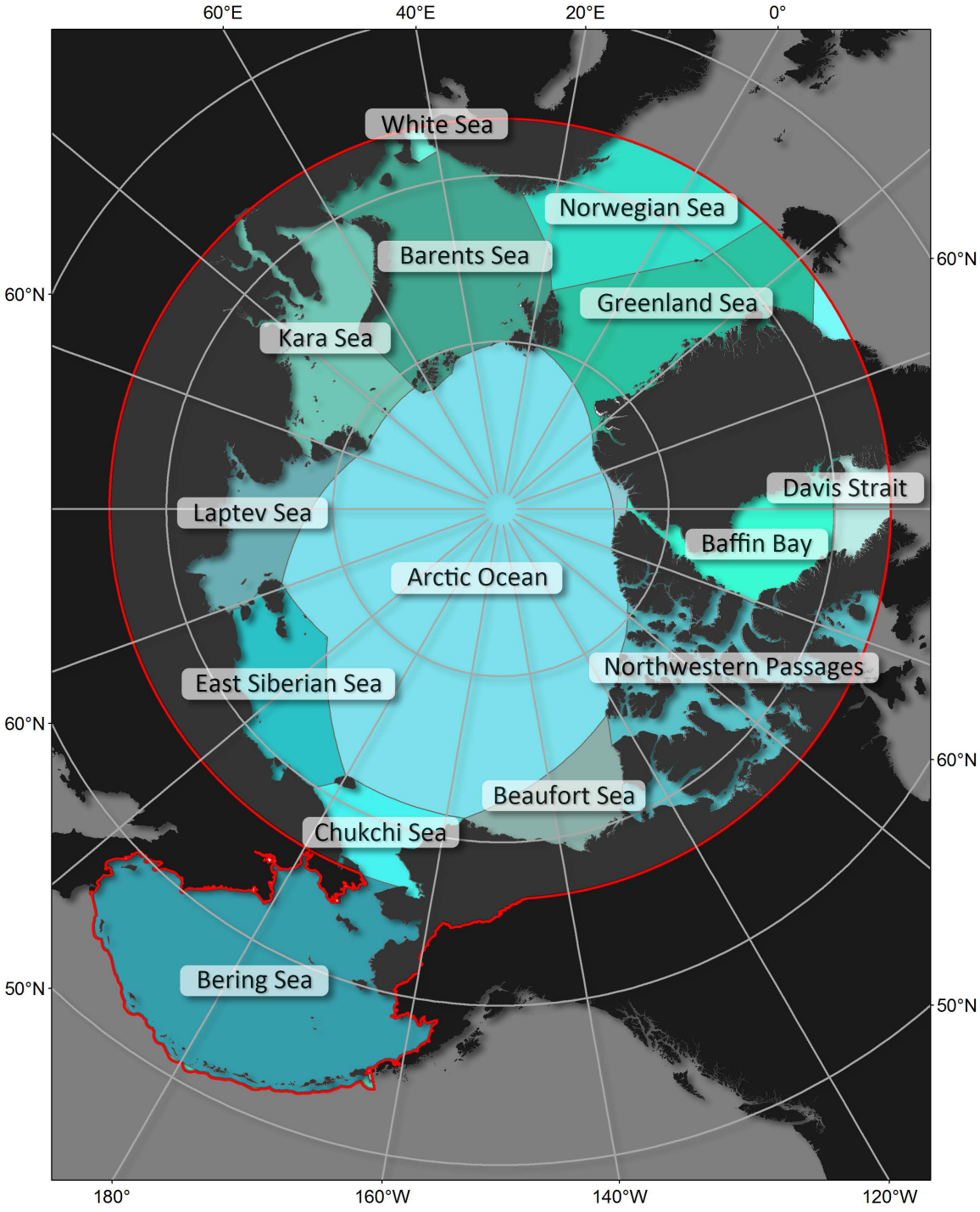
Regional Transit Distance
by Vessel Type Class and Month

Transit distance for the Arctic in 2015 averaged 2,044,687 nm/month, with a range of 1,560,218 nm in February to 2,659,064 nm in August (see Appendix 21 for monthly transit distance by vessel type).



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	255081	520055	764901	42095	7146	87471	**1676750**
Feb	199963	397493	818832	42462	12372	89097	**1560218**
Mar	235725	547293	973653	62345	16454	96516	**1931987**
Apr	188184	467194	725910	81551	25704	99035	**1587578**
May	263315	637471	818563	111268	32680	103713	**1967010**
Jun	229044	661457	970672	153562	32155	106465	**2153355**
Jul	264678	790490	1021370	295109	61812	146870	**2580329**
Aug	262174	839375	970986	341290	64694	180546	**2659064**
Sep	237757	760674	1040492	331336	70465	188977	**2629702**
Oct	275548	672447	1040389	230441	59652	133172	**2411649**
Nov	187464	473171	918119	79785	32629	93359	**1784527**
Dec	243679	476073	710617	45441	22459	95807	**1594075**

Sea Area Vessel Activity in the Arctic



Overview of Sea Area Vessel Activity in the Arctic

While the region-wide data presented in the previous section is informative, vessel activity in the Arctic during 2015 was both spatially and temporally diverse. Some areas exhibited relatively high amounts of vessel activity across the entire year while activity in other areas was limited to only a few months of the year. Existing reports of vessel activity in the Arctic have either aggregated data across the entire region or have limited reporting to activity occurring in specific areas of interest (Arctic Council, 2009; Eguíluz, et al., 2016). When the reporting of vessel activity data is aggregated across the entire region, the spatial variability within the region is indiscernible and the character of the temporal variability is muted. Likewise, reporting vessel activity for a specific area of interest within the Arctic does not provide a full characterization of activity in the region as a whole or for other areas within the region. To capture the spatial and temporal variability of vessel activity in the Arctic, we chose to supplement our reporting of vessel activity for the entire region with the reporting of activity within the different sea areas (pg. 21) located in the region.

When examining the reported vessel activity metrics for the different oceans and seas in the Arctic, it is important to consider their respective locations within the region. Those sea areas located on or near the southern boundary of the Arctic will experience lower amounts of seasonal sea ice coverage than those located closer to the Pole. As such, conditions necessary for safe, year-round navigability are more prevalent in the oceans and seas located along the southern boundary of the region. For example, fishing vessels accounted for nearly half of the 116,317 transits logged in the Arctic during 2015. Of the 51,093 total fishing vessel transits logged in the Arctic during 2015, 46,210 (90%) were located either entirely or partially in the Barents, Bering and Norwegian Seas. In fact, 87% (n=101,667 transits) of all the transits in the Arctic during 2015 were located either entirely or partially in the Barents, Bering and Norwegian Seas. While graphics depicting the location and density of transits in the Arctic suggest the clustering of activity in these regions, the reporting of the metrics for the different oceans and seas within the Arctic will help to better monitor and interpret vessel activity trends over time, especially for those areas that have typically experienced lower amounts of activity due to high, persistent seasonal ice coverage (Appendix 13).

Another important consideration when comparing and contrasting vessel activity metrics for the different oceans and seas is water surface area. The amount of water surface area for the different oceans and seas in the region range from 32,675 to 5,109,900 km^2. It is important to consider these differences in water surface area when inferring potential impacts associated with current and future activity metrics. To illustrate, the amount of transit distance logged in the Chukchi and White Seas during 2015 were 201,155 and 211,693 nm, respectively. However, the water surface area of the Chukchi Sea (353,025 km^2) is ten times greater than the water surface area of the portion of the White Sea (32,675 km^2) located within the Arctic boundary. So, while the reported vessel activity metrics for these two seas are similar, the impacts associated with the vessel activity are most likely quite different.

To better characterize the volume and potential impact of vessel activity within the Arctic, we included transit density descriptive statistics in our reporting of vessel activity. While visualizing and interpreting the magnitude and implications of individual density statistic values associated with the different sea areas can be difficult, examining the relative differences in density statistics for the different oceans and seas is more straightforward. As an example, the average transit densities for the Chukchi and White Seas during 2015 were 1.1 km/km^2 and 11.9 km/km^2, respectively. While these two values might not carry a large amount of interpretive value when considered individually, considered together they reveal that, on average, transit density is approximately ten times greater in the White Sea. This provides a more objective measure of the potential differences in vessel activity impacts suggested in the previous paragraph. Maximum transit densities were also calculated for the different oceans and seas. Not surprisingly, some of the highest maximum transit densities were during 2015 were observed in the Barents (253.0 km/km^2), Bering (479.9km/km^2) and Norwegian (581.4 km/km^2) Seas. For perspective, the lowest maximum density (5.1 km/km^2) was observed in Northwestern Passages, which also had one of the lowest average transit densities (0.4 km/km^2) of the fourteen oceans and seas examined.

As with the overview of region-wide activity, the above observations serve as a guide for the types of inferences and conclusions that can be derived from the data that follows in the one-page synopses and annotated charts. Because of the year-round, high level of vessel activity observed in a few of the oceans and seas located within the region, the spatial and temporal aspects of vessel activity found in many of different sea areas get lost when the data is aggregated across the entire region. Those sea areas currently with higher seasonal variability in vessel activity due to the impact of seasonal ice extent will most likely be the areas that experience larger rates of increase in vessel activity as the extent and duration of sea ice changes. As a result, monitoring trends in the different oceans and seas As such, monitoring trends in the different oceans and seas is as important, if not more, as monitoring trends for the Arctic as a whole. Most of the data in the synopses and annotated bar charts for the different oceans and sea are aggregated by vessel type class. Tables listing vessel activity metrics by individual vessel type for the different sea areas can be found in a document containing supplemental appendices (please contact the lead author for availability).

Arctic Ocean Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 1 of 14 for total amount of water surface area within the ARPA Arctic boundary (5,109,900 km^2)
- average sea ice extent ranged from 74% of the water surface area in September to 100% in March; average sea ice extent exceeded 25% of the water surface area for 12 months, 50% for 12 months, and 75% for 11 months

Unique Vessels:

- 8 of 14 for total number of unique vessels (129 vessels)
- vessel type class with the highest number of unique vessels (48 vessels) was Miscellaneous (see Appendix S1 for total unique vessel counts by vessel type*)

Transit Counts:

- 10 out of 14 for total number of transits (1,018 transits)
- vessel type class with the highest number of transits (442 transits) was Miscellaneous (see Appendix S2 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (421 transits) was 1000-4999 GT (see Appendix S2 for total transit counts by vessel size class)
- transit counts averaged 88 transits/month, with a range of 5 transits in March to 326 transits in August (see Appendix S6 for monthly transit counts by vessel type*)

Operational Hours:

- 8 out of 14 for total operational hours (32,603 hrs)
- vessel type class with the highest number of operational hours (5,434 hrs) was Fishing (see Appendix S3 for total operational hours by vessel type*)
- operational hours averaged 2,717 hrs/month, with a range of 210 hours in April to 8,745 hours in September (see Appendix S7 for monthly operational hours by vessel type*)

Transit Distance:

- 10 out of 14 for total transit distance (151,395 nm)
- vessel type class with the highest amount of transit distance (65,304 nm) was Miscellaneous (see Appendix S4 for total transit distance by vessel type*)
- transit distance averaged 12,616 nm/month, with a range of 897 nm in March to 41,890 nm in September (see Appendix S8 for monthly transit distance by vessel type*)

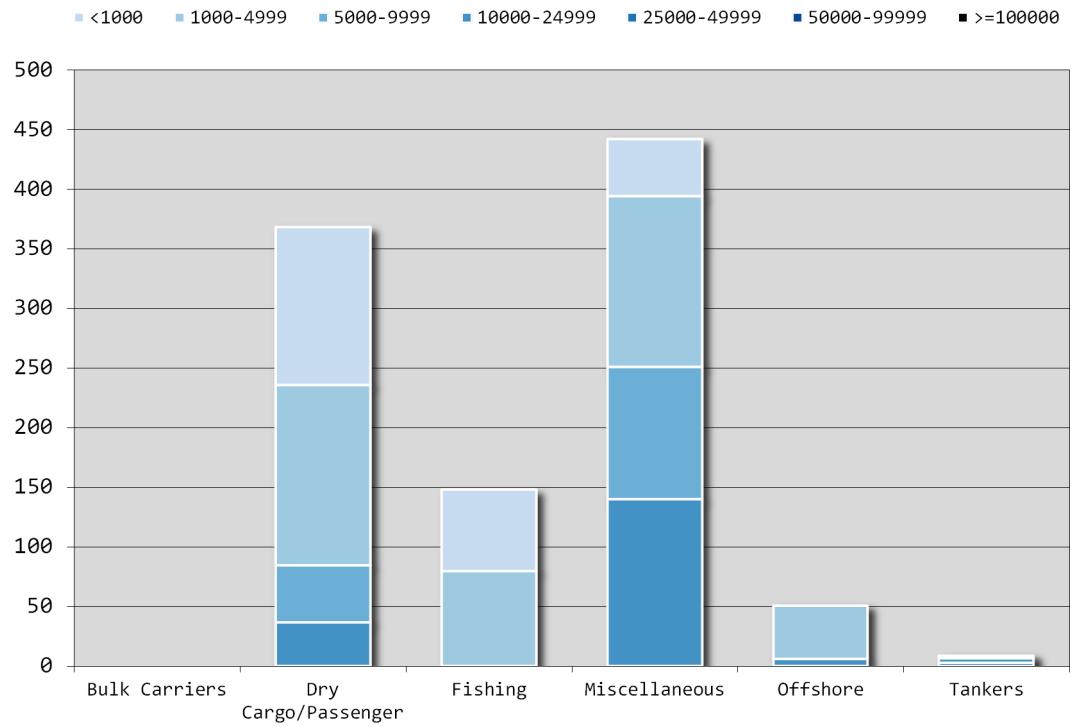
Transit Density:

- 14 out of 14 for percent of water surface area exposed to vessel traffic (22.3%)
- 14 out of 14 for average transit density (0.24 km/km^2)
- 9 out of 14 for maximum transit density (23.92 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Arctic Ocean Transit Counts
by Vessel Type Class and Gross Tonnage Class

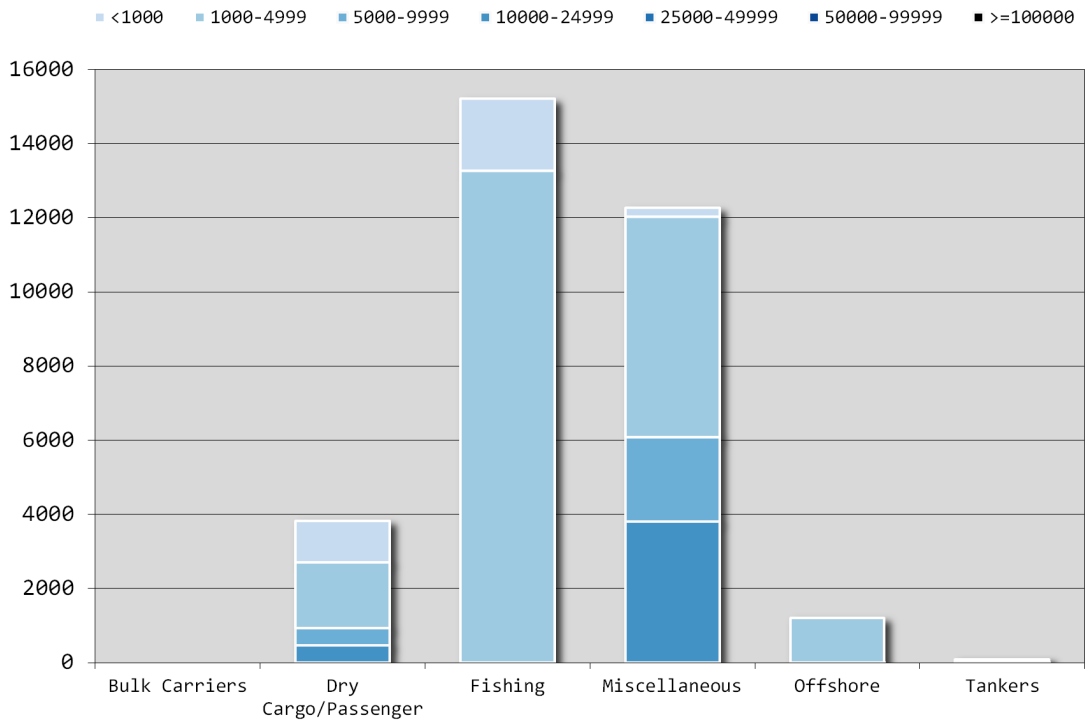
As an aggregate, the Miscellaneous vessel type class logged the highest number of transits (442 transits) in the Arctic Ocean during 2015. The vessel types with the highest number of transits were Passenger/Cruise, Research Survey Vessel, and Icebreaker with 260, 160, and 106 transits, respectively (Appendix S2). Of the 1,018 total transits, the highest number (421 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S2). Vessels with a gross tonnage ≥ 10,000 accounted for 19% of the total transits. The flag countries that logged the highest number of transits in the Arctic Ocean during 2015 were United States Of America, Norway, and Russia with 161, 159, and 153 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	132	151	48	0	37	0	0	**368**
Fishing	68	80	0	0	0	0	0	**148**
Miscellaneous	48	143	111	0	140	0	0	**442**
Offshore	0	45	0	0	6	0	0	**51**
Tankers	0	2	0	3	4	0	0	**9**
Totals:	**248**	**421**	**159**	**3**	**187**	**0**	**0**	**1018**

Arctic Ocean Operational Hours
by Vessel Type Class and Gross Tonnage Class

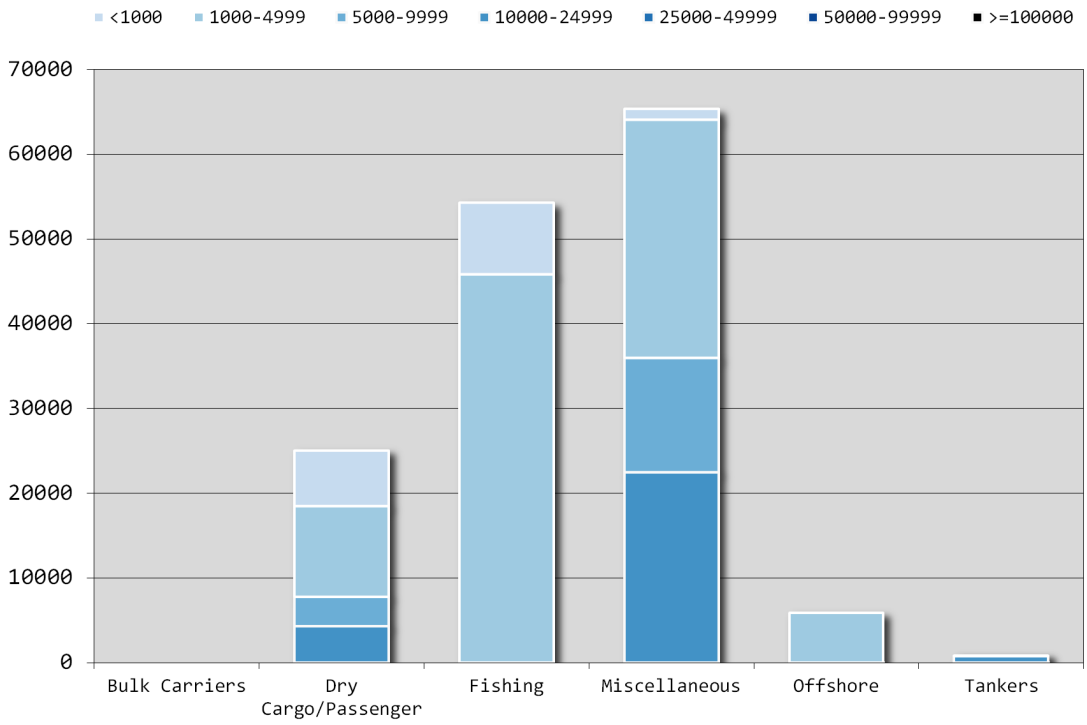
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (15,209 hrs) in the Arctic Ocean during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Research Survey Vessel, and Icebreaker with 12,203; 5,852; and 3,563 hours, respectively (Appendix S3). Of the 32,603 total operational hours, the highest number (22,175 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S3). Vessels with a gross tonnage ≥ 10,000 accounted for 13% of the total operational hours. The flag countries that logged the highest number of operational hours in the Arctic Ocean during 2015 were Russia, Norway, and Estonia with 7,978; 4,445; and 4,019 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	1120	1767	471	471	0	0	0	**3830**
Fishing	1942	13267	0	0	0	0	0	**15209**
Miscellaneous	250	5942	2268	3809	0	0	0	**12269**
Offshore	0	1188	0	26	0	0	0	**1214**
Tankers	0	11	0	57	13	0	0	**81**
Totals:	**3312**	**22175**	**2740**	**4363**	**13**	**0**	**0**	**32603**

Arctic Ocean Transit Distance
by Vessel Type Class and Gross Tonnage Class

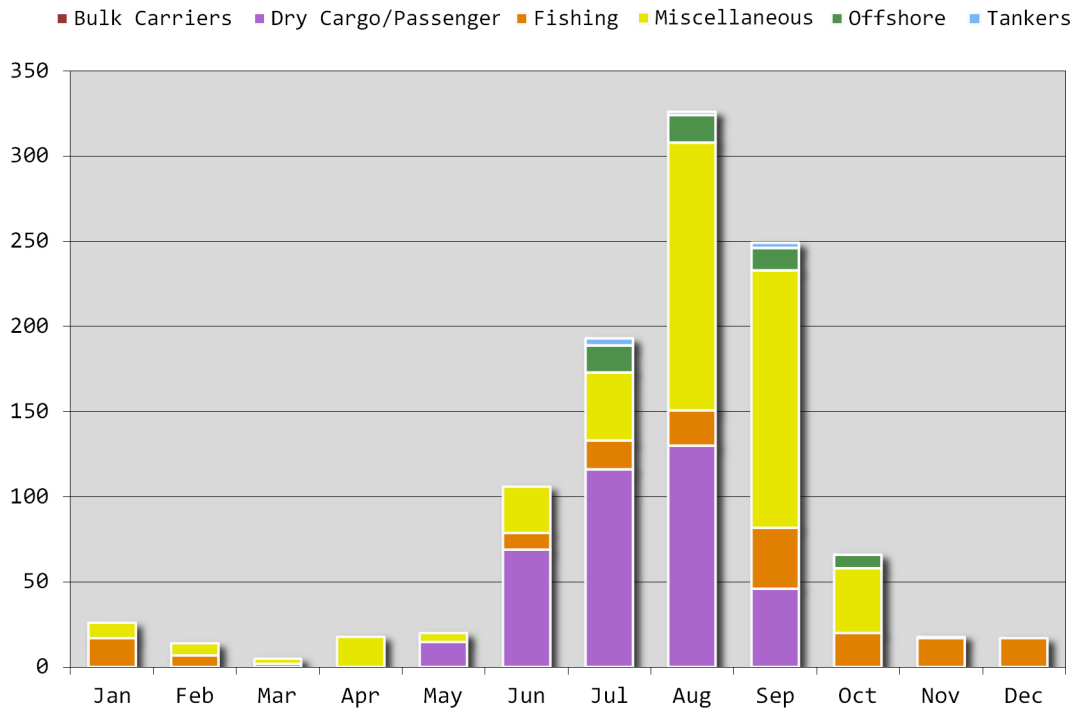
As an aggregate, the Miscellaneous vessel type class logged the highest amount of transit distance (65,304 nm) in the Arctic Ocean during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Research Survey Vessel, and Icebreaker with 42,646; 27,800; and 21,252 nm, respectively (Appendix S4). Of the 151,395 nm of total transit distance, the highest amount (90,617 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S4). Vessels with a gross tonnage ≥ 10,000 accounted for 18% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Arctic Ocean during 2015 were Russia, Norway, and Estonia with 42,062; 18,925; and 13,111 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	0	0	0	4315	3518	10671	6571	**25075**
Fishing	0	0	0	0	0	45861	8373	**54235**
Miscellaneous	0	0	0	22471	13473	28138	1223	**65304**
Offshore	0	0	0	74	0	5821	0	**5894**
Tankers	0	0	149	612	0	126	0	**886**
Totals:	**0**	**0**	**149**	**27471**	**16991**	**90617**	**16167**	**151395**

Arctic Ocean Transit Counts
by Vessel Type Class and Month

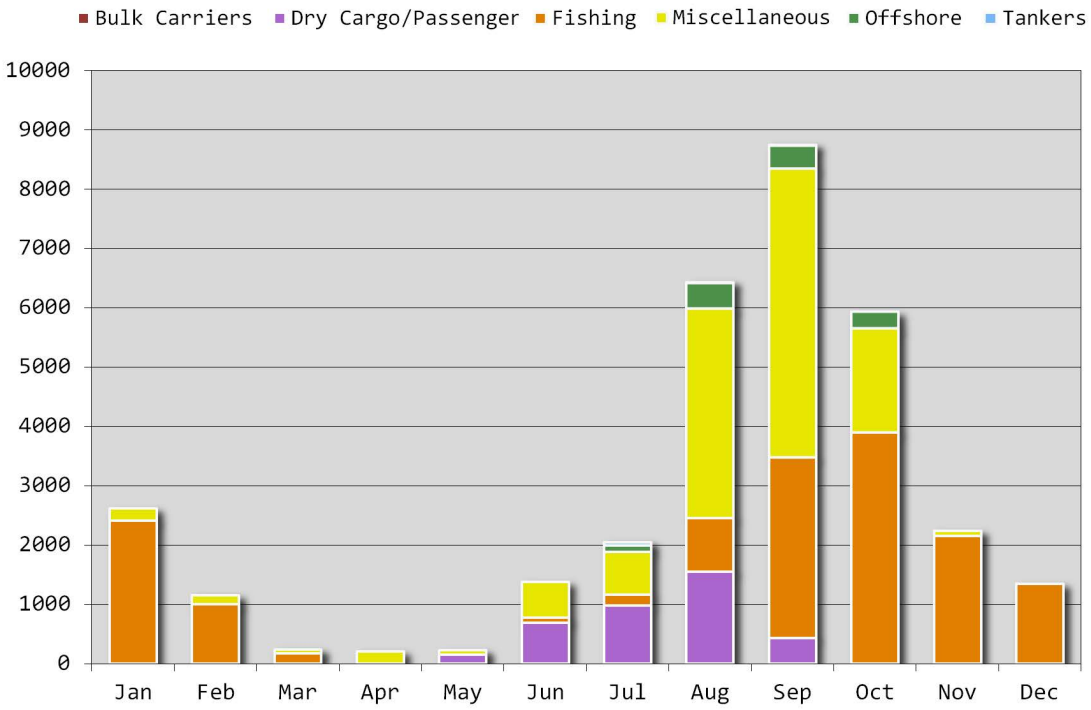
Transit counts for the Arctic Ocean in 2015 averaged 88 transits/month, with a range of 5 transits in March to 326 transits in August (see Appendix S6 for monthly transit counts by vessel type). With a coefficient of variation of 1.23, the Arctic Ocean had a moderate amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	17	9	0	0	**26**
Feb	0	0	7	7	0	0	**14**
Mar	0	0	2	3	0	0	**5**
Apr	0	0	0	18	0	0	**18**
May	0	15	0	5	0	0	**20**
Jun	0	69	10	27	0	0	**106**
Jul	0	116	17	40	16	4	**193**
Aug	0	130	21	157	16	2	**326**
Sep	0	46	36	151	13	3	**249**
Oct	0	0	20	38	8	0	**66**
Nov	0	0	17	1	0	0	**18**
Dec	0	0	17	0	0	0	**17**

Arctic Ocean Operational Hours
by Vessel Type Class and Month

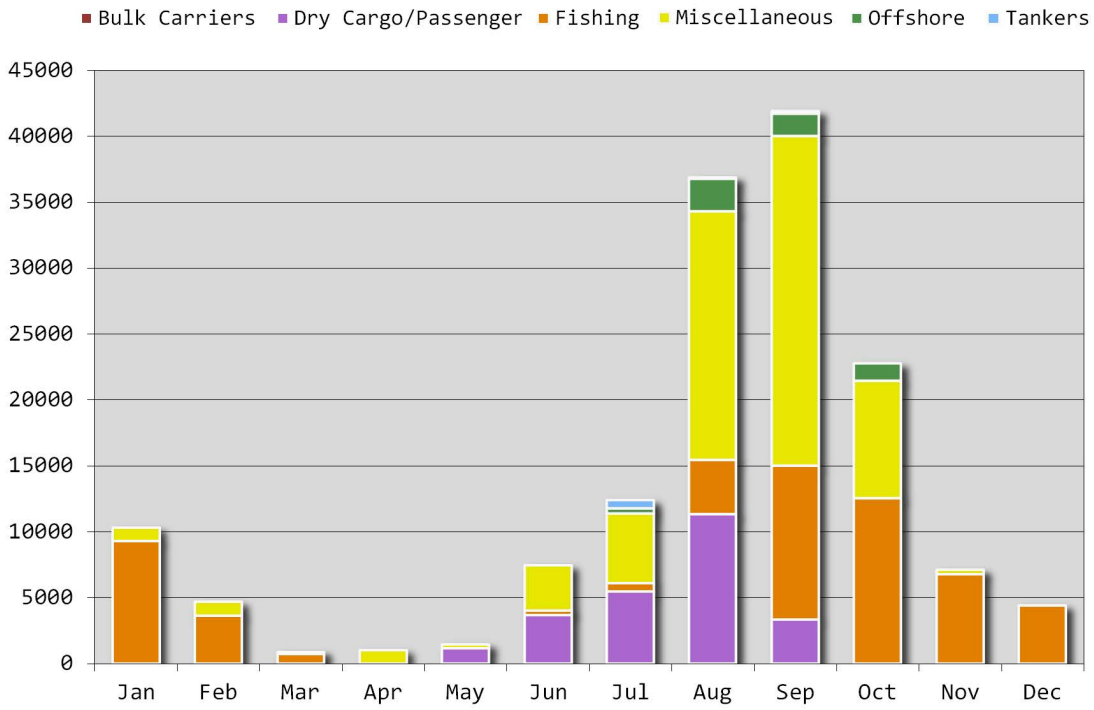
Operational hours for the Arctic Ocean in 2015 averaged 2,717 hrs/month, with a range of 210 hours in April to 8,745 hours in September (see Appendix S7 for monthly operational hours by vessel type). With a coefficient of variation of 1.03, the Arctic Ocean had a moderate amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	2415	210	0	0	**2625**
Feb	0	0	1003	158	0	0	**1161**
Mar	0	0	178	63	0	0	**241**
Apr	0	0	0	210	0	0	**210**
May	0	153	0	74	0	0	**227**
Jun	0	691	86	604	0	0	**1382**
Jul	0	989	176	726	107	57	**2055**
Aug	0	1557	902	3523	438	8	**6428**
Sep	0	438	3038	4865	388	16	**8745**
Oct	0	0	3904	1746	282	0	**5932**
Nov	0	0	2154	90	0	0	**2244**
Dec	0	0	1353	0	0	0	**1353**

Arctic Ocean Transit Distance
by Vessel Type Class and Month

Transit distance for the Arctic Ocean in 2015 averaged 12,616 nm/month, with a range of 897 nm in March to 41,890 nm in September (see Appendix S8 for monthly transit distance by vessel type). With a coefficient of variation of 1.1, the Arctic Ocean had a moderate amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	9297	1030	0	0	**10327**
Feb	0	0	3641	1064	0	0	**4705**
Mar	0	0	736	161	0	0	**897**
Apr	0	0	0	1030	0	0	**1030**
May	0	1167	0	303	0	0	**1470**
Jun	0	3692	345	3437	0	0	**7474**
Jul	0	5475	654	5259	408	612	**12408**
Aug	0	11358	4121	18800	2480	88	**36847**
Sep	0	3383	11632	24984	1703	186	**41888**
Oct	0	0	12570	8924	1302	0	**22796**
Nov	0	0	6808	311	0	0	**7119**
Dec	0	0	4431	0	0	0	**4431**

Baffin Bay Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 9 of 14 for total amount of water surface area within the ARPA Arctic boundary (544,325 km^2)
- average sea ice extent ranged from 10% of the water surface area in August to 94% in January, February, March, April, and May; average sea ice extent exceeded 25% of the water surface area for 9 months, 50% for 8 months, and 75% for 7 months

Unique Vessels:

- 10 of 14 for total number of unique vessels (94 vessels)
- vessel type class with the highest count of unique vessels (31 vessels) was Dry Cargo/Passenger (see Appendix S9 for total unique vessel counts by vessel type*)

Transit Counts:

- 9 out of 14 for total number of transits (1,234 transits)
- vessel type class with the highest number of transits (618 transits) was Dry Cargo/Passenger (see Appendix S10 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (573 transits) was 1000-4999 GT (see Appendix S10 for total transit counts by vessel size class)
- transit counts averaged 106 transits/month, with a range of 0 transits in February and March to 342 transits in August (see Appendix S14 for monthly transit counts by vessel type*)

Operational Hours:

- 9 out of 14 for total operational hours (28,056 hrs)
- vessel type class with the highest number of operational hours (4,676 hrs) was Fishing (see Appendix S11 for total operational hours by vessel type*)
- operational hours averaged 2,338 hrs/month, with a range of 0 hours in February and March to 6,627 hours in August (see Appendix S15 for monthly operational hours by vessel type*)

Transit Distance:

- 9 out of 14 for total transit distance (175,600 nm)
- vessel type class with the highest amount of transit distance (73,882 nm) was Dry Cargo/Passenger (see Appendix S12 for total transit distance by vessel type*)
- transit distance averaged 14,633 nm/month, with a range of 0 nm in February and March to 50,184 nm in August (see Appendix S16 for monthly transit distance by vessel type*)

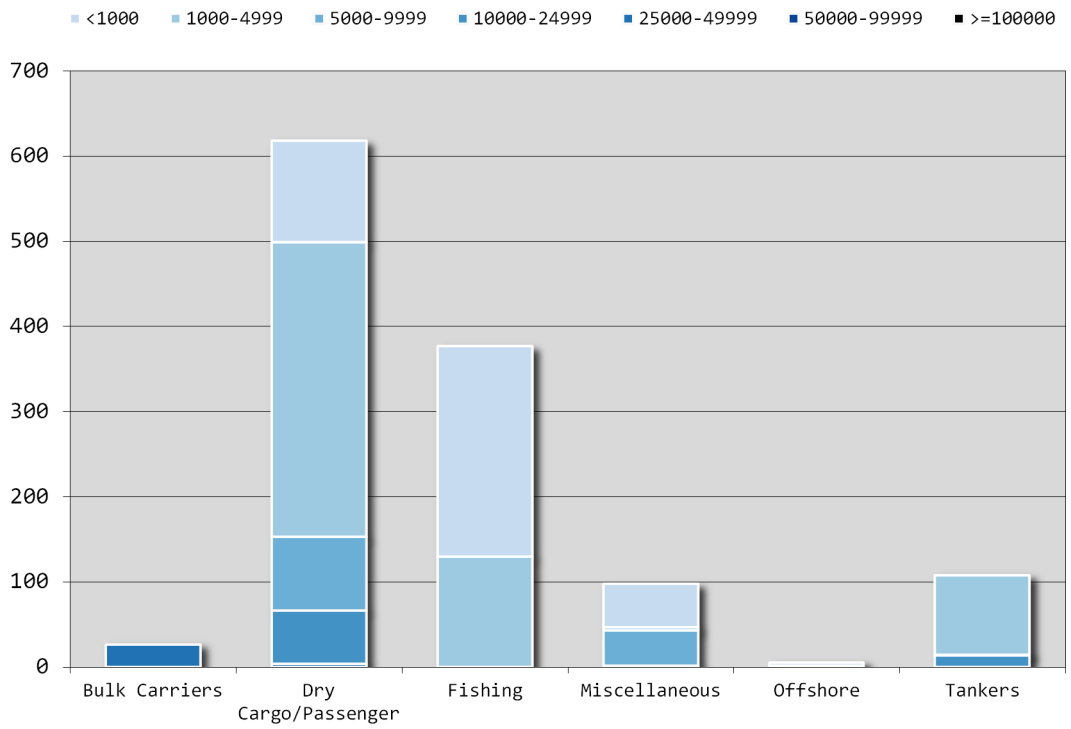
Transit Density:

- 8 out of 14 for percent of water surface area exposed to vessel traffic (80.5%)
- 9 out of 14 for average transit density (0.71 km/km^2)
- 10 out of 14 for maximum transit density (19.22 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Baffin Bay Transit Counts
by Vessel Type Class and Gross Tonnage Class

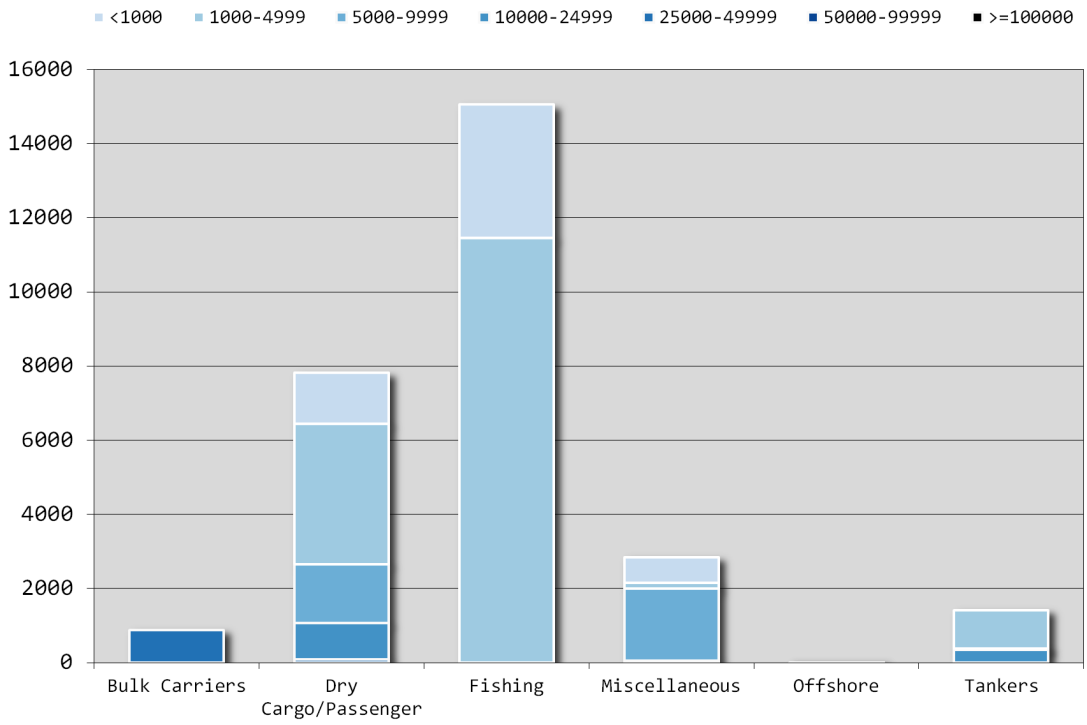
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (618 transits) in Baffin Bay during 2015. The vessel types with the highest number of transits were Passenger/Cruise, General Cargo Ship, and Stern Trawler with 207, 183, and 167 transits, respectively (Appendix S10). Of the 1,234 total transits, the highest number (573 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S10). Vessels with a gross tonnage ≥ 10,000 accounted for 9% of the total transits. The flag countries that logged the highest number of transits in the Baffin Bay during 2015 were Denmark, Denmark (Dis), and St Kitts & Nevis with 305, 257, and 163 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	27	0	0	0	**27**
Dry Cargo/Passenger	119	346	86	4	63	0	0	**618**
Fishing	247	130	0	0	0	0	0	**377**
Miscellaneous	51	4	41	0	2	0	0	**98**
Offshore	4	0	0	0	0	0	2	**6**
Tankers	0	93	1	0	14	0	0	**108**
Totals:	**421**	**573**	**128**	**31**	**79**	**0**	**2**	**1234**

Baffin Bay Operational Hours
by Vessel Type Class and Gross Tonnage Class

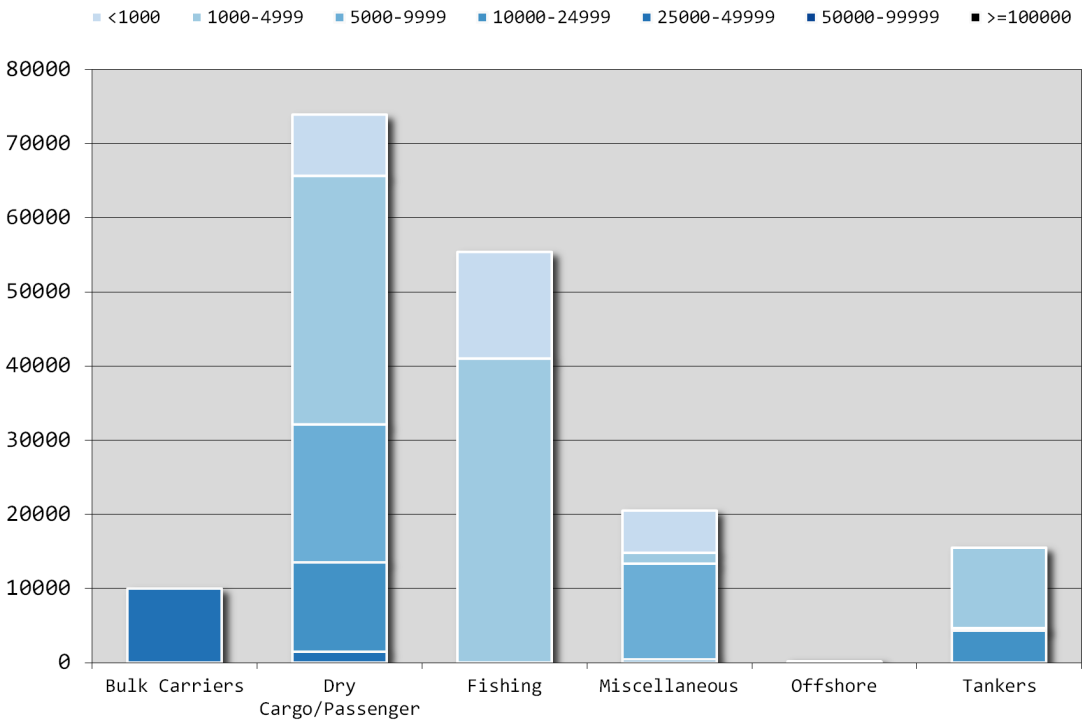
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (15,046 hrs) in Baffin Bay during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Factory Stern Trawler, and Passenger/Cruise with 8,616; 4,833; and 3,330 hours, respectively (Appendix S11). Of the 28,056 total operational hours, the highest number (16,433 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S11). Vessels with a gross tonnage ≥ 10,000 accounted for 8% of the total operational hours. The flag countries that logged the highest number of operational hours in the Baffin Bay during 2015 were Denmark, Denmark (Dis), and Canada with 12,882; 2,903; and 2,721 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	890	0	0	**890**
Dry Cargo/Passenger	1368	3787	1600	965	103	0	0	**7822**
Fishing	3591	11455	0	0	0	0	0	**15046**
Miscellaneous	696	154	1942	59	0	0	0	**2852**
Offshore	19	0	0	0	0	0	5	**24**
Tankers	0	1038	22	361	0	0	0	**1421**
Totals:	**5675**	**16433**	**3565**	**1386**	**993**	**0**	**5**	**28056**

Baffin Bay Transit Distance
by Vessel Type Class and Gross Tonnage Class

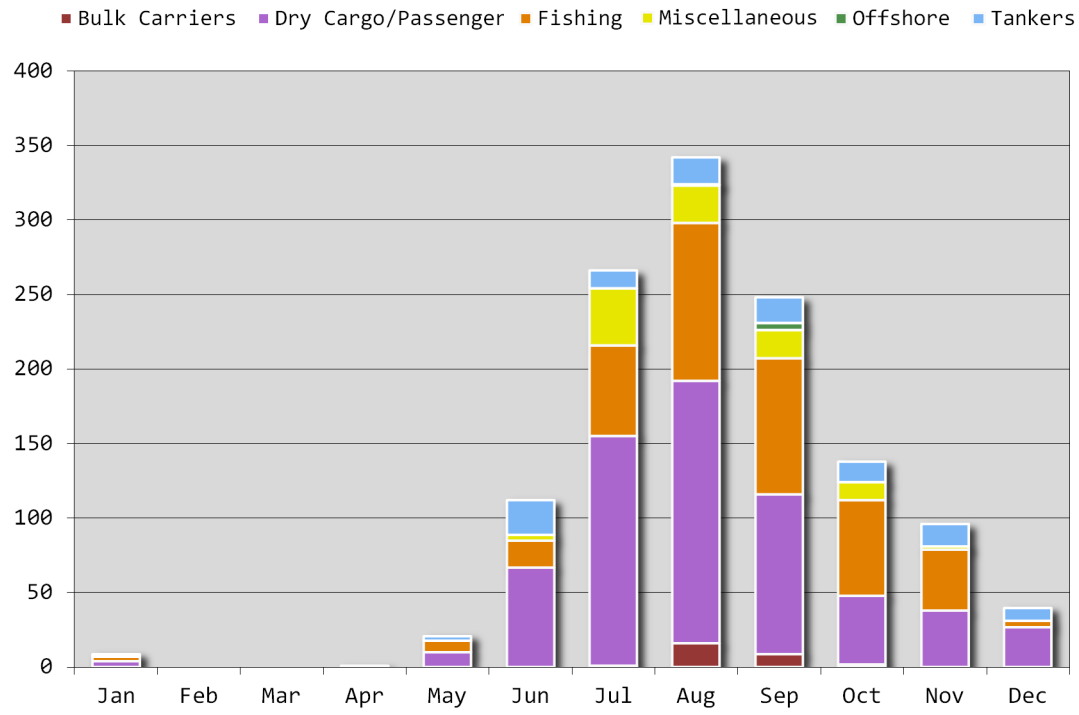
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest amount of transit distance (73,882 nm) in Baffin Bay during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Passenger/Cruise, and General Cargo Ship with 31,856; 31,587; and 18,137 nm, respectively (Appendix S12). Of the 175,600 nm of total transit distance, the highest amount (86,796 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S12). Vessels with a gross tonnage ≥ 10,000 accounted for 16% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Baffin Bay during 2015 were Denmark, Denmark (Dis), and Bahamas with 49,639; 28,671; and 22,050 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	9988	0	0	0	0	**9988**
Dry Cargo/Passenger	0	0	1531	12060	18529	33485	8278	**73882**
Fishing	0	0	0	0	0	40984	14418	**55401**
Miscellaneous	0	0	0	517	12854	1470	5715	**20556**
Offshore	44	0	0	0	0	0	215	**259**
Tankers	0	0	0	4387	268	10858	0	**15513**
Totals:	**44**	**0**	**11519**	**16964**	**31651**	**86796**	**28626**	**175600**

Baffin Bay Transit Counts
by Vessel Type Class and Month

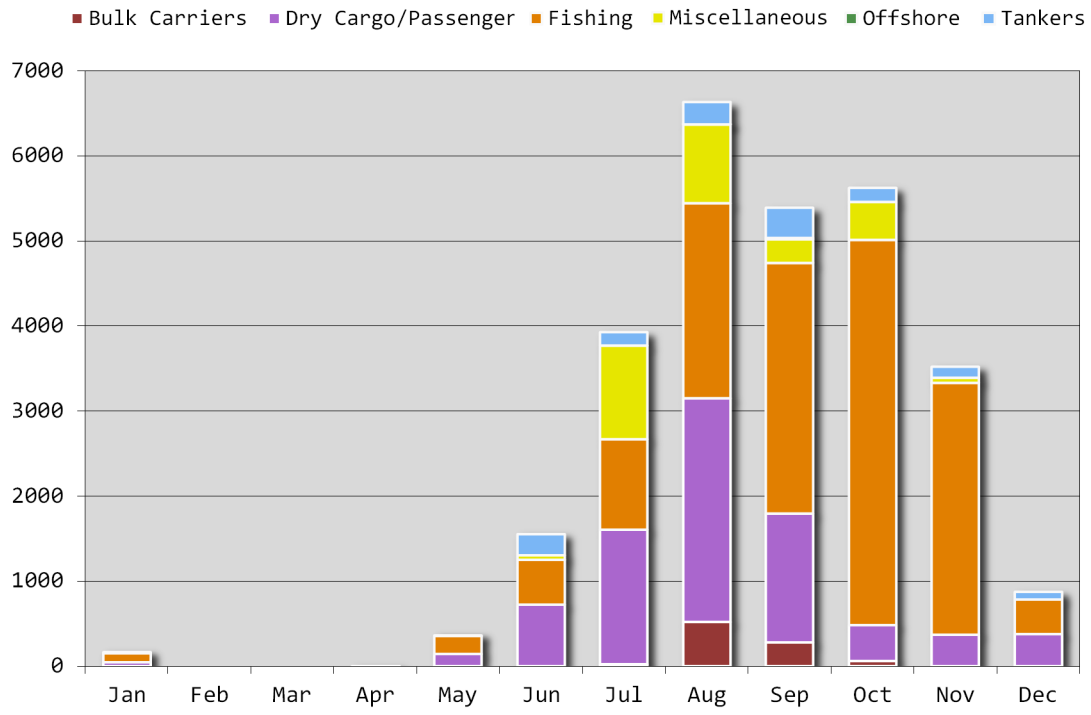
Transit counts for Baffin Bay in 2015 averaged 106 transits/month, with a range of 0 transits in February and March to 342 transits in August (see Appendix S14 for monthly transit counts by vessel type). With a coefficient of variation of 1.13, the Baffin Bay had a moderate amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	4	3	0	0	2	**9**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	1	0	0	0	0	**1**
May	0	10	8	0	0	3	**21**
Jun	0	67	18	4	0	23	**112**
Jul	1	154	61	38	0	12	**266**
Aug	16	176	106	25	1	18	**342**
Sep	9	107	91	19	5	17	**248**
Oct	2	46	64	12	0	14	**138**
Nov	0	38	41	2	0	15	**96**
Dec	0	27	4	0	0	9	**40**

Baffin Bay Operational Hours
by Vessel Type Class and Month

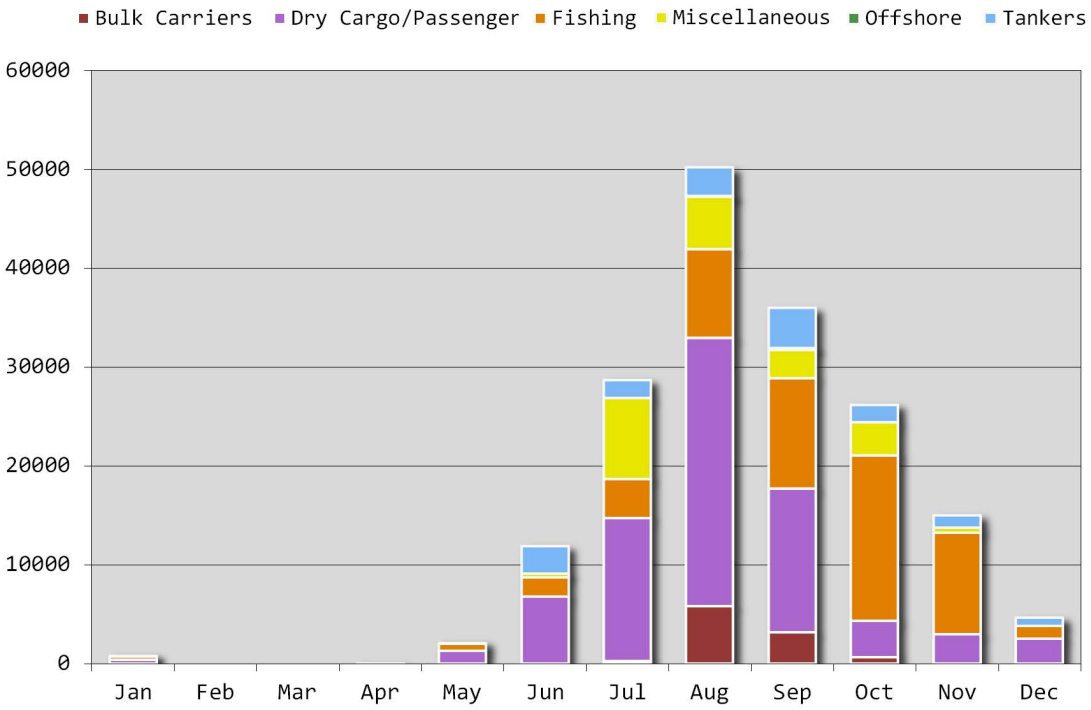
Operational hours for Baffin Bay in 2015 averaged 2,338 hrs/month, with a range of 0 hours in February and March to 6,627 hours in August (see Appendix S15 for monthly operational hours by vessel type). With a coefficient of variation of 1.08, the Baffin Bay had a moderate amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	49	108	0	0	9	**165**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	4	0	0	0	0	**4**
May	0	145	215	0	0	7	**368**
Jun	0	727	524	56	0	250	**1557**
Jul	23	1584	1065	1099	0	154	**3924**
Aug	524	2625	2292	924	5	258	**6627**
Sep	282	1513	2948	273	19	354	**5389**
Oct	61	422	4532	441	0	166	**5623**
Nov	0	376	2955	59	0	134	**3524**
Dec	0	377	408	0	0	89	**874**

Baffin Bay Transit Distance
by Vessel Type Class and Month

Transit distance for Baffin Bay in 2015 averaged 14,633 nm/month, with a range of 0 nm in February and March to 50,184 nm in August (see Appendix S16 for monthly transit distance by vessel type). With a coefficient of variation of 1.16, the Baffin Bay had a moderate amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	407	334	0	0	67	**808**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	35	0	0	0	0	**35**
May	0	1306	718	0	0	84	**2108**
Jun	0	6798	1973	395	0	2725	**11891**
Jul	317	14463	3931	8148	0	1842	**28701**
Aug	5815	27135	8960	5286	62	2926	**50184**
Sep	3185	14531	11195	2836	197	4038	**35982**
Oct	672	3669	16738	3373	0	1749	**26201**
Nov	0	2980	10262	517	0	1281	**15040**
Dec	0	2559	1290	0	0	801	**4650**

Barents Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 3 of 14 for total amount of water surface area within the ARPA Arctic boundary (1,418,825 km^2)
- average sea ice extent ranged from 0% of the water surface area in September to 49% in February; average sea ice extent exceeded 25% of the water surface area for 5 months, 50% for 0 months, and 75% for 0 months

Unique Vessels:

- 3 of 14 for total number of unique vessels (1,486 vessels)
- vessel type class with the highest count of unique vessels (458 vessels) was Fishing (see Appendix S17 for total unique vessel counts by vessel type*)

Transit Counts:

- 3 out of 14 for total number of transits (24,187 transits)
- vessel type class with the highest number of transits (12,664 transits) was Fishing (see Appendix S18 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (11,899 transits) was <1000 GT (see Appendix S18 for total transit counts by vessel size class)
- transit counts averaged 2,123 transits/month, with a range of 1,341 transits in January to 2,686 transits in June (see Appendix S22 for monthly transit counts by vessel type*)

Operational Hours:

- 1 out of 14 for total operational hours (1,131,267 hrs)
- vessel type class with the highest number of operational hours (188,544 hrs) was Fishing (see Appendix S19 for total operational hours by vessel type*)
- operational hours averaged 94,272 hrs/month, with a range of 54,444 hours in February to 126,390 hours in October (see Appendix S23 for monthly operational hours by vessel type*)

Transit Distance:

- 3 out of 14 for total transit distance (6,005,671 nm)
- vessel type class with the highest amount of transit distance (3,718,528 nm) was Fishing (see Appendix S20 for total transit distance by vessel type*)
- transit distance averaged 500,473 nm/month, with a range of 287,518 nm in February to 682,998 nm in October (see Appendix S24 for monthly transit distance by vessel type*)

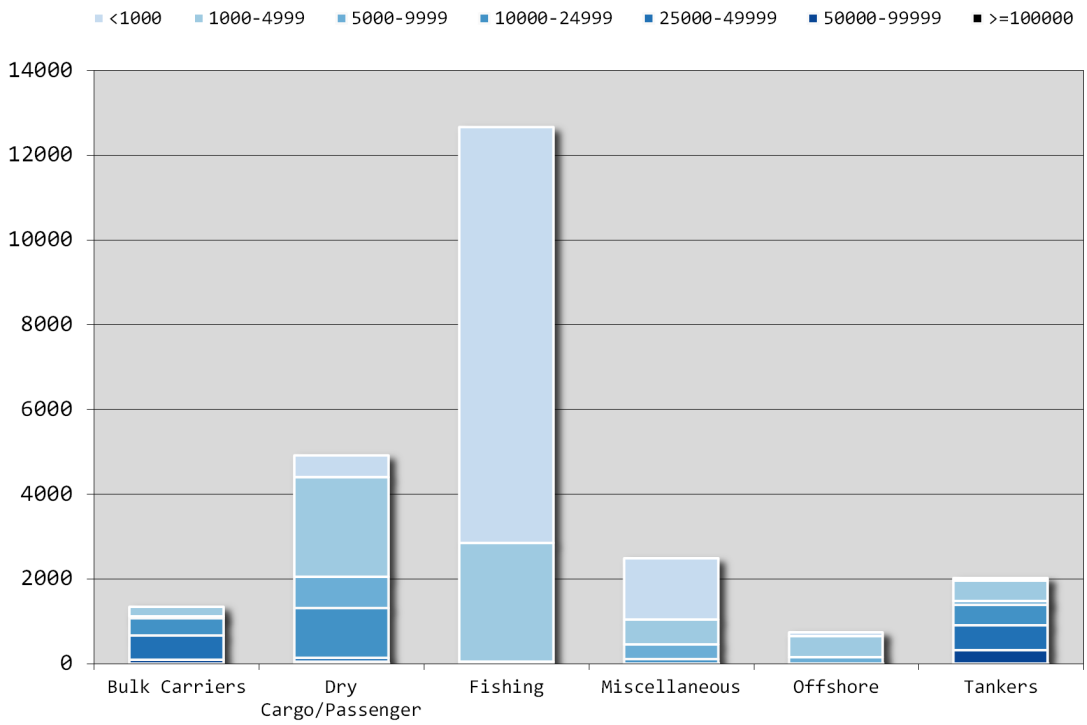
Transit Density:

- 4 out of 14 for percent of water surface area exposed to vessel traffic (95.4%)
- 3 out of 14 for average transit density (7.92 km/km^2)
- 4 out of 14 for maximum transit density (253.05 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Barents Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

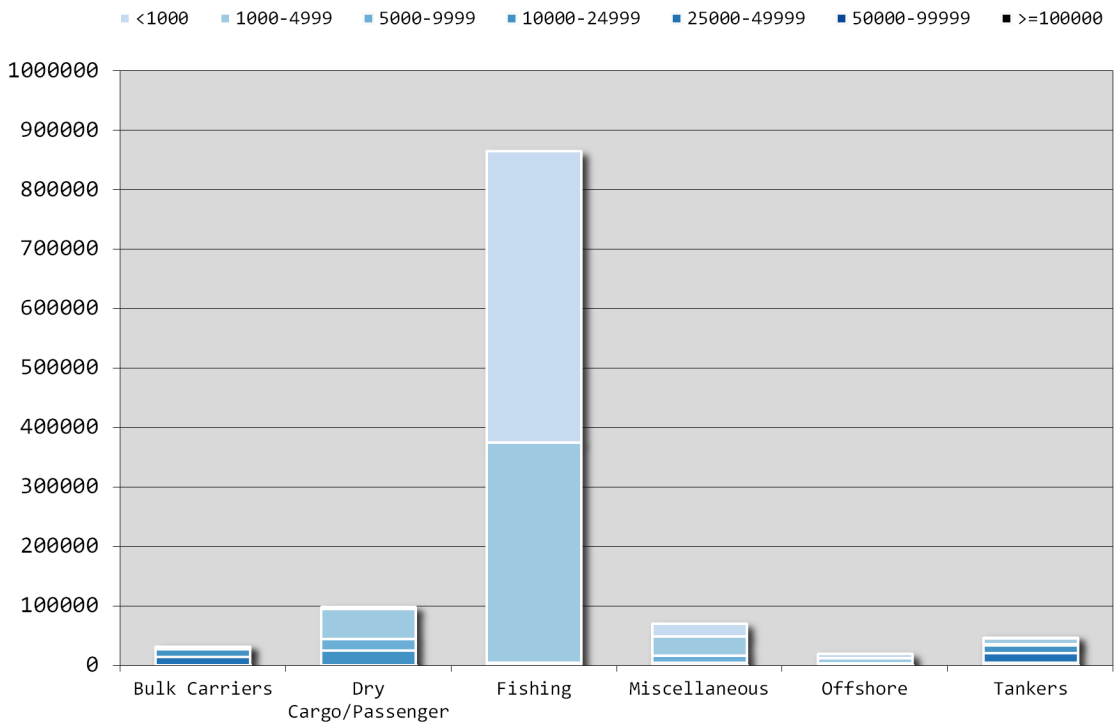
As an aggregate, the Fishing vessel type class logged the highest number of transits (12,664 transits) in the Barents Sea during 2015. The vessel types with the highest number of transits were Fishing Vessel, Stern Trawler, and General Cargo Ship with 5,531; 5,160; and 2,159 transits, respectively (Appendix S18). Of the 24,187 total transits, the highest number (11,899 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S18). Vessels with a gross tonnage ≥ 10,000 accounted for 16% of the total transits. The flag countries that logged the highest number of transits in the Barents Sea during 2015 were Russia, Norway, and Malta with 9,855; 8,687; and 512 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	225	46	574	417	91	0	**1353**
Dry Cargo/Passenger	512	2355	734	87	1182	35	19	**4924**
Fishing	9805	2811	48	0	0	0	0	**12664**
Miscellaneous	1445	584	341	10	108	0	0	**2488**
Offshore	82	498	144	11	0	0	4	**739**
Tankers	55	485	79	585	490	313	12	**2019**
Totals:	**11899**	**6958**	**1392**	**1267**	**2197**	**439**	**35**	**24187**

Barents Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

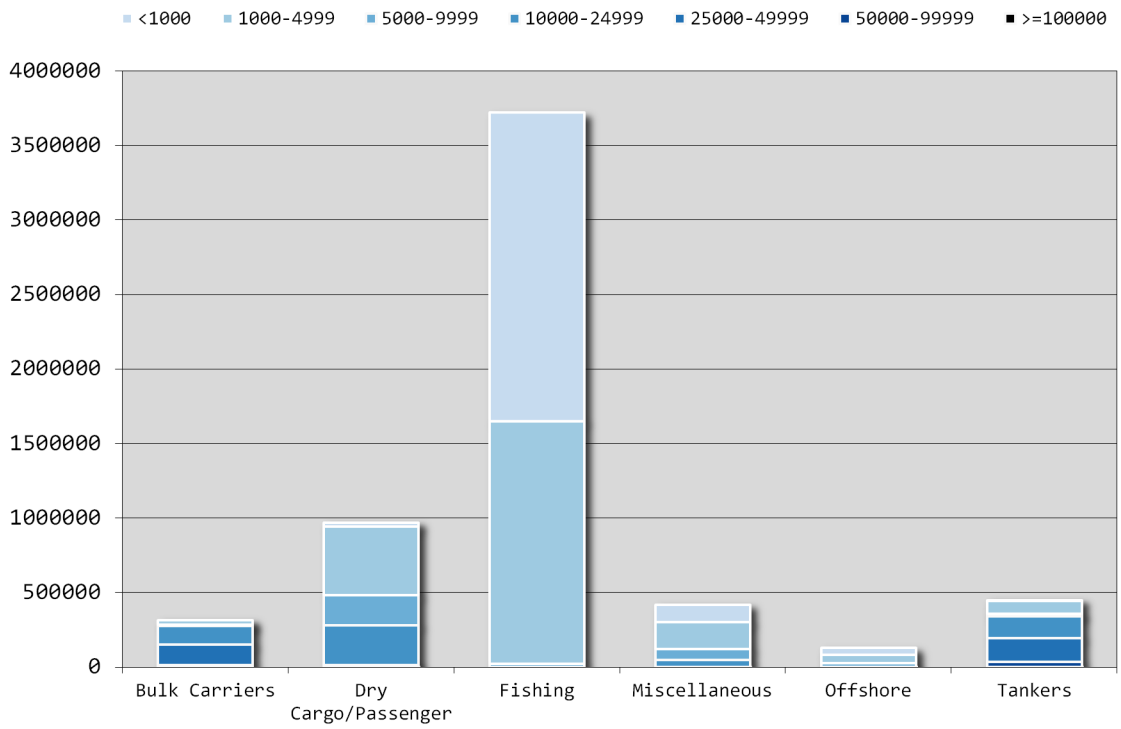
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (864,458 hrs) in the Barents Sea during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Fishing Vessel, and Factory Stern Trawler with 492,314; 217,792; and 107,327 hours, respectively (Appendix S19). Of the 1,131,267 total operational hours, the highest number (521,289 hrs) was logged by vessels in the <1000 GT vessel size class (Appendix S19). Vessels with a gross tonnage ≥ 10,000 accounted for 8% of the total operational hours. The flag countries that logged the highest number of operational hours in the Barents Sea during 2015 were Russia, Norway, and Latvia with 545,303; 311,097; and 32,549 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	3777	861	12560	12914	1868	0	**31979**
Dry Cargo/Passenger	3373	50736	19002	23851	1088	178	45	**98273**
Fishing	489128	370755	4575	0	0	0	0	**864458**
Miscellaneous	21052	32728	11517	4786	295	0	0	**70378**
Offshore	7412	8889	2997	0	234	0	55	**19586**
Tankers	325	10290	2158	12960	15811	4817	232	**46593**
Totals:	**521289**	**477174**	**41109**	**54157**	**30342**	**6863**	**332**	**1131267**

Barents Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

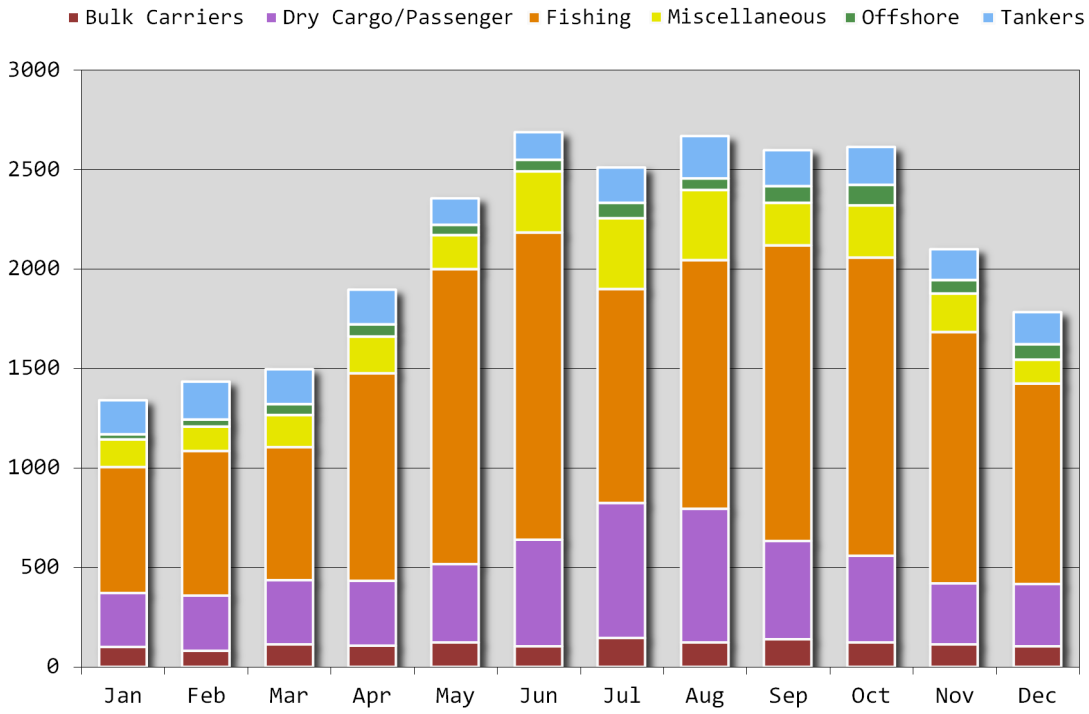
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (3,718,528 nm) in the Barents Sea during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Fishing Vessel, and General Cargo Ship with 2,148,541; 844,935; and 572,351 nm, respectively (Appendix S20). Of the 6,005,671 nm of total transit distance, the highest amount (2,440,500 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S20). Vessels with a gross tonnage ≥ 10,000 accounted for 16% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Barents Sea during 2015 were Russia, Norway, and Latvia with 2,948,742; 1,419,112; and 133,990 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	16907	134167	125115	10061	31250	0	**317500**
Dry Cargo/Passenger	641	2726	13156	266302	200814	461432	26472	**971544**
Fishing	0	0	0	0	25502	1627039	2065988	**3718528**
Miscellaneous	0	0	3272	46151	73300	182900	116027	**421650**
Offshore	396	0	1351	0	28405	54684	45084	**129920**
Tankers	1602	36497	158886	145294	18652	83196	2403	**446530**
Totals:	**2639**	**56130**	**310832**	**582863**	**356734**	**2440500**	**2255973**	**6005671**

Barents Sea Transit Counts
by Vessel Type Class and Month

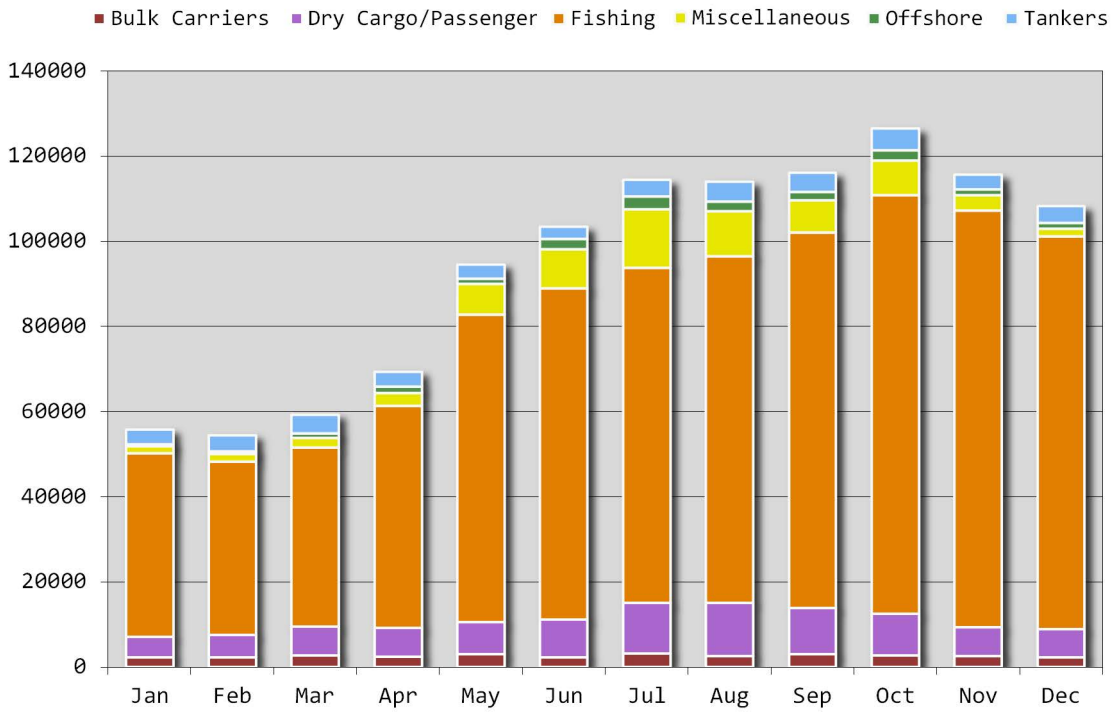
Transit counts for the Barents Sea in 2015 averaged 2,123 transits/month, with a range of 1,341 transits in January to 2,686 transits in June (see Appendix S22 for monthly transit counts by vessel type). With a coefficient of variation of 0.24, the Barents Sea had some of the lowest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	101	273	630	139	28	170	**1341**
Feb	83	278	724	125	35	189	**1434**
Mar	114	324	668	162	54	175	**1497**
Apr	108	325	1045	184	61	172	**1895**
May	124	393	1483	171	50	135	**2356**
Jun	106	535	1541	308	59	137	**2686**
Jul	147	679	1074	354	77	179	**2510**
Aug	123	672	1250	351	58	213	**2667**
Sep	140	493	1485	213	85	182	**2598**
Oct	123	436	1500	259	105	191	**2614**
Nov	115	306	1263	193	67	155	**2099**
Dec	104	314	1006	119	78	162	**1783**

Barents Sea Operational Hours
by Vessel Type Class and Month

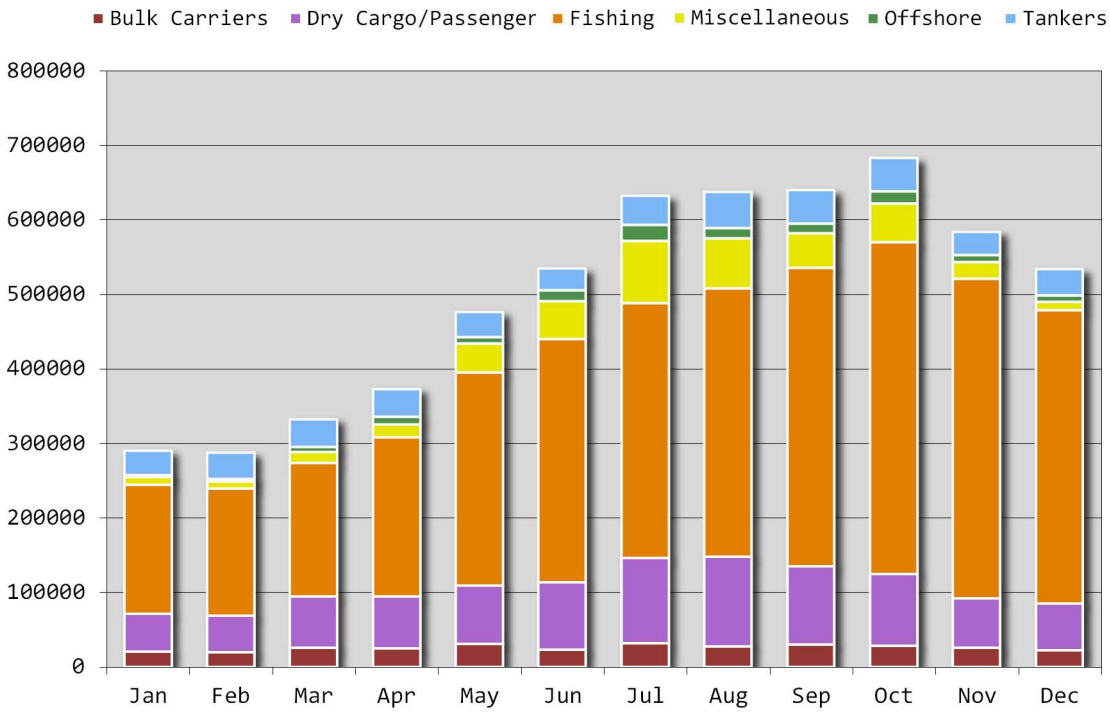
Operational hours for the Barents Sea in 2015 averaged 94,272 hrs/month, with a range of 54,444 hours in February to 126,390 hours in October (see Appendix S23 for monthly operational hours by vessel type). With a coefficient of variation of 0.29, the Barents Sea had some of the lowest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	2272	4872	43079	1737	403	3385	**55748**
Feb	2300	5266	40718	1730	612	3818	**54444**
Mar	2717	6794	42039	2359	1013	4353	**59275**
Apr	2474	6822	52121	2973	1474	3487	**69350**
May	3080	7507	72141	7244	1270	3325	**94566**
Jun	2279	8909	77745	9179	2397	2877	**103386**
Jul	3192	11887	78750	13620	3044	3836	**114327**
Aug	2712	12469	81308	10575	2268	4671	**114003**
Sep	3034	10852	88207	7449	1972	4506	**116021**
Oct	2851	9658	98241	8156	2418	5066	**126390**
Nov	2690	6687	97849	3568	1344	3456	**115595**
Dec	2378	6550	92260	1789	1372	3814	**108163**

Barents Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Barents Sea in 2015 averaged 500,473 nm/month, with a range of 287,518 nm in February to 682,998 nm in October (see Appendix S24 for monthly transit distance by vessel type). With a coefficient of variation of 0.29, the Barents Sea had some of the lowest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	21004	50644	173570	9629	2741	32637	**290225**
Feb	20201	48835	170812	9104	3752	34814	**287518**
Mar	25943	68839	179574	14846	6595	37183	**332980**
Apr	25469	69454	213631	17089	10319	37545	**373507**
May	31769	78181	285356	38566	9224	33327	**476423**
Jun	23834	90470	326033	51019	14685	28635	**534676**
Jul	32638	114241	341851	83531	21019	38940	**632220**
Aug	28350	119870	360388	66459	14372	47690	**637129**
Sep	30527	105194	400351	46425	12460	44810	**639767**
Oct	29158	96263	444748	52053	16246	44529	**682997**
Nov	26137	66580	428522	22100	9447	31560	**584346**
Dec	22469	62971	393692	10829	9062	34859	**533882**

Beaufort Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 11 of 14 for total amount of water surface area within the ARPA Arctic boundary (440,400 km^2)
- average sea ice extent ranged from 9% of the water surface area in September to 98% in January, February, March, April, May, November, and December; average sea ice extent exceeded 25% of the water surface area for 11 months, 50% for 10 months, and 75% for 9 months

Unique Vessels:

- 14 of 14 for total number of unique vessels (43 vessels)
- vessel type class with the highest count of unique vessels (32 vessels) was Miscellaneous (see Appendix S25 for total unique vessel counts by vessel type*)

Transit Counts:

- 12 out of 14 for total number of transits (483 transits)
- vessel type class with the highest number of transits (424 transits) was Miscellaneous (see Appendix S26 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (397 transits) was <1000 GT (see Appendix S26 for total transit counts by vessel size class)
- transit counts averaged 42 transits/month, with a range of 0 transits in January, February, March, April, May, November, and December to 218 transits in September (see Appendix S30 for monthly transit counts by vessel type*)

Operational Hours:

- 14 out of 14 for total operational hours (8,034 hrs)
- vessel type class with the highest number of operational hours (1,339 hrs) was Miscellaneous (see Appendix S27 for total operational hours by vessel type*)
- operational hours averaged 669 hrs/month, with a range of 0 hours in January, February, March, April, May, November, and December to 3,417 hours in September (see Appendix S31 for monthly operational hours by vessel type*)

Transit Distance:

- 14 out of 14 for total transit distance (47,447 nm)
- vessel type class with the highest amount of transit distance (37,475 nm) was Miscellaneous (see Appendix S28 for total transit distance by vessel type*)
- transit distance averaged 3,954 nm/month, with a range of 0 nm in January, February, March, April, May, November, and December to 21,685 nm in September (see Appendix S32 for monthly transit distance by vessel type*)

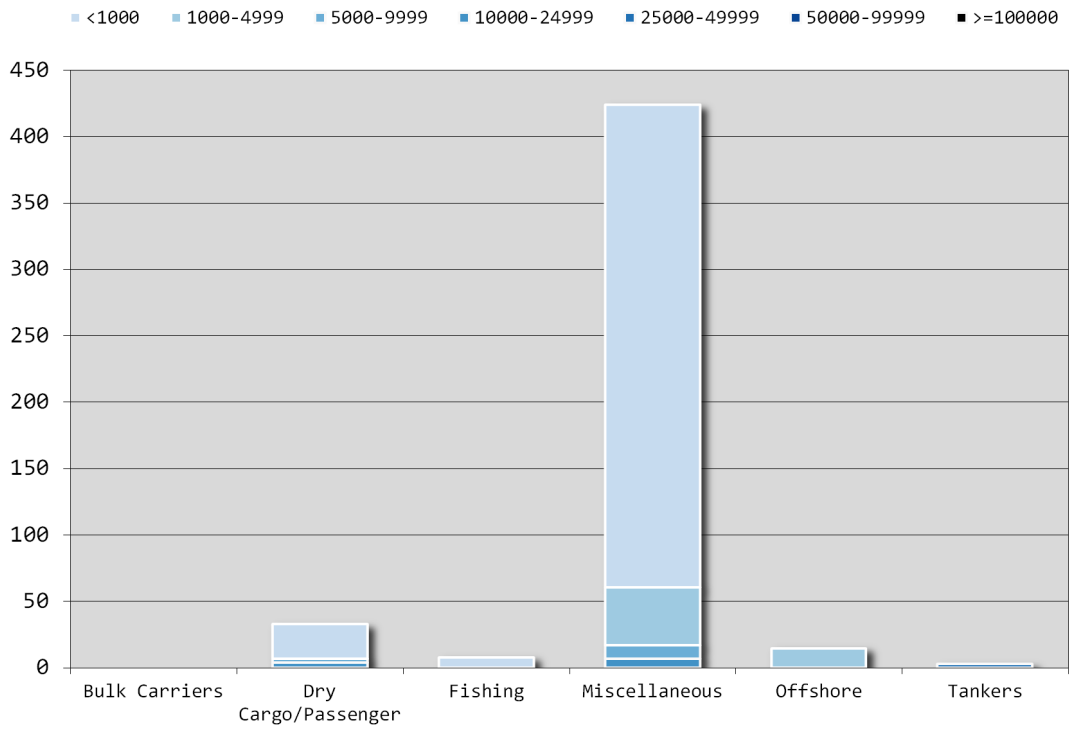
Transit Density:

- 12 out of 14 for percent of water surface area exposed to vessel traffic (54.4%)
- 13 out of 14 for average transit density (0.35 km/km^2)
- 11 out of 14 for maximum transit density (16.97 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Beaufort Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

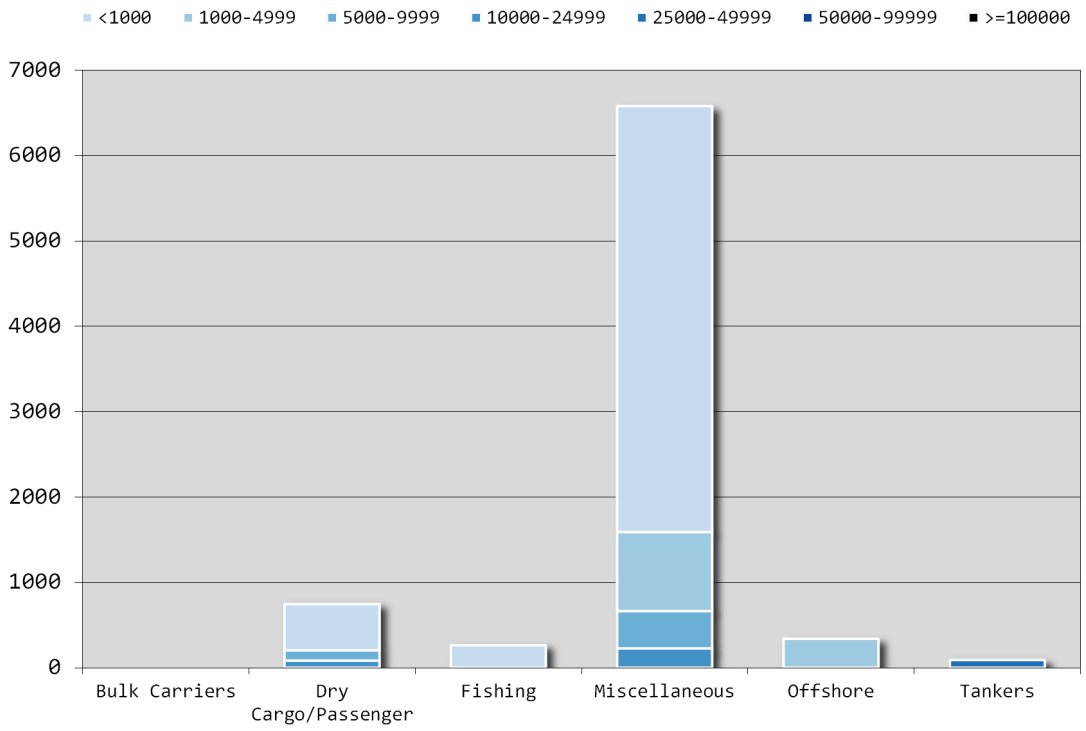
As an aggregate, the Miscellaneous vessel type class logged the highest number of transits (424 transits) in the Beaufort Sea during 2015. The vessel types with the highest number of transits were Tug, Pusher Tug, and Buoy Tender with 302, 52, and 28 transits, respectively (Appendix S26). Of the 483 total transits, the highest number (397 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S26). Vessels with a gross tonnage ≥ 10,000 accounted for 3% of the total transits. The flag countries that logged the highest number of transits in the Beaufort Sea during 2015 were United States Of America, Canada, and Singapore with 362, 94, and 12 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	26	0	3	0	4	0	0	**33**
Fishing	8	0	0	0	0	0	0	**8**
Miscellaneous	363	44	10	0	7	0	0	**424**
Offshore	0	15	0	0	0	0	0	**15**
Tankers	0	0	0	3	0	0	0	**3**
Totals:	**397**	**59**	**13**	**3**	**11**	**0**	**0**	**483**

Beaufort Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

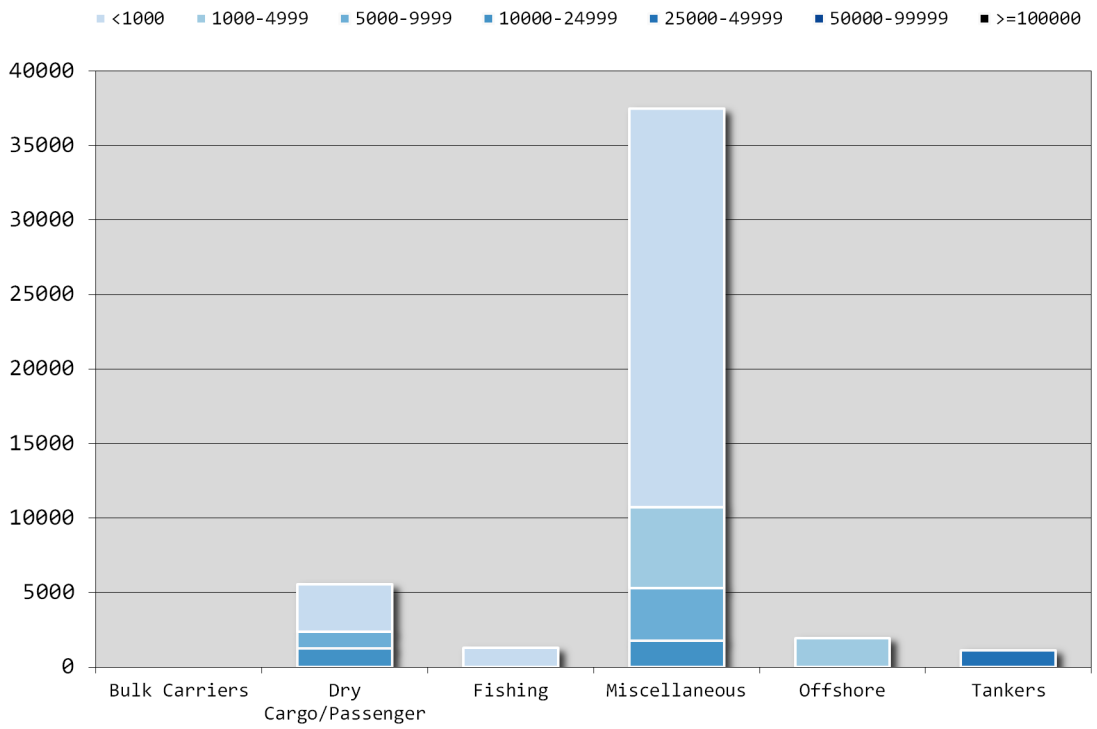
As an aggregate, the Miscellaneous vessel type class logged the highest number of operational hours (6,577 hrs) in the Beaufort Sea during 2015. The vessel types with the highest number of operational hours were Tug, Pusher Tug, and Landing Craft with 4,184; 821; and 544 hours, respectively (Appendix S27). Of the 8,034 total operational hours, the highest number (5,801 hrs) was logged by vessels in the <1000 GT vessel size class (Appendix S27). Vessels with a gross tonnage ≥ 10,000 accounted for 5% of the total operational hours. The flag countries that logged the highest number of operational hours in the Beaufort Sea during 2015 were United States Of America, Canada, and Singapore with 5,223; 2,147; and 216 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	544	0	118	89	0	0	0	**751**
Fishing	271	0	0	0	0	0	0	**271**
Miscellaneous	4986	922	438	231	0	0	0	**6577**
Offshore	0	342	0	0	0	0	0	**342**
Tankers	0	0	0	0	93	0	0	**93**
Totals:	**5801**	**1263**	**556**	**320**	**93**	**0**	**0**	**8034**

Beaufort Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

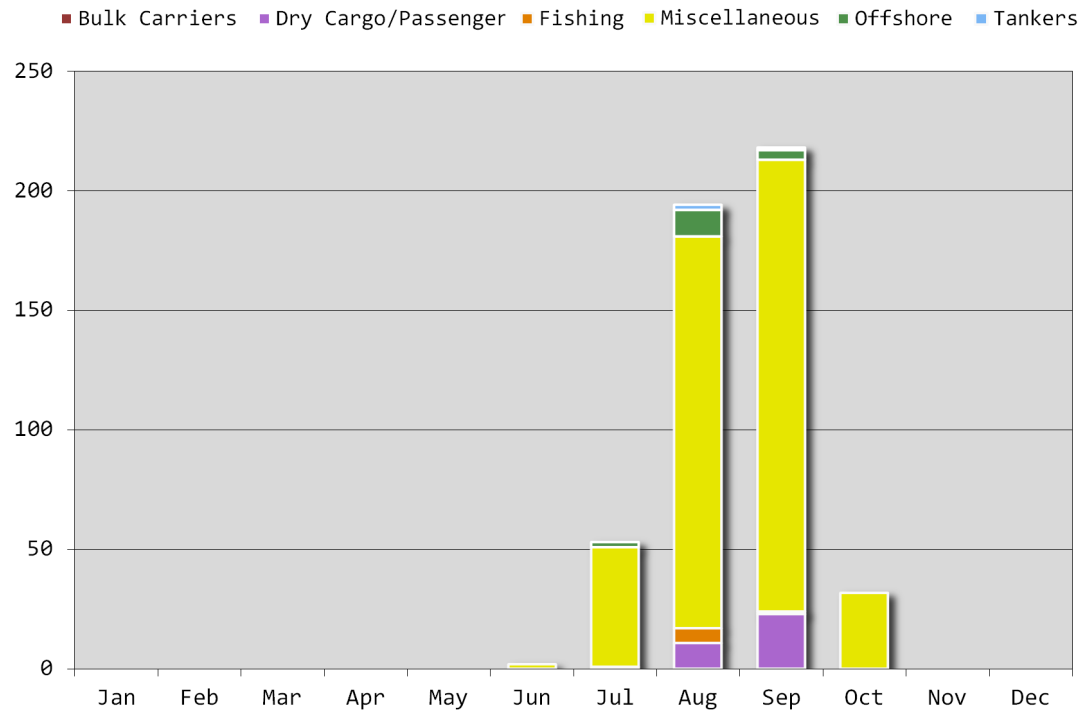
As an aggregate, the Miscellaneous vessel type class logged the highest amount of transit distance (37,475 nm) in the Beaufort Sea during 2015. The vessel types with the highest amount of transit distance were Tug, Pusher Tug, and Buoy Tender with 22,253; 4,528; and 3,225 nm, respectively (Appendix S28). Of the 47,447 nm of total transit distance, the highest amount (31,191 nm) was logged by vessels in the <1000 GT vessel size class (Appendix S28). Vessels with a gross tonnage ≥ 10,000 accounted for 9% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Beaufort Sea during 2015 were United States Of America, Canada, and Finland with 27,805; 13,544; and 1,287 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	0	0	0	1264	1132	0	3162	**5557**
Fishing	0	0	0	0	0	0	1295	**1295**
Miscellaneous	0	0	0	1808	3523	5409	26734	**37475**
Offshore	0	0	0	0	0	1960	0	**1960**
Tankers	0	0	1160	0	0	0	0	**1160**
Totals:	**0**	**0**	**1160**	**3072**	**4656**	**7369**	**31191**	**47447**

Beaufort Sea Transit Counts
by Vessel Type Class and Month

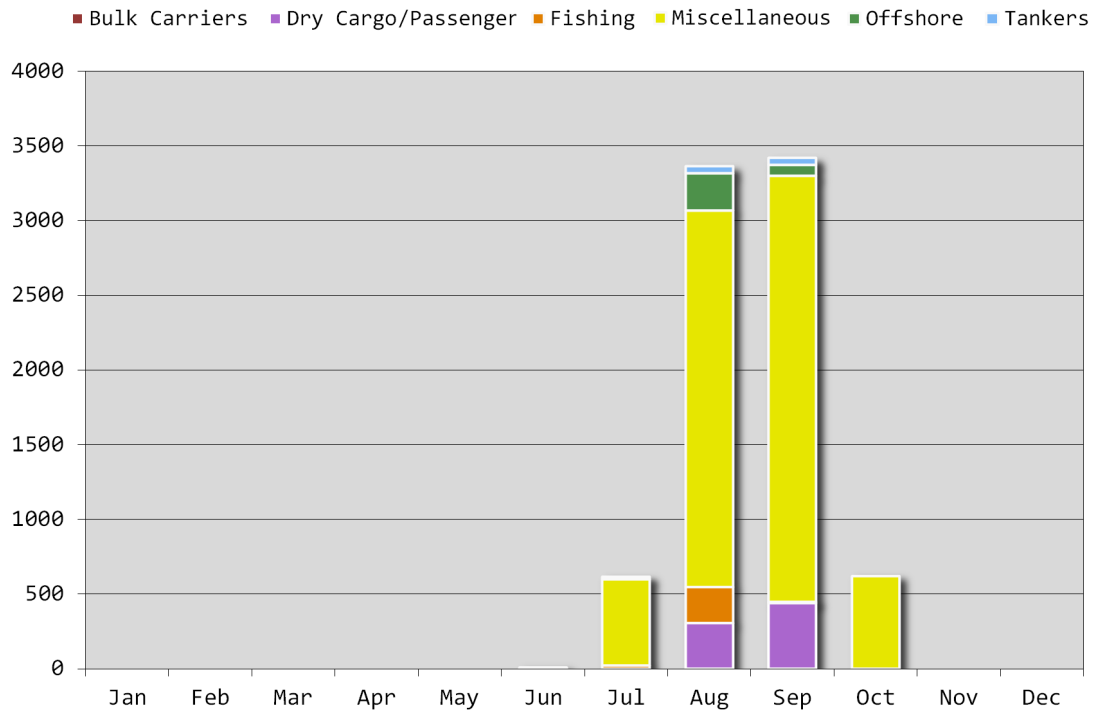
Transit counts for the Beaufort Sea in 2015 averaged 42 transits/month, with a range of 0 transits in January, February, March, April, May, November, and December to 218 transits in September (see Appendix S30 for monthly transit counts by vessel type). With a coefficient of variation of 1.89, the Beaufort Sea had some of the highest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	2	0	0	**2**
Jul	0	0	1	50	2	0	**53**
Aug	0	11	6	164	11	2	**194**
Sep	0	23	1	189	4	1	**218**
Oct	0	0	0	32	0	0	**32**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Beaufort Sea Operational Hours
by Vessel Type Class and Month

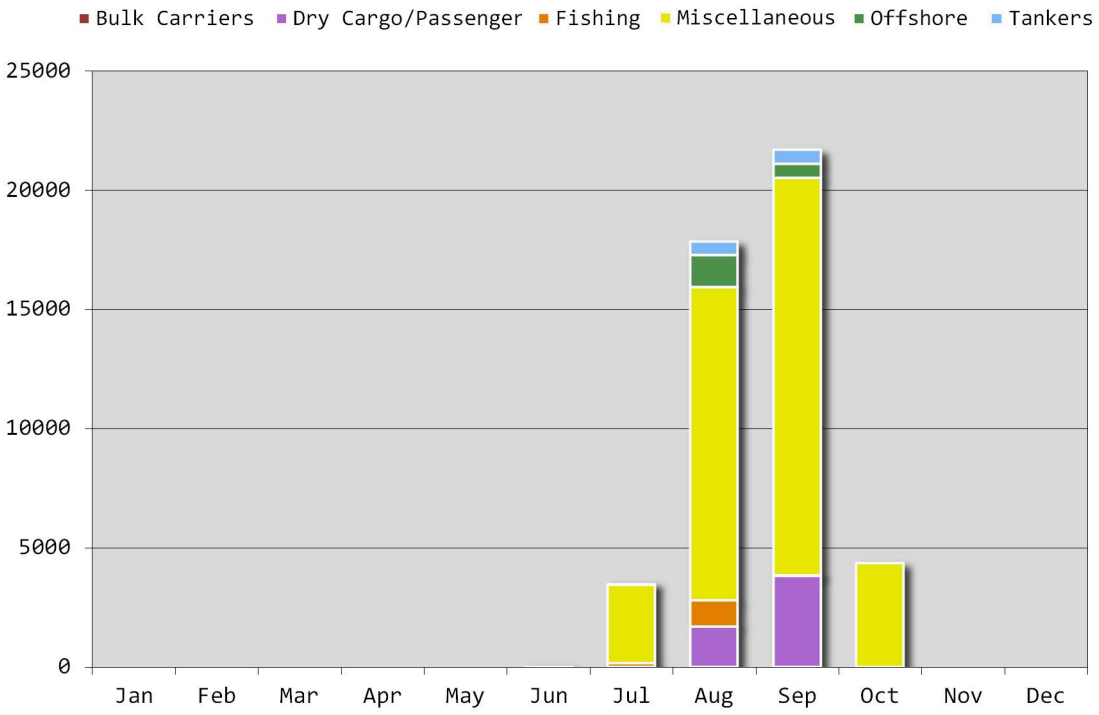
Operational hours for the Beaufort Sea in 2015 averaged 669 hrs/month, with a range of 0 hours in January, February, March, April, May, November, and December to 3,417 hours in September (see Appendix S31 for monthly operational hours by vessel type). With a coefficient of variation of 1.93, the Beaufort Sea had some of the highest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	12	0	0	**12**
Jul	0	0	24	575	18	0	**617**
Aug	0	309	239	2519	247	50	**3365**
Sep	0	442	7	2848	76	44	**3417**
Oct	0	0	0	624	0	0	**624**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Beaufort Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Beaufort Sea in 2015 averaged 3,954 nm/month, with a range of 0 nm in January, February, March, April, May, November, and December to 21,685 nm in September (see Appendix S32 for monthly transit distance by vessel type). With a coefficient of variation of 1.92, the Beaufort Sea had some of the highest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	43	0	0	**43**
Jul	0	0	163	3287	39	0	**3489**
Aug	0	1721	1096	13123	1330	582	**17852**
Sep	0	3836	36	16645	590	578	**21685**
Oct	0	0	0	4377	0	0	**4377**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Bering Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 2 of 14 for total amount of water surface area within the ARPA Arctic boundary (2,404,400 km^2)
- average sea ice extent ranged from 0% of the water surface area in August to 26% in March; average sea ice extent exceeded 25% of the water surface area for 2 months, 50% for 0 months, and 75% for 0 months

Unique Vessels:

- 1 of 14 for total number of unique vessels (2,922 vessels)
- vessel type class with the highest count of unique vessels (1,215 vessels) was Bulk Carriers (see Appendix S33 for total unique vessel counts by vessel type*)

Transit Counts:

- 2 out of 14 for total number of transits (28,302 transits)
- vessel type class with the highest number of transits (17,758 transits) was Fishing (see Appendix S34 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (15,939 transits) was <1000 GT (see Appendix S34 for total transit counts by vessel size class)
- transit counts averaged 2,472 transits/month, with a range of 1,210 transits in December to 5,117 transits in July (see Appendix S38 for monthly transit counts by vessel type*)

Operational Hours:

- 2 out of 14 for total operational hours (1,054,746 hrs)
- vessel type class with the highest number of operational hours (175,791 hrs) was Fishing (see Appendix S35 for total operational hours by vessel type*)
- operational hours averaged 87,895 hrs/month, with a range of 53,322 hours in December to 124,853 hours in July (see Appendix S39 for monthly operational hours by vessel type*)

Transit Distance:

- 1 out of 14 for total transit distance (8,106,124 nm)
- vessel type class with the highest amount of transit distance (3,138,661 nm) was Fishing (see Appendix S36 for total transit distance by vessel type*)
- transit distance averaged 675,510 nm/month, with a range of 455,496 nm in December to 944,675 nm in July (see Appendix S40 for monthly transit distance by vessel type*)

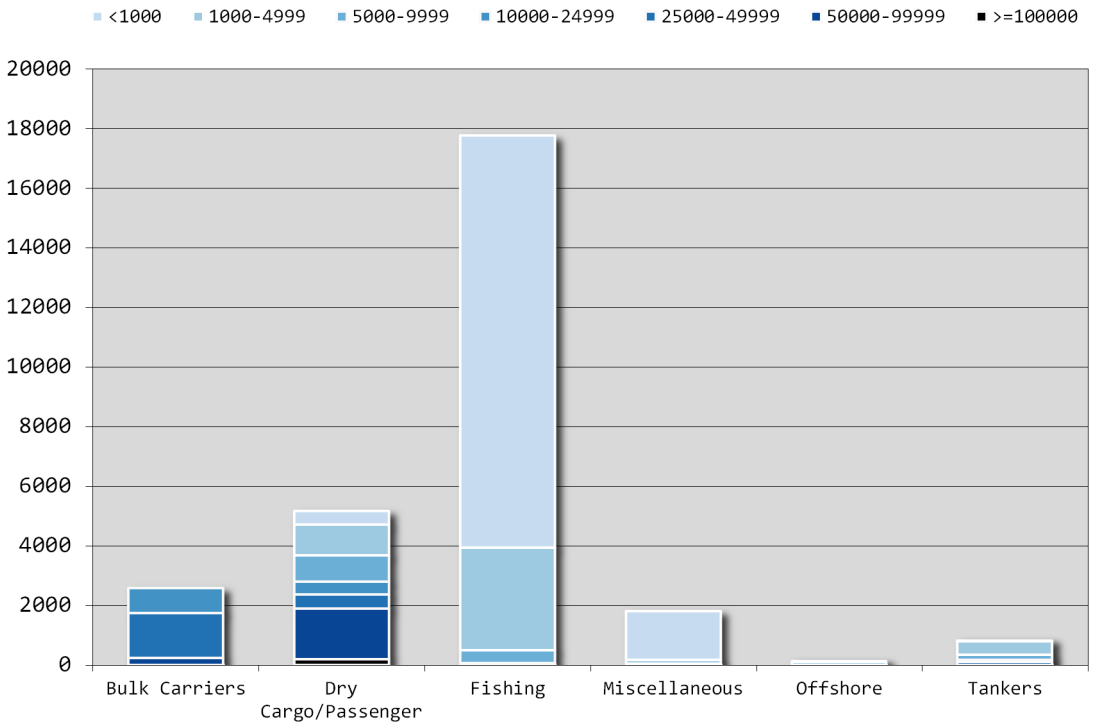
Transit Density:

- 2 out of 14 for percent of water surface area exposed to vessel traffic (98.2%)
- 4 out of 14 for average transit density (6.42 km/km^2)
- 2 out of 14 for maximum transit density (479.94 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Bering Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

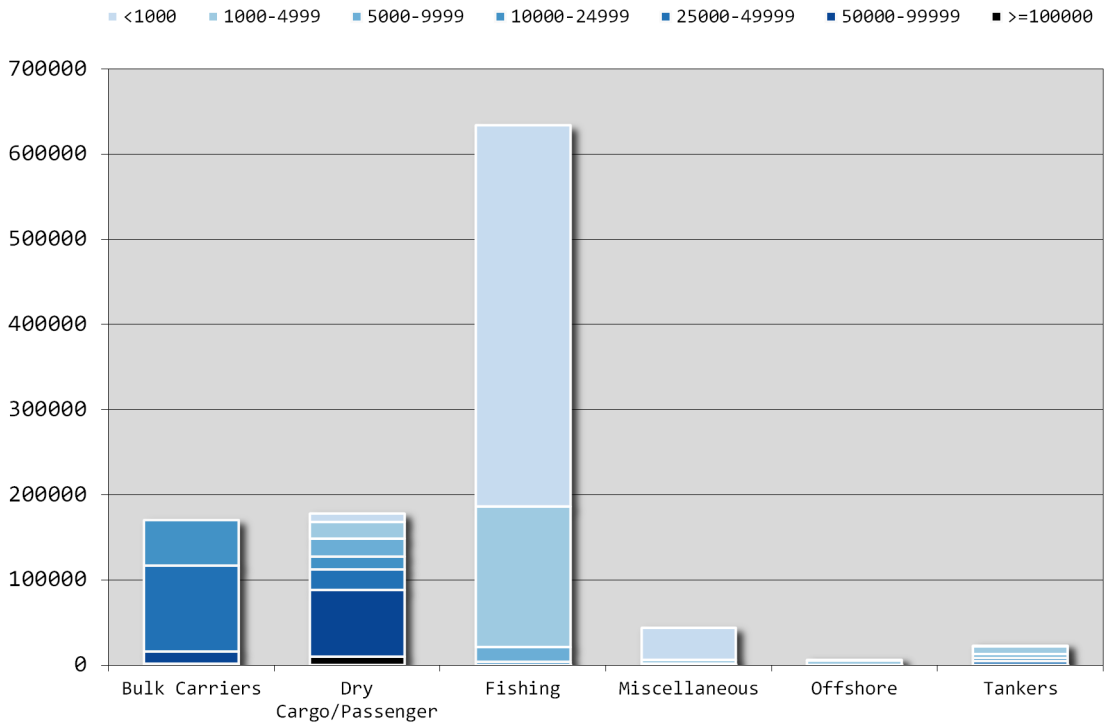
As an aggregate, the Fishing vessel type class logged the highest number of transits (17,758 transits) in the Bering Sea during 2015. The vessel types with the highest number of transits were Fishing Vessel, Stern Trawler, and Bulk Carrier with 11,089; 3,404; and 2,555 transits, respectively (Appendix S34). Of the 28,302 total transits, the highest number (15,939 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S34). Vessels with a gross tonnage ≥ 10,000 accounted for 20% of the total transits. The flag countries that logged the highest number of transits in the Bering Sea during 2015 were United States Of America, Russia, and Panama with 16,126; 5,997; and 1,770 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	1509	827	218	34	**2588**
Dry Cargo/Passenger	458	1027	893	469	422	1696	212	**5177**
Fishing	13817	3426	447	20	48	0	0	**17758**
Miscellaneous	1642	130	22	0	27	0	0	**1821**
Offshore	9	102	0	0	17	0	0	**128**
Tankers	13	470	158	88	77	24	0	**830**
Totals:	**15939**	**5155**	**1520**	**2086**	**1418**	**1938**	**246**	**28302**

Bering Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

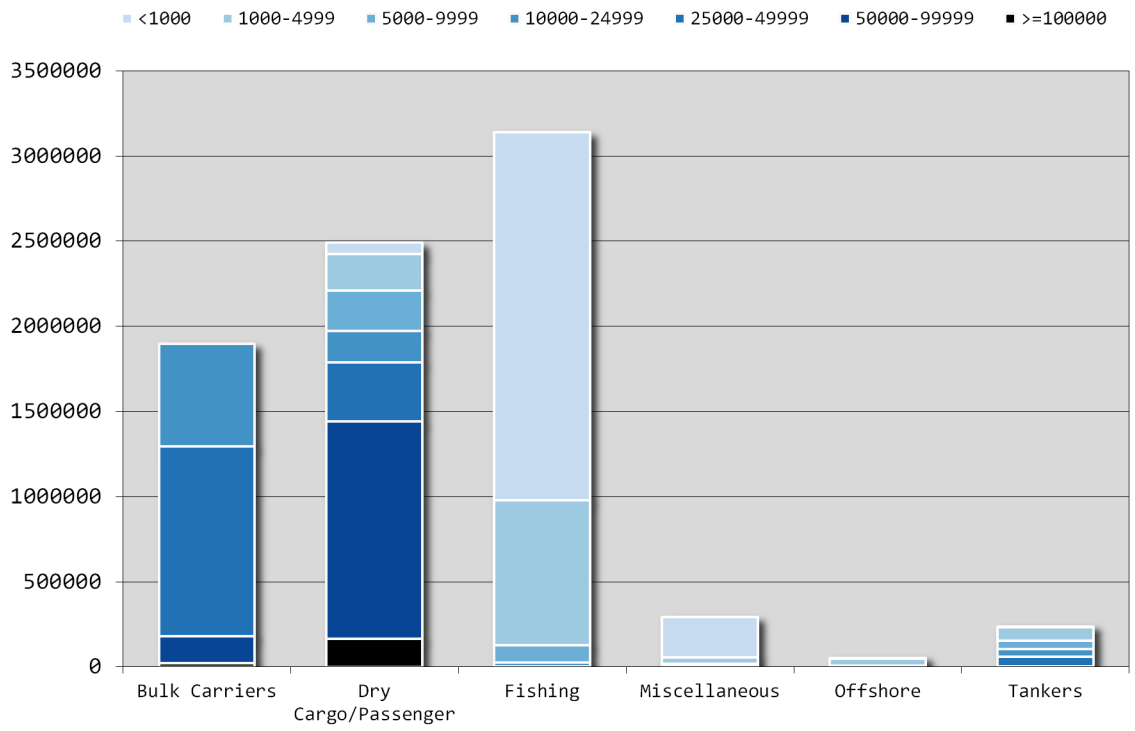
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (633,496 hrs) in the Bering Sea during 2015. The vessel types with the highest number of operational hours were Fishing Vessel, Bulk Carrier, and Stern Trawler with 376,295; 168,373; and 120,104 hours, respectively (Appendix S35). Of the 1,054,746 total operational hours, the highest number (495,043 hrs) was logged by vessels in the <1000 GT vessel size class (Appendix S35). Vessels with a gross tonnage ≥ 10,000 accounted for 30% of the total operational hours. The flag countries that logged the highest number of operational hours in the Bering Sea during 2015 were United States Of America, Russia, and Panama with 516,651; 186,085; and 101,376 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	53541	100710	14074	2005	**170330**
Dry Cargo/Passenger	9907	19901	21119	14606	24156	78421	10158	**178269**
Fishing	447137	165245	16689	4222	203	0	0	**633496**
Miscellaneous	37704	4385	980	782	0	0	0	**43851**
Offshore	33	5206	0	702	0	0	0	**5942**
Tankers	262	9293	4651	3526	4588	538	0	**22859**
Totals:	**495043**	**204032**	**43439**	**77379**	**129656**	**93033**	**12163**	**1054746**

Bering Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

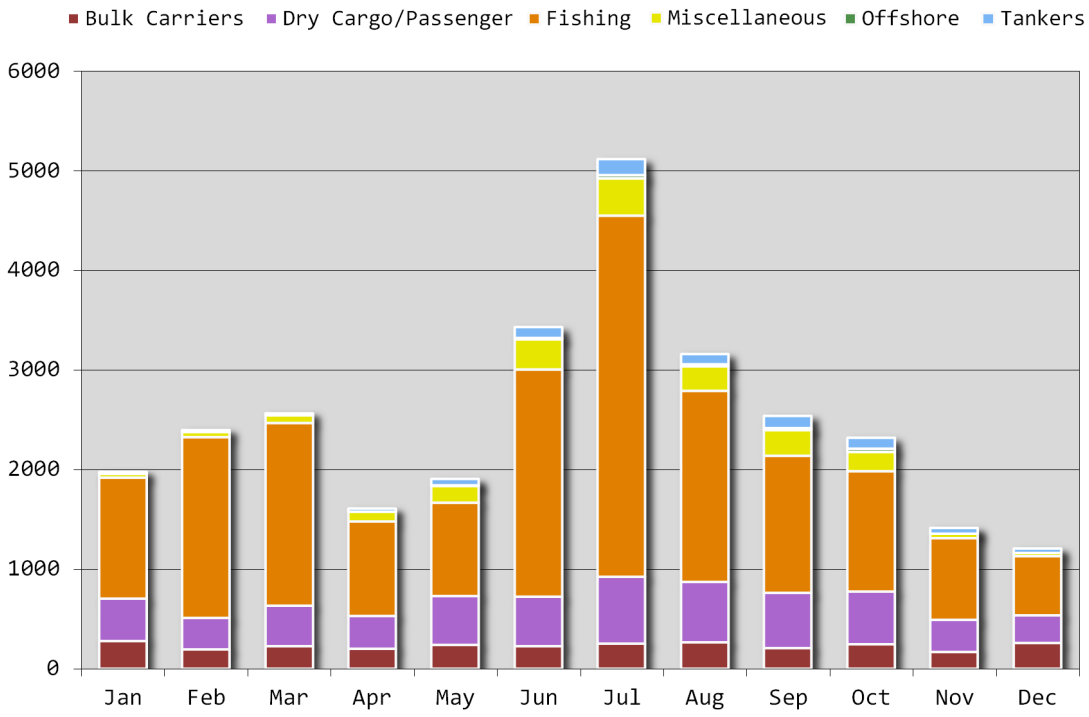
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (3,138,661 nm) in the Bering Sea during 2015. The vessel types with the highest amount of transit distance were Bulk Carrier, Fishing Vessel, and Container Ship (Fully Cellular) with 1,873,017; 1,750,599; and 1,503,023 nm, respectively (Appendix S36). Of the 8,106,124 nm of total transit distance, the highest amount (2,472,482 nm) was logged by vessels in the <1000 GT vessel size class (Appendix S36). Vessels with a gross tonnage ≥ 10,000 accounted for 50% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Bering Sea during 2015 were United States Of America, Panama, and Russia with 2,726,808; 1,290,379; and 1,088,004 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	23796	155832	1114219	601727	0	0	0	**1895574**
Dry Cargo/Passenger	165112	1276941	343960	184951	238551	213852	70408	**2493775**
Fishing	0	0	1339	24688	101656	848962	2162016	**3138661**
Miscellaneous	0	0	0	8974	10537	36323	237418	**293252**
Offshore	0	0	0	5329	0	43168	349	**48846**
Tankers	0	4957	55890	44953	46563	81363	2291	**236017**
Totals:	**188908**	**1437731**	**1515408**	**870621**	**397306**	**1223668**	**2472482**	**8106124**

Bering Sea Transit Counts
by Vessel Type Class and Month

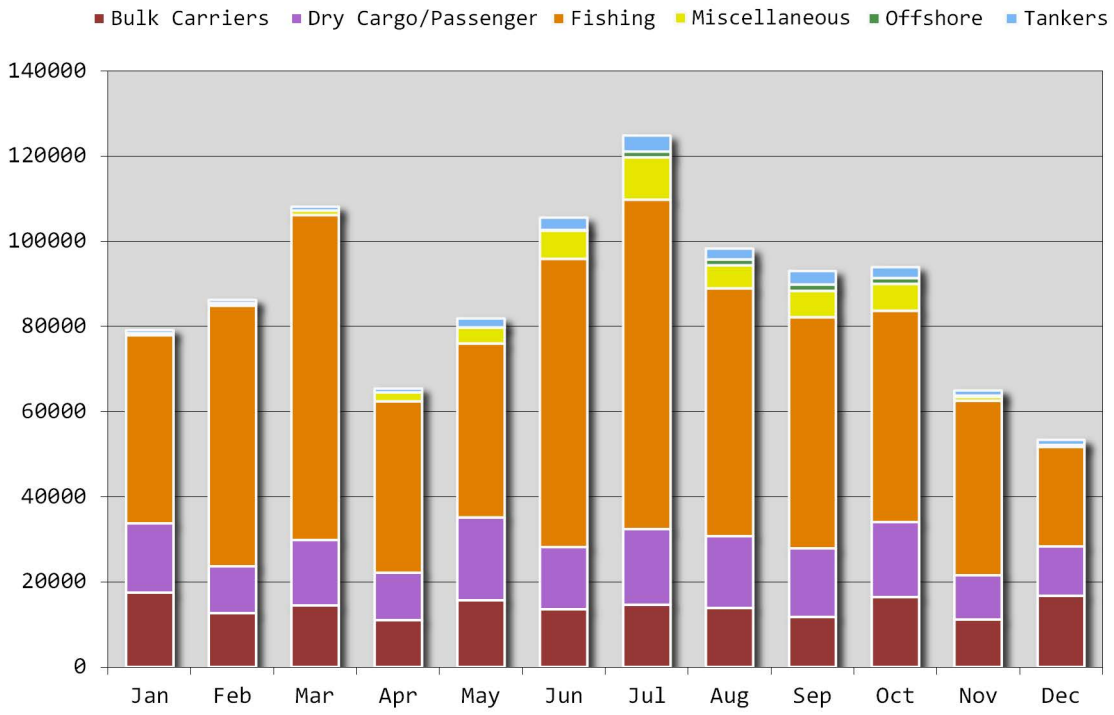
Transit counts for the Bering Sea in 2015 averaged 2,472 transits/month, with a range of 1,210 transits in December to 5,117 transits in July (see Appendix S38 for monthly transit counts by vessel type). With a coefficient of variation of 0.43, the Bering Sea had a low amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	284	420	1218	39	0	18	**1979**
Feb	197	314	1817	53	0	17	**2398**
Mar	232	406	1831	79	0	21	**2569**
Apr	205	328	949	96	0	31	**1609**
May	244	492	935	166	5	64	**1906**
Jun	230	494	2284	303	11	106	**3428**
Jul	257	672	3621	369	38	160	**5117**
Aug	267	611	1916	241	23	105	**3163**
Sep	207	560	1370	258	23	124	**2542**
Oct	249	526	1207	196	34	108	**2320**
Nov	172	322	819	44	3	58	**1418**
Dec	259	280	596	30	0	45	**1210**

Bering Sea Operational Hours
by Vessel Type Class and Month

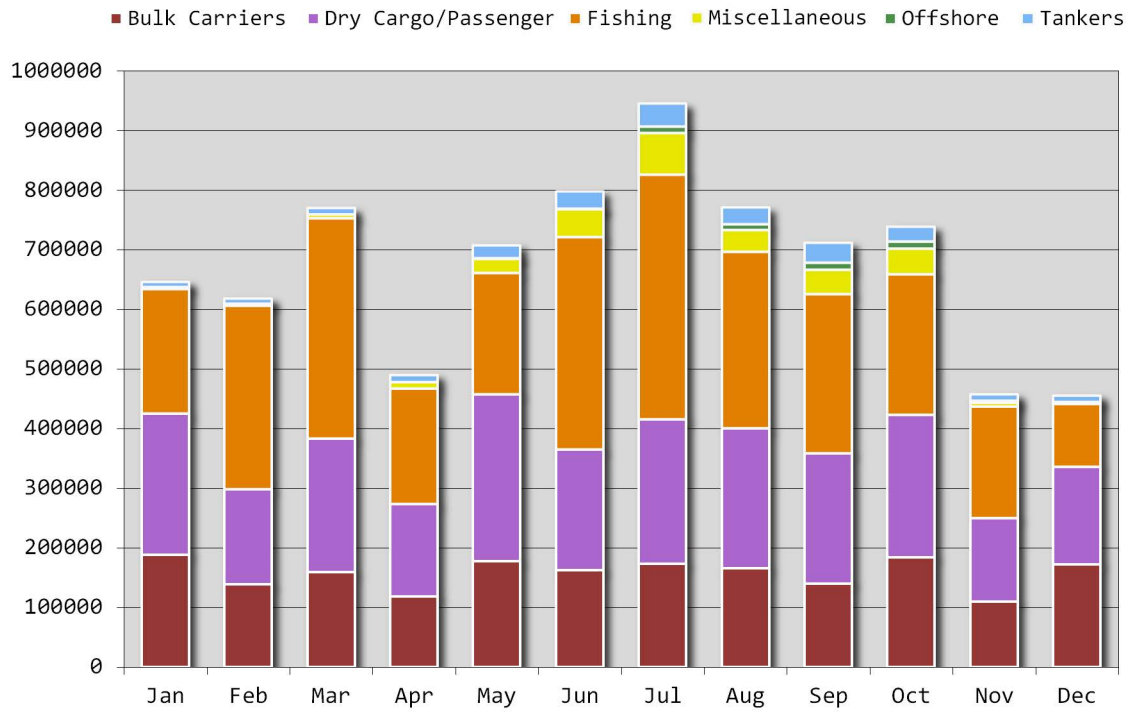
Operational hours for the Bering Sea in 2015 averaged 87,895 hrs/month, with a range of 53,322 hours in December to 124,853 hours in July (see Appendix S39 for monthly operational hours by vessel type). With a coefficient of variation of 0.23, the Bering Sea had some of the lowest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	17522	16331	44141	447	0	755	**79195**
Feb	12768	11014	61113	544	0	751	**86190**
Mar	14522	15329	76250	1079	0	895	**108076**
Apr	11071	11190	40209	2024	0	977	**65471**
May	15728	19496	40718	3785	82	2071	**81880**
Jun	13635	14648	67556	6666	100	2890	**105495**
Jul	14720	17677	77358	9984	1351	3763	**124853**
Aug	13986	16845	58110	5464	1246	2573	**98224**
Sep	11815	16115	54304	6171	1436	3225	**93066**
Oct	16550	17594	49464	6331	1454	2559	**93953**
Nov	11238	10358	41002	905	273	1245	**65021**
Dec	16772	11672	23273	451	0	1154	**53322**

Bering Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Bering Sea in 2015 averaged 675,510 nm/month, with a range of 455,496 nm in December to 944,675 nm in July (see Appendix S40 for monthly transit distance by vessel type). With a coefficient of variation of 0.22, the Bering Sea had some of the lowest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	189148	236080	209264	2891	0	8514	**645897**
Feb	139461	159291	307139	3435	0	8507	**617833**
Mar	159295	224253	368533	6466	0	10754	**769301**
Apr	118835	155455	193312	10877	0	11072	**489551**
May	178539	279677	203058	22983	1076	22033	**707366**
Jun	162542	202337	356197	46514	630	29642	**797862**
Jul	174165	241870	409892	69468	10661	38619	**944675**
Aug	166174	234353	295626	36565	10409	27348	**770475**
Sep	140793	218254	266789	40614	12019	33186	**711655**
Oct	184266	238788	236164	43042	11555	24774	**738589**
Nov	110059	139911	186900	7311	2495	10748	**457424**
Dec	172298	163505	105787	3086	0	10821	**455497**

Chukchi Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 12 of 14 for total amount of water surface area within the ARPA Arctic boundary (353,025 km^2)
- average sea ice extent ranged from 0% of the water surface area in August to 97% in January, February, March, April, May, and December; average sea ice extent exceeded 25% of the water surface area for 8 months, 50% for 7 months, and 75% for 6 months

Unique Vessels:

- 7 of 14 for total number of unique vessels (159 vessels)
- vessel type class with the highest count of unique vessels (52 vessels) was Miscellaneous (see Appendix S41 for total unique vessel counts by vessel type*)

Transit Counts:

- 8 out of 14 for total number of transits (1,654 transits)
- vessel type class with the highest number of transits (829 transits) was Miscellaneous (see Appendix S42 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (654 transits) was <1000 GT (see Appendix S42 for total transit counts by vessel size class)
- transit counts averaged 143 transits/month, with a range of 0 transits in January, February, and March to 540 transits in August (see Appendix S46 for monthly transit counts by vessel type*)

Operational Hours:

- 7 out of 14 for total operational hours (36,536 hrs)
- vessel type class with the highest number of operational hours (6,089 hrs) was Miscellaneous (see Appendix S43 for total operational hours by vessel type*)
- operational hours averaged 3,045 hrs/month, with a range of 0 hours in January, February, and March to 11,760 hours in August (see Appendix S47 for monthly operational hours by vessel type*)

Transit Distance:

- 8 out of 14 for total transit distance (201,155 nm)
- vessel type class with the highest amount of transit distance (87,814 nm) was Miscellaneous (see Appendix S44 for total transit distance by vessel type*)
- transit distance averaged 16,763 nm/month, with a range of 0 nm in January, February, and March to 61,593 nm in August (see Appendix S48 for monthly transit distance by vessel type*)

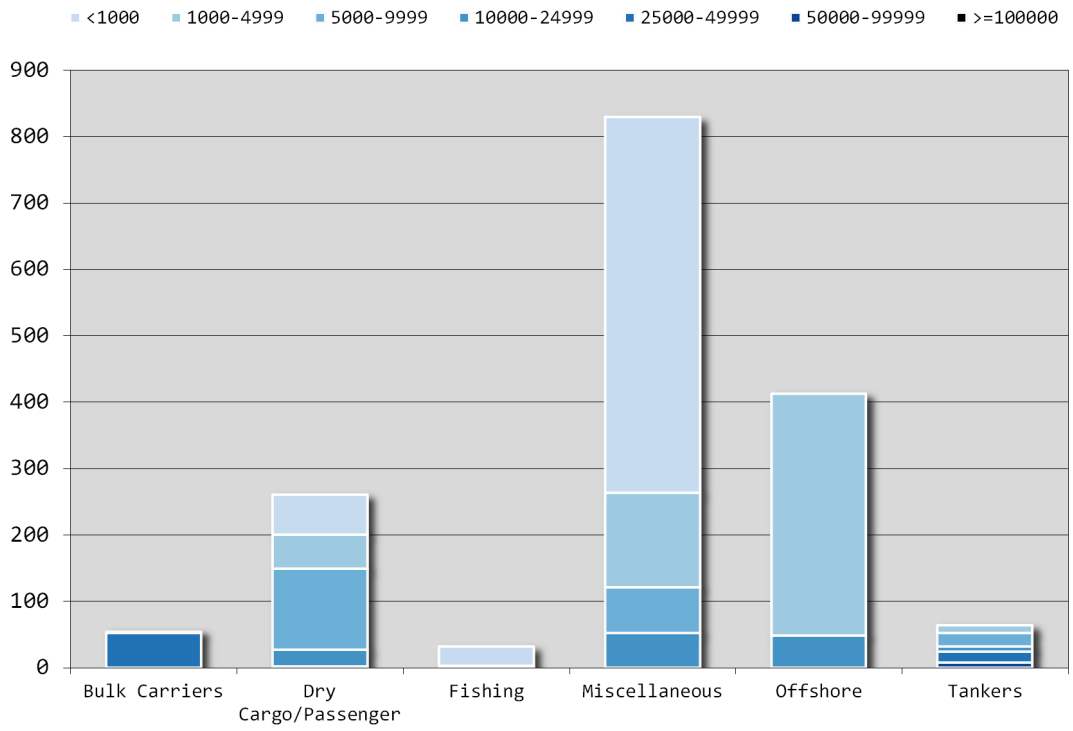
Transit Density:

- 5 out of 14 for percent of water surface area exposed to vessel traffic (90.9%)
- 8 out of 14 for average transit density (1.15 km/km^2)
- 7 out of 14 for maximum transit density (56.86 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Chukchi Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

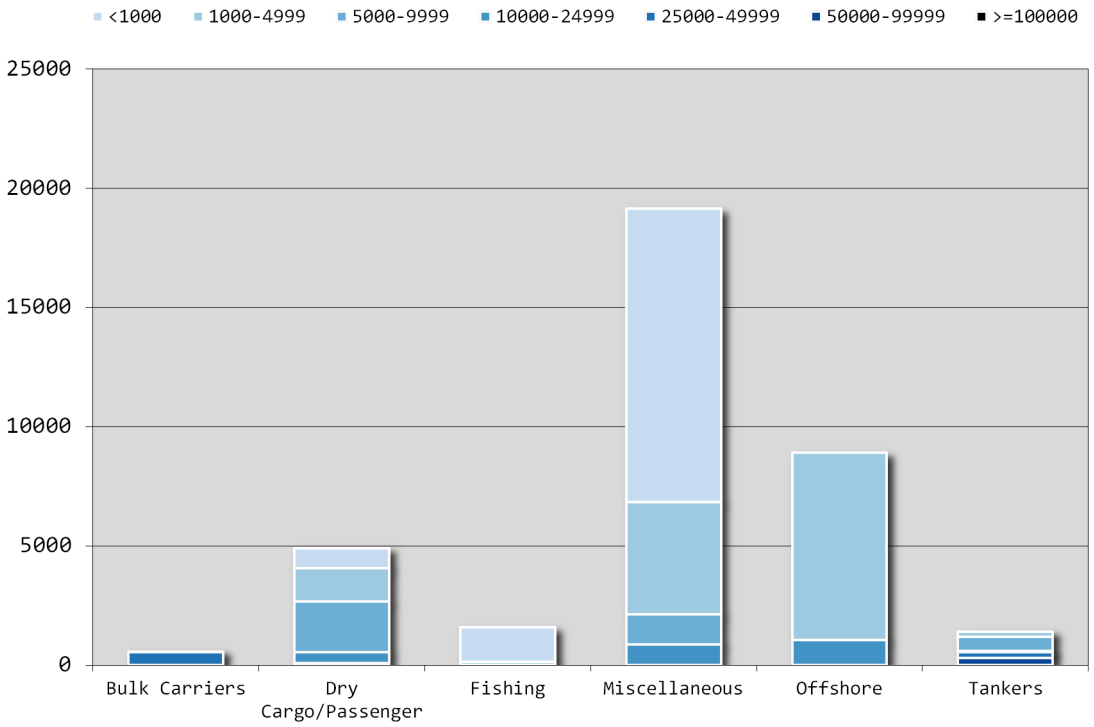
As an aggregate, the Miscellaneous vessel type class logged the highest number of transits (829 transits) in the Chukchi Sea during 2015. The vessel types with the highest number of transits were Tug, Platform Supply Ship, and Anchor Handling Tug Supply with 637, 247, and 161 transits, respectively (Appendix S42). Of the 1,654 total transits, the highest number (654 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S42). Vessels with a gross tonnage ≥ 10,000 accounted for 13% of the total transits. The flag countries that logged the highest number of transits in the Chukchi Sea during 2015 were United States Of America, Russia, and Finland with 1,115; 271; and 58 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	53	2	0	0	**55**
Dry Cargo/Passenger	60	51	122	2	26	0	0	**261**
Fishing	29	3	0	0	0	0	0	**32**
Miscellaneous	565	142	69	0	53	0	0	**829**
Offshore	0	364	0	0	49	0	0	**413**
Tankers	0	11	21	17	7	8	0	**64**
Totals:	**654**	**571**	**212**	**72**	**137**	**8**	**0**	**1654**

Chukchi Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

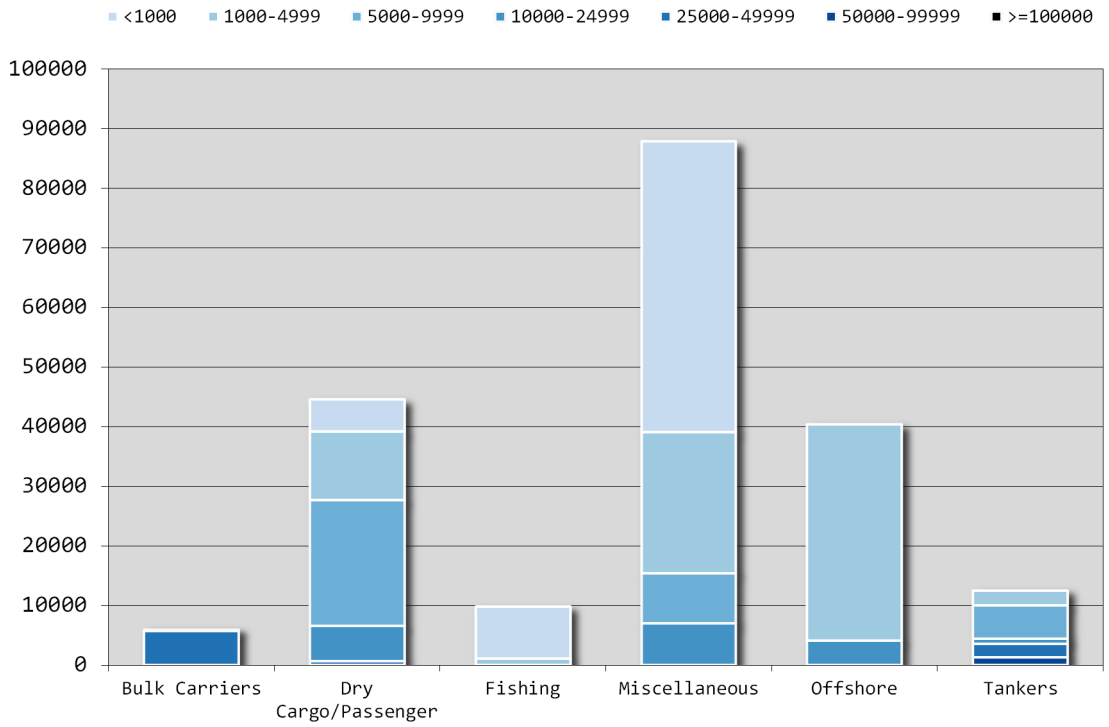
As an aggregate, the Miscellaneous vessel type class logged the highest number of operational hours (19,136 hrs) in the Chukchi Sea during 2015. The vessel types with the highest number of operational hours were Tug, Platform Supply Ship, and Anchor Handling Tug Supply with 14,328; 4,952; and 3,766 hours, respectively (Appendix S43). Of the 36,536 total operational hours, the highest number (14,580 hrs) was logged by vessels in the <1000 GT vessel size class (Appendix S43). Vessels with a gross tonnage ≥ 10,000 accounted for 10% of the total operational hours. The flag countries that logged the highest number of operational hours in the Chukchi Sea during 2015 were United States Of America, Russia, and Finland with 24,957; 5,730; and 936 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	18	543	0	0	**561**
Dry Cargo/Passenger	845	1389	2131	466	82	0	0	**4912**
Fishing	1456	137	0	0	0	0	0	**1593**
Miscellaneous	12280	4718	1263	876	0	0	0	**19136**
Offshore	0	7864	0	1050	0	0	0	**8914**
Tankers	0	233	570	76	243	297	0	**1419**
Totals:	**14580**	**14341**	**3964**	**2485**	**868**	**297**	**0**	**36536**

Chukchi Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

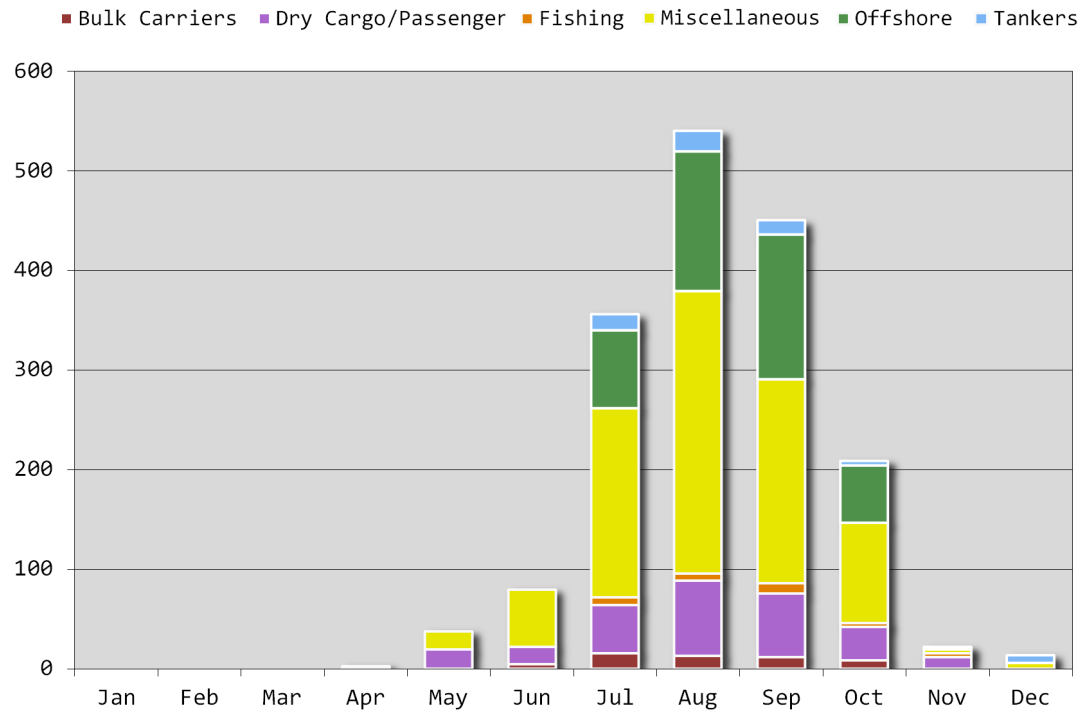
As an aggregate, the Miscellaneous vessel type class logged the highest amount of transit distance (87,814 nm) in the Chukchi Sea during 2015. The vessel types with the highest amount of transit distance were Tug, General Cargo Ship, and Platform Supply Ship with 53,274; 27,339; and 20,317 nm, respectively (Appendix S44). Of the 201,155 nm of total transit distance, the highest amount (75,063 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S44). Vessels with a gross tonnage ≥ 10,000 accounted for 14% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Chukchi Sea during 2015 were United States Of America, Russia, and Finland with 110,345; 48,477; and 5,838 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	5776	211	0	0	0	**5987**
Dry Cargo/Passenger	0	0	747	5831	21075	11520	5390	**44563**
Fishing	0	0	0	0	0	1116	8712	**9827**
Miscellaneous	0	0	0	7068	8378	23678	48689	**87814**
Offshore	0	0	0	4132	0	36261	0	**40393**
Tankers	0	1342	2292	869	5580	2489	0	**12571**
Totals:	**0**	**1342**	**8815**	**18111**	**35033**	**75063**	**62791**	**201155**

Chukchi Sea Transit Counts
by Vessel Type Class and Month

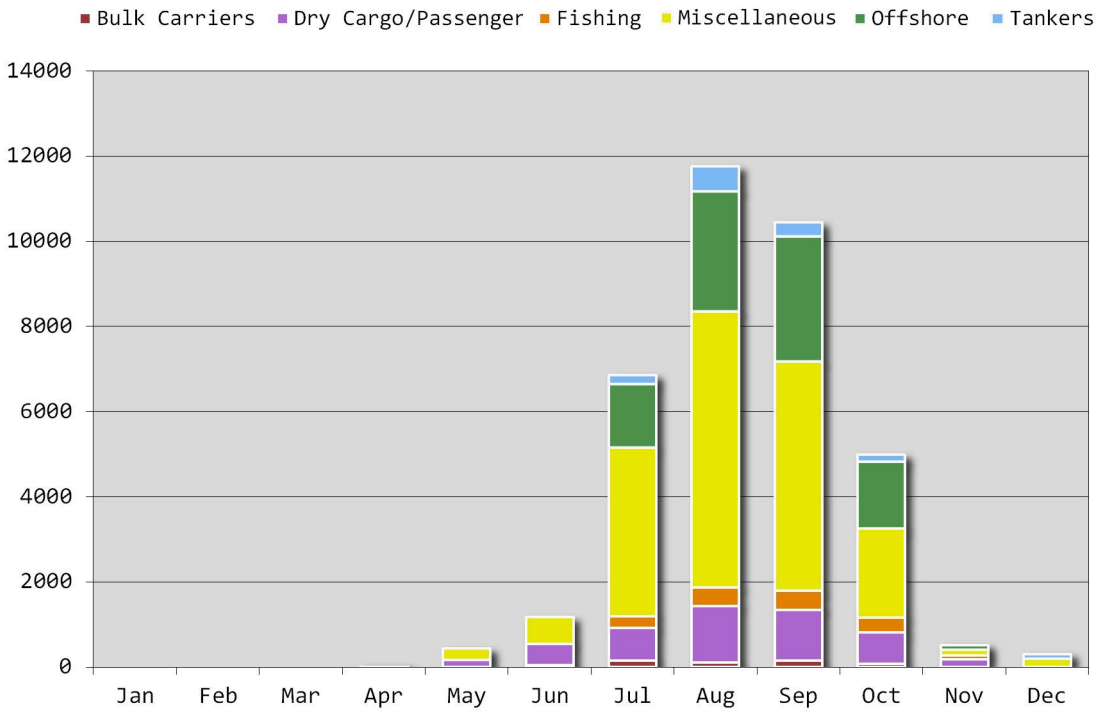
Transit counts for the Chukchi Sea in 2015 averaged 143 transits/month, with a range of 0 transits in January, February, and March to 540 transits in August (see Appendix S46 for monthly transit counts by vessel type). With a coefficient of variation of 1.38, the Chukchi Sea had a high amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	2	0	1	0	0	**3**
May	0	20	0	18	0	0	**38**
Jun	5	17	0	58	0	0	**80**
Jul	16	48	8	190	78	16	**356**
Aug	13	76	7	283	140	21	**540**
Sep	12	64	10	205	145	14	**450**
Oct	9	33	4	101	57	5	**209**
Nov	0	12	4	4	2	0	**22**
Dec	0	0	0	6	0	8	**14**

Chukchi Sea Operational Hours
by Vessel Type Class and Month

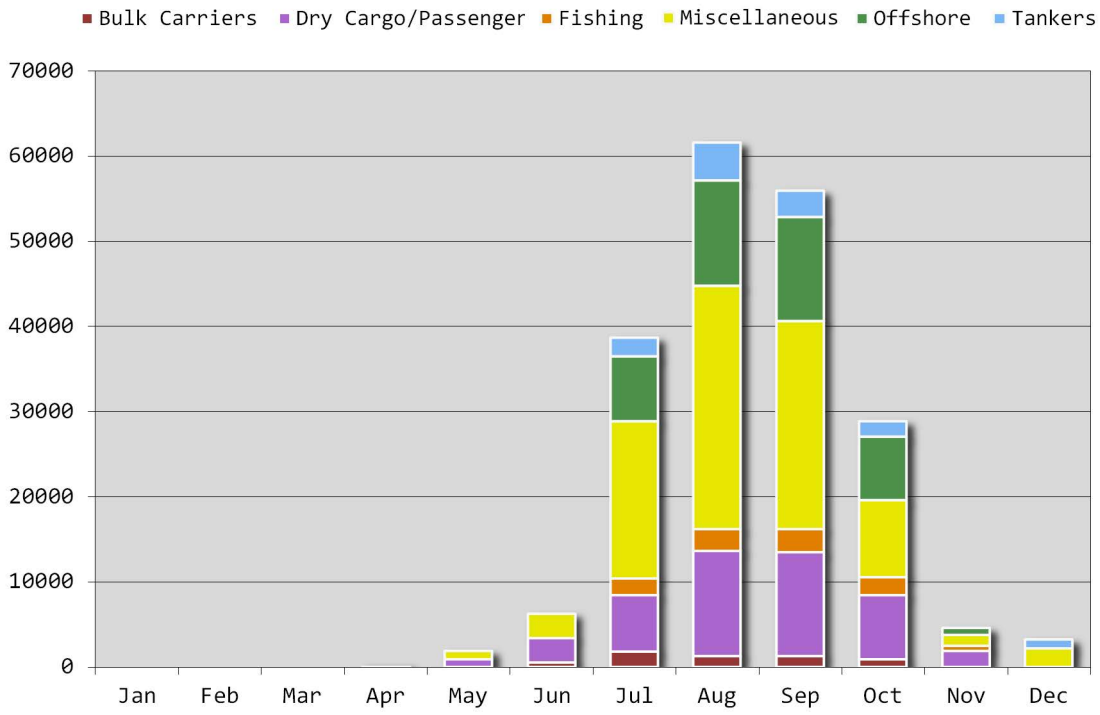
Operational hours for the Chukchi Sea in 2015 averaged 3,045 hrs/month, with a range of 0 hours in January, February, and March to 11,760 hours in August (see Appendix S47 for monthly operational hours by vessel type). With a coefficient of variation of 1.44, the Chukchi Sea had a high amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	7	0	5	0	0	**12**
May	0	179	0	263	0	0	**442**
Jun	49	502	0	626	0	0	**1177**
Jul	159	763	281	3960	1493	209	**6865**
Aug	119	1326	427	6475	2818	595	**11760**
Sep	153	1201	453	5373	2935	337	**10451**
Oct	81	744	338	2101	1561	171	**4996**
Nov	0	190	95	129	108	0	**523**
Dec	0	0	0	203	0	107	**310**

Chukchi Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Chukchi Sea in 2015 averaged 16,763 nm/month, with a range of 0 nm in January, February, and March to 61,593 nm in August (see Appendix S48 for monthly transit distance by vessel type). With a coefficient of variation of 1.39, the Chukchi Sea had a high amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	28	0	35	0	0	**63**
May	0	961	0	930	0	0	**1891**
Jun	596	2824	0	2868	0	0	**6288**
Jul	1818	6650	1933	18519	7547	2207	**38674**
Aug	1353	12342	2529	28520	12404	4445	**61593**
Sep	1305	12229	2729	24399	12184	3071	**55917**
Oct	915	7592	2049	9062	7454	1796	**28868**
Nov	0	1939	588	1280	804	0	**4611**
Dec	0	0	0	2201	0	1052	**3253**

Davis Strait Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 13 of 14 for total amount of water surface area within the ARPA Arctic boundary (207,025 km^2)
- average sea ice extent ranged from 0% of the water surface area in September and October to 93% in February, March, and April; average sea ice extent exceeded 25% of the water surface area for 9 months, 50% for 9 months, and 75% for 6 months

Unique Vessels:

- 9 of 14 for total number of unique vessels (114 vessels)
- vessel type class with the highest count of unique vessels (37 vessels) was Fishing (see Appendix S49 for total unique vessel counts by vessel type*)

Transit Counts:

- 6 out of 14 for total number of transits (2,159 transits)
- vessel type class with the highest number of transits (922 transits) was Dry Cargo/Passenger (see Appendix S50 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (993 transits) was 1000-4999 GT (see Appendix S50 for total transit counts by vessel size class)
- transit counts averaged 184 transits/month, with a range of 40 transits in March to 341 transits in August (see Appendix S54 for monthly transit counts by vessel type*)

Operational Hours:

- 6 out of 14 for total operational hours (46,337 hrs)
- vessel type class with the highest number of operational hours (7,723 hrs) was Fishing (see Appendix S51 for total operational hours by vessel type*)
- operational hours averaged 3,861 hrs/month, with a range of 684 hours in March to 7,330 hours in September (see Appendix S55 for monthly operational hours by vessel type*)

Transit Distance:

- 6 out of 14 for total transit distance (248,172 nm)
- vessel type class with the highest amount of transit distance (124,032 nm) was Fishing (see Appendix S52 for total transit distance by vessel type*)
- transit distance averaged 20,681 nm/month, with a range of 2,158 nm in March to 41,865 nm in September (see Appendix S56 for monthly transit distance by vessel type*)

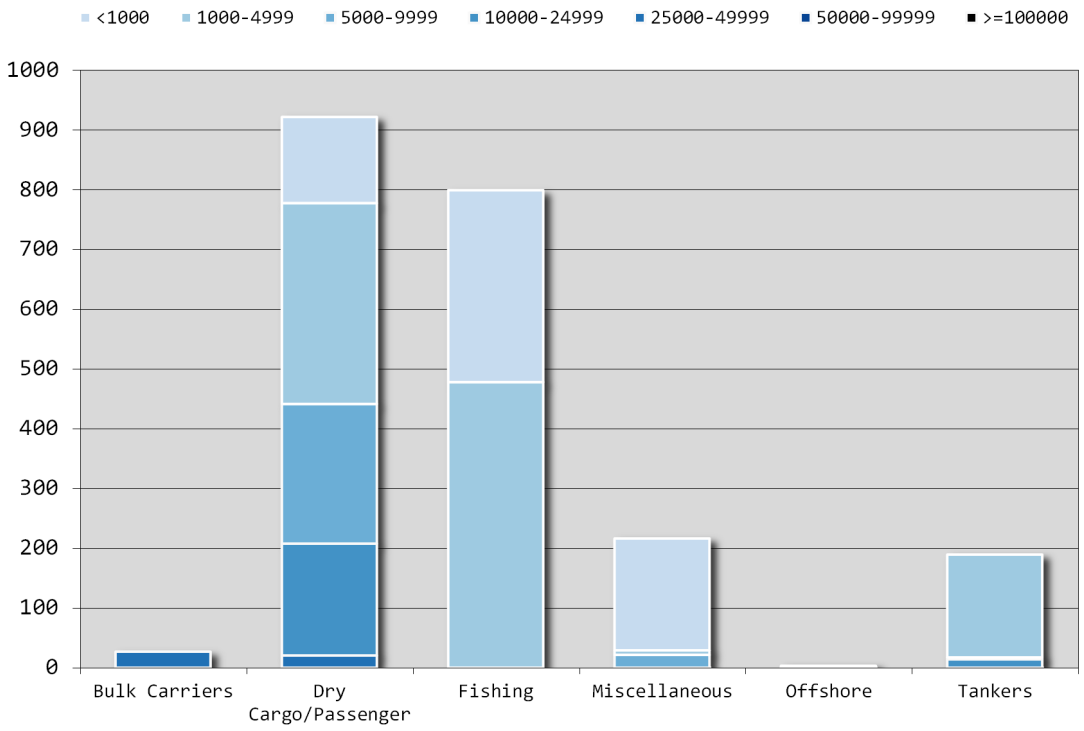
Transit Density:

- 6 out of 14 for percent of water surface area exposed to vessel traffic (88.8%)
- 5 out of 14 for average transit density (2.40 km/km^2)
- 8 out of 14 for maximum transit density (37.05 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Davis Strait Transit Counts
by Vessel Type Class and Gross Tonnage Class

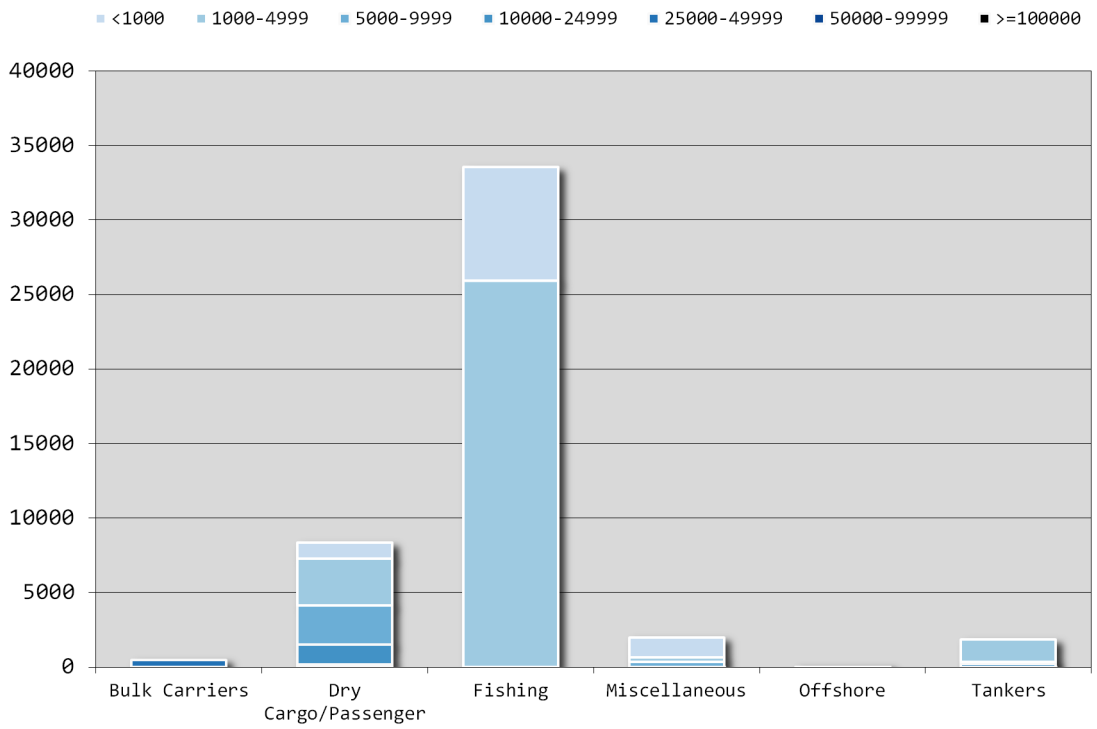
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (922 transits) in the Davis Strait during 2015. The vessel types with the highest number of transits were Stern Trawler, Passenger/Cruise, and Factory Stern Trawler with 361, 308, and 248 transits, respectively (Appendix S50). Of the 2,159 total transits, the highest number (993 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S50). Vessels with a gross tonnage ≥ 10,000 accounted for 12% of the total transits. The flag countries that logged the highest number of transits in the Davis Strait during 2015 were Denmark, Denmark (Dis), and Canada with 926, 544, and 186 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	27	0	0	0	**27**
Dry Cargo/Passenger	145	335	234	21	187	0	0	**922**
Fishing	321	478	0	0	0	0	0	**799**
Miscellaneous	187	8	20	0	2	0	0	**217**
Offshore	2	0	0	0	0	0	2	**4**
Tankers	0	172	3	2	13	0	0	**190**
Totals:	**655**	**993**	**257**	**50**	**202**	**0**	**2**	**2159**

Davis Strait Operational Hours
by Vessel Type Class and Gross Tonnage Class

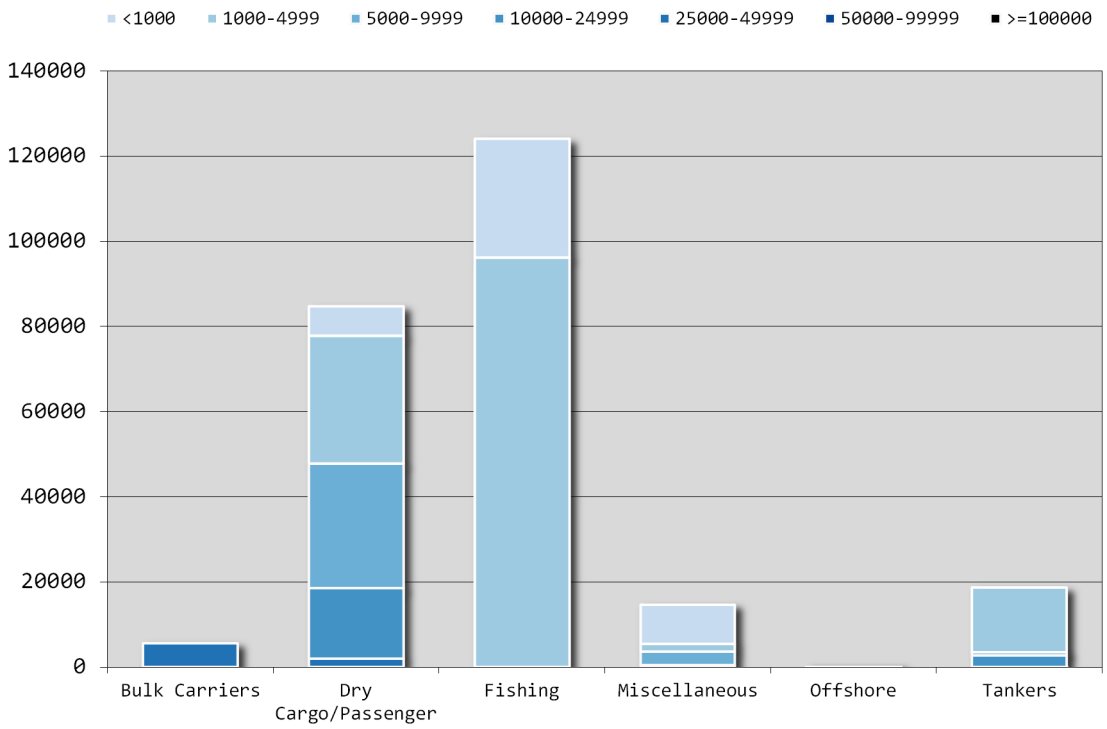
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (33,559 hrs) in the Davis Strait during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Factory Stern Trawler, and Passenger/Cruise with 21,913; 9,902; and 2,390 hours, respectively (Appendix S51). Of the 46,337 total operational hours, the highest number (30,870 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S51). Vessels with a gross tonnage ≥ 10,000 accounted for 5% of the total operational hours. The flag countries that logged the highest number of operational hours in the Davis Strait during 2015 were Denmark, Denmark (Dis), and Canada with 31,743; 4,759; and 3,594 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	506	0	0	**506**
Dry Cargo/Passenger	1072	3129	2649	1336	183	0	0	**8369**
Fishing	7645	25915	0	0	0	0	0	**33559**
Miscellaneous	1337	309	330	33	0	0	0	**2009**
Offshore	15	0	0	0	0	0	7	**22**
Tankers	0	1518	119	229	5	0	0	**1872**
Totals:	**10070**	**30870**	**3098**	**1598**	**694**	**0**	**7**	**46337**

Davis Strait Transit Distance
by Vessel Type Class and Gross Tonnage Class

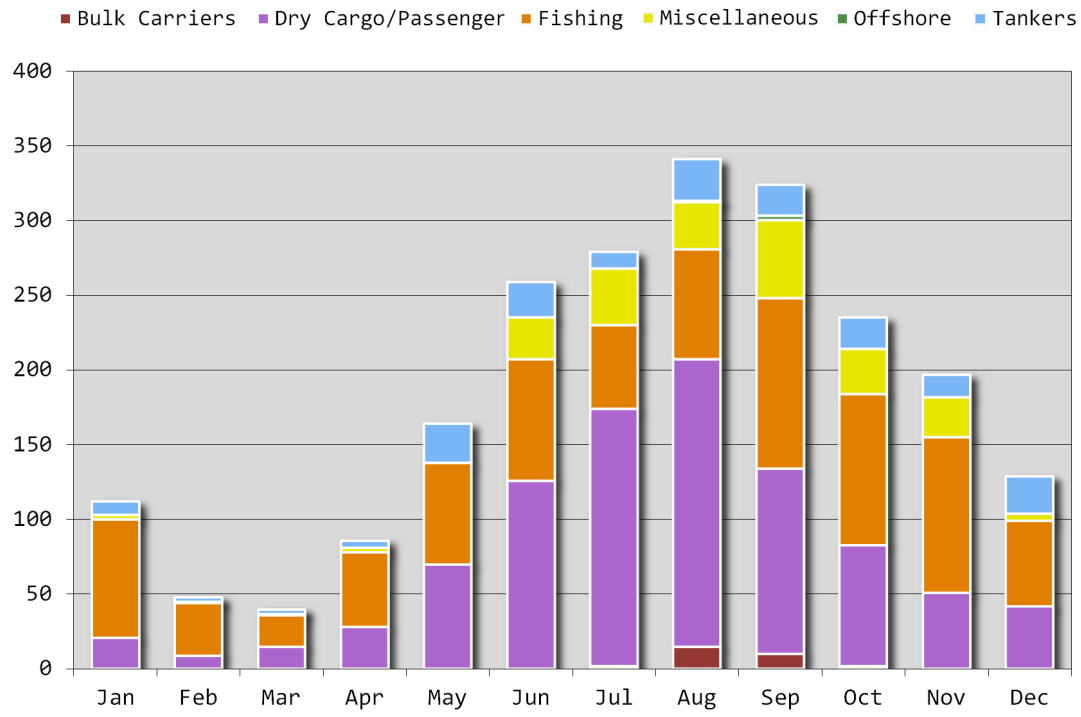
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (124,032 nm) in the Davis Strait during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Factory Stern Trawler, and Container Ship (Fully Cellular) with 80,430; 36,955; and 27,266 nm, respectively (Appendix S52). Of the 248,172 nm of total transit distance, the highest amount (143,226 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S52). Vessels with a gross tonnage ≥ 10,000 accounted for 11% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Davis Strait during 2015 were Denmark, Denmark (Dis), and Canada with 127,627; 50,763; and 21,065 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	5646	0	0	0	0	**5646**
Dry Cargo/Passenger	0	0	2020	16523	29296	29981	6956	**84775**
Fishing	0	0	0	0	0	96238	27794	**124032**
Miscellaneous	0	0	0	493	3157	1876	9233	**14759**
Offshore	70	0	0	0	0	0	187	**257**
Tankers	0	0	51	2717	803	15132	0	**18703**
Totals:	**70**	**0**	**7716**	**19733**	**33256**	**143226**	**44170**	**248172**

Davis Strait Transit Counts
by Vessel Type Class and Month

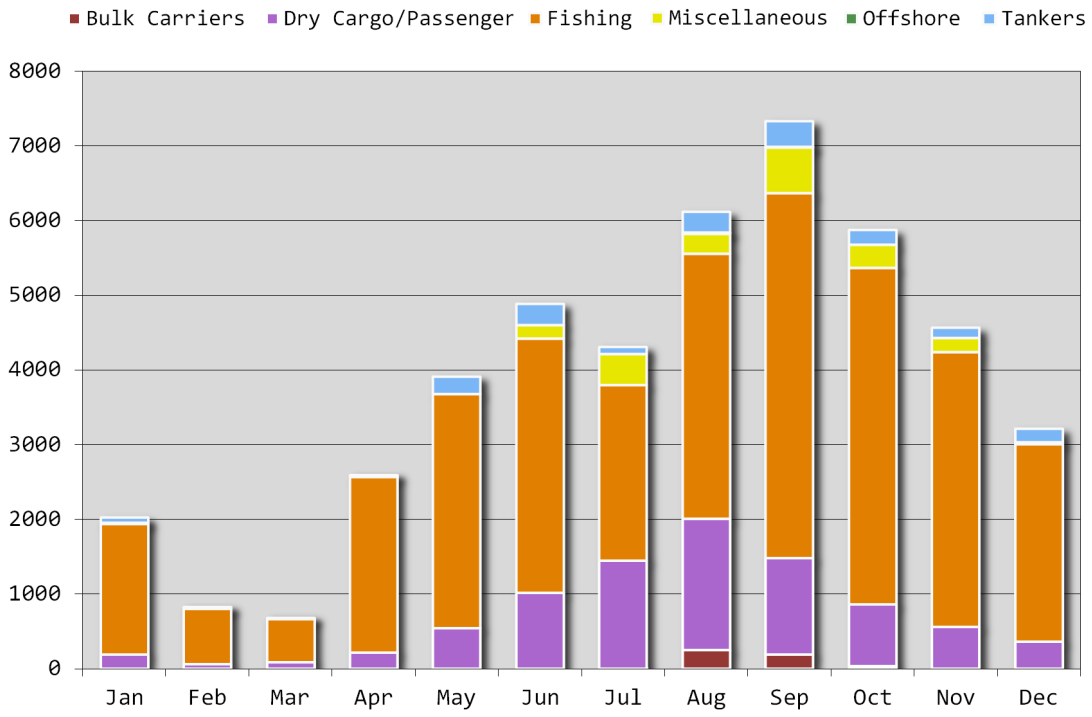
Transit counts for the Davis Strait in 2015 averaged 184 transits/month, with a range of 40 transits in March to 341 transits in August (see Appendix S54 for monthly transit counts by vessel type). With a coefficient of variation of 0.56, the Davis Strait had a moderate amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	21	79	3	0	9	**112**
Feb	0	9	35	1	0	3	**48**
Mar	0	15	21	1	0	3	**40**
Apr	0	28	50	3	0	5	**86**
May	0	70	68	0	0	26	**164**
Jun	0	126	81	28	0	24	**259**
Jul	2	172	56	38	0	11	**279**
Aug	15	192	74	31	1	28	**341**
Sep	10	124	114	52	3	21	**324**
Oct	2	81	101	30	0	21	**235**
Nov	0	51	104	27	0	15	**197**
Dec	0	42	57	5	0	25	**129**

Davis Strait Operational Hours
by Vessel Type Class and Month

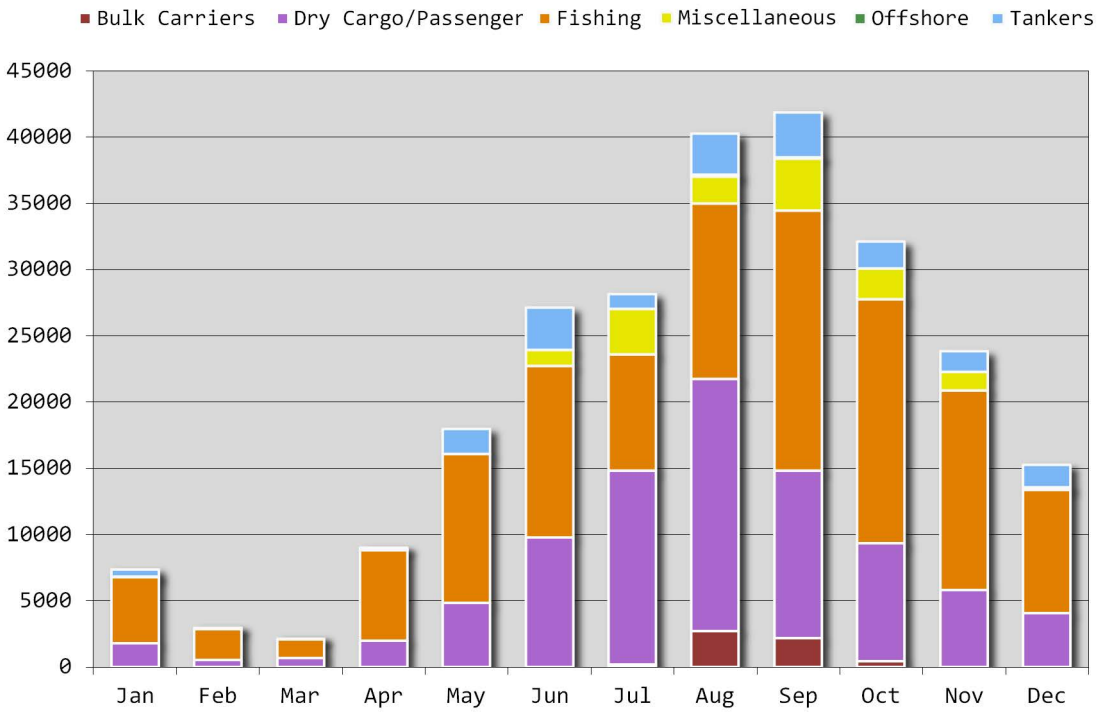
Operational hours for the Davis Strait in 2015 averaged 3,861 hrs/month, with a range of 684 hours in March to 7,330 hours in September (see Appendix S55 for monthly operational hours by vessel type). With a coefficient of variation of 0.54, the Davis Strait had a moderate amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	190	1755	11	0	70	**2026**
Feb	0	68	738	5	0	19	**830**
Mar	0	92	574	4	0	14	**684**
Apr	0	218	2353	9	0	15	**2594**
May	0	549	3131	0	0	234	**3915**
Jun	0	1017	3405	180	0	285	**4887**
Jul	17	1434	2352	409	0	98	**4310**
Aug	255	1758	3545	264	14	281	**6117**
Sep	192	1290	4885	608	8	348	**7330**
Oct	42	820	4504	308	0	197	**5871**
Nov	0	565	3678	186	0	133	**4561**
Dec	0	368	2639	26	0	178	**3210**

Davis Strait Transit Distance
by Vessel Type Class and Month

Transit distance for the Davis Strait in 2015 averaged 20,681 nm/month, with a range of 2,158 nm in March to 41,865 nm in September (see Appendix S56 for monthly transit distance by vessel type). With a coefficient of variation of 0.66, the Davis Strait had a moderate amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	1816	4966	74	0	549	**7405**
Feb	0	565	2295	42	0	72	**2974**
Mar	0	707	1381	6	0	65	**2159**
Apr	0	1997	6839	82	0	106	**9024**
May	0	4846	11246	0	0	1902	**17994**
Jun	0	9808	12943	1201	0	3160	**27112**
Jul	239	14599	8785	3400	0	1142	**28165**
Aug	2754	19009	13198	2032	180	3084	**40257**
Sep	2189	12647	19588	3956	77	3408	**41865**
Oct	464	8889	18404	2349	0	2002	**32108**
Nov	0	5821	15052	1438	0	1525	**23836**
Dec	0	4071	9335	180	0	1690	**15276**

East Siberian Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 8 of 14 for total amount of water surface area within the ARPA Arctic boundary (638,050 km^2)
- average sea ice extent ranged from 5% of the water surface area in September to 98% in January, February, March, April, May, June, November, and December; average sea ice extent exceeded 25% of the water surface area for 10 months, 50% for 10 months, and 75% for 9 months

Unique Vessels:

- 11 of 14 for total number of unique vessels (77 vessels)
- vessel type class with the highest count of unique vessels (47 vessels) was Dry Cargo/Passenger (see Appendix S57 for total unique vessel counts by vessel type*)

Transit Counts:

- 14 out of 14 for total number of transits (352 transits)
- vessel type class with the highest number of transits (234 transits) was Dry Cargo/Passenger (see Appendix S58 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (177 transits) was 1000-4999 GT (see Appendix S58 for total transit counts by vessel size class)
- transit counts averaged 31 transits/month, with a range of 0 transits in January, February, March, April, and June to 137 transits in September (see Appendix S62 for monthly transit counts by vessel type*)

Operational Hours:

- 12 out of 14 for total operational hours (12,493 hrs)
- vessel type class with the highest number of operational hours (2,082 hrs) was Dry Cargo/Passenger (see Appendix S59 for total operational hours by vessel type*)
- operational hours averaged 1,041 hrs/month, with a range of 0 hours in January, February, March, April, and June to 4,928 hours in September (see Appendix S63 for monthly operational hours by vessel type*)

Transit Distance:

- 12 out of 14 for total transit distance (118,476 nm)
- vessel type class with the highest amount of transit distance (65,930 nm) was Dry Cargo/Passenger (see Appendix S60 for total transit distance by vessel type*)
- transit distance averaged 9,873 nm/month, with a range of 0 nm in January, February, March, April, and June to 47,123 nm in September (see Appendix S64 for monthly transit distance by vessel type*)

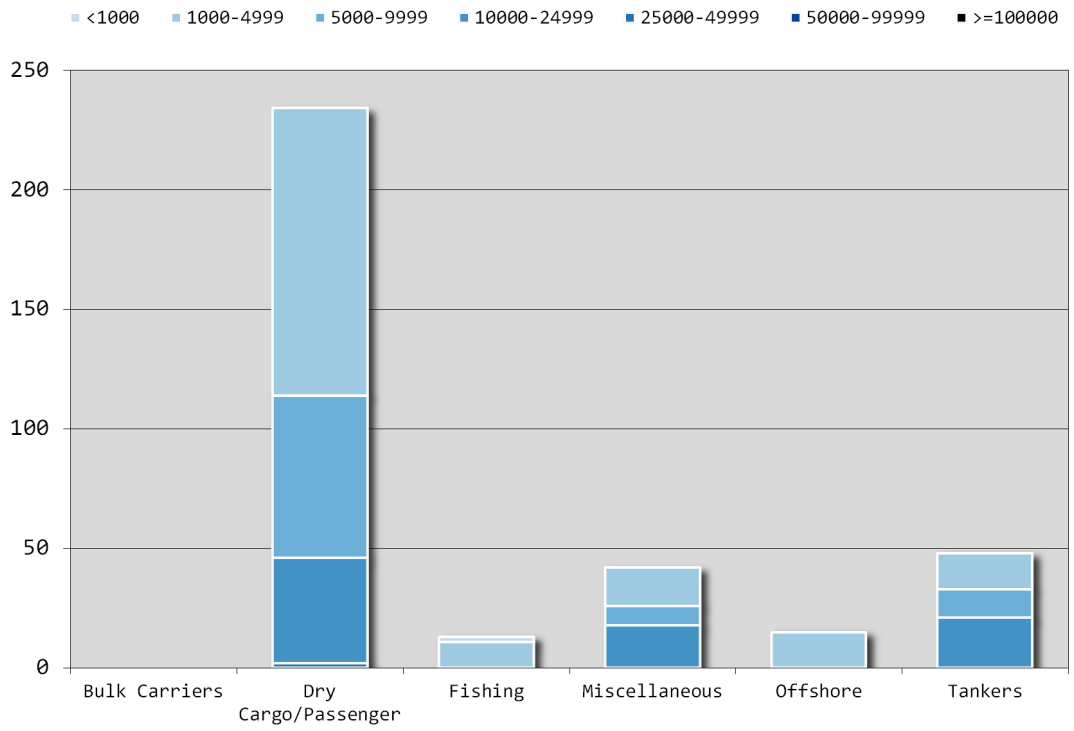
Transit Density:

- 11 out of 14 for percent of water surface area exposed to vessel traffic (65.2%)
- 11 out of 14 for average transit density (0.57 km/km^2)
- 13 out of 14 for maximum transit density (9.26 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

East Siberian Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

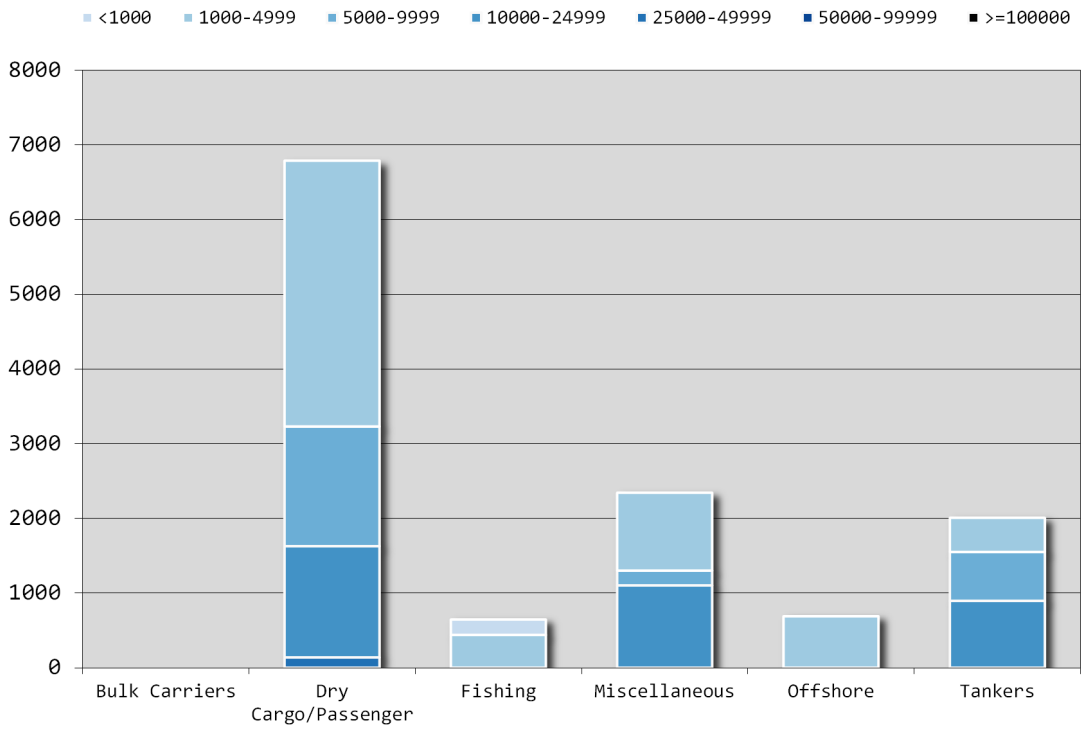
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (234 transits) in the East Siberian Sea during 2015. The vessel types with the highest number of transits were General Cargo Ship, Passenger/Cruise, and Research Survey Vessel with 180, 34, and 22 transits, respectively (Appendix S58). Of the 352 total transits, the highest number (177 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S58). Vessels with a gross tonnage ≥ 10,000 accounted for 24% of the total transits. The flag countries that logged the highest number of transits in the East Siberian Sea during 2015 were Russia, Netherlands, Antigua & Barbuda, and Liberia with 313, 12, 5, and 5 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	0	120	68	2	44	0	0	**234**
Fishing	2	11	0	0	0	0	0	**13**
Miscellaneous	0	16	8	0	18	0	0	**42**
Offshore	0	15	0	0	0	0	0	**15**
Tankers	0	15	12	0	21	0	0	**48**
Totals:	**2**	**177**	**88**	**2**	**83**	**0**	**0**	**352**

East Siberian Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

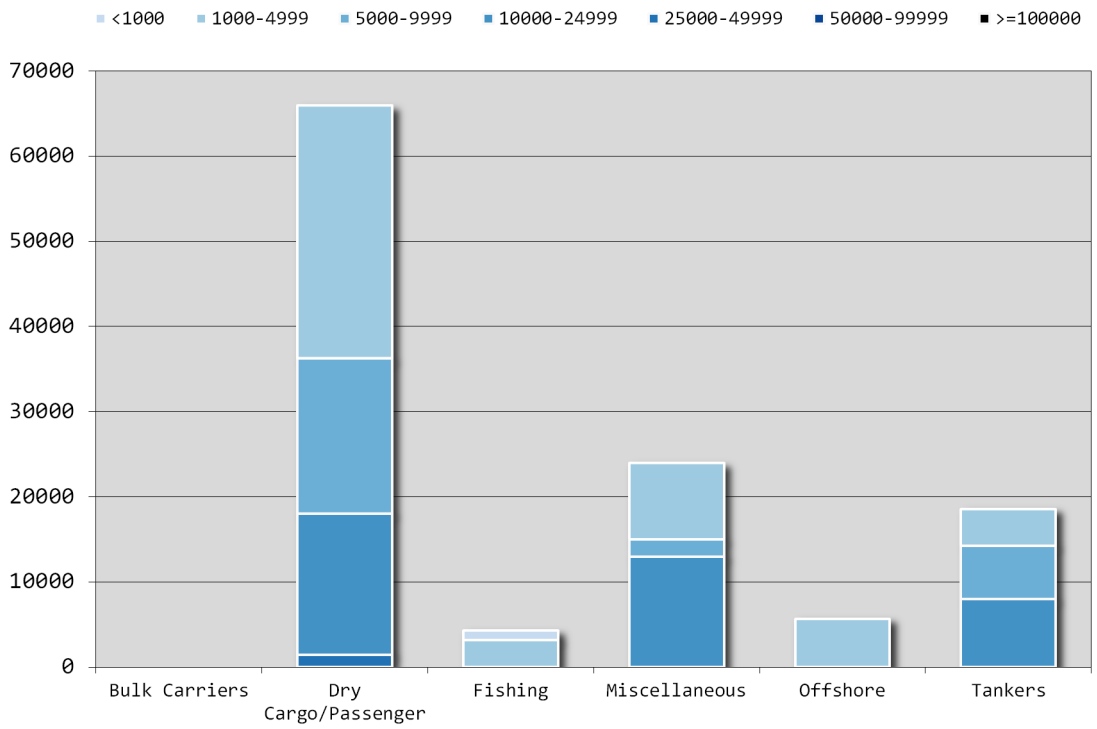
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of operational hours (6,784 hrs) in the East Siberian Sea during 2015. The vessel types with the highest number of operational hours were General Cargo Ship, Research Survey Vessel, and Icebreaker with 5,205; 1,206; and 1,056 hours, respectively (Appendix S59). Of the 12,493 total operational hours, the highest number (6,192 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S59). Vessels with a gross tonnage ≥ 10,000 accounted for 29% of the total operational hours. The flag countries that logged the highest number of operational hours in the East Siberian Sea during 2015 were Russia, Netherlands, and Liberia with 11,203; 513; and 190 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	0	3547	1607	1485	144	0	0	**6784**
Fishing	206	447	0	0	0	0	0	**652**
Miscellaneous	0	1045	198	1105	0	0	0	**2348**
Offshore	0	697	0	0	0	0	0	**697**
Tankers	0	456	655	901	0	0	0	**2012**
Totals:	**206**	**6192**	**2460**	**3491**	**144**	**0**	**0**	**12493**

East Siberian Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

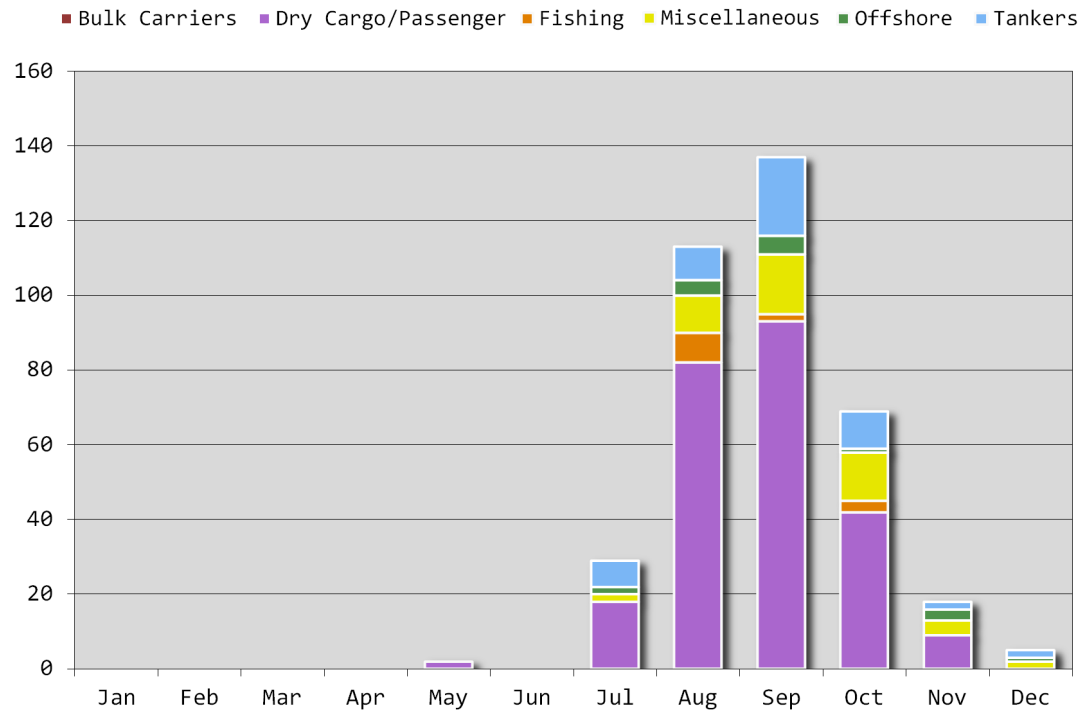
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest amount of transit distance (65,930 nm) in the East Siberian Sea during 2015. The vessel types with the highest amount of transit distance were General Cargo Ship, Icebreaker, and Research Survey Vessel with 48,954; 12,424; and 10,621 nm, respectively (Appendix S60). Of the 118,476 nm of total transit distance, the highest amount (51,865 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S60). Vessels with a gross tonnage ≥ 10,000 accounted for 33% of the total transit distance. The flag countries that logged the highest amount of transit distance in the East Siberian Sea during 2015 were Russia, Netherlands, and Liberia with 103,539; 6,594; and 2,228 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	0	0	0	**0**
Dry Cargo/Passenger	0	0	1502	16566	18170	29693	0	**65930**
Fishing	0	0	0	0	0	3204	1097	**4300**
Miscellaneous	0	0	0	12963	2030	8960	0	**23952**
Offshore	0	0	0	0	0	5700	0	**5700**
Tankers	0	0	0	8005	6279	4308	0	**18593**
Totals:	**0**	**0**	**1502**	**37533**	**26480**	**51865**	**1097**	**118476**

East Siberian Sea Transit Counts
by Vessel Type Class and Month

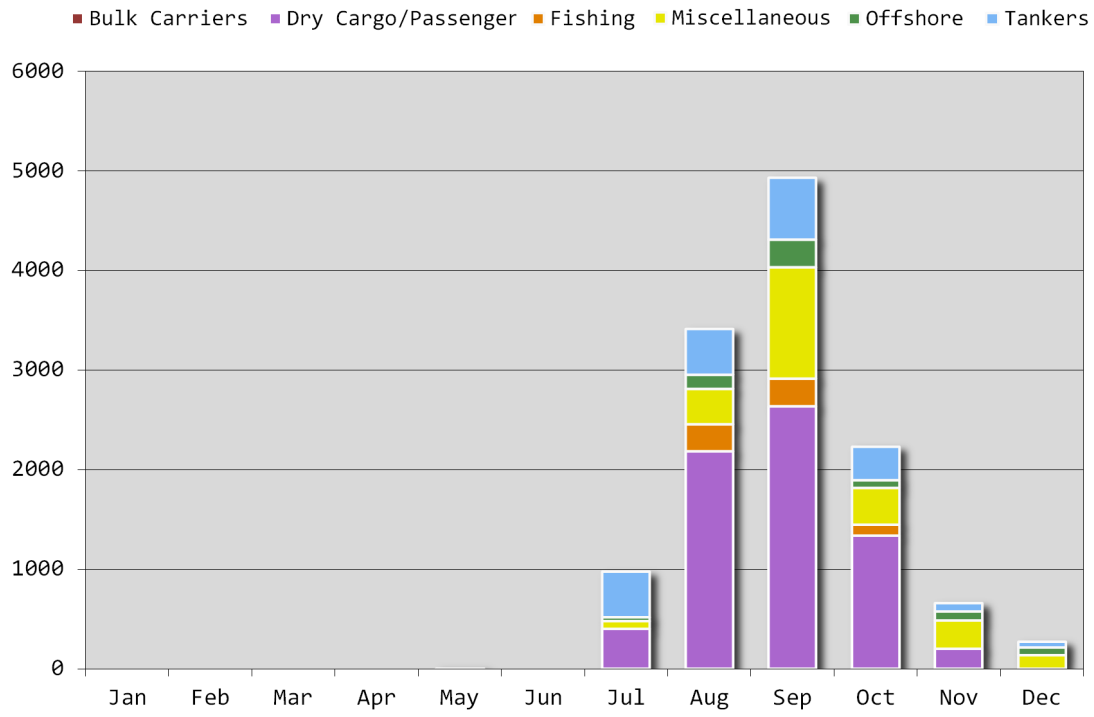
Transit counts for the East Siberian Sea in 2015 averaged 31 transits/month, with a range of 0 transits in January, February, March, April, and June to 137 transits in September (see Appendix S62 for monthly transit counts by vessel type). With a coefficient of variation of 1.56, the East Siberian Sea had some of the highest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	2	0	0	0	0	**2**
Jun	0	0	0	0	0	0	**0**
Jul	0	18	0	2	2	7	**29**
Aug	0	82	8	10	4	9	**113**
Sep	0	93	2	16	5	21	**137**
Oct	0	42	3	13	1	10	**69**
Nov	0	9	0	4	3	2	**18**
Dec	0	0	0	2	1	2	**5**

East Siberian Sea Operational Hours
by Vessel Type Class and Month

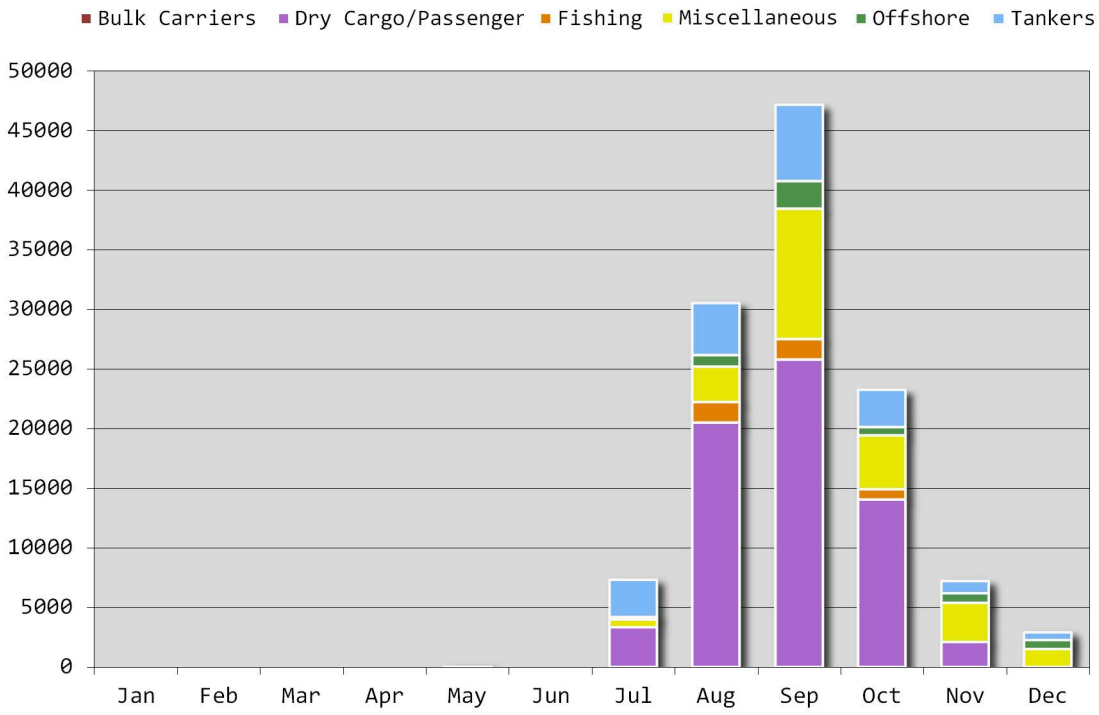
Operational hours for the East Siberian Sea in 2015 averaged 1,041 hrs/month, with a range of 0 hours in January, February, March, April, and June to 4,928 hours in September (see Appendix S63 for monthly operational hours by vessel type). With a coefficient of variation of 1.57, the East Siberian Sea had some of the highest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	11	0	0	0	0	**11**
Jun	0	0	0	0	0	0	**0**
Jul	0	404	0	80	33	459	**976**
Aug	0	2185	271	355	143	459	**3414**
Sep	0	2640	273	1121	276	617	**4928**
Oct	0	1339	108	370	79	336	**2232**
Nov	0	205	0	284	86	86	**661**
Dec	0	0	0	137	80	55	**272**

East Siberian Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the East Siberian Sea in 2015 averaged 9,873 nm/month, with a range of 0 nm in January, February, March, April, and June to 47,123 nm in September (see Appendix S64 for monthly transit distance by vessel type). With a coefficient of variation of 1.57, the East Siberian Sea had some of the highest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	90	0	0	0	0	**90**
Jun	0	0	0	0	0	0	**0**
Jul	0	3357	0	652	217	3117	**7343**
Aug	0	20497	1724	2995	930	4375	**30521**
Sep	0	25778	1736	10936	2287	6387	**47124**
Oct	0	14085	840	4513	719	3090	**23247**
Nov	0	2123	0	3303	791	1012	**7229**
Dec	0	0	0	1554	755	612	**2921**

Greenland Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 4 of 14 for total amount of water surface area within the ARPA Arctic boundary (1,163,300 km^2)
- average sea ice extent ranged from 24% of the water surface area in September to 48% in February; average sea ice extent exceeded 25% of the water surface area for 10 months, 50% for 0 months, and 75% for 0 months

Unique Vessels:

- 4 of 14 for total number of unique vessels (507 vessels)
- vessel type class with the highest count of unique vessels (292 vessels) was Fishing (see Appendix S65 for total unique vessel counts by vessel type*)

Transit Counts:

- 4 out of 14 for total number of transits (7,102 transits)
- vessel type class with the highest number of transits (4,052 transits) was Fishing (see Appendix S66 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (3,159 transits) was 1000-4999 GT (see Appendix S66 for total transit counts by vessel size class)
- transit counts averaged 613 transits/month, with a range of 284 transits in December to 1,077 transits in July (see Appendix S70 for monthly transit counts by vessel type*)

Operational Hours:

- 4 out of 14 for total operational hours (175,558 hrs)
- vessel type class with the highest number of operational hours (29,260 hrs) was Fishing (see Appendix S67 for total operational hours by vessel type*)
- operational hours averaged 14,630 hrs/month, with a range of 7,419 hours in December to 27,594 hours in September (see Appendix S71 for monthly operational hours by vessel type*)

Transit Distance:

- 5 out of 14 for total transit distance (914,438 nm)
- vessel type class with the highest amount of transit distance (589,739 nm) was Fishing (see Appendix S68 for total transit distance by vessel type*)
- transit distance averaged 76,203 nm/month, with a range of 34,631 nm in April to 143,009 nm in September (see Appendix S72 for monthly transit distance by vessel type*)

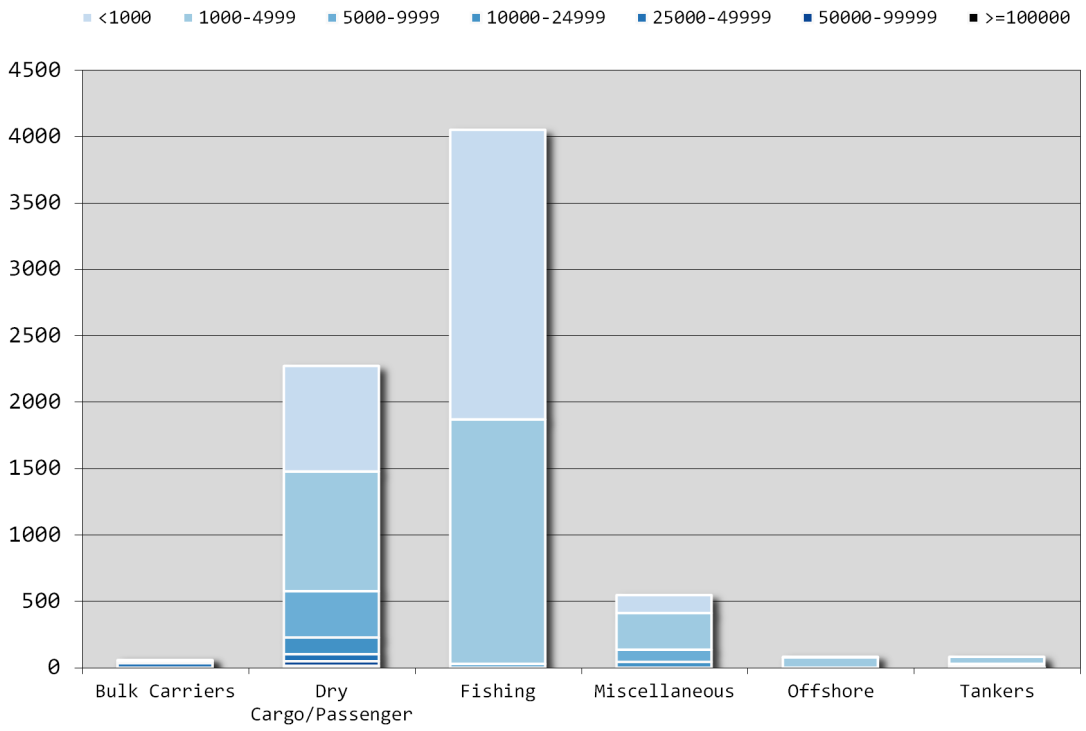
Transit Density:

- 9 out of 14 for percent of water surface area exposed to vessel traffic (79.6%)
- 7 out of 14 for average transit density (1.74 km/km^2)
- 6 out of 14 for maximum transit density (103.97 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Greenland Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

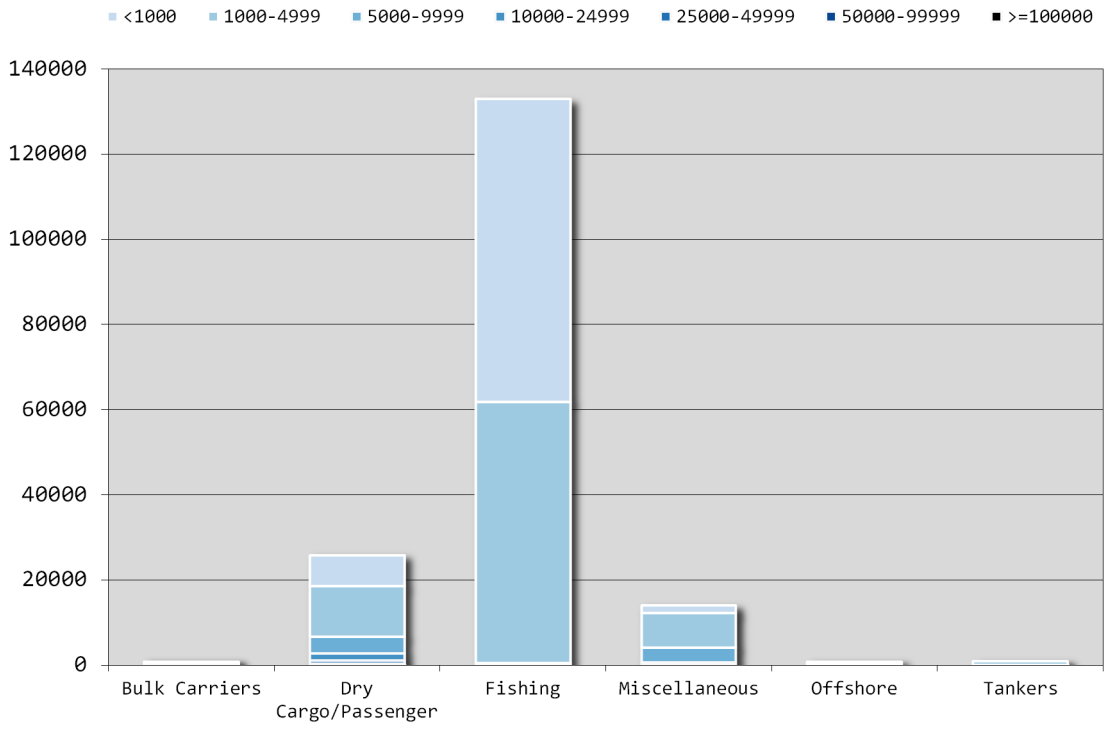
As an aggregate, the Fishing vessel type class logged the highest number of transits (4,052 transits) in the Greenland Sea during 2015. The vessel types with the highest number of transits were Stern Trawler, Fishing Vessel, and Passenger/Cruise with 1,870; 1,217; and 1,150 transits, respectively (Appendix S66). Of the 7,102 total transits, the highest number (3,159 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S66). Vessels with a gross tonnage ≥ 10,000 accounted for 5% of the total transits. The flag countries that logged the highest number of transits in the Greenland Sea during 2015 were Iceland, Norway, and Russia with 2,891; 867; and 798 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	9	5	34	15	0	0	**63**
Dry Cargo/Passenger	795	900	348	52	125	35	18	**2273**
Fishing	2179	1843	30	0	0	0	0	**4052**
Miscellaneous	134	274	95	0	45	0	0	**548**
Offshore	2	78	0	0	0	0	0	**80**
Tankers	0	55	15	2	14	0	0	**86**
Totals:	**3110**	**3159**	**493**	**88**	**199**	**35**	**18**	**7102**

Greenland Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

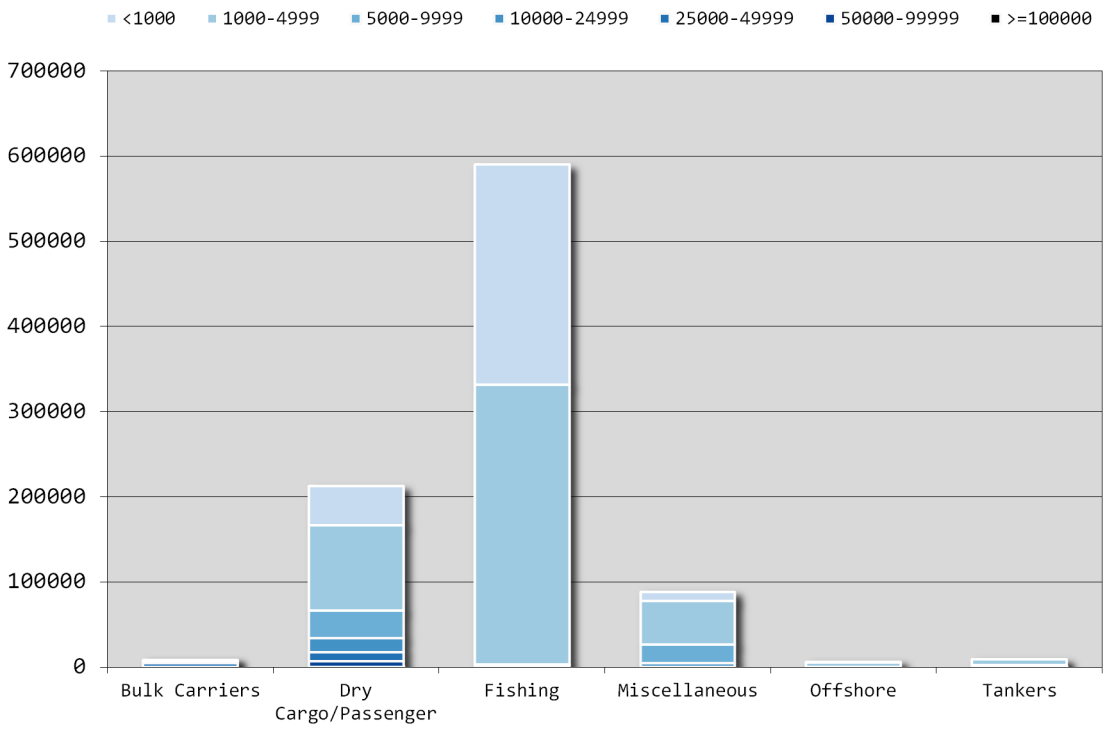
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (132,947 hrs) in the Greenland Sea during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Fishing Vessel, and Factory Stern Trawler with 71,194; 30,194; and 21,593 hours, respectively (Appendix S67). Of the 175,558 total operational hours, the highest number (82,975 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S67). Vessels with a gross tonnage ≥ 10,000 accounted for 2% of the total operational hours. The flag countries that logged the highest number of operational hours in the Greenland Sea during 2015 were Iceland, Russia, and Norway with 93,251; 23,841; and 14,749 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	127	42	217	455	0	0	**841**
Dry Cargo/Passenger	7357	11843	3856	1627	760	364	84	**25892**
Fishing	71052	61371	525	0	0	0	0	**132947**
Miscellaneous	1854	8112	3423	720	0	0	0	**14108**
Offshore	31	740	0	0	0	0	0	**771**
Tankers	0	783	108	46	62	0	0	**998**
Totals:	**80293**	**82975**	**7954**	**2610**	**1278**	**364**	**84**	**175558**

Greenland Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

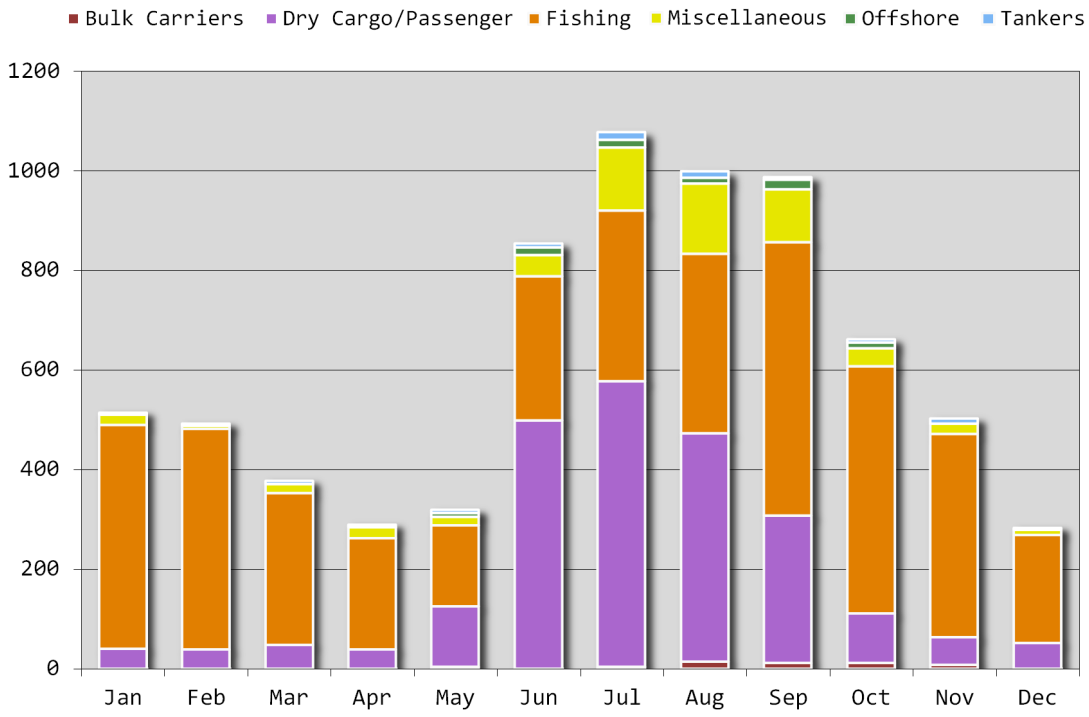
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (589,739 nm) in the Greenland Sea during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, Factory Stern Trawler, and Fishing Vessel with 314,330; 117,611; and 112,325 nm, respectively (Appendix S68). Of the 914,438 nm of total transit distance, the highest amount (492,101 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S68). Vessels with a gross tonnage ≥ 10,000 accounted for 5% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Greenland Sea during 2015 were Iceland, Russia, and Norway with 359,776; 137,281; and 96,713 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	4700	2136	452	1178	0	**8466**
Dry Cargo/Passenger	1398	5763	10467	16522	32724	99578	46248	**212700**
Fishing	0	0	0	0	3629	328205	257905	**589739**
Miscellaneous	0	0	0	4963	21799	51106	10742	**88609**
Offshore	0	0	0	0	0	5411	281	**5692**
Tankers	0	0	680	568	1359	6624	0	**9231**
Totals:	**1398**	**5763**	**15847**	**24189**	**59963**	**492101**	**315176**	**914438**

Greenland Sea Transit Counts
by Vessel Type Class and Month

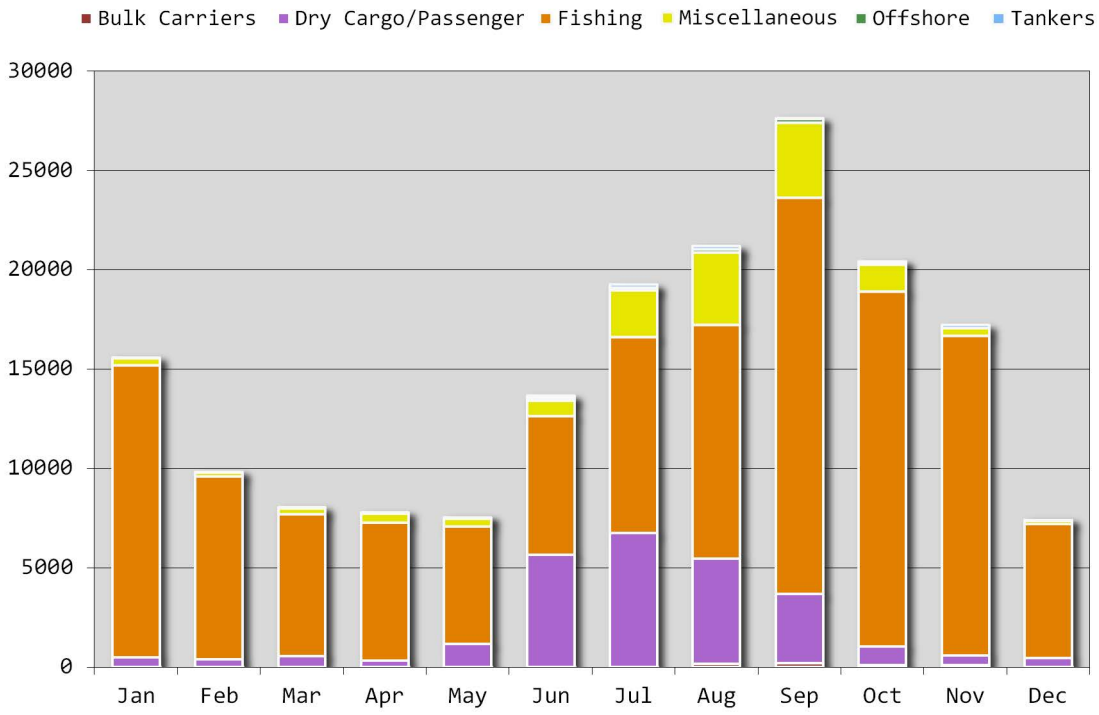
Transit counts for the Greenland Sea in 2015 averaged 613 transits/month, with a range of 284 transits in December to 1,077 transits in July (see Appendix S70 for monthly transit counts by vessel type). With a coefficient of variation of 0.48, the Greenland Sea had a low amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	1	40	449	21	0	4	**515**
Feb	2	37	443	7	0	4	**493**
Mar	0	49	304	18	0	7	**378**
Apr	1	38	224	22	0	5	**290**
May	4	122	163	17	7	6	**319**
Jun	2	497	289	43	15	8	**854**
Jul	5	573	342	127	15	15	**1077**
Aug	15	458	361	140	12	12	**998**
Sep	12	296	549	105	20	5	**987**
Oct	12	100	496	35	12	7	**662**
Nov	9	55	408	21	0	10	**503**
Dec	1	51	217	11	0	4	**284**

Greenland Sea Operational Hours
by Vessel Type Class and Month

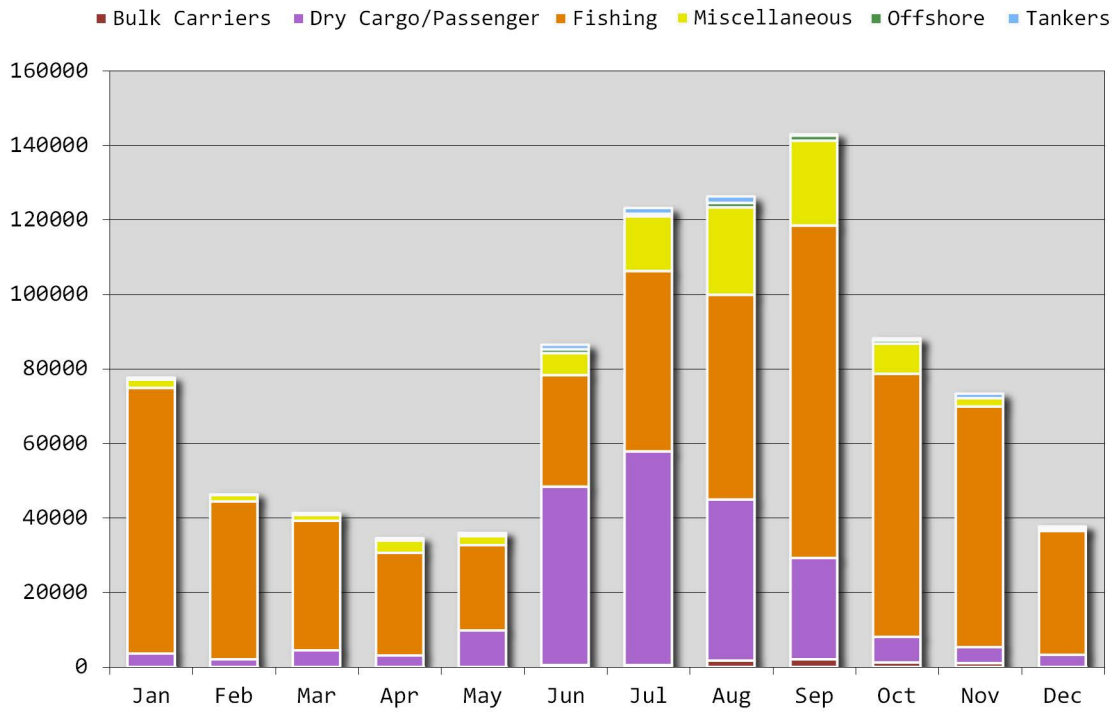
Operational hours for the Greenland Sea in 2015 averaged 14,630 hrs/month, with a range of 7,419 hours in December to 27,594 hours in September (see Appendix S71 for monthly operational hours by vessel type). With a coefficient of variation of 0.46, the Greenland Sea had a low amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	28	475	14678	359	0	41	**15581**
Feb	4	396	9197	197	0	18	**9812**
Mar	0	579	7108	302	0	49	**8038**
Apr	1	341	6951	438	0	72	**7804**
May	36	1158	5877	387	39	55	**7551**
Jun	54	5612	6955	782	145	110	**13657**
Jul	59	6698	9847	2371	125	152	**19252**
Aug	178	5299	11742	3643	158	176	**21197**
Sep	208	3483	19924	3759	190	31	**27594**
Oct	128	912	17851	1347	114	73	**20426**
Nov	116	498	16069	367	0	174	**17224**
Dec	29	441	6746	156	0	48	**7419**

Greenland Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Greenland Sea in 2015 averaged 76,203 nm/month, with a range of 34,631 nm in April to 143,009 nm in September (see Appendix S72 for monthly transit distance by vessel type). With a coefficient of variation of 0.51, the Greenland Sea had a low amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	221	3477	71348	2217	0	379	**77642**
Feb	33	2110	42432	1631	0	140	**46346**
Mar	0	4499	34756	1701	0	428	**41384**
Apr	14	3248	27443	3350	0	576	**34631**
May	341	9618	22860	2316	329	603	**36067**
Jun	567	47831	30069	5724	1126	1218	**86535**
Jul	550	57313	48387	14591	847	1526	**123214**
Aug	1822	43147	54928	23508	1103	1712	**126220**
Sep	2072	27201	89296	22635	1476	329	**143009**
Oct	1311	6956	70457	8137	811	571	**88243**
Nov	1194	4230	64516	2201	0	1276	**73417**
Dec	341	3070	33247	597	0	474	**37729**

Kara Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 7 of 14 for total amount of water surface area within the ARPA Arctic boundary (893,675 km^2)
- average sea ice extent ranged from 5% of the water surface area in September to 96% in January, February, March, and April; average sea ice extent exceeded 25% of the water surface area for 10 months, 50% for 8 months, and 75% for 6 months

Unique Vessels:

- 6 of 14 for total number of unique vessels (244 vessels)
- vessel type class with the highest count of unique vessels (99 vessels) was Dry Cargo/Passenger (see Appendix S73 for total unique vessel counts by vessel type*)

Transit Counts:

- 5 out of 14 for total number of transits (3,757 transits)
- vessel type class with the highest number of transits (1,518 transits) was Miscellaneous (see Appendix S74 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (1,201 transits) was <1000 GT (see Appendix S74 for total transit counts by vessel size class)
- transit counts averaged 327 transits/month, with a range of 102 transits in February to 1,030 transits in September (see Appendix S78 for monthly transit counts by vessel type*)

Operational Hours:

- 5 out of 14 for total operational hours (129,620 hrs)
- vessel type class with the highest number of operational hours (21,603 hrs) was Miscellaneous (see Appendix S75 for total operational hours by vessel type*)
- operational hours averaged 10,802 hrs/month, with a range of 3,312 hours in January to 32,676 hours in September (see Appendix S79 for monthly operational hours by vessel type*)

Transit Distance:

- 4 out of 14 for total transit distance (922,083 nm)
- vessel type class with the highest amount of transit distance (348,315 nm) was Miscellaneous (see Appendix S76 for total transit distance by vessel type*)
- transit distance averaged 76,840 nm/month, with a range of 26,298 nm in January to 204,201 nm in August (see Appendix S80 for monthly transit distance by vessel type*)

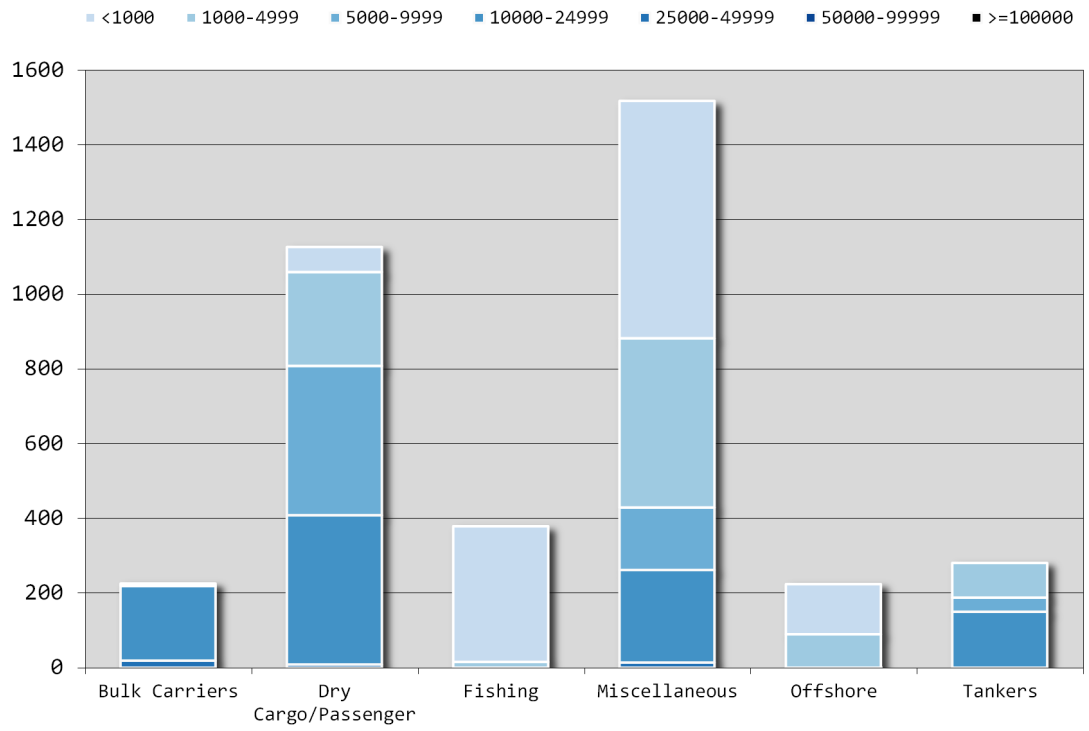
Transit Density:

- 7 out of 14 for percent of water surface area exposed to vessel traffic (85.1%)
- 6 out of 14 for average transit density (2.11 km/km^2)
- 3 out of 14 for maximum transit density (281.08 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Kara Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

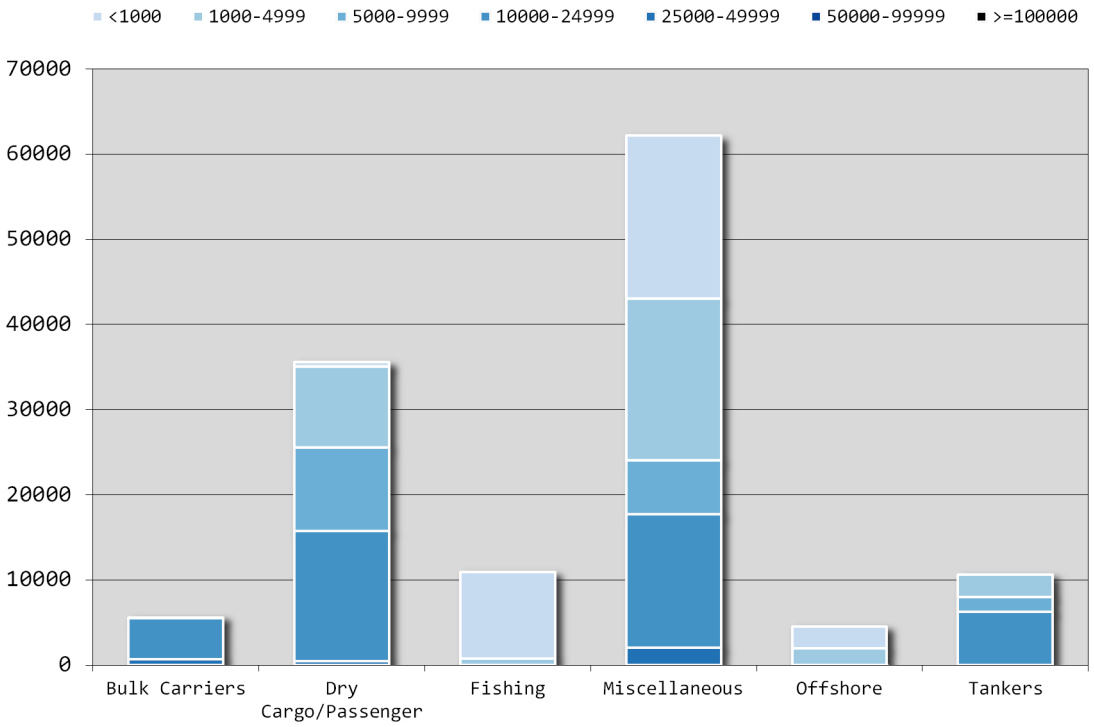
As an aggregate, the Miscellaneous vessel type class logged the highest number of transits (1,518 transits) in the Kara Sea during 2015. The vessel types with the highest number of transits were General Cargo Ship, Tug, and Stern Trawler with 816, 488, and 318 transits, respectively (Appendix S74). Of the 3,757 total transits, the highest number (1,201 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S74). Vessels with a gross tonnage ≥ 10,000 accounted for 28% of the total transits. The flag countries that logged the highest number of transits in the Kara Sea during 2015 were Russia, Netherlands, and Belgium with 2,812; 213; and 194 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	7	0	19	200	0	0	**226**
Dry Cargo/Passenger	68	251	399	10	399	0	0	**1127**
Fishing	363	16	0	0	0	0	0	**379**
Miscellaneous	635	454	167	14	248	0	0	**1518**
Offshore	135	88	2	0	0	0	0	**225**
Tankers	0	93	39	0	150	0	0	**282**
Totals:	**1201**	**909**	**607**	**43**	**997**	**0**	**0**	**3757**

Kara Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

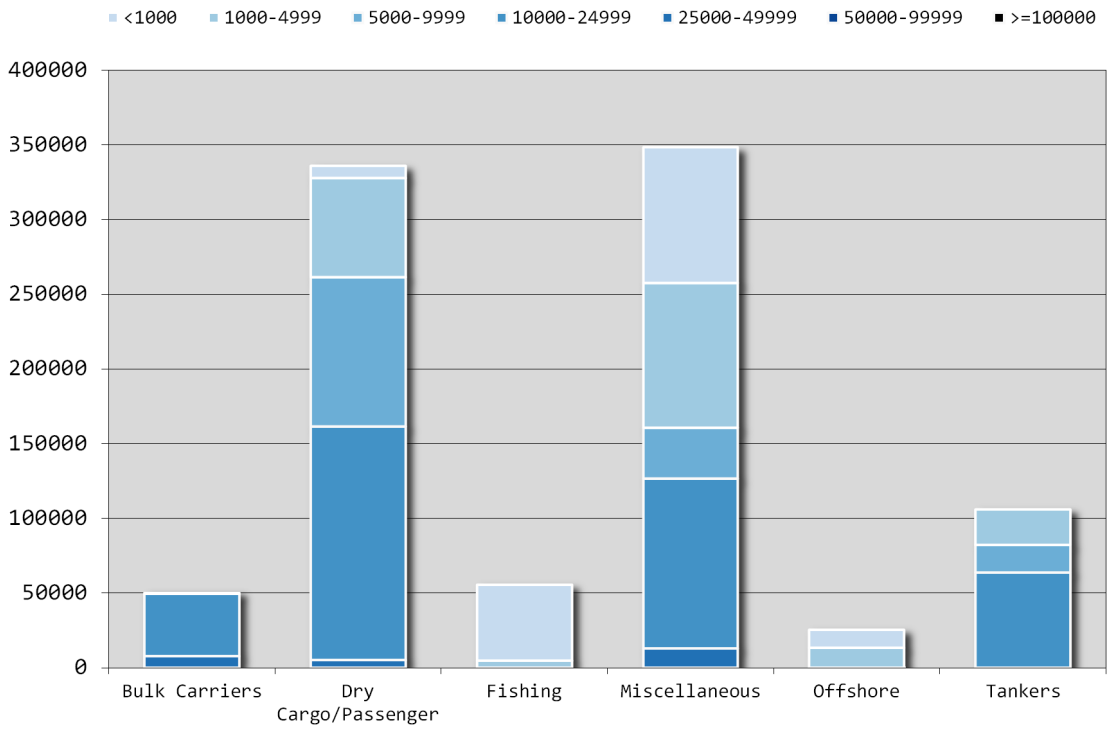
As an aggregate, the Miscellaneous vessel type class logged the highest number of operational hours (62,163 hrs) in the Kara Sea during 2015. The vessel types with the highest number of operational hours were General Cargo Ship, Research Survey Vessel, and Trailing Suction Hopper Dredger with 27,565; 17,151; and 14,014 hours, respectively (Appendix S75). Of the 129,620 total operational hours, the highest number (42,142 hrs) was logged by vessels in the 10000-24999 GT vessel size class (Appendix S75). Vessels with a gross tonnage ≥ 10,000 accounted for 35% of the total operational hours. The flag countries that logged the highest number of operational hours in the Kara Sea during 2015 were Russia, Belgium, and Netherlands with 91,064; 10,720; and 6,954 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	55	0	4853	686	0	0	**5595**
Dry Cargo/Passenger	584	9457	9815	15261	494	0	0	**35611**
Fishing	10197	795	0	0	0	0	0	**10992**
Miscellaneous	19128	19009	6256	15735	2036	0	0	**62163**
Offshore	2563	1937	82	0	0	0	0	**4583**
Tankers	0	2620	1764	6292	0	0	0	**10676**
Totals:	**32472**	**33873**	**17918**	**42142**	**3216**	**0**	**0**	**129620**

Kara Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

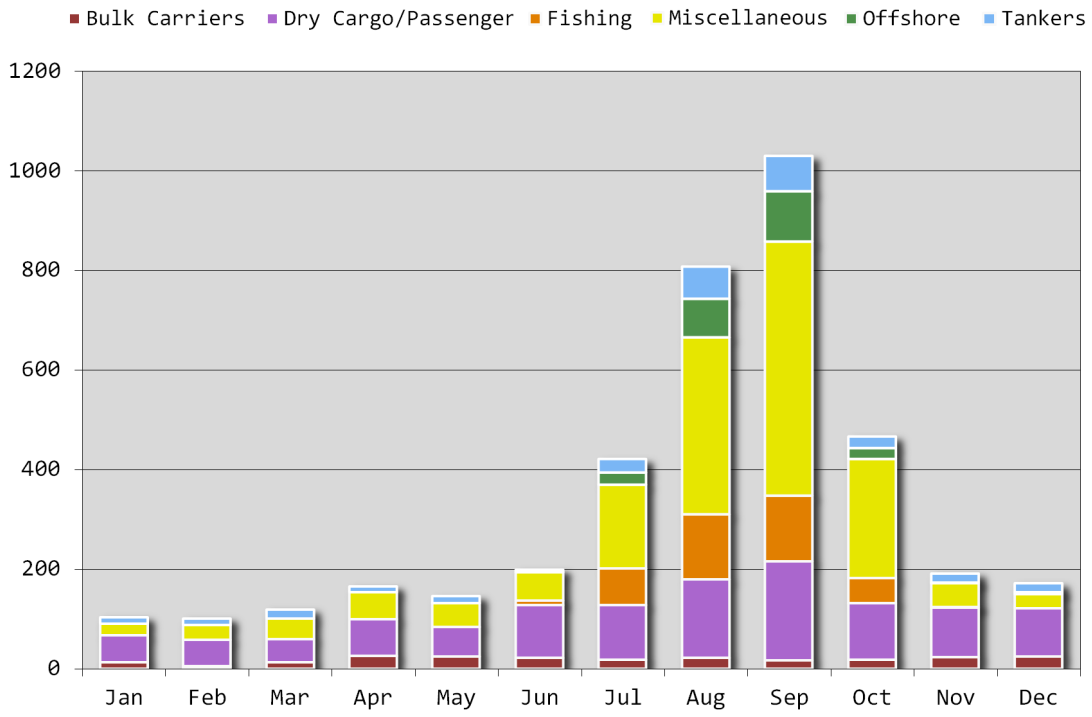
As an aggregate, the Miscellaneous vessel type class logged the highest amount of transit distance (348,315 nm) in the Kara Sea during 2015. The vessel types with the highest amount of transit distance were General Cargo Ship, Icebreaker, and Research Survey Vessel with 261,381; 90,131; and 89,377 nm, respectively (Appendix S76). Of the 922,083 nm of total transit distance, the highest amount (375,412 nm) was logged by vessels in the 10000-24999 GT vessel size class (Appendix S76). Vessels with a gross tonnage ≥ 10,000 accounted for 44% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Kara Sea during 2015 were Russia, Belgium, and Netherlands with 692,762; 50,542; and 38,501 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	8088	41669	0	466	0	**50223**
Dry Cargo/Passenger	0	0	5416	156053	100012	66280	8288	**336049**
Fishing	0	0	0	0	0	5135	50546	**55681**
Miscellaneous	0	0	13246	113652	33929	96834	90654	**348315**
Offshore	0	0	0	0	681	12864	12050	**25596**
Tankers	0	0	0	64038	18172	24009	0	**106219**
Totals:	**0**	**0**	**26750**	**375412**	**152794**	**205589**	**161539**	**922083**

Kara Sea Transit Counts
by Vessel Type Class and Month

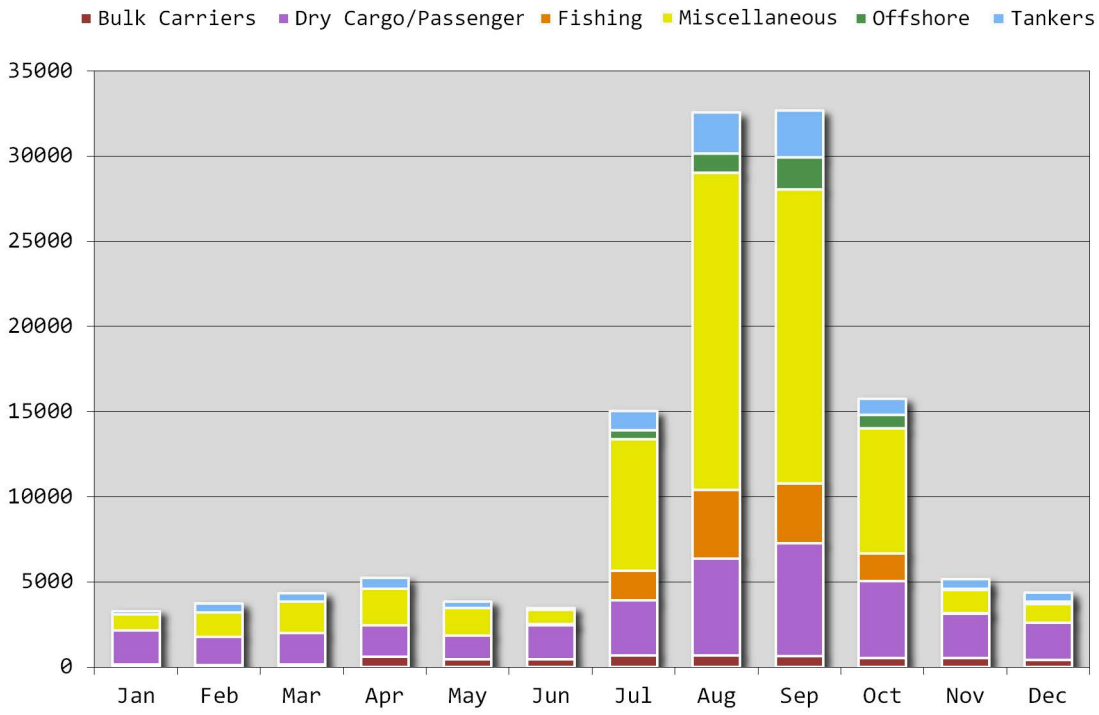
Transit counts for the Kara Sea in 2015 averaged 327 transits/month, with a range of 102 transits in February to 1,030 transits in September (see Appendix S78 for monthly transit counts by vessel type). With a coefficient of variation of 0.93, the Kara Sea had a moderate amount of month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	14	54	0	23	0	13	**104**
Feb	6	53	0	30	0	13	**102**
Mar	14	46	0	41	0	19	**120**
Apr	26	74	0	54	0	12	**166**
May	25	60	0	48	0	13	**146**
Jun	22	107	9	56	0	5	**199**
Jul	19	110	73	168	25	26	**421**
Aug	23	157	131	355	77	64	**807**
Sep	18	198	132	510	100	72	**1030**
Oct	19	114	50	238	23	23	**467**
Nov	24	99	1	48	2	18	**192**
Dec	25	97	0	29	3	18	**172**

Kara Sea Operational Hours
by Vessel Type Class and Month

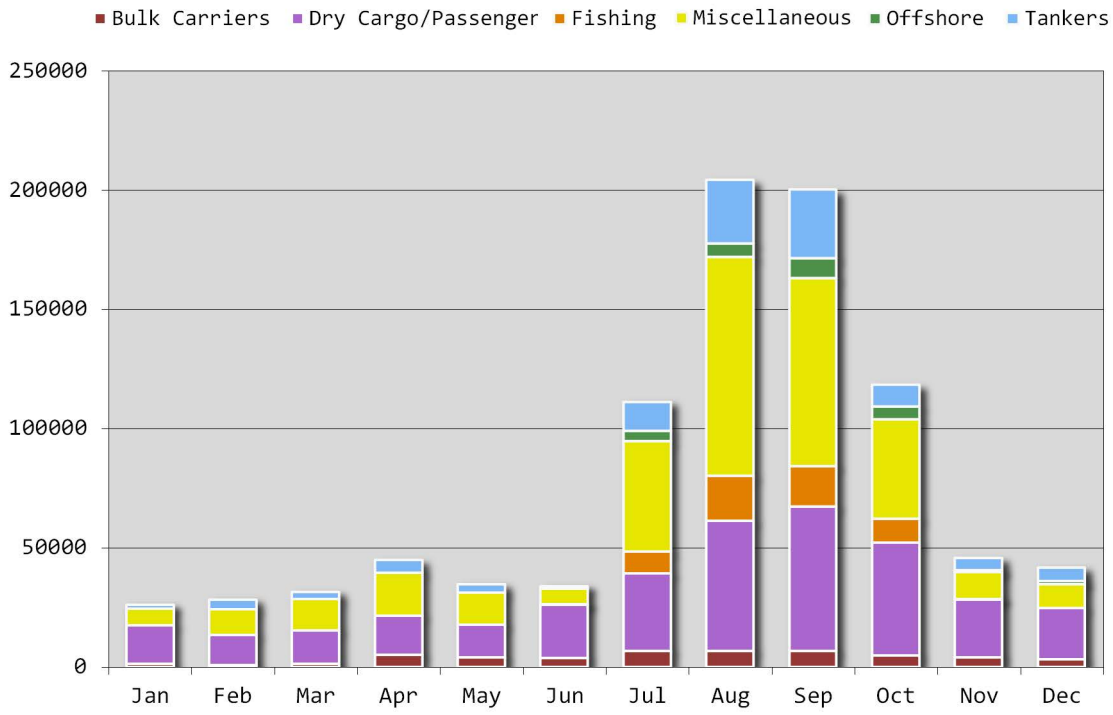
Operational hours for the Kara Sea in 2015 averaged 10,802 hrs/month, with a range of 3,312 hours in January to 32,676 hours in September (see Appendix S79 for monthly operational hours by vessel type). With a coefficient of variation of 1.02, the Kara Sea had a moderate amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	176	1972	0	965	0	199	**3312**
Feb	122	1670	0	1440	0	516	**3748**
Mar	186	1821	0	1859	0	488	**4354**
Apr	609	1870	0	2141	0	651	**5272**
May	467	1409	0	1605	0	393	**3874**
Jun	456	2028	47	838	0	102	**3472**
Jul	703	3229	1741	7712	518	1130	**15032**
Aug	684	5706	4011	18599	1129	2417	**32546**
Sep	668	6611	3515	17248	1890	2744	**32676**
Oct	558	4491	1633	7336	805	951	**15773**
Nov	536	2616	46	1325	99	548	**5170**
Dec	430	2187	0	1095	142	537	**4390**

Kara Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Kara Sea in 2015 averaged 76,840 nm/month, with a range of 26,298 nm in January to 204,201 nm in August (see Appendix S80 for monthly transit distance by vessel type). With a coefficient of variation of 0.86, the Kara Sea had a moderate amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	1355	16301	0	7023	0	1619	**26298**
Feb	821	12876	0	10770	0	4037	**28504**
Mar	1400	14186	0	12935	0	3201	**31722**
Apr	5162	16538	0	17874	0	5371	**44945**
May	4203	13606	0	13401	0	3628	**34838**
Jun	3953	22214	345	6491	0	1095	**34098**
Jul	6836	32469	9381	46242	4091	12333	**111352**
Aug	6970	54487	18709	91891	5495	26648	**204200**
Sep	6961	60448	16984	78625	8523	28627	**200168**
Oct	4901	47342	10060	41633	5337	9130	**118403**
Nov	4268	24160	202	11283	903	4960	**45776**
Dec	3392	21422	0	10147	1246	5571	**41778**

Laptev Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 10 of 14 for total amount of water surface area within the ARPA Arctic boundary (541,950 km^2)
- average sea ice extent ranged from 5% of the water surface area in September to 96% in January, February, March, April, May, October, November, and December; average sea ice extent exceeded 25% of the water surface area for 10 months, 50% for 10 months, and 75% for 9 months

Unique Vessels:

- 11 of 14 for total number of unique vessels (77 vessels)
- vessel type class with the highest count of unique vessels (43 vessels) was Dry Cargo/Passenger (see Appendix S81 for total unique vessel counts by vessel type*)

Transit Counts:

- 11 out of 14 for total number of transits (548 transits)
- vessel type class with the highest number of transits (349 transits) was Dry Cargo/Passenger (see Appendix S82 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (306 transits) was 1000-4999 GT (see Appendix S82 for total transit counts by vessel size class)
- transit counts averaged 48 transits/month, with a range of 0 transits in January, February, March, April, and June to 197 transits in September (see Appendix S86 for monthly transit counts by vessel type*)

Operational Hours:

- 11 out of 14 for total operational hours (14,539 hrs)
- vessel type class with the highest number of operational hours (2,423 hrs) was Dry Cargo/Passenger (see Appendix S83 for total operational hours by vessel type*)
- operational hours averaged 1,212 hrs/month, with a range of 0 hours in January, February, March, April, and June to 4,951 hours in September (see Appendix S87 for monthly operational hours by vessel type*)

Transit Distance:

- 11 out of 14 for total transit distance (129,414 nm)
- vessel type class with the highest amount of transit distance (69,256 nm) was Dry Cargo/Passenger (see Appendix S84 for total transit distance by vessel type*)
- transit distance averaged 10,785 nm/month, with a range of 0 nm in January, February, March, April, and June to 45,815 nm in September (see Appendix S88 for monthly transit distance by vessel type*)

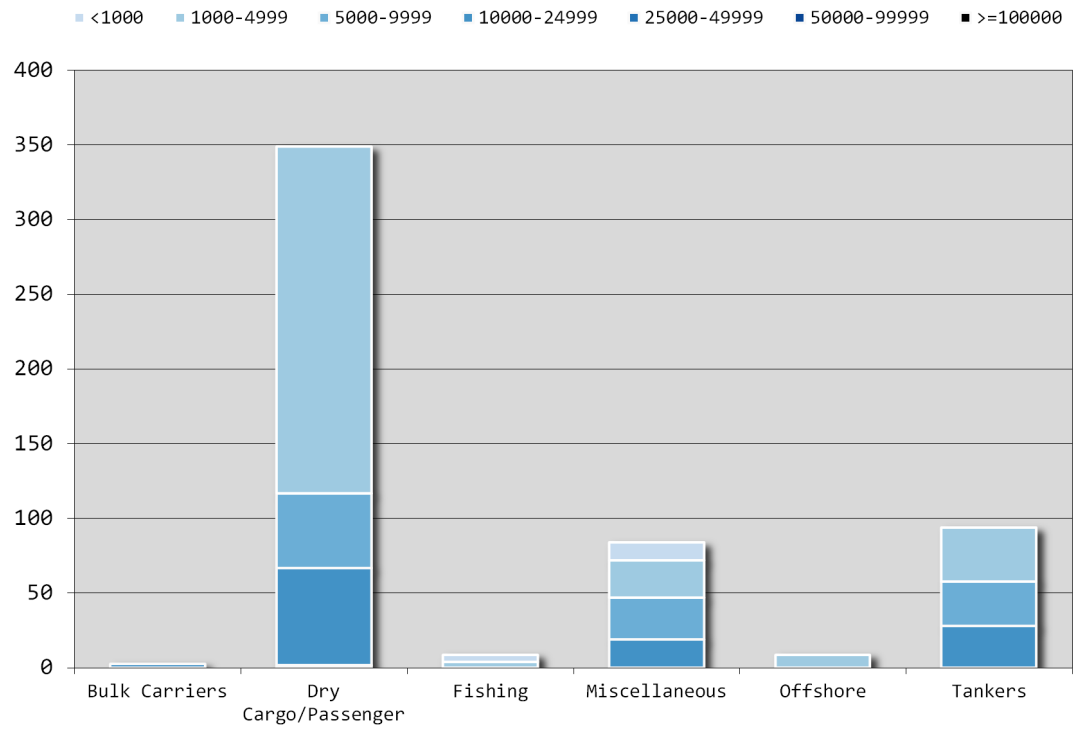
Transit Density:

- 10 out of 14 for percent of water surface area exposed to vessel traffic (79.3%)
- 10 out of 14 for average transit density (0.62 km/km^2)
- 12 out of 14 for maximum transit density (10.52 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Laptev Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

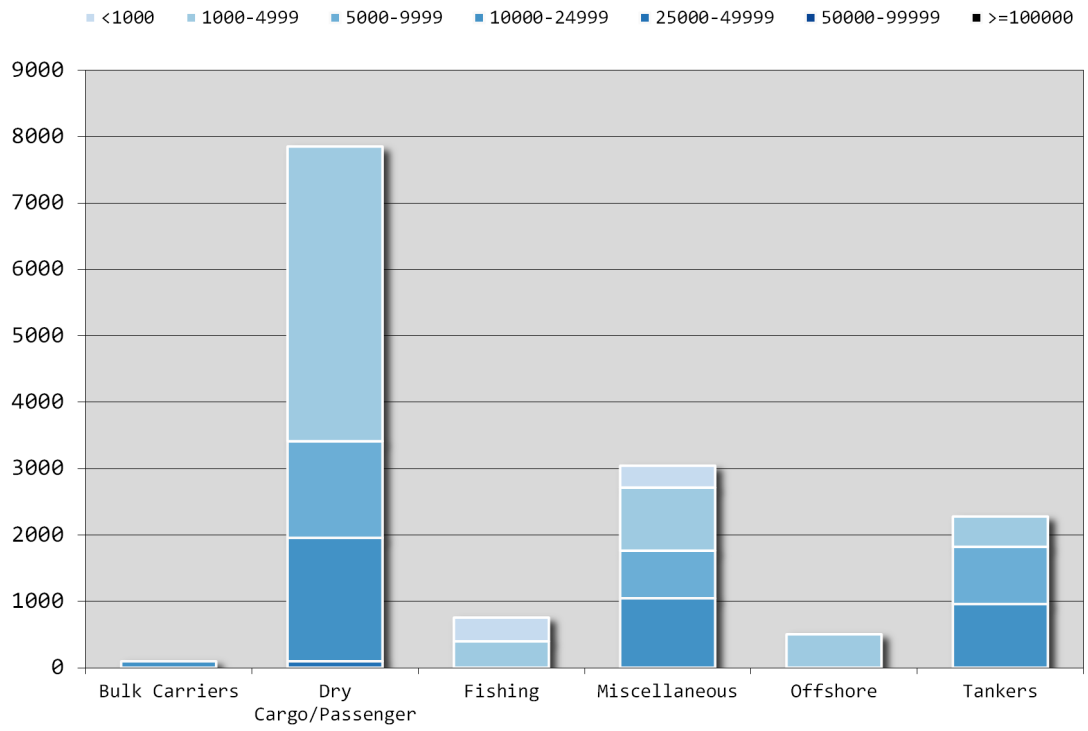
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (349 transits) in the Laptev Sea during 2015. The vessel types with the highest number of transits were General Cargo Ship, Products Tanker, and Research Survey Vessel with 292, 53, and 48 transits, respectively (Appendix S82). Of the 548 total transits, the highest number (306 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S82). Vessels with a gross tonnage ≥ 10,000 accounted for 21% of the total transits. The flag countries that logged the highest number of transits in the Laptev Sea during 2015 were Russia, Netherlands, and Liberia with 517, 14, and 5 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	3	0	0	**3**
Dry Cargo/Passenger	0	232	50	2	65	0	0	**349**
Fishing	5	4	0	0	0	0	0	**9**
Miscellaneous	12	25	28	0	19	0	0	**84**
Offshore	0	9	0	0	0	0	0	**9**
Tankers	0	36	30	0	28	0	0	**94**
Totals:	**17**	**306**	**108**	**2**	**115**	**0**	**0**	**548**

Laptev Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

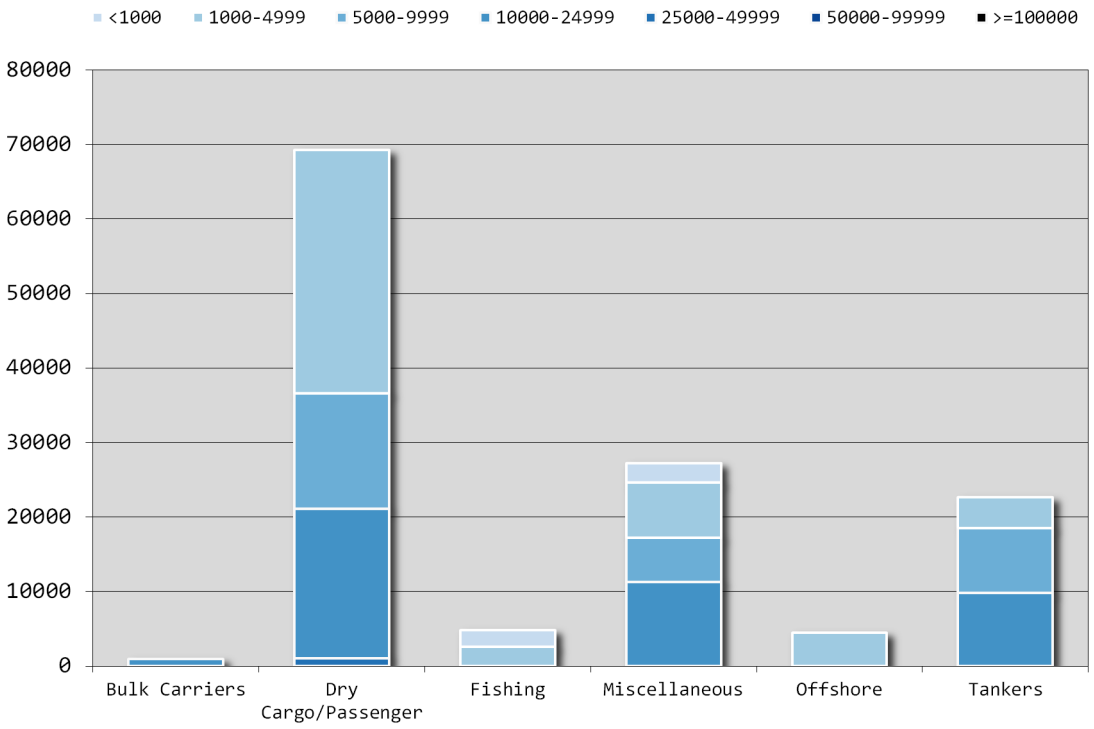
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of operational hours (7,850 hrs) in the Laptev Sea during 2015. The vessel types with the highest number of operational hours were General Cargo Ship, Research Survey Vessel, and Passenger/Cruise with 5,930; 1,674; and 984 hours, respectively (Appendix S83). Of the 14,539 total operational hours, the highest number (6,753 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S83). Vessels with a gross tonnage ≥ 10,000 accounted for 28% of the total operational hours. The flag countries that logged the highest number of operational hours in the Laptev Sea during 2015 were Russia, Netherlands, and Panama with 13,433; 371; and 190 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	100	0	0	0	**100**
Dry Cargo/Passenger	0	4441	1452	1855	102	0	0	**7850**
Fishing	351	406	0	0	0	0	0	**757**
Miscellaneous	329	948	721	1046	0	0	0	**3044**
Offshore	0	507	0	0	0	0	0	**507**
Tankers	0	452	866	963	0	0	0	**2281**
Totals:	**680**	**6753**	**3039**	**3964**	**102**	**0**	**0**	**14539**

Laptev Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

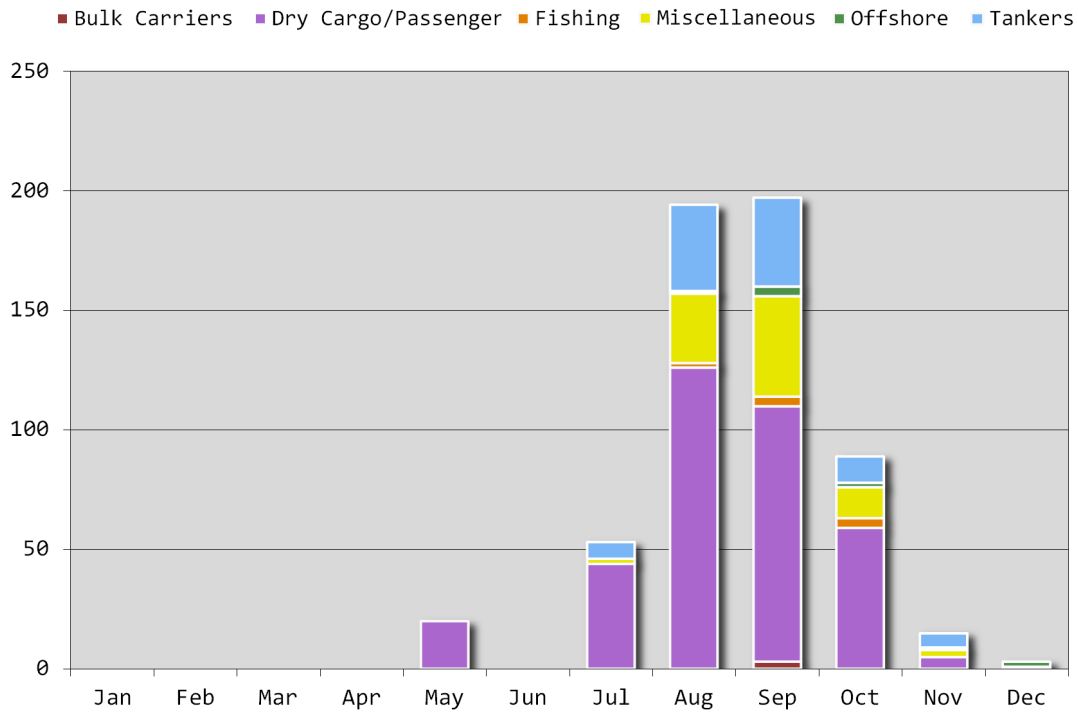
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest amount of transit distance (69,256 nm) in the Laptev Sea during 2015. The vessel types with the highest amount of transit distance were General Cargo Ship, Research Survey Vessel, and Icebreaker with 48,717; 13,342; and 10,273 nm, respectively (Appendix S84). Of the 129,414 nm of total transit distance, the highest amount (51,174 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S84). Vessels with a gross tonnage ≥ 10,000 accounted for 33% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Laptev Sea during 2015 were Russia, Netherlands, and Liberia with 117,723; 4,607; and 1,676 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	954	0	0	0	**954**
Dry Cargo/Passenger	0	0	1114	20021	15478	32643	0	**69256**
Fishing	0	0	0	0	0	2599	2236	**4835**
Miscellaneous	0	0	0	11300	5944	7373	2605	**27221**
Offshore	0	0	0	0	0	4488	0	**4488**
Tankers	0	0	0	9893	8696	4072	0	**22661**
Totals:	**0**	**0**	**1114**	**42167**	**30118**	**51174**	**4841**	**129414**

Laptev Sea Transit Counts
by Vessel Type Class and Month

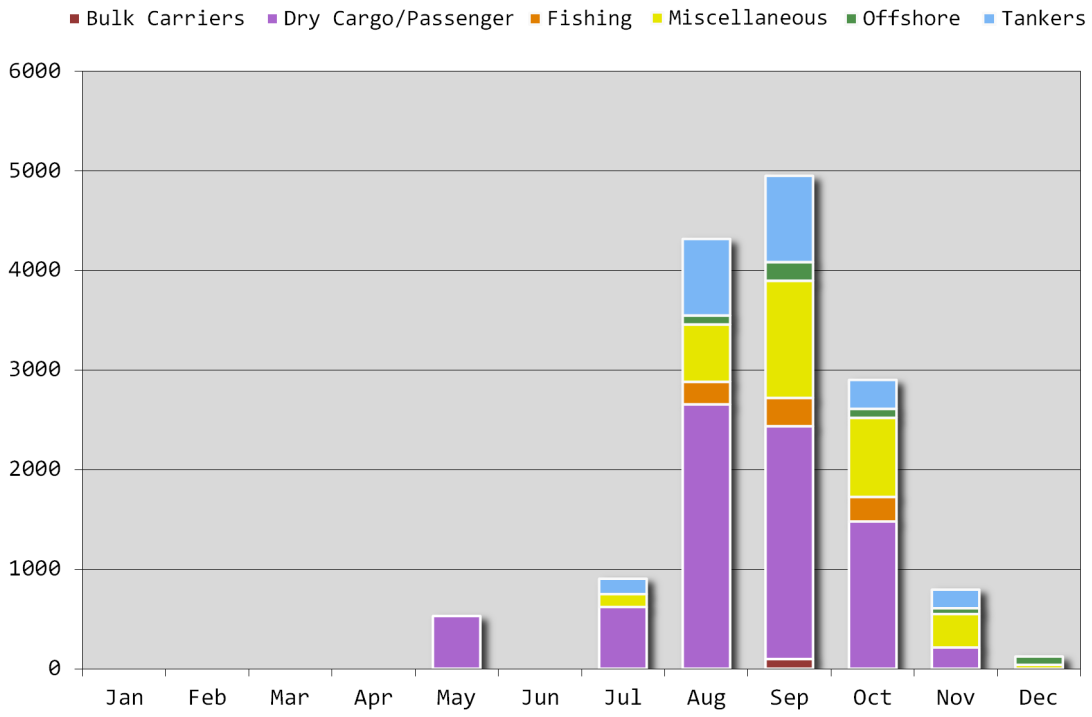
Transit counts for the Laptev Sea in 2015 averaged 48 transits/month, with a range of 0 transits in January, February, March, April, and June to 197 transits in September (see Appendix S86 for monthly transit counts by vessel type). With a coefficient of variation of 1.56, the Laptev Sea had some of the highest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	20	0	0	0	0	**20**
Jun	0	0	0	0	0	0	**0**
Jul	0	44	0	2	0	7	**53**
Aug	0	126	2	29	1	36	**194**
Sep	3	107	4	42	4	37	**197**
Oct	0	59	4	13	2	11	**89**
Nov	0	5	0	3	1	6	**15**
Dec	0	0	0	1	2	0	**3**

Laptev Sea Operational Hours
by Vessel Type Class and Month

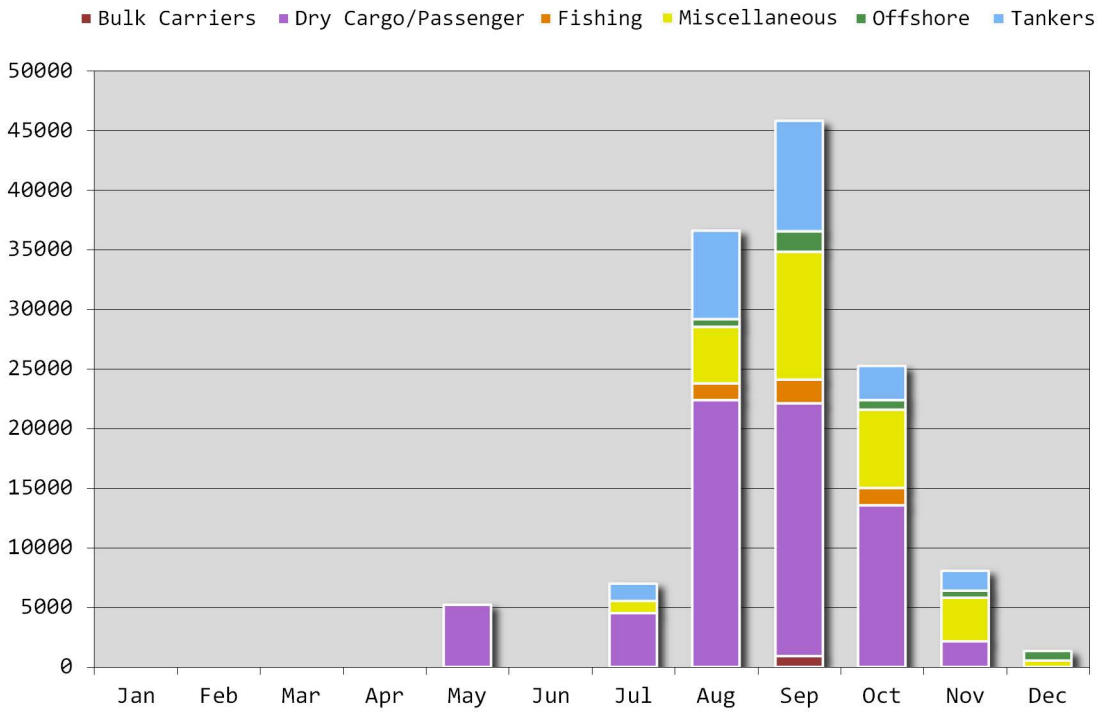
Operational hours for the Laptev Sea in 2015 averaged 1,212 hrs/month, with a range of 0 hours in January, February, March, April, and June to 4,951 hours in September (see Appendix S87 for monthly operational hours by vessel type). With a coefficient of variation of 1.49, the Laptev Sea had a high amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	534	0	0	0	0	**534**
Jun	0	0	0	0	0	0	**0**
Jul	0	624	0	125	0	161	**910**
Aug	0	2656	226	574	90	770	**4316**
Sep	100	2337	284	1176	187	867	**4951**
Oct	0	1483	247	789	89	294	**2902**
Nov	0	217	0	334	61	188	**801**
Dec	0	0	0	45	80	0	**125**

Laptev Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Laptev Sea in 2015 averaged 10,785 nm/month, with a range of 0 nm in January, February, March, April, and June to 45,815 nm in September (see Appendix S88 for monthly transit distance by vessel type). With a coefficient of variation of 1.49, the Laptev Sea had a high amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	5264	0	0	0	0	**5264**
Jun	0	0	0	0	0	0	**0**
Jul	0	4571	0	1017	0	1427	**7015**
Aug	0	22423	1398	4708	654	7440	**36623**
Sep	954	21198	1999	10704	1697	9263	**45815**
Oct	0	13598	1438	6561	814	2833	**25244**
Nov	0	2202	0	3640	565	1698	**8105**
Dec	0	0	0	592	757	0	**1349**

Northwestern Passages Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 6 of 14 for total amount of water surface area within the ARPA Arctic boundary (957,425 km^2)
- average sea ice extent ranged from 29% of the water surface area in September to 88% in November; average sea ice extent exceeded 25% of the water surface area for 12 months, 50% for 11 months, and 75% for 9 months

Unique Vessels:

- 13 of 14 for total number of unique vessels (53 vessels)
- vessel type class with the highest count of unique vessels (18 vessels) was Dry Cargo/Passenger (see Appendix S89 for total unique vessel counts by vessel type*)

Transit Counts:

- 13 out of 14 for total number of transits (443 transits)
- vessel type class with the highest number of transits (170 transits) was Miscellaneous (see Appendix S90 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (143 transits) was 5000-9999 GT (see Appendix S90 for total transit counts by vessel size class)
- transit counts averaged 38 transits/month, with a range of 0 transits in January, February, March, April, May, June, November, and December to 213 transits in August and September (see Appendix S94 for monthly transit counts by vessel type*)

Operational Hours:

- 13 out of 14 for total operational hours (8,669 hrs)
- vessel type class with the highest number of operational hours (1,445 hrs) was Miscellaneous (see Appendix S91 for total operational hours by vessel type*)
- operational hours averaged 722 hrs/month, with a range of 0 hours in January, February, March, April, May, June, November, and December to 4,446 hours in September (see Appendix S95 for monthly operational hours by vessel type*)

Transit Distance:

- 13 out of 14 for total transit distance (77,466 nm)
- vessel type class with the highest amount of transit distance (34,347 nm) was Miscellaneous (see Appendix S92 for total transit distance by vessel type*)
- transit distance averaged 6,455 nm/month, with a range of 0 nm in January, February, March, April, May, June, November, and December to 41,726 nm in September (see Appendix S96 for monthly transit distance by vessel type*)

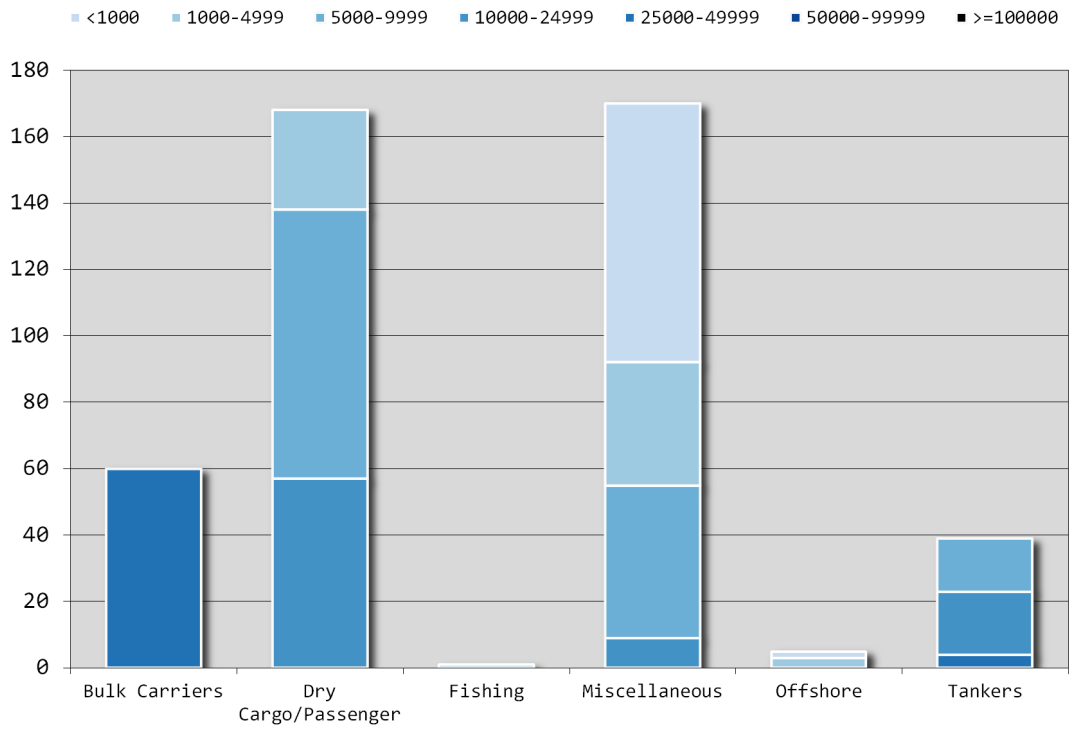
Transit Density:

- 13 out of 14 for percent of water surface area exposed to vessel traffic (37.2%)
- 12 out of 14 for average transit density (0.39 km/km^2)
- 14 out of 14 for maximum transit density (5.10 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Northwestern Passages Transit Counts
by Vessel Type Class and Gross Tonnage Class

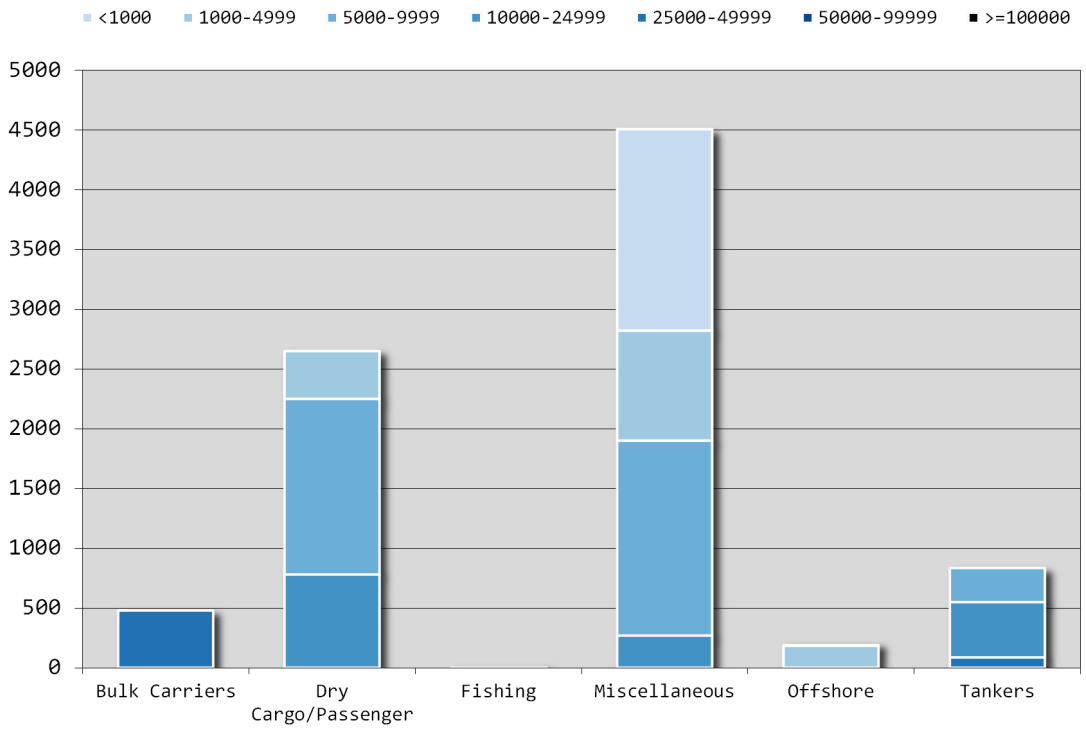
As an aggregate, the Miscellaneous vessel type class logged the highest number of transits (170 transits) in the Northwestern Passages during 2015. The vessel types with the highest number of transits were Passenger/Cruise, Bulk Carrier, and Tug with 117, 60, and 49 transits, respectively (Appendix S90). Of the 443 total transits, the highest number (143 transits) was logged by vessels in the 5000-9999 GT vessel size class (Appendix S90). Vessels with a gross tonnage ≥ 10,000 accounted for 34% of the total transits. The flag countries that logged the highest number of transits in the Northwestern Passages during 2015 were Canada, Bahamas, and Panama with 246, 80, and 27 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	60	0	0	0	**60**
Dry Cargo/Passenger	0	30	81	0	57	0	0	**168**
Fishing	0	1	0	0	0	0	0	**1**
Miscellaneous	78	37	46	0	9	0	0	**170**
Offshore	2	3	0	0	0	0	0	**5**
Tankers	0	0	16	4	19	0	0	**39**
Totals:	**80**	**71**	**143**	**64**	**85**	**0**	**0**	**443**

Northwestern Passages Operational Hours by Vessel Type Class and Gross Tonnage Class

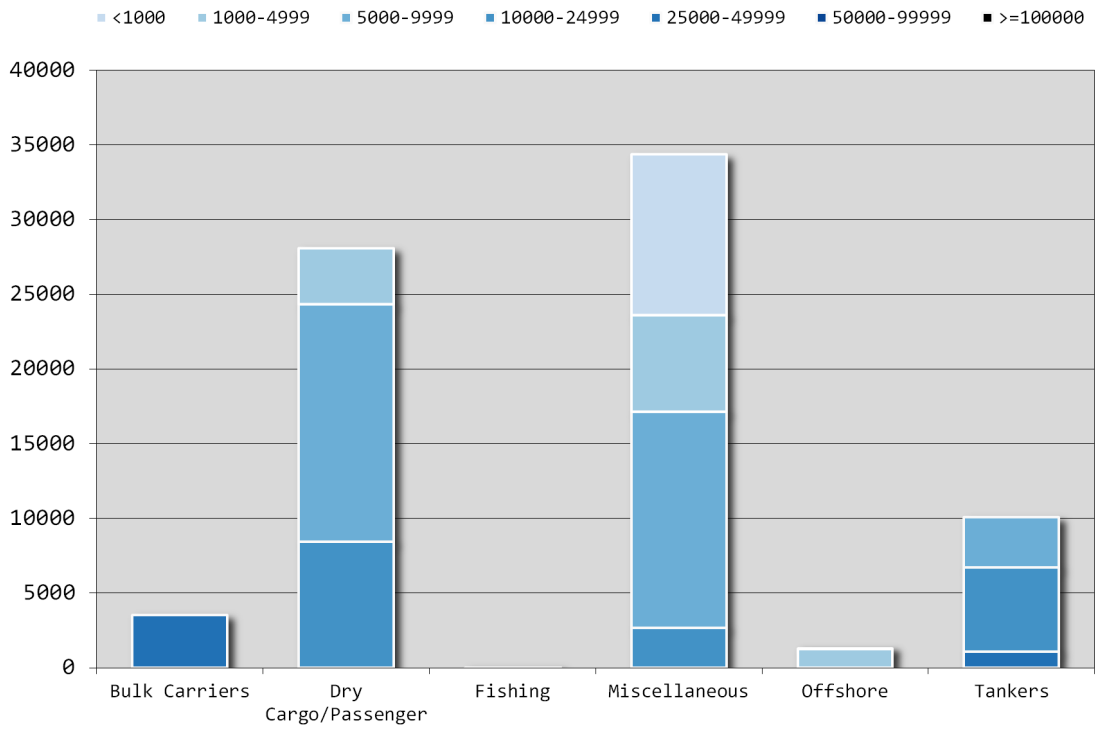
As an aggregate, the Miscellaneous vessel type class logged the highest number of operational hours (4,502 hrs) in the Northwestern Passages during 2015. The vessel types with the highest number of operational hours were Passenger/Cruise, Icebreaker, and Tug with 1,649; 1,170; and 965 hours, respectively (Appendix S91). Of the 8,669 total operational hours, the highest number (3,380 hrs) was logged by vessels in the 5000-9999 GT vessel size class (Appendix S91). Vessels with a gross tonnage ≥ 10,000 accounted for 24% of the total operational hours. The flag countries that logged the highest number of operational hours in the Northwestern Passages during 2015 were Canada, Bahamas, and Russia with 5,922; 1,046; and 450 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	0	0	480	0	0	**480**
Dry Cargo/Passenger	0	403	1465	784	0	0	0	**2652**
Fishing	0	7	0	0	0	0	0	**7**
Miscellaneous	1680	922	1629	272	0	0	0	**4502**
Offshore	5	187	0	0	0	0	0	**193**
Tankers	0	0	286	462	87	0	0	**835**
Totals:	**1685**	**1519**	**3380**	**1517**	**567**	**0**	**0**	**8669**

Northwestern Passages Transit Distance by Vessel Type Class and Gross Tonnage Class

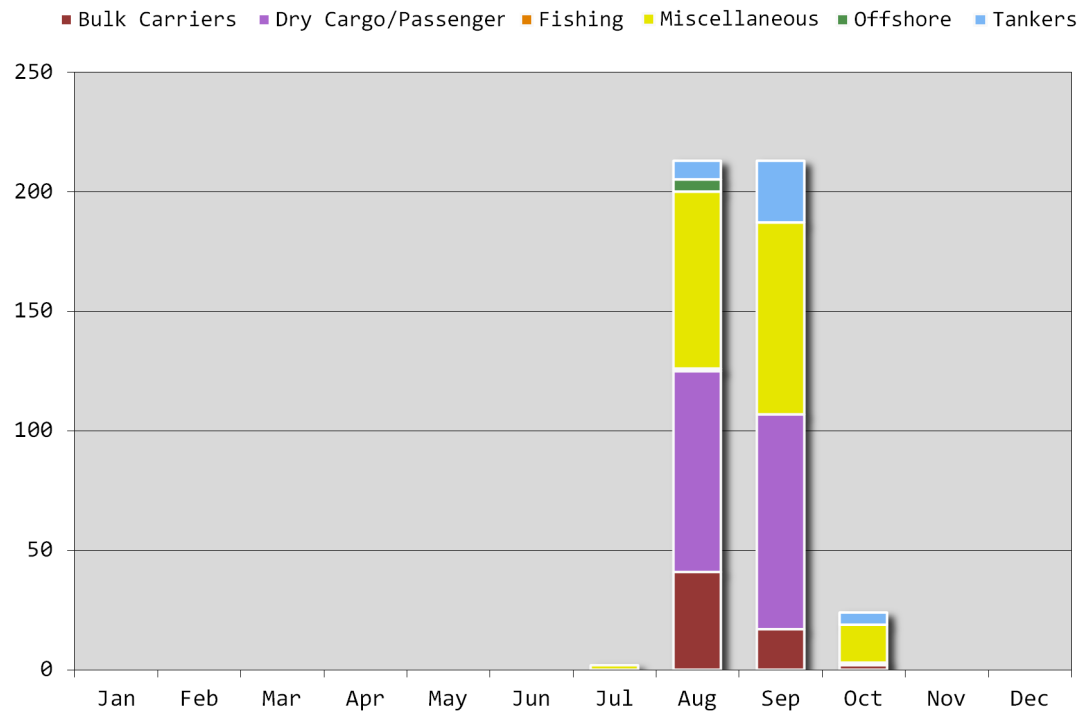
As an aggregate, the Miscellaneous vessel type class logged the highest amount of transit distance (34,347 nm) in the Northwestern Passages during 2015. The vessel types with the highest amount of transit distance were Passenger/Cruise, Icebreaker, and Chemical/Products Tanker with 16,184; 12,211; and 9,448 nm, respectively (Appendix S92). Of the 77,466 nm of total transit distance, the highest amount (33,684 nm) was logged by vessels in the 5000-9999 GT vessel size class (Appendix S92). Vessels with a gross tonnage ≥ 10,000 accounted for 28% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Northwestern Passages during 2015 were Canada, Bahamas, and France with 51,270; 10,251; and 3,998 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	3540	0	0	0	0	**3540**
Dry Cargo/Passenger	0	0	0	8452	15893	3751	0	**28096**
Fishing	0	0	0	0	0	75	0	**75**
Miscellaneous	0	0	0	2711	14430	6479	10727	**34347**
Offshore	0	0	0	0	0	1283	39	**1322**
Tankers	0	0	1119	5605	3361	0	0	**10086**
Totals:	**0**	**0**	**4659**	**16769**	**33684**	**11589**	**10766**	**77466**

Northwestern Passages Transit Counts
by Vessel Type Class and Month

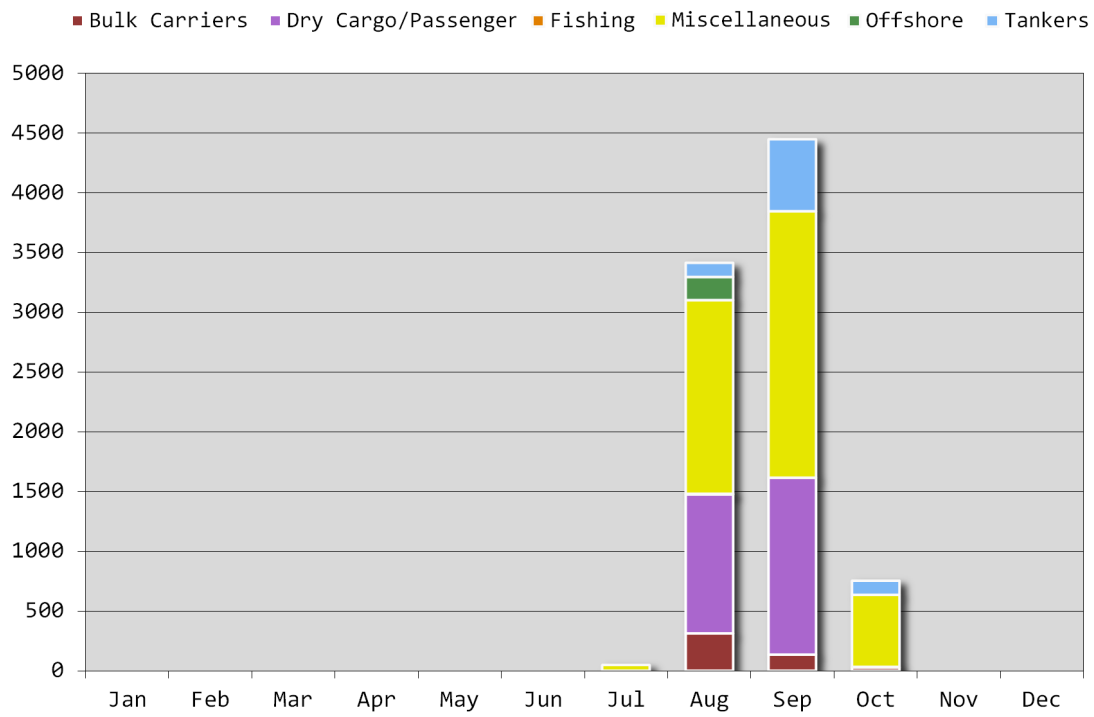
Transit counts for the Northwestern Passages in 2015 averaged 38 transits/month, with a range of 0 transits in January, February, March, April, May, June, November, and December to 213 transits in August and September (see Appendix S94 for monthly transit counts by vessel type). With a coefficient of variation of 2.18, the Northwestern Passages had the highest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	0	0	0	**0**
Jul	0	0	0	2	0	0	**2**
Aug	41	84	1	74	5	8	**213**
Sep	17	90	0	80	0	26	**213**
Oct	2	1	0	16	0	5	**24**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Northwestern Passages Operational Hours
by Vessel Type Class and Month

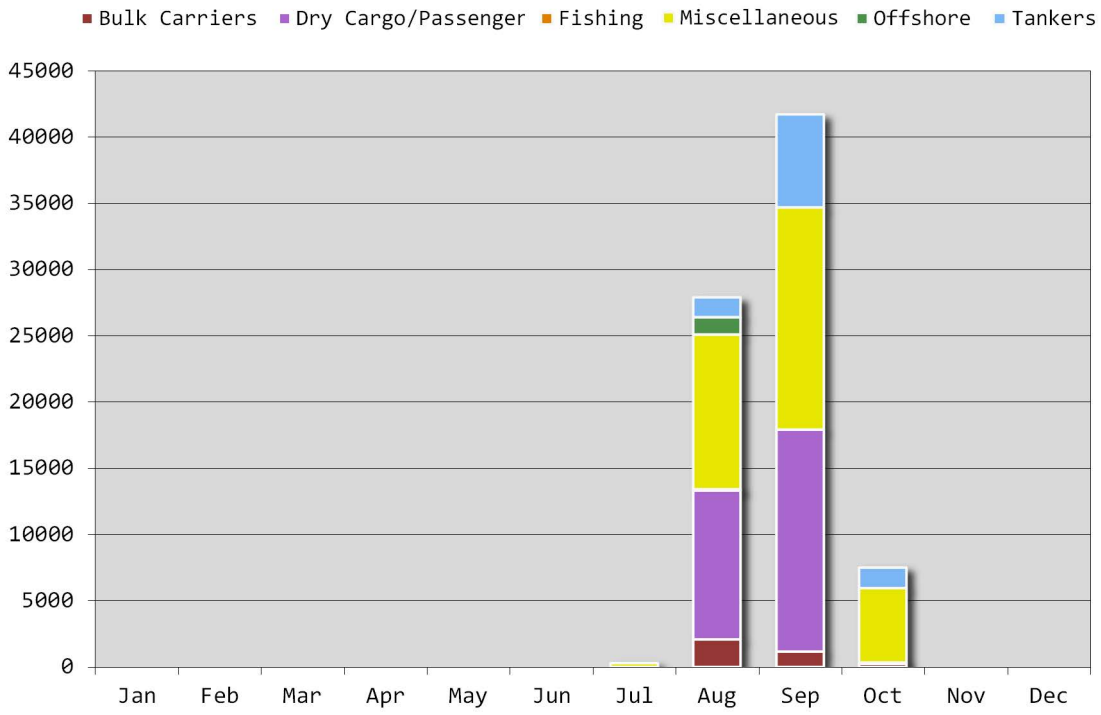
Operational hours for the Northwestern Passages in 2015 averaged 722 hrs/month, with a range of 0 hours in January, February, March, April, May, June, November, and December to 4,446 hours in September (see Appendix S95 for monthly operational hours by vessel type). With a coefficient of variation of 2.12, the Northwestern Passages had the highest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	0	0	0	**0**
Jul	0	0	0	53	0	0	**53**
Aug	314	1162	7	1620	193	116	**3412**
Sep	137	1482	0	2227	0	600	**4446**
Oct	28	8	0	602	0	119	**758**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Northwestern Passages Transit Distance
by Vessel Type Class and Month

Transit distance for the Northwestern Passages in 2015 averaged 6,455 nm/month, with a range of 0 nm in January, February, March, April, May, June, November, and December to 41,726 nm in September (see Appendix S96 for monthly transit distance by vessel type). With a coefficient of variation of 2.13, the Northwestern Passages had the highest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	0	0	0	0	0	0	**0**
Feb	0	0	0	0	0	0	**0**
Mar	0	0	0	0	0	0	**0**
Apr	0	0	0	0	0	0	**0**
May	0	0	0	0	0	0	**0**
Jun	0	0	0	0	0	0	**0**
Jul	0	0	0	315	0	0	**315**
Aug	2129	11214	75	11670	1322	1485	**27895**
Sep	1166	16759	0	16746	0	7056	**41727**
Oct	245	124	0	5616	0	1545	**7530**
Nov	0	0	0	0	0	0	**0**
Dec	0	0	0	0	0	0	**0**

Norwegian Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 5 of 14 for total amount of water surface area within the ARPA Arctic boundary (958,750 km^2)
- average sea ice extent ranged from 0% of the water surface area in June, July, August, September, October, November, and December to 0% in February; average sea ice extent exceeded 25% of the water surface area for 0 months, 50% for 0 months, and 75% for 0 months

Unique Vessels:

- 2 of 14 for total number of unique vessels (2,130 vessels)
- vessel type class with the highest count of unique vessels (669 vessels) was Dry Cargo/Passenger (see Appendix S97 for total unique vessel counts by vessel type*)

Transit Counts:

- 1 out of 14 for total number of transits (56,952 transits)
- vessel type class with the highest number of transits (29,712 transits) was Dry Cargo/Passenger (see Appendix S98 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (28,862 transits) was <1000 GT (see Appendix S98 for total transit counts by vessel size class)
- transit counts averaged 4,856 transits/month, with a range of 3,880 transits in December to 6,078 transits in March (see Appendix S102 for monthly transit counts by vessel type*)

Operational Hours:

- 3 out of 14 for total operational hours (1,051,006 hrs)
- vessel type class with the highest number of operational hours (175,168 hrs) was Fishing (see Appendix S99 for total operational hours by vessel type*)
- operational hours averaged 87,584 hrs/month, with a range of 66,263 hours in December to 119,135 hours in March (see Appendix S103 for monthly operational hours by vessel type*)

Transit Distance:

- 2 out of 14 for total transit distance (7,227,109 nm)
- vessel type class with the highest amount of transit distance (3,002,488 nm) was Fishing (see Appendix S100 for total transit distance by vessel type*)
- transit distance averaged 602,259 nm/month, with a range of 481,407 nm in December to 739,948 nm in March (see Appendix S104 for monthly transit distance by vessel type*)

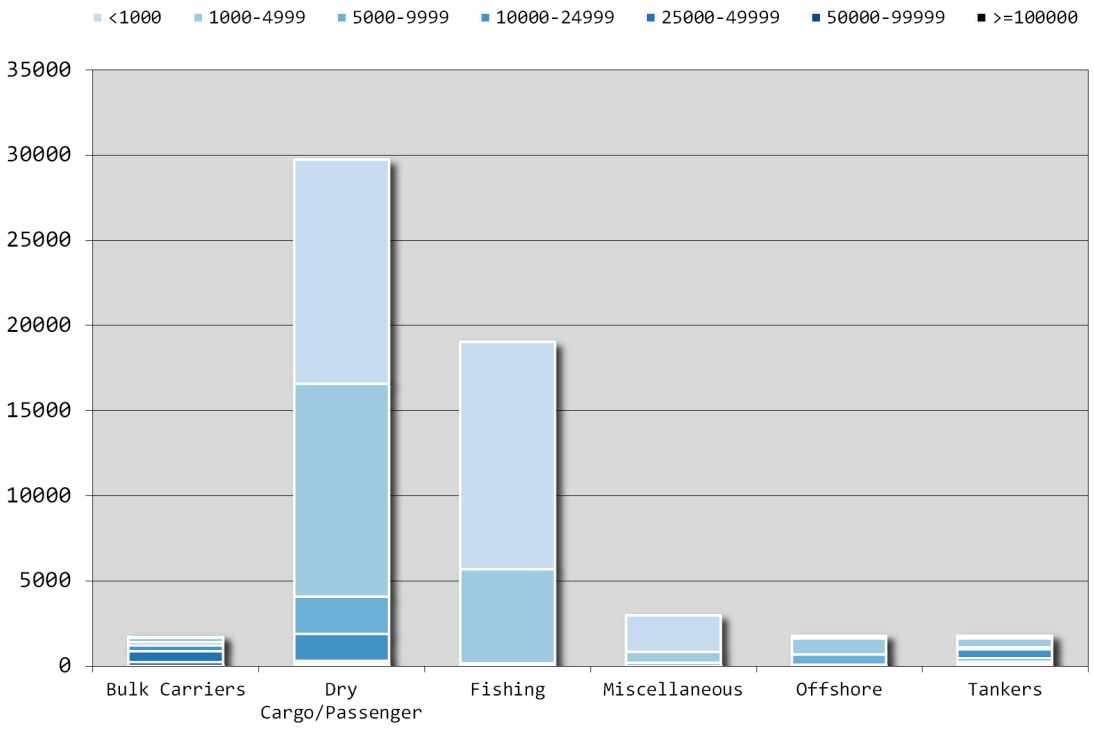
Transit Density:

- 1 out of 14 for percent of water surface area exposed to vessel traffic (99.8%)
- 1 out of 14 for average transit density (12.07 km/km^2)
- 1 out of 14 for maximum transit density (581.44 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

Norwegian Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

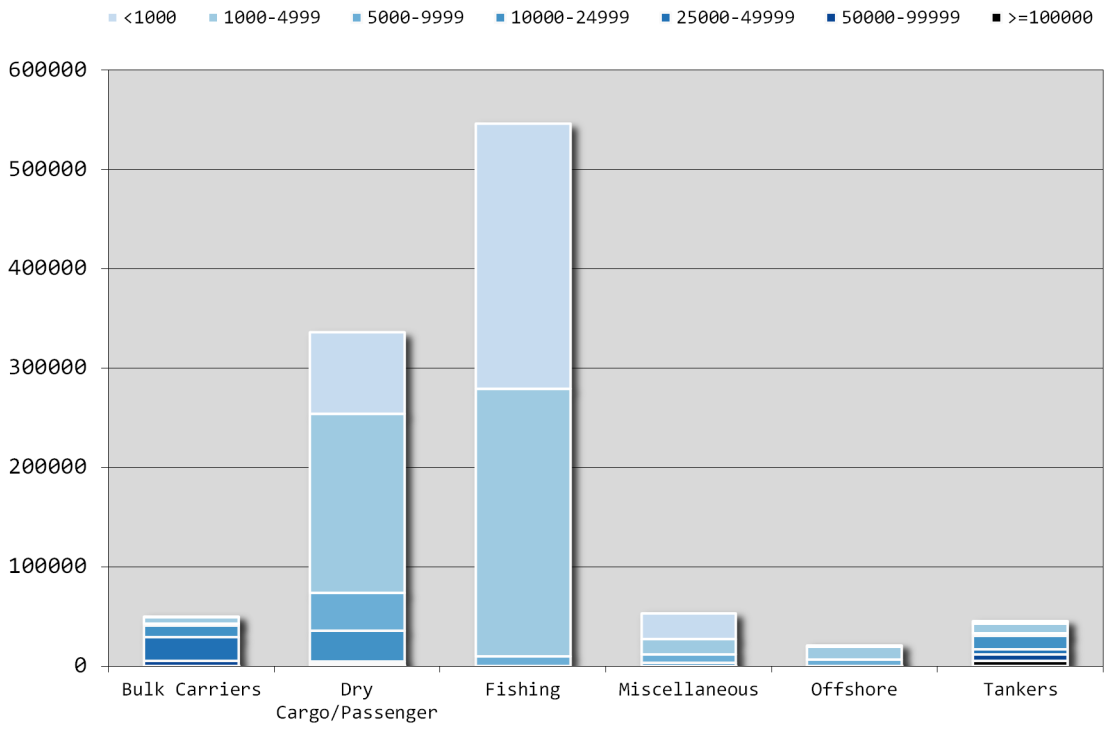
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (29,712 transits) in the Norwegian Sea during 2015. The vessel types with the highest number of transits were Passenger/Ro-Ro Ship (Vehicles), Fishing Vessel, and General Cargo Ship with 11,656; 8,747; and 7,468 transits, respectively (Appendix S98). Of the 56,952 total transits, the highest number (28,862 transits) was logged by vessels in the <1000 GT vessel size class (Appendix S98). Vessels with a gross tonnage ≥ 10,000 accounted for 8% of the total transits. The flag countries that logged the highest number of transits in the Norwegian Sea during 2015 were Norway, Russia, and Malta with 43,251; 3,062; and 951 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000 -24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	6	252	183	636	350	216	33	**1676**
Dry Cargo/Passenger	13141	12472	2209	150	1576	125	39	**29712**
Fishing	13311	5517	188	0	0	0	0	**19016**
Miscellaneous	2137	637	180	5	34	0	0	**2993**
Offshore	135	958	570	0	107	3	2	**1775**
Tankers	132	541	106	158	541	156	146	**1780**
Totals:	**28862**	**20377**	**3436**	**949**	**2608**	**500**	**220**	56952

Norwegian Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

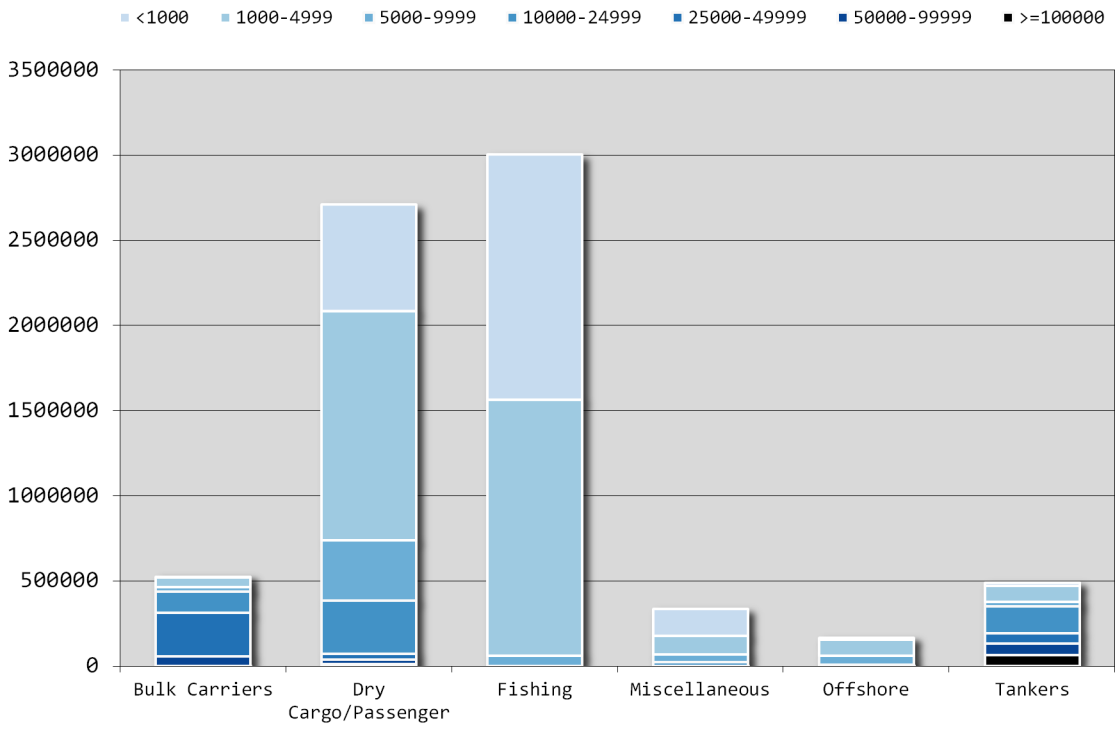
As an aggregate, the Fishing vessel type class logged the highest number of operational hours (546,063 hrs) in the Norwegian Sea during 2015. The vessel types with the highest number of operational hours were Stern Trawler, Fishing Vessel, and General Cargo Ship with 237,583; 152,385; and 129,369 hours, respectively (Appendix S99). Of the 1,051,006 total operational hours, the highest number (494,814 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S99). Vessels with a gross tonnage ≥ 10,000 accounted for 11% of the total operational hours. The flag countries that logged the highest number of operational hours in the Norwegian Sea during 2015 were Norway, Russia, and Malta with 557,721; 233,202; and 24,417 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	111	6091	2127	11893	23283	5228	581	**49314**
Dry Cargo/Passenger	81637	180489	37775	30950	2506	1752	666	**335775**
Fishing	266653	269646	9764	0	0	0	0	**546063**
Miscellaneous	25629	16006	8198	3305	152	0	0	**53290**
Offshore	1811	12524	5854	976	0	10	48	**21224**
Tankers	2268	10057	2632	12988	5729	6054	5612	**45339**
Totals:	**378109**	**494814**	**66349**	**60112**	**31670**	**13044**	**6908**	**1051006**

Norwegian Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

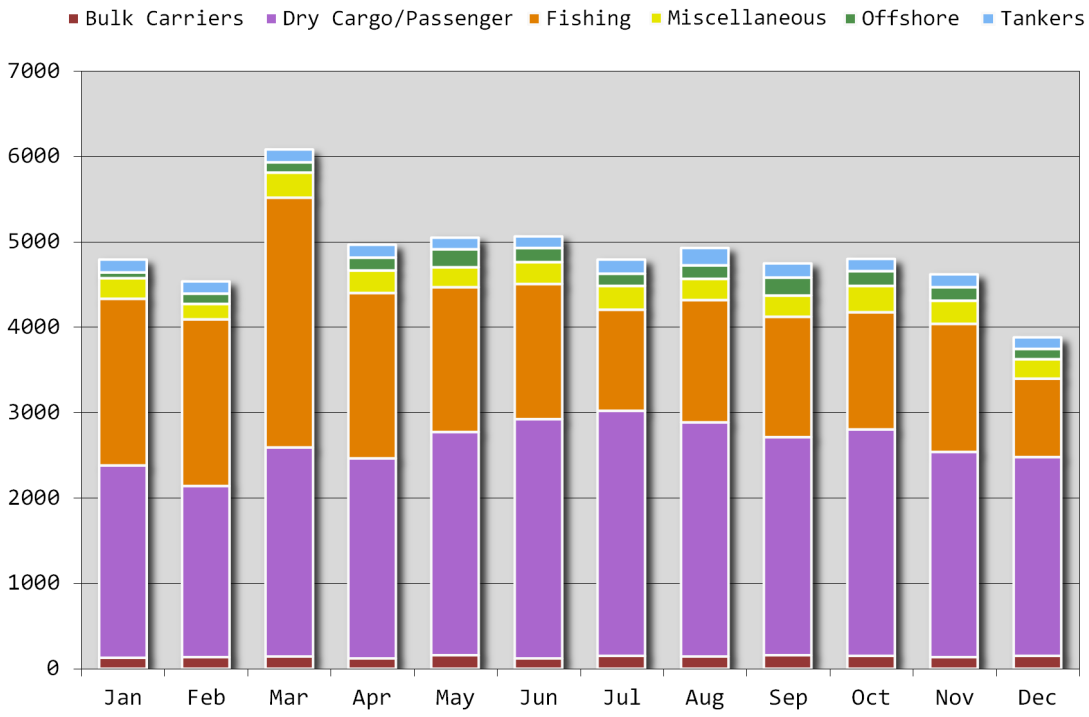
As an aggregate, the Fishing vessel type class logged the highest amount of transit distance (3,002,488 nm) in the Norwegian Sea during 2015. The vessel types with the highest amount of transit distance were Stern Trawler, General Cargo Ship, and Fishing Vessel with 1,203,320; 1,144,455; and 828,402 nm, respectively (Appendix S100). Of the 7,227,109 nm of total transit distance, the highest amount (3,200,930 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S100). Vessels with a gross tonnage ≥ 10,000 accounted for 17% of the total transit distance. The flag countries that logged the highest amount of transit distance in the Norwegian Sea during 2015 were Norway, Russia, and Malta with 3,631,909; 1,234,870; and 254,979 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	6267	52871	254535	125083	24984	58440	1017	**523196**
Dry Cargo/Passenger	11691	26064	35885	311696	356033	1341041	625600	**2708010**
Fishing	0	0	0	0	62512	1501516	1438460	**3002488**
Miscellaneous	0	0	1790	20896	45736	111027	157245	**336694**
Offshore	471	103	0	10608	50415	93175	11461	**166232**
Tankers	67642	65798	62000	155778	25604	95732	17935	**490489**
Totals:	**86069**	**144836**	**354211**	**624061**	**565283**	**3200930**	**2251718**	**7227109**

Norwegian Sea Transit Counts
by Vessel Type Class and Month

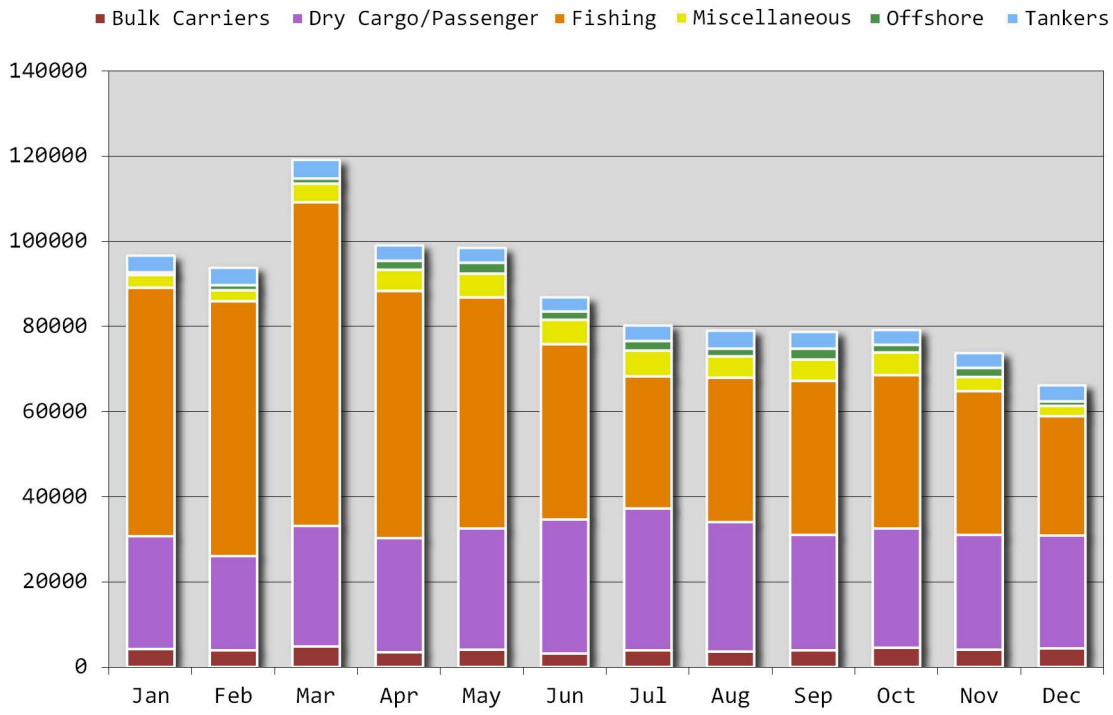
Transit counts for the Norwegian Sea in 2015 averaged 4,856 transits/month, with a range of 3,880 transits in December to 6,078 transits in March (see Appendix S102 for monthly transit counts by vessel type). With a coefficient of variation of 0.1, the Norwegian Sea had the lowest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	132	2250	1950	241	67	153	**4793**
Feb	137	2007	1946	186	117	145	**4538**
Mar	145	2446	2926	294	121	146	**6078**
Apr	124	2339	1939	264	150	152	**4968**
May	159	2616	1692	238	210	138	**5053**
Jun	127	2798	1583	254	169	136	**5067**
Jul	151	2876	1177	279	145	167	**4795**
Aug	145	2742	1433	247	155	210	**4932**
Sep	161	2553	1407	251	214	165	**4751**
Oct	158	2647	1372	309	171	141	**4798**
Nov	138	2405	1500	269	161	148	**4621**
Dec	152	2332	920	220	121	135	**3880**

Norwegian Sea Operational Hours
by Vessel Type Class and Month

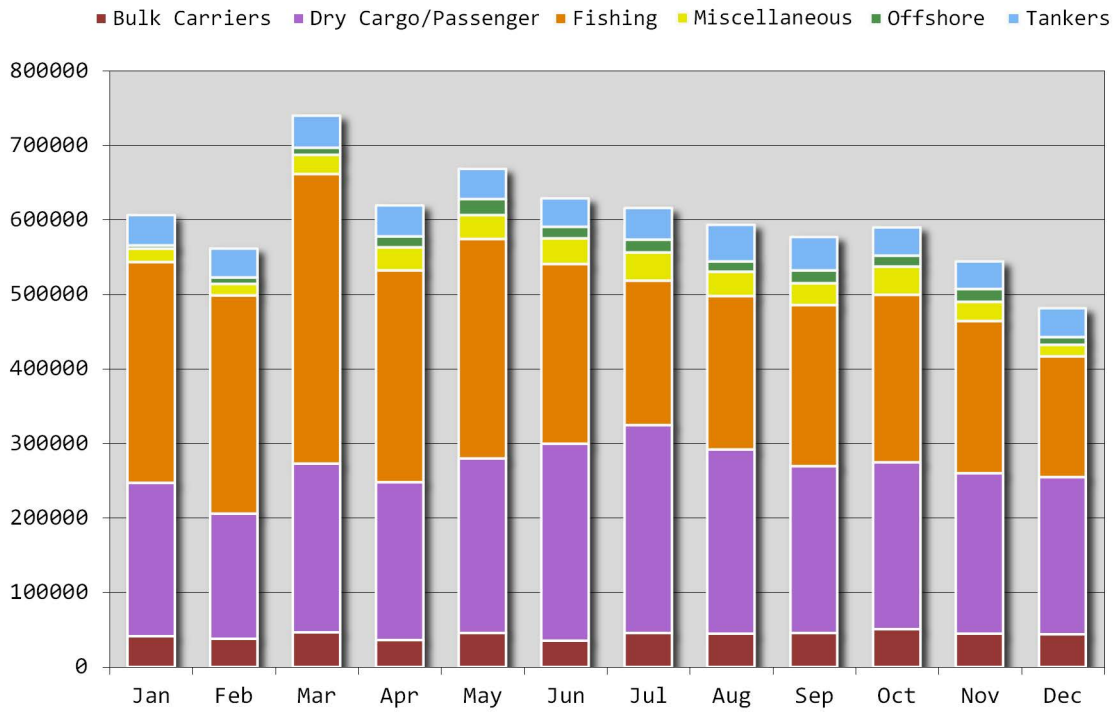
Operational hours for the Norwegian Sea in 2015 averaged 87,584 hrs/month, with a range of 66,263 hours in December to 119,135 hours in March (see Appendix S103 for monthly operational hours by vessel type). With a coefficient of variation of 0.16, the Norwegian Sea had the lowest month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	4371	26462	58301	3019	598	3868	**96617**
Feb	3993	22188	59815	2556	1216	4047	**93815**
Mar	4926	28325	75862	4411	1244	4368	**119135**
Apr	3613	26769	57906	5083	1978	3745	**99093**
May	4156	28489	54155	5557	2573	3437	**98368**
Jun	3260	31407	41240	5670	1987	3222	**86786**
Jul	3948	33352	30986	6028	2288	3640	**80242**
Aug	3765	30343	33830	5020	1820	4281	**79061**
Sep	4060	27003	36249	4979	2432	4007	**78730**
Oct	4669	27941	36060	5166	1873	3472	**79181**
Nov	4152	26924	33708	3414	2021	3494	**73714**
Dec	4403	26572	27951	2385	1194	3758	**66263**

Norwegian Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the Norwegian Sea in 2015 averaged 602,259 nm/month, with a range of 481,407 nm in December to 739,948 nm in March (see Appendix S104 for monthly transit distance by vessel type). With a coefficient of variation of 0.11, the Norwegian Sea had the lowest month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	41618	205574	295905	18830	4382	40334	**606643**
Feb	38438	167630	292506	15472	8619	38753	**561418**
Mar	46901	226026	388451	25828	9851	42891	**739948**
Apr	36769	211620	284145	30383	15377	41192	**619486**
May	46328	233769	294115	32057	22014	40266	**668549**
Jun	36002	264048	241087	34406	15666	37375	**628584**
Jul	45654	279202	193916	37958	16682	42354	**615766**
Aug	44822	247079	205961	32723	13726	49399	**593710**
Sep	46148	223687	215801	29757	17234	44665	**577292**
Oct	51151	223733	224688	37690	14932	37932	**590126**
Nov	45053	215162	203882	25773	17173	37135	**544178**
Dec	44312	210479	162031	15818	10574	38193	**481407**

White Sea Vessel Activity Synopsis

Surface Area and Sea Ice Extent:

- 15 of 14 for total amount of water surface area within the ARPA Arctic boundary (32,675 km^2)
- average sea ice extent ranged from 0% of the water surface area in July, August, and September to 85% in February; average sea ice extent exceeded 25% of the water surface area for 4 months, 50% for 3 months, and 75% for 3 months

Unique Vessels:

- 5 of 14 for total number of unique vessels (269 vessels)
- vessel type class with the highest count of unique vessels (146 vessels) was Dry Cargo/Passenger (see Appendix S105 for total unique vessel counts by vessel type*)

Transit Counts:

- 7 out of 14 for total number of transits (2,140 transits)
- vessel type class with the highest number of transits (1,194 transits) was Dry Cargo/Passenger (see Appendix S106 for total transit counts by vessel type*)
- vessel size class with the highest number of transits (1,033 transits) was 1000-4999 GT (see Appendix S106 for total transit counts by vessel size class)
- transit counts averaged 180 transits/month, with a range of 120 transits in January to 250 transits in July and August (see Appendix S110 for monthly transit counts by vessel type*)

Operational Hours:

- 10 out of 14 for total operational hours (22,592 hrs)
- vessel type class with the highest number of operational hours (3,765 hrs) was Dry Cargo/Passenger (see Appendix S107 for total operational hours by vessel type*)
- operational hours averaged 1,883 hrs/month, with a range of 1,135 hours in January to 3,018 hours in August (see Appendix S111 for monthly operational hours by vessel type*)

Transit Distance:

- 7 out of 14 for total transit distance (211,693 nm)
- vessel type class with the highest amount of transit distance (123,980 nm) was Dry Cargo/Passenger (see Appendix S108 for total transit distance by vessel type*)
- transit distance averaged 17,641 nm/month, with a range of 10,919 nm in February to 26,990 nm in July (see Appendix S112 for monthly transit distance by vessel type*)

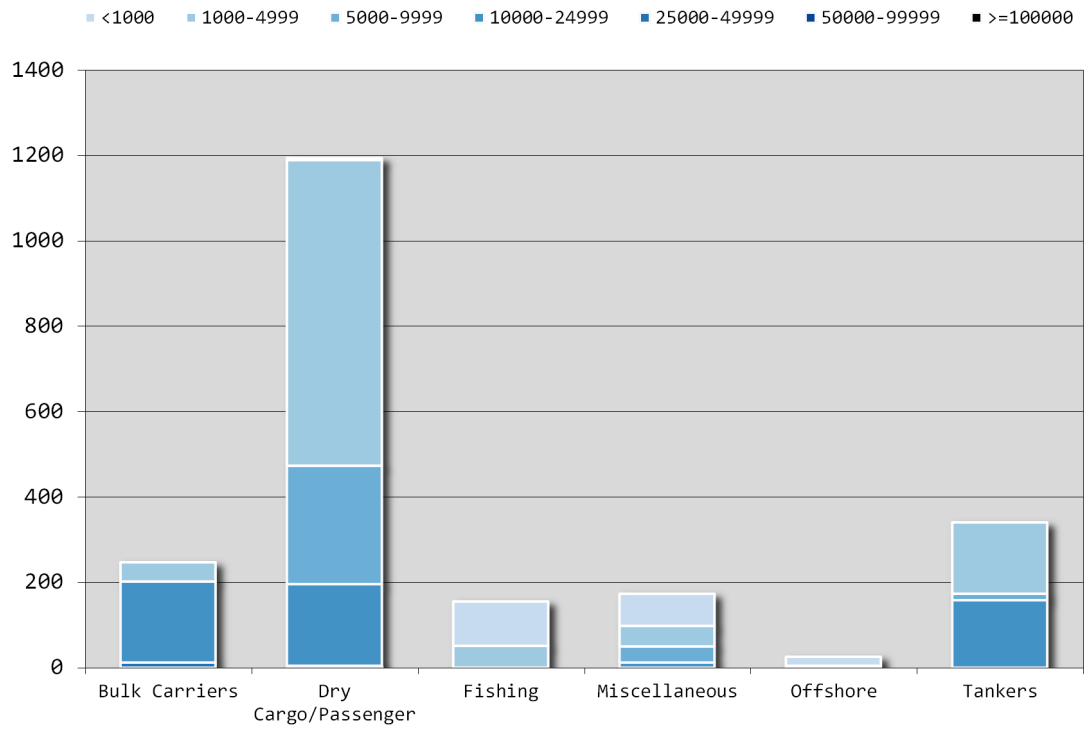
Transit Density:

- 3 out of 14 for percent of water surface area exposed to vessel traffic (97.1%)
- 2 out of 14 for average transit density (11.88 km/km^2)
- 5 out of 14 for maximum transit density (104.38 km/km^2)

*supplemental appendices located at http://www.nmfs.noaa.gov/pr/publications/techmemos.htm

White Sea Transit Counts
by Vessel Type Class and Gross Tonnage Class

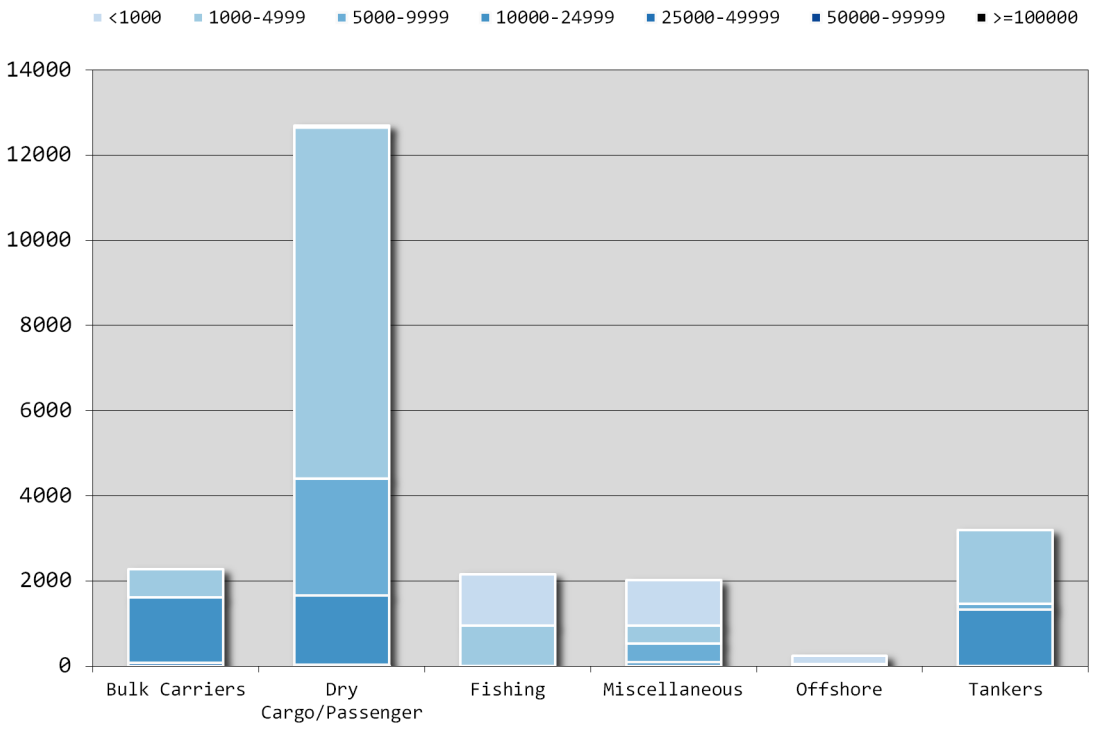
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of transits (1,194 transits) in the White Sea during 2015. The vessel types with the highest number of transits were General Cargo Ship, Bulk Carrier, and Chemical/Products Tanker with 1,057; 203; and 162 transits, respectively (Appendix S106). Of the 2,140 total transits, the highest number (1,033 transits) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S106). Vessels with a gross tonnage ≥ 10,000 accounted for 27% of the total transits. The flag countries that logged the highest number of transits in the White Sea during 2015 were Russia, Netherlands, and Cyprus with 1,583; 123; and 88 transits, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	45	0	13	190	0	0	**248**
Dry Cargo/Passenger	5	716	277	4	190	2	0	**1194**
Fishing	104	52	0	0	0	0	0	**156**
Miscellaneous	75	48	38	0	13	0	0	**174**
Offshore	22	5	0	0	0	0	0	**27**
Tankers	0	167	15	0	159	0	0	**341**
Totals:	**206**	**1033**	**330**	**17**	**552**	**2**	**0**	**2140**

White Sea Operational Hours
by Vessel Type Class and Gross Tonnage Class

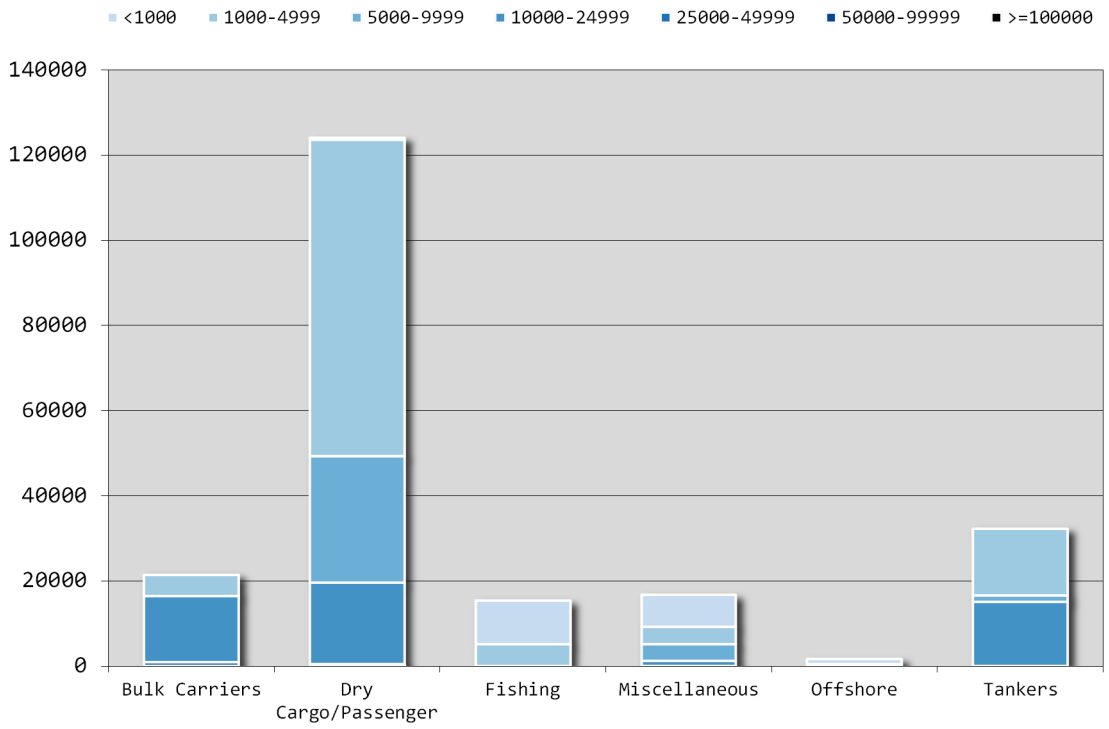
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest number of operational hours (12,687 hrs) in the White Sea during 2015. The vessel types with the highest number of operational hours were General Cargo Ship, Bulk Carrier, and Chemical/Products Tanker with 11,504; 1,618; and 1,348 hours, respectively (Appendix S107). Of the 22,592 total operational hours, the highest number (12,067 hrs) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S107). Vessels with a gross tonnage ≥ 10,000 accounted for 21% of the total operational hours. The flag countries that logged the highest number of operational hours in the White Sea during 2015 were Russia, Netherlands, and Malta with 17,588; 1,192; and 760 hours, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	659	0	1535	83	0	0	**2277**
Dry Cargo/Passenger	43	8240	2741	1630	28	6	0	**12687**
Fishing	1205	954	0	0	0	0	0	**2158**
Miscellaneous	1063	430	428	102	0	0	0	**2024**
Offshore	197	49	0	0	0	0	0	**246**
Tankers	0	1735	135	1329	0	0	0	**3200**
Totals:	**2508**	**12067**	**3305**	**4597**	**111**	**6**	**0**	**22592**

White Sea Transit Distance
by Vessel Type Class and Gross Tonnage Class

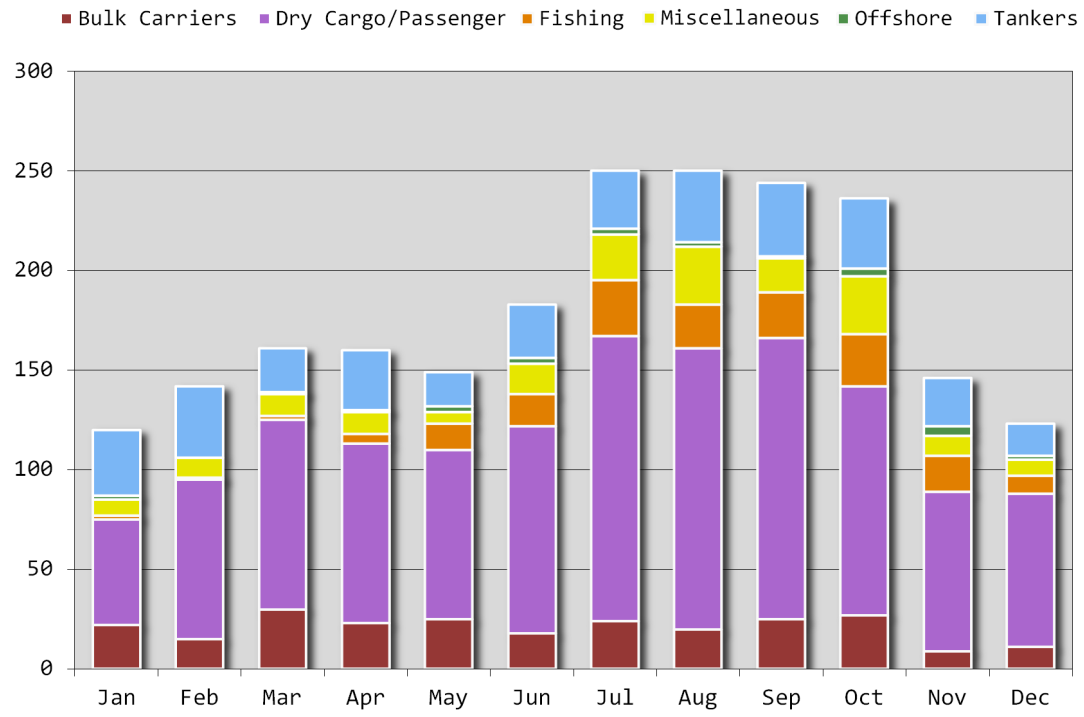
As an aggregate, the Dry Cargo/Passenger vessel type class logged the highest amount of transit distance (123,980 nm) in the White Sea during 2015. The vessel types with the highest amount of transit distance were General Cargo Ship, Bulk Carrier, and Chemical/Products Tanker with 110,953; 16,502; and 15,287 nm, respectively (Appendix S108). Of the 211,693 nm of total transit distance, the highest amount (104,735 nm) was logged by vessels in the 1000-4999 GT vessel size class (Appendix S108). Vessels with a gross tonnage ≥ 10,000 accounted for 25% of the total transit distance. The flag countries that logged the highest amount of transit distance in the White Sea during 2015 were Russia, Netherlands, and Cyprus with 157,606; 12,625; and 8,191 nm, respectively.



Vessel Type Class	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	>=100000	Totals
Bulk Carriers	0	0	1010	15492	0	5037	0	**21539**
Dry Cargo/Passenger	0	95	412	19180	29593	74248	452	**123980**
Fishing	0	0	0	0	0	5200	10206	**15406**
Miscellaneous	0	0	0	1331	3895	3966	7542	**16734**
Offshore	0	0	0	0	0	500	1165	**1665**
Tankers	0	0	0	15212	1371	15785	0	**32369**
Totals:	**0**	**95**	**1422**	**51216**	**34859**	**104735**	**19365**	**211693**

White Sea Transit Counts
by Vessel Type Class and Month

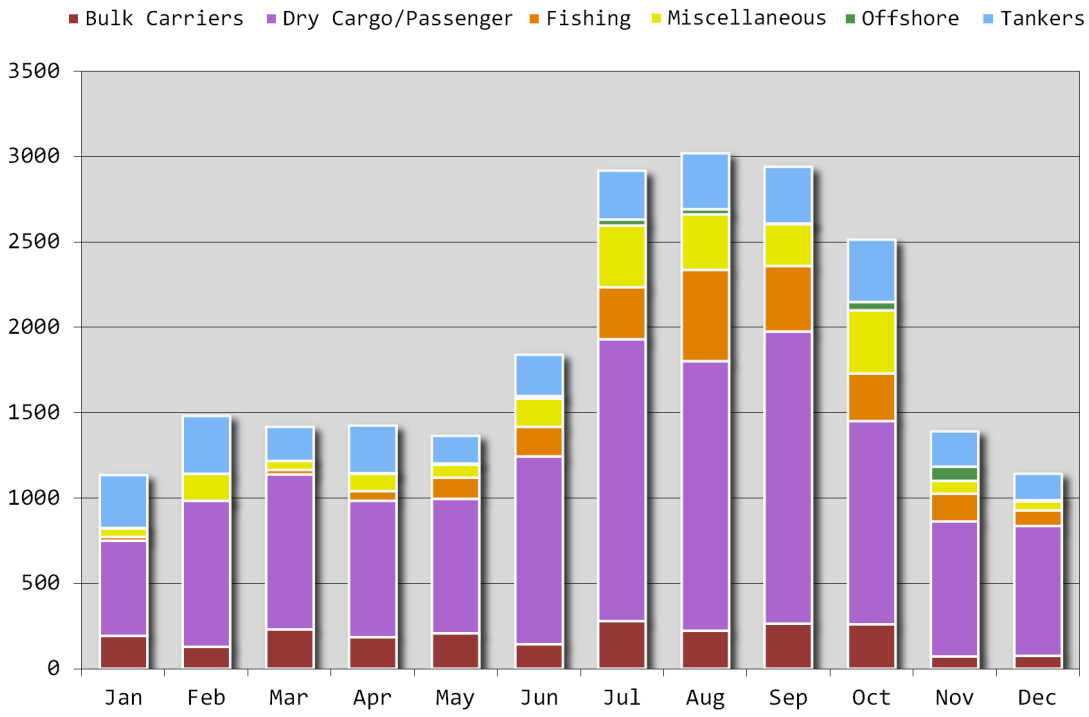
Transit counts for the White Sea in 2015 averaged 180 transits/month, with a range of 120 transits in January to 250 transits in July and August (see Appendix S110 for monthly transit counts by vessel type). With a coefficient of variation of 0.28, the White Sea had some of the lowest month-to-month transit count variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	22	53	2	8	2	33	**120**
Feb	15	80	1	10	0	36	**142**
Mar	30	95	2	11	1	22	**161**
Apr	23	90	5	11	1	30	**160**
May	25	85	13	6	3	17	**149**
Jun	18	104	16	15	3	27	**183**
Jul	24	143	28	23	3	29	**250**
Aug	20	141	22	29	2	36	**250**
Sep	25	141	23	17	1	37	**244**
Oct	27	115	26	29	4	35	**236**
Nov	9	80	18	10	5	24	**146**
Dec	11	77	9	8	2	16	**123**

White Sea Operational Hours
by Vessel Type Class and Month

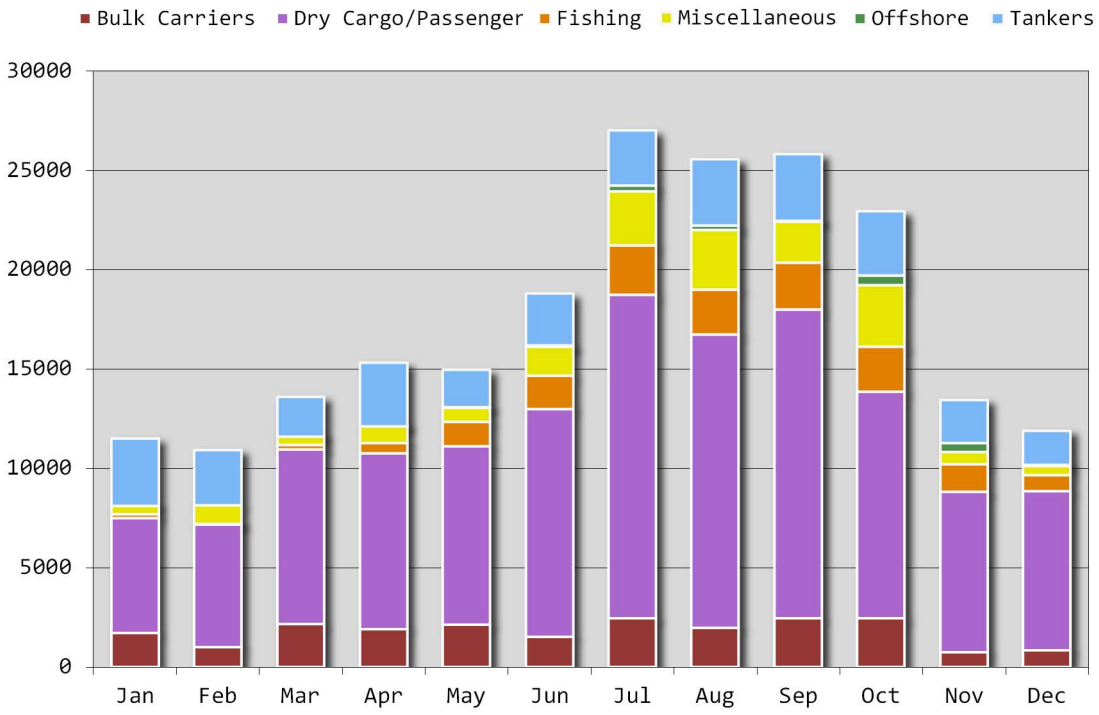
Operational hours for the White Sea in 2015 averaged 1,883 hrs/month, with a range of 1,135 hours in January to 3,018 hours in August (see Appendix S111 for monthly operational hours by vessel type). With a coefficient of variation of 0.39, the White Sea had a low amount of month-to-month operational hour variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	194	558	21	49	6	307	**1135**
Feb	129	856	1	156	0	340	**1483**
Mar	233	906	25	53	2	199	**1417**
Apr	188	797	56	101	4	280	**1426**
May	208	789	123	75	10	160	**1366**
Jun	146	1100	172	164	17	242	**1842**
Jul	279	1649	308	360	34	287	**2916**
Aug	223	1579	536	324	27	328	**3018**
Sep	266	1709	384	246	2	331	**2939**
Oct	260	1193	277	368	52	364	**2515**
Nov	72	793	161	76	84	207	**1393**
Dec	78	759	93	52	8	154	**1144**

White Sea Transit Distance
by Vessel Type Class and Month

Transit distance for the White Sea in 2015 averaged 17,641 nm/month, with a range of 10,919 nm in February to 26,990 nm in July (see Appendix S112 for monthly transit distance by vessel type). With a coefficient of variation of 0.35, the White Sea had a low amount of month-to-month transit distance variability in 2015 relative to the 14 other world seas analyzed.



Month	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Totals
Jan	1734	5756	219	401	23	3372	**11505**
Feb	1008	6185	8	944	0	2773	**10918**
Mar	2188	8782	223	403	8	1994	**13598**
Apr	1935	8819	539	832	8	3173	**15306**
May	2135	8986	1211	711	36	1871	**14950**
Jun	1550	11435	1678	1462	48	2615	**18788**
Jul	2459	16279	2477	2723	301	2751	**26990**
Aug	1986	14739	2271	3009	228	3323	**25556**
Sep	2458	15529	2356	2074	17	3374	**25808**
Oct	2466	11409	2233	3110	482	3222	**22922**
Nov	753	8065	1387	628	450	2164	**13447**
Dec	866	7996	804	438	64	1735	**11903**

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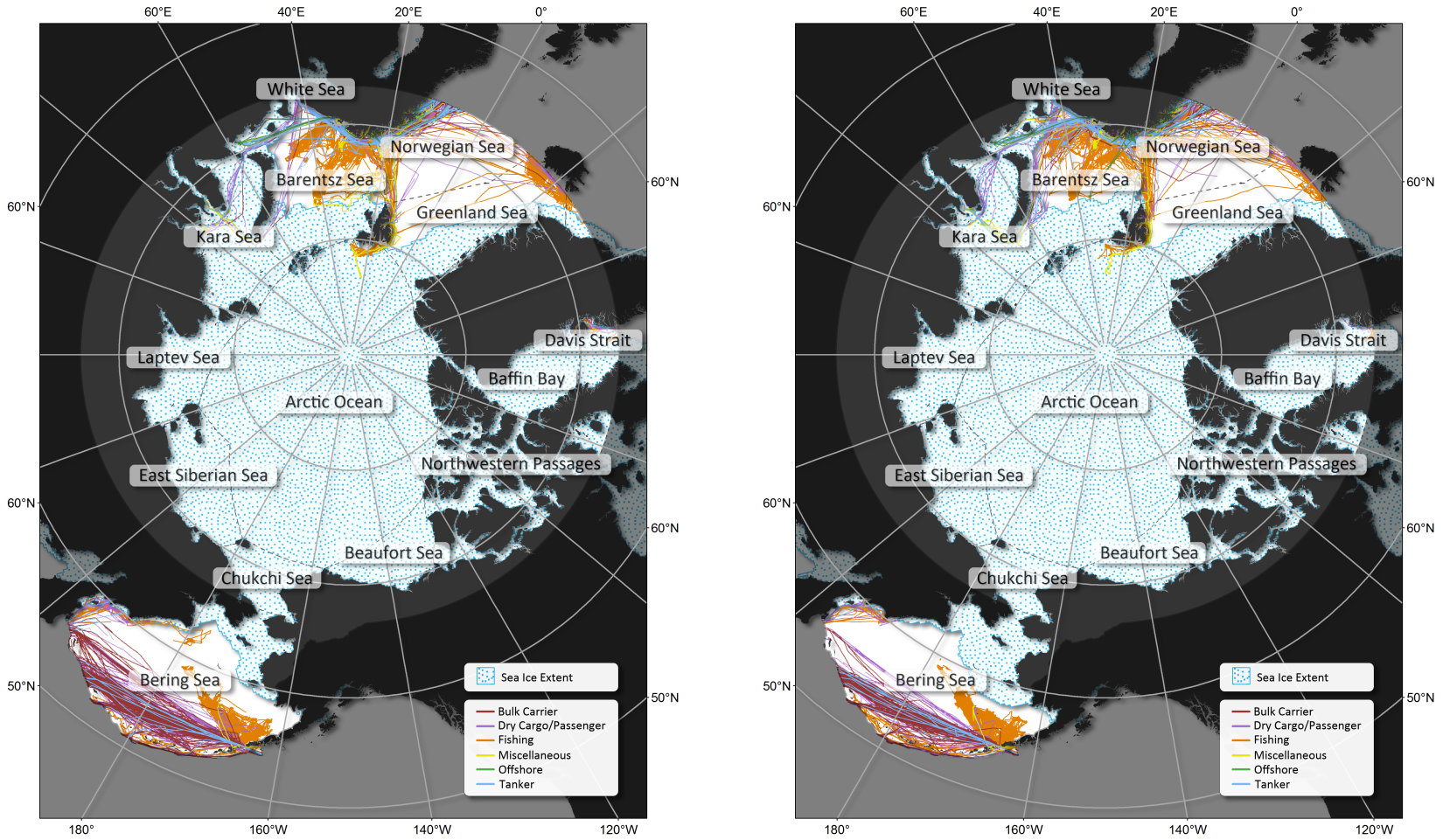
Appendices

Appendix 1. Counts and gross tonnage statistics (average, minimum, and maximum) for vessels operating in the Arctic Region during 2015.

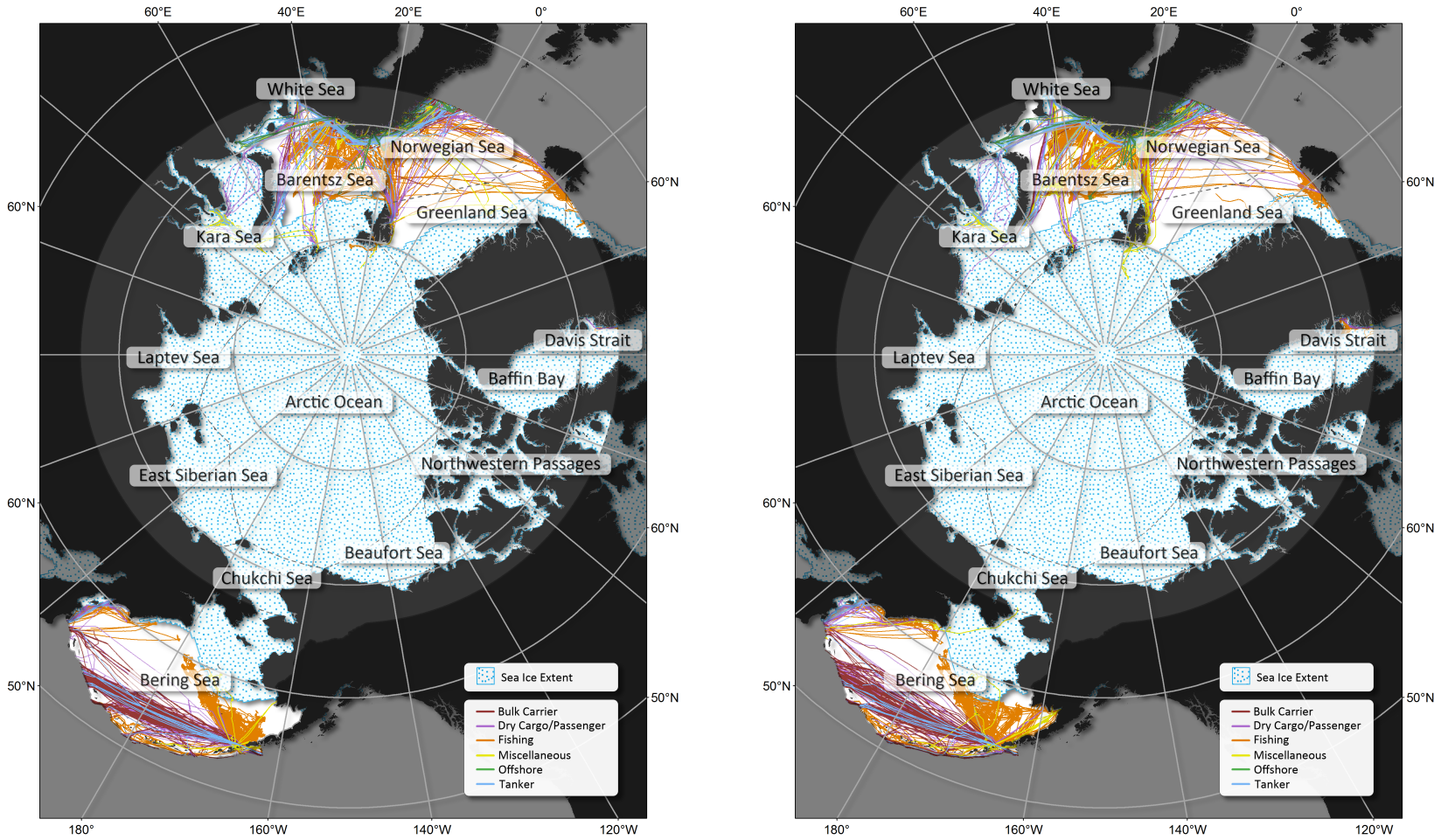
Vessel Type Class	Vessel Type	Count	Gross Tonnage		
			Avg	Min	Max
Bulk Carriers	Bulk Carrier	1555	39307	3883	108051
	Bulk Carrier, Self-discharging	9	24979	14145	55695
	Cement Carrier	11	5091	624	11251
	Limestone Carrier	1	3092	3092	3092
	Ore Carrier	1	91563	91563	91563
	Ore/Oil Carrier	4	2614	2613	2615
	Wood Chips Carrier	14	41289	36823	49718
Dry Cargo/Passenger	Container Ship (Fully Cellular)	598	71937	5333	153666
	Deck Cargo Ship	4	597	473	968
	General Cargo Ship	558	5452	218	38226
	General Cargo Ship (with Ro-Ro facility)	8	14383	9984	18574
	General Cargo Ship, Self-discharging	2	1550	1550	1550
	General Cargo/Passenger Ship	9	2311	199	6261
	Heavy Load Carrier	2	15226	14462	15989
	Heavy Load Carrier, semi submersible	6	38270	15382	91784
	Landing Craft	11	517	196	907
	Livestock Carrier	1	3013	3013	3013
	Nuclear Fuel Carrier	3	3244	1000	5806
	Open Hatch Cargo Ship	54	27474	15861	44684
	Palletised Cargo Ship	10	1893	486	2854
	Passenger Ship	37	528	106	4575
	Passenger/Cruise	84	35973	140	137936
	Passenger/Ro-Ro Ship (Vehicles)	66	3344	154	16151
	Refrigerated Cargo Ship	142	4981	498	13496
	Ro-Ro Cargo Ship	17	11325	1253	24688
	Vehicles Carrier	159	54833	31367	75251
Fishing	Factory Stern Trawler	184	3502	191	8210
	Fish Carrier	23	2396	190	12410
	Fish Factory Ship	20	6301	199	32096
	Fish Farm Support Vessel	6	938	172	2145
	Fishery Patrol Vessel	2	904	657	1150
	Fishery Research Vessel	10	1334	332	2545
	Fishing Vessel	542	640	101	4377
	Live Fish Carrier (Well Boat)	33	1058	103	3893
	Seal Catcher	4	561	300	807
	Stern Trawler	379	1212	123	9494
	Trawler	54	1289	110	5192
Miscellaneous	Articulated Pusher Tug	2	378	341	416
	Bunkering Tanker	3	827	702	895
	Buoy & Lighthouse Tender	3	461	187	642
	Buoy Tender	6	2330	569	3812
	Cable Layer	4	4820	407	11242
	Crane Vessel	3	16740	859	47426
	Cutter Suction Dredger	1	8082	8082	8082
	Hopper, Motor	10	1180	264	2427
	Hopper/Dredger (unspecified)	1	407	407	407
	Icebreaker	23	9703	1960	23439
	Icebreaker/Research	4	9686	5910	12711
	Patrol Vessel	14	2138	139	6375
	Pollution Control Vessel	4	618	231	1058

Appendix 1. Counts and gross tonnage statistics (average, minimum, and maximum) for vessels operating in the Arctic Region during 2015 (continued)

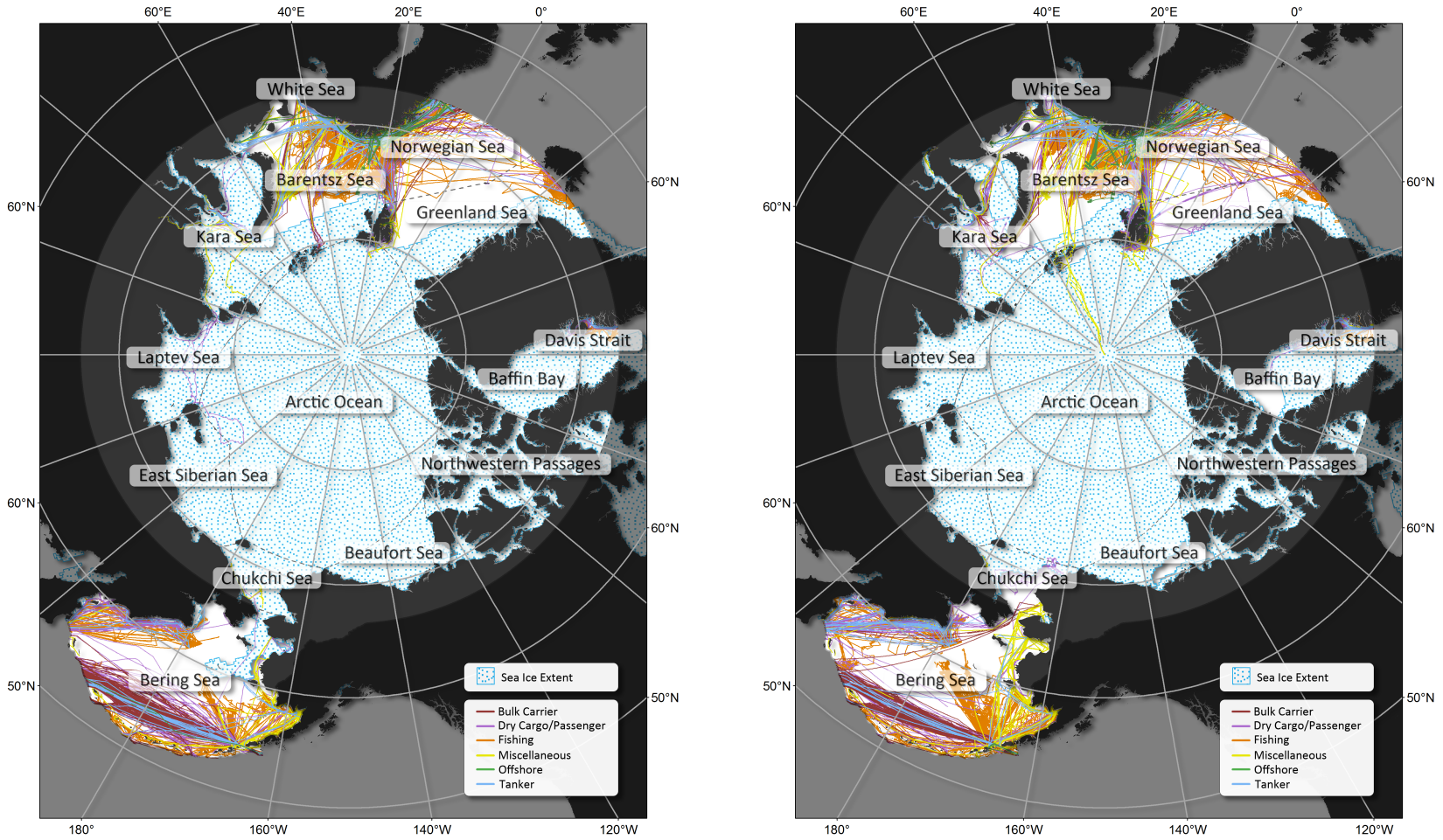
Vessel Type Class	Vessel Type	Count	Gross Tonnage		
			Avg	Min	Max
Miscellaneous (continued)	Pusher Tug	3	609	268	783
	Research Survey Vessel	74	2921	101	10732
	Salvage Ship	5	2047	111	4766
	Search & Rescue Vessel	2	120	103	136
	Suction Dredger	2	384	335	433
	Suction Hopper Dredger	1	479	479	479
	Supply Tender	1	412	412	412
	Trailing Suction Hopper Dredger	11	8440	2276	28634
	Training Ship	1	448	448	448
	Tug	150	536	100	5871
	Utility Vessel	4	281	220	406
	Waste Disposal Vessel	2	864	803	926
	Work/Repair Vessel	1	1239	1239	1239
Offshore	Anchor Handling Tug Supply	46	4820	731	12892
	Crew/Supply Vessel	2	218	150	285
	Diving Support Vessel	3	8746	361	18640
	Drilling Ship	3	5678	780	13485
	FPSO, Oil	1	187864	187864	187864
	FSO, Oil	2	113154	37581	188728
	Offshore Support Vessel	12	10027	3923	18151
	Offshore Tug/Supply Ship	10	2283	228	6251
	Pipe Burying Vessel	1	19950	19950	19950
	Pipe Layer	3	37044	5913	94855
	Platform Supply Ship	32	3573	464	6545
	Standby Safety Vessel	8	1063	333	4462
Tankers	Asphalt/Bitumen Tanker	4	6644	4025	12959
	Chemical Tanker	17	5787	498	22028
	Chemical/Products Tanker	176	15739	655	30641
	Crude Oil Tanker	29	65331	38832	85421
	Crude/Oil Products Tanker	30	54787	11290	84598
	LNG Tanker	17	106354	97741	121597
	LPG Tanker	12	21074	1687	37366
	Products Tanker	61	14910	499	66919
	Shuttle Tanker	8	58473	49597	80850
	Tanker (unspecified)	1	678	678	678
	Vegetable Oil Tanker	1	1037	1037	1037



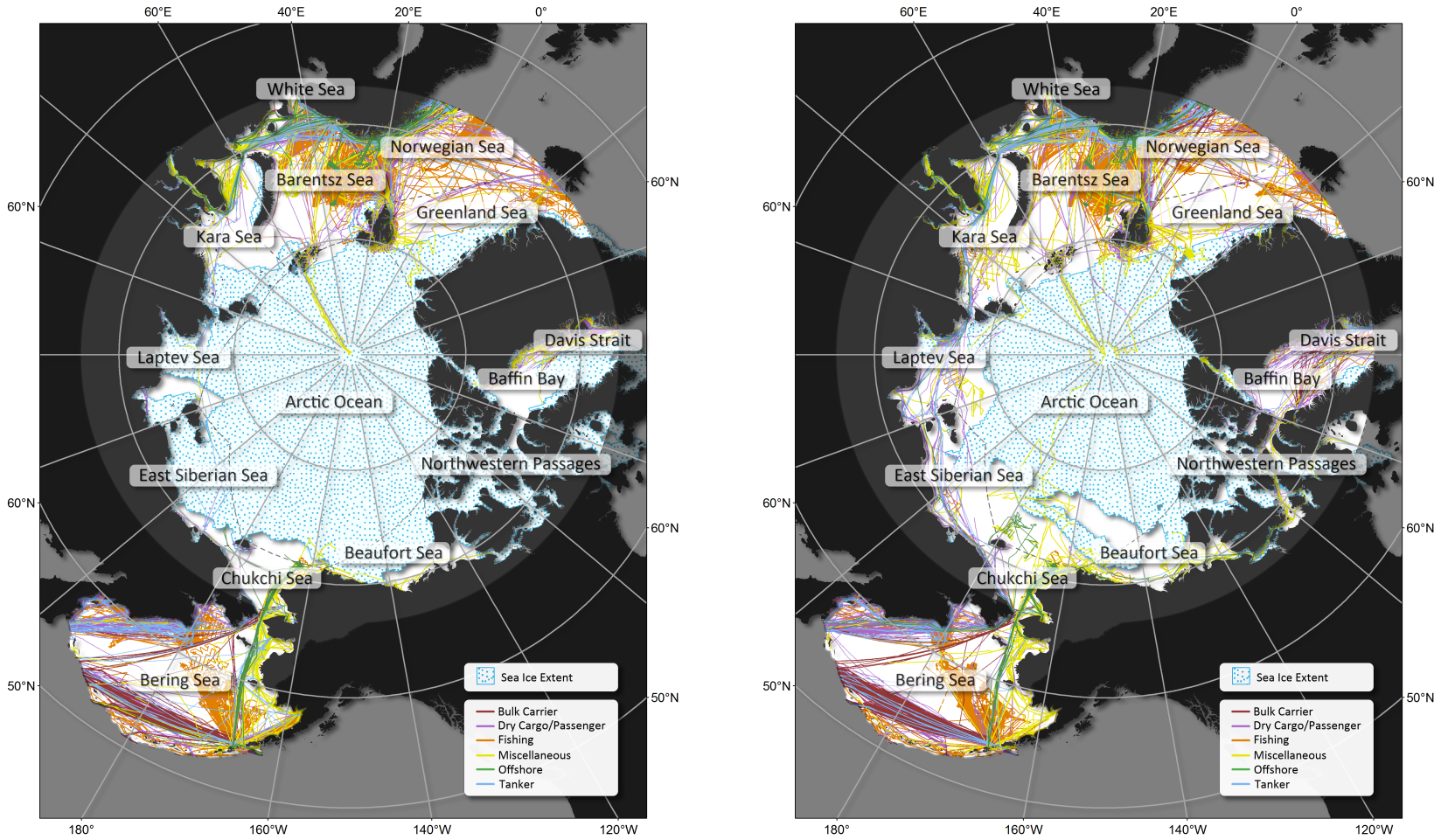
Appendix 2. January (left) and February (right) 2015 transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



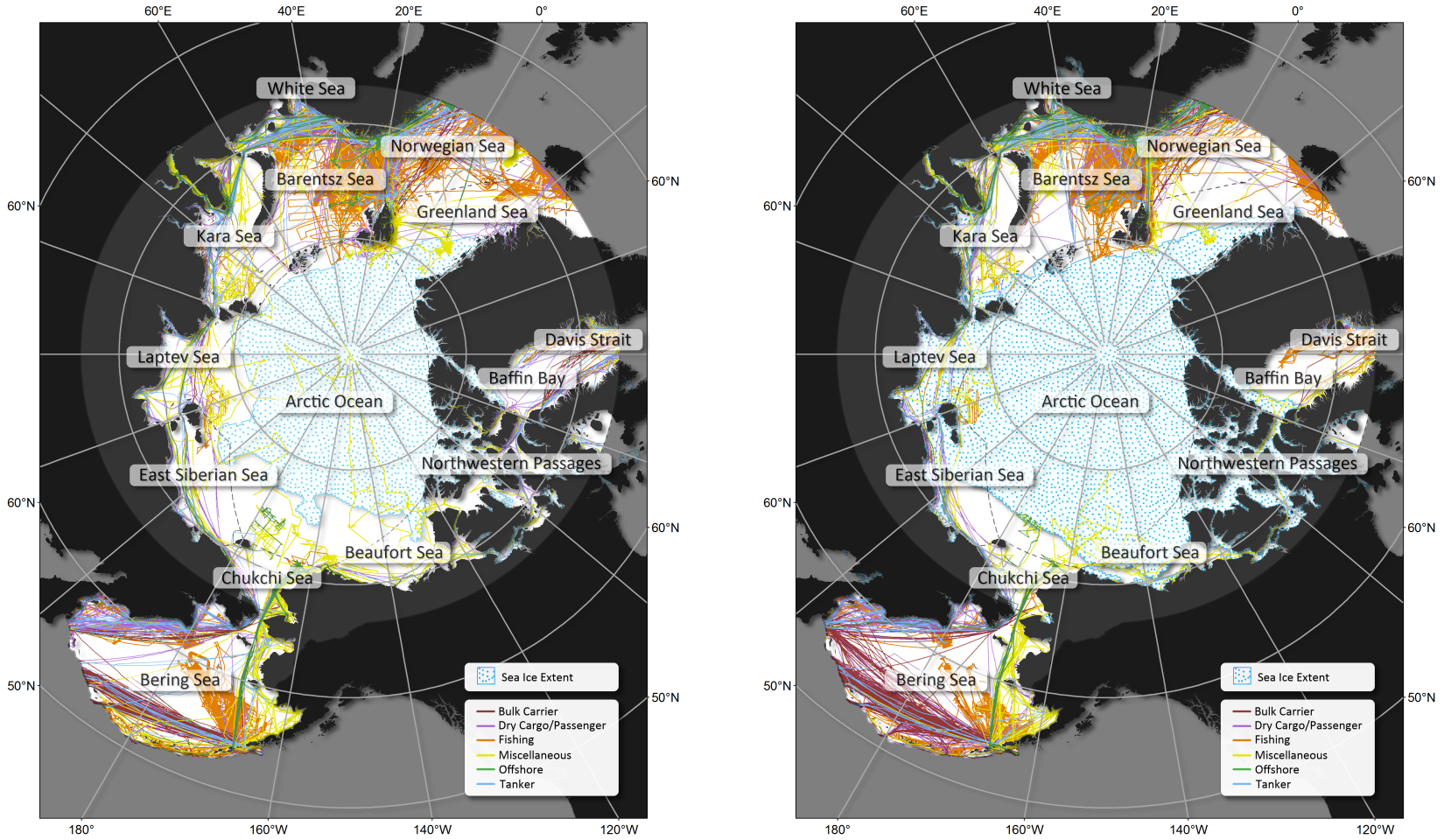
Appendix 3. March (left) and April (right) 2015 vessel transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



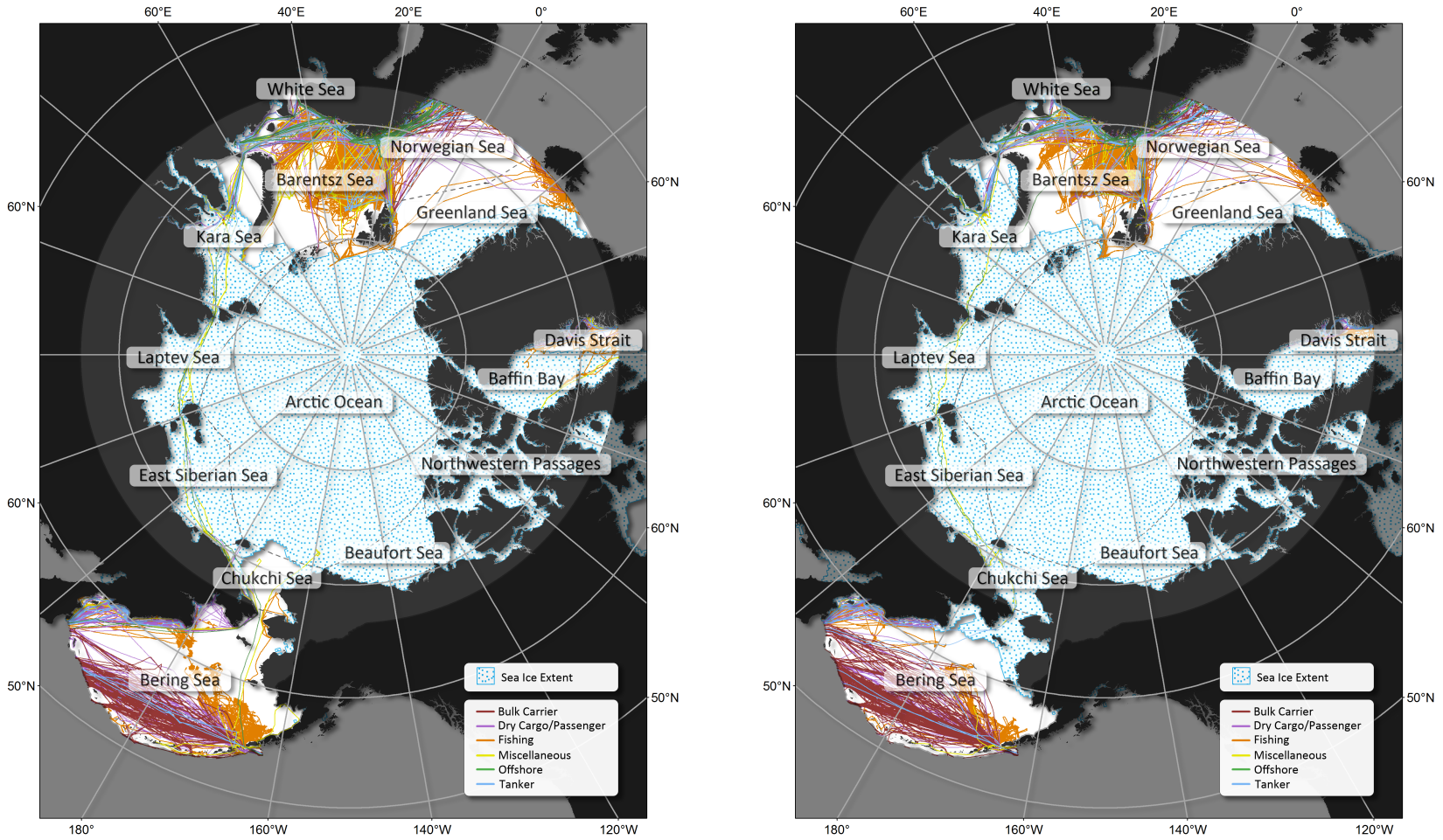
Appendix 4. May (left) and June (right) 2015 vessel transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



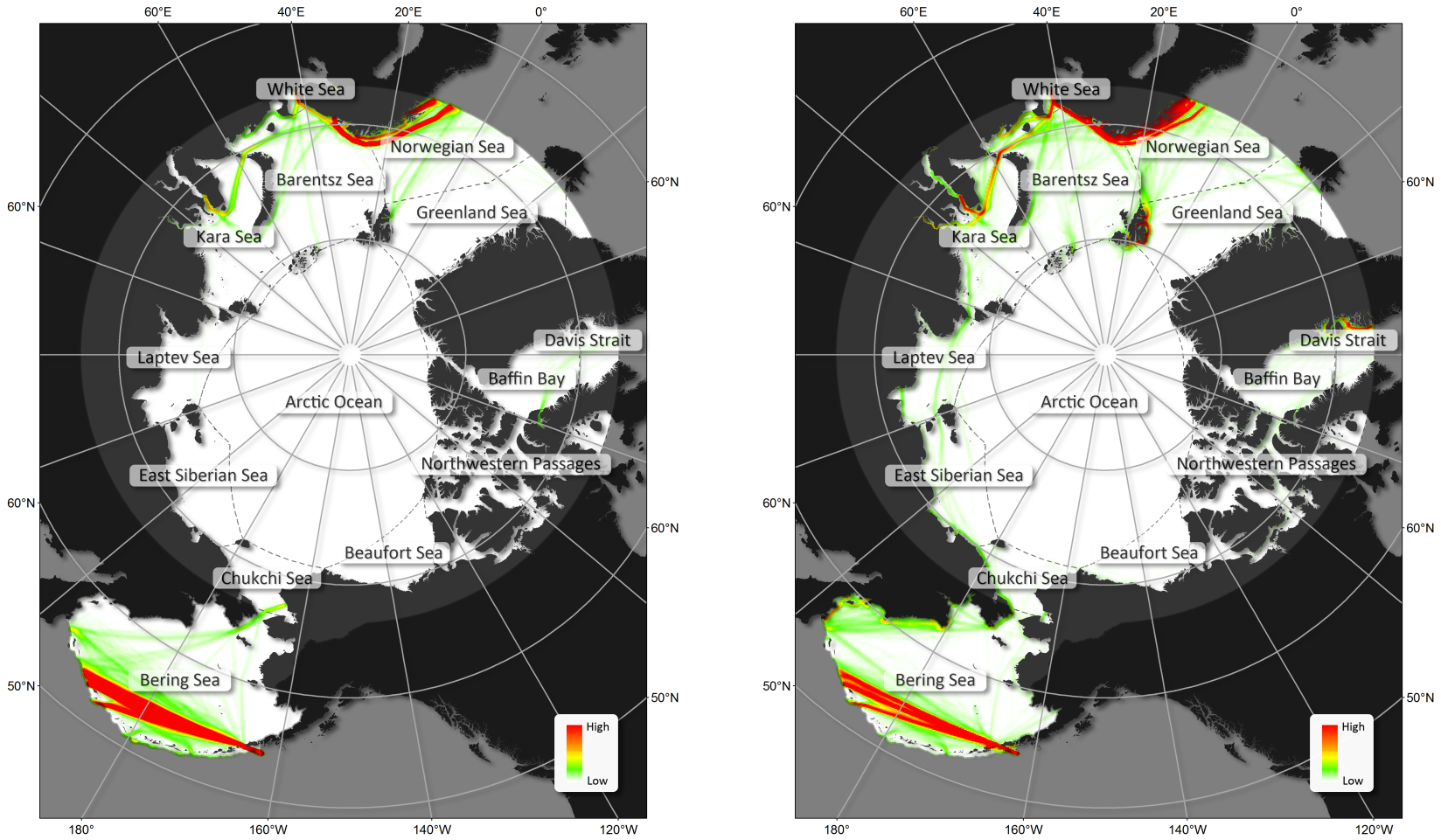
Appendix 5. July (left) and August (right) 2015 vessel transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



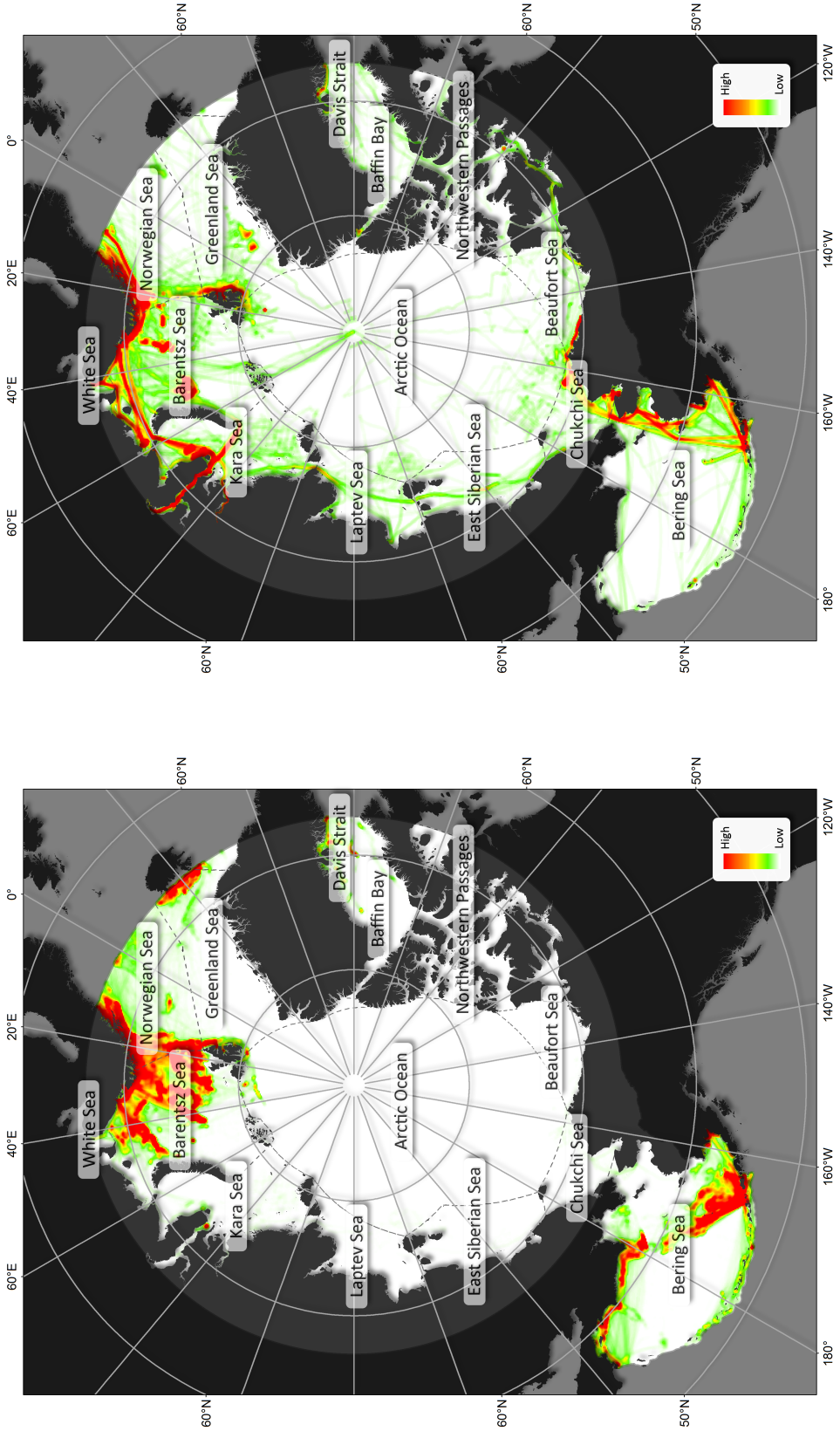
Appendix 6. September (left) and October (right) 2015 vessel transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



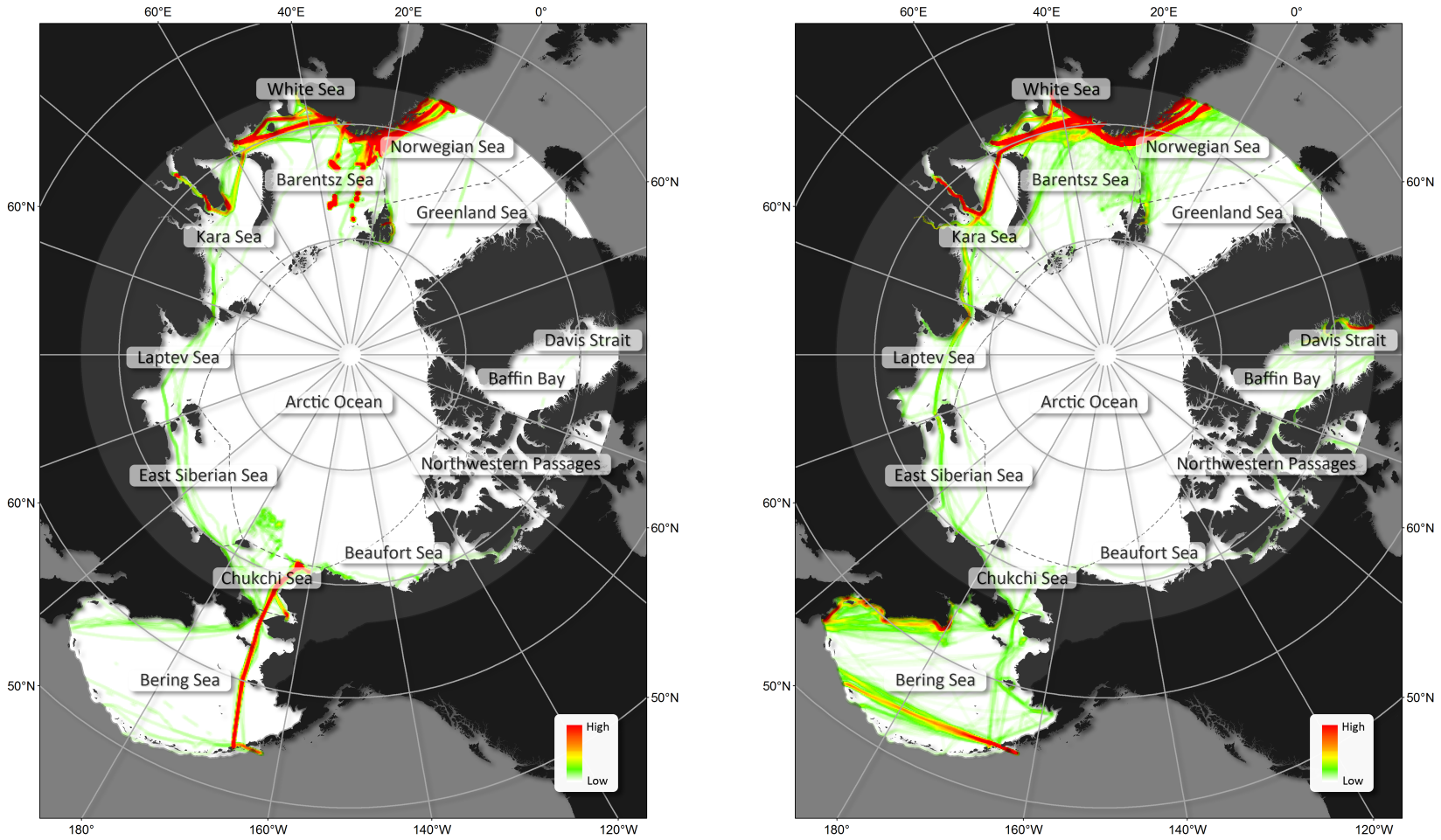
Appendix 7. November (left) and December (right) 2015 vessel transits and sea ice extent in the Arctic region. Transits are symbolized by vessel type class and layered in following order: Offshore, Tanker, Miscellaneous, Bulk Carrier, Dry Cargo/Passenger, and Fishing (when transits from the different vessel type classes overlap, only the uppermost transit will be visible).



Appendix 8. Transit density in the Arctic during 2015 for the Bulk Carrier (left) and Dry Cargo/Passenger (right) vessel type classes.



Appendix 9. Transit density in the Arctic during 2015 for the Fishing (left) and Miscellaneous (right) vessel type classes.



Appendix 10. Transit density in the Arctic during 2015 for the Offshore (left) and Tanker (right) vessel type classes.

Appendix 11. Counts of vessels operating in the Arctic region by vessel type class and flag country.

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Antigua & Barbuda	7	86	0	0	0	1	**94**
Australia	0	0	0	2	0	0	**2**
Bahamas	67	99	0	7	4	12	**189**
Barbados	8	35	0	0	0	0	**43**
Belgium	5	0	0	8	0	2	**15**
Belize	3	5	1	0	1	0	**10**
Bermuda	2	7	0	1	0	4	**14**
Cambodia	0	0	0	0	0	1	**1**
Canada	0	10	4	15	1	6	**36**
Cayman Islands	1	6	0	0	0	1	**8**
China, People's Republic Of	12	11	3	1	0	0	**27**
Chinese Taipei	1	6	0	0	0	0	**7**
Colombia	0	0	0	1	0	0	**1**
Comoros	1	0	0	0	0	0	**1**
Cook Islands	0	3	0	1	0	0	**4**
Croatia	1	0	0	0	0	1	**2**
Curacao	0	3	0	0	0	0	**3**
Cyprus	53	29	0	8	2	11	**103**
Denmark	0	3	33	5	0	0	**41**
Denmark (Dis)	1	40	0	5	8	12	**66**
Dominica	0	1	0	1	0	0	**2**
Egypt	1	0	0	0	0	0	**1**
Estonia	0	0	3	0	0	0	**3**
Faeroe Islands	0	4	22	0	0	2	**28**
Faeroes (Fas)	0	20	0	2	1	0	**23**
Finland	2	0	0	5	0	1	**8**
Flag Not Required	0	0	0	0	1	0	**1**
France	0	3	3	0	0	0	**6**
France (Fis)	0	8	0	3	0	1	**12**
Germany	0	34	6	3	0	3	**46**
Gibraltar	3	32	0	1	2	13	**51**

Appendix 11. Counts of vessels operating in the Arctic region by vessel type class and flag country (continued).

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Greece	51	3	0	0	0	30	**84**
Hong Kong, China	224	90	0	0	0	5	**319**
Iceland	0	3	114	4	0	0	**121**
India	6	0	0	0	0	0	**6**
Indonesia	1	2	1	0	0	1	**5**
Irish Republic	0	0	3	0	0	0	**3**
Isle Of Man	11	1	0	0	5	7	**24**
Israel	0	2	0	0	0	0	**2**
Italy	10	11	0	1	1	3	**26**
Japan	15	11	2	1	0	1	**30**
Korea, South	15	10	6	1	0	1	**33**
Latvia	0	1	9	0	0	0	**10**
Liberia	126	136	0	0	2	26	**290**
Libya	0	0	0	1	0	0	**1**
Lithuania	0	1	5	0	0	0	**6**
Luxembourg	1	1	0	1	0	0	**3**
Malaysia	1	1	0	0	1	0	**3**
Malta	100	85	0	1	3	23	**212**
Marshall Islands	190	46	0	1	0	30	**267**
Moldova	0	2	0	0	0	0	**2**
Montenegro	1	0	0	0	0	0	**1**
Netherlands	4	89	4	9	1	6	**113**
Norway	0	157	369	59	48	6	**639**
Norway (Nis)	14	36	0	7	4	18	**79**
Pakistan	2	0	0	0	0	0	**2**
Panama	483	241	0	7	3	20	**754**
Philippines	13	3	0	0	0	1	**17**
Poland	0	1	1	2	0	0	**4**
Portugal	0	0	1	0	0	0	**1**
Portugal (Mar)	9	10	0	0	0	5	**24**
Qatar	0	0	0	0	0	1	**1**

Appendix 11. Counts of vessels operating in the Arctic region by vessel type class and flag country (continued).

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Russia	17	210	354	83	15	64	**743**
Saudi Arabia	0	1	0	0	0	0	**1**
Sierra Leone	0	0	0	0	0	4	**4**
Singapore	109	78	0	2	3	18	**210**
Spain	0	0	9	0	0	0	**9**
Spain (Csr)	1	0	0	0	0	0	**1**
St Kitts & Nevis	0	10	2	0	0	1	**13**
St Vincent & The Grenadines	1	12	0	0	1	0	**14**
Sweden	0	9	0	2	2	3	**16**
Switzerland	3	0	0	0	0	0	**3**
Thailand	1	0	0	0	0	0	**1**
Turkey	3	1	0	0	0	2	**6**
United Arab Emirates	0	0	0	0	1	0	**1**
United Kingdom	4	34	4	4	1	7	**54**
United States Of America	0	26	298	79	8	1	**412**
Unknown	2	0	0	1	1	0	**4**
Vanuatu	8	2	0	0	3	0	**13**
Venezuela	0	0	0	0	0	1	**1**
Vietnam	1	0	0	0	0	0	**1**
Total	**1595**	**1771**	**1257**	**335**	**123**	**356**	**5437**

Appendix 12. Counts of transits in the Arctic region by vessel type class and flag country.

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Antigua & Barbuda	20	1029	0	0	0	2	**1051**
Australia	0	0	0	6	0	0	**6**
Bahamas	158	1694	0	67	29	89	**2037**
Barbados	78	328	0	0	0	0	**406**
Belgium	15	0	0	216	0	11	**242**
Belize	10	82	9	0	5	0	**106**
Bermuda	6	62	0	6	0	23	**97**
Cambodia	0	0	0	0	0	9	**9**
Canada	0	101	129	276	11	40	**557**
Cayman Islands	1	11	0	0	0	14	**26**
China, People's Republic Of	20	48	35	1	0	0	**104**
Chinese Taipei	3	12	0	0	0	0	**15**
Colombia	0	0	0	4	0	0	**4**
Comoros	1	0	0	0	0	0	**1**
Cook Islands	0	162	0	46	0	0	**208**
Croatia	1	0	0	0	0	6	**7**
Curacao	0	6	0	0	0	0	**6**
Cyprus	324	350	0	127	47	211	**1059**
Denmark	0	140	986	190	0	0	**1316**
Denmark (Dis)	2	571	0	140	267	406	**1386**
Dominica	0	47	0	7	0	0	**54**
Egypt	1	0	0	0	0	0	**1**
Estonia	0	0	62	0	0	0	**62**
Faeroe Islands	0	210	460	0	0	4	**674**
Faeroes (Fas)	0	863	0	46	44	0	**953**
Finland	21	0	0	147	0	5	**173**
Flag Not Required	0	0	0	0	5	0	**5**
France	0	122	63	0	0	0	**185**
France (Fis)	0	13	0	24	0	2	**39**
Germany	0	244	40	124	0	7	**415**
Gibraltar	15	116	0	16	23	127	**297**

Appendix 12. Counts of transits in the Arctic region by vessel type class and flag country (continued).

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Greece	132	14	0	0	0	177	**323**
Hong Kong, China	598	265	0	0	0	15	**878**
Iceland	0	212	2983	59	0	0	**3254**
India	9	0	0	0	0	0	**9**
Indonesia	1	2	4	0	0	1	**8**
Irish Republic	0	0	29	0	0	0	**29**
Isle Of Man	27	1	0	0	51	20	**99**
Israel	0	7	0	0	0	0	**7**
Italy	22	114	0	8	18	10	**172**
Japan	33	21	13	11	0	5	**83**
Korea, South	35	48	154	24	0	1	**262**
Latvia	0	2	492	0	0	0	**494**
Liberia	285	508	0	0	15	220	**1028**
Libya	0	0	0	1	0	0	**1**
Lithuania	0	3	89	0	0	0	**92**
Luxembourg	3	1	0	17	0	0	**21**
Malaysia	2	1	0	0	1	0	**4**
Malta	395	648	0	1	32	224	**1300**
Marshall Islands	493	138	0	19	0	117	**767**
Moldova	0	229	0	0	0	0	**229**
Montenegro	2	0	0	0	0	0	**2**
Netherlands	10	886	9	198	55	29	**1187**
Norway	0	24389	20337	3339	1060	269	**49394**
Norway (Nis)	32	326	0	147	222	154	**881**
Pakistan	2	0	0	0	0	0	**2**
Panama	1300	816	0	67	127	55	**2365**
Philippines	19	17	0	0	0	1	**37**
Poland	0	12	18	46	0	0	**76**
Portugal	0	0	10	0	0	0	**10**
Portugal (Mar)	27	57	0	0	0	63	**147**
Qatar	0	0	0	0	0	3	**3**

Appendix 12. Counts of transits in the Arctic region by vessel type class and flag country (continued).

Flag Country	Bulk Carriers	Dry Cargo/Passenger	Fishing	Miscellaneous	Offshore	Tankers	Total
Russia	562	4563	11207	2416	508	1752	**21008**
Saudi Arabia	0	1	0	0	0	0	**1**
Sierra Leone	0	0	0	0	0	139	**139**
Singapore	267	201	0	23	40	118	**649**
Spain	0	0	219	0	0	0	**219**
Spain (Csr)	8	0	0	0	0	0	**8**
St Kitts & Nevis	0	451	105	0	0	4	**560**
St Vincent & The Grenadines	6	195	0	0	9	0	**210**
Sweden	0	423	0	37	68	140	**668**
Switzerland	11	0	0	0	0	0	**11**
Thailand	3	0	0	0	0	0	**3**
Turkey	4	4	0	0	0	52	**60**
United Arab Emirates	0	0	0	0	1	0	**1**
United Kingdom	7	170	72	62	71	64	**446**
United States Of America	0	849	13568	2639	378	11	**17445**
Unknown	2	0	0	2	16	0	**20**
Vanuatu	31	138	0	0	30	0	**199**
Venezuela	0	0	0	0	0	3	**3**
Vietnam	2	0	0	0	0	0	**2**
Total	**5006**	**41923**	**51093**	**10559**	**3133**	**4603**	**116317**

Appendix 13. Average monthly sea ice extent in 2015 as a percentage of water surface area for the Arctic and the different oceans and seas located within the region. The table cells are shaded based on sea ice extent percent using the following scheme: 0-25% (green), 26-50% (yellow), 51-75% (orange), and 76-100% (red).

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arctic Region	**70**	**72**	**71**	**70**	**67**	**61**	**51**	**35**	**29**	**48**	**59**	**66**
Arctic Ocean	99	100	100	100	100	99	96	81	74	93	98	99
Baffin Bay	94	94	94	94	94	71	35	10	10	21	83	94
Barents Sea	43	49	40	30	27	16	7	0	0	1	5	15
Beaufort Sea	98	98	98	98	98	84	76	33	9	73	98	98
Bering Sea	16	25	26	25	8	0	0	0	0	0	1	15
Chukchi Sea	97	97	97	97	97	50	3	0	0	1	32	97
Davis Strait	92	93	93	93	88	73	55	15	0	0	54	81
East Siberian Sea	98	98	98	98	98	98	79	17	5	59	98	98
Greenland Sea	44	48	47	46	46	44	36	24	24	36	42	41
Kara Sea	96	96	96	96	96	71	35	8	5	33	68	87
Laptev Sea	96	96	96	96	96	95	73	22	5	96	96	96
Northwestern Passages	88	88	88	88	87	84	77	50	29	72	88	88
Norwegian Sea	0	0	0	0	0	0	0	0	0	0	0	0
White Sea	78	85	76	47	4	4	0	0	0	4	4	17

Appendix 14. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category.

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Bulk Carriers	**1**	**17**	**5**	**376**	**987**	**188**	**21**	**1595**
Bulk Carrier	0	7	1	369	971	186	21	1555
Bulk Carrier, Self-discharging	0	0	0	6	2	1	0	9
Cement Carrier	1	5	4	1	0	0	0	11
Limestone Carrier	0	1	0	0	0	0	0	1
Ore Carrier	0	0	0	0	0	1	0	1
Ore/Oil Carrier	0	4	0	0	0	0	0	4
Wood Chips Carrier	0	0	0	0	14	0	0	14
Dry Cargo/Passenger	**120**	**485**	**203**	**146**	**206**	**536**	**75**	**1771**
Container Ship (Fully Cellular)	0	0	13	16	90	409	70	598
Deck Cargo Ship	4	0	0	0	0	0	0	4
General Cargo Ship	27	344	123	54	10	0	0	558
General Cargo Ship (with Ro-Ro facility)	0	0	2	6	0	0	0	8
General Cargo Ship, Self-discharging	0	2	0	0	0	0	0	2
General Cargo/Passenger Ship	4	3	2	0	0	0	0	9
Heavy Load Carrier	0	0	0	2	0	0	0	2
Heavy Load Carrier, semi submersible	0	0	0	2	3	1	0	6
Landing Craft	11	0	0	0	0	0	0	11
Livestock Carrier	0	1	0	0	0	0	0	1
Nuclear Fuel Carrier	0	2	1	0	0	0	0	3
Open Hatch Cargo Ship	0	0	0	21	33	0	0	54
Palletised Cargo Ship	2	8	0	0	0	0	0	10
Passenger Ship	33	4	0	0	0	0	0	37
Passenger/Cruise	6	11	9	16	17	20	5	84
Passenger/Ro-Ro Ship (Vehicles)	28	24	4	10	0	0	0	66
Refrigerated Cargo Ship	5	81	44	12	0	0	0	142
Ro-Ro Cargo Ship	0	5	5	7	0	0	0	17
Vehicles Carrier	0	0	0	0	53	106	0	159

Appendix 14. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Fishing	**754**	**465**	**33**	**4**	**1**	**0**	**0**	**1257**
Factory Stern Trawler	7	154	23	0	0	0	0	184
Fish Carrier	17	3	0	3	0	0	0	23
Fish Factory Ship	1	11	6	1	1	0	0	20
Fish Farm Support Vessel	3	3	0	0	0	0	0	6
Fishery Patrol Vessel	1	1	0	0	0	0	0	2
Fishery Research Vessel	5	5	0	0	0	0	0	10
Fishing Vessel	443	99	0	0	0	0	0	542
Live Fish Carrier (Well Boat)	21	12	0	0	0	0	0	33
Seal Catcher	4	0	0	0	0	0	0	4
Stern Trawler	222	155	2	0	0	0	0	379
Trawler	30	22	2	0	0	0	0	54
Miscellaneous	**200**	**86**	**31**	**16**	**2**	**0**	**0**	**335**
Articulated Pusher Tug	2	0	0	0	0	0	0	2
Bunkering Tanker	3	0	0	0	0	0	0	3
Buoy & Lighthouse Tender	3	0	0	0	0	0	0	3
Buoy Tender	1	5	0	0	0	0	0	6
Cable Layer	2	0	1	1	0	0	0	4
Crane Vessel	1	1	0	0	1	0	0	3
Cutter Suction Dredger	0	0	1	0	0	0	0	1
Hopper, Motor	5	5	0	0	0	0	0	10
Hopper/Dredger (unspecified)	1	0	0	0	0	0	0	1
Icebreaker	0	6	10	7	0	0	0	23
Icebreaker/Research	0	0	2	2	0	0	0	4
Patrol Vessel	8	5	1	0	0	0	0	14
Pollution Control Vessel	3	1	0	0	0	0	0	4
Pusher Tug	3	0	0	0	0	0	0	3
Research Survey Vessel	17	43	11	3	0	0	0	74
Salvage Ship	2	3	0	0	0	0	0	5
Search & Rescue Vessel	2	0	0	0	0	0	0	2
Suction Dredger	2	0	0	0	0	0	0	2
Suction Hopper Dredger	1	0	0	0	0	0	0	1
Supply Tender	1	0	0	0	0	0	0	1
Trailing Suction Hopper Dredger	0	4	3	3	1	0	0	11

Appendix 14. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Training Ship	1	0	0	0	0	0	0	1
Tug	136	12	2	0	0	0	0	150
Utility Vessel	4	0	0	0	0	0	0	4
Waste Disposal Vessel	2	0	0	0	0	0	0	2
Work/Repair Vessel	0	1	0	0	0	0	0	1
Offshore	**19**	**60**	**31**	**9**	**1**	**1**	**2**	**123**
Anchor Handling Tug Supply	1	24	20	1	0	0	0	46
Crew/Supply Vessel	2	0	0	0	0	0	0	2
Diving Support Vessel	1	0	1	1	0	0	0	3
Drilling Ship	1	1	0	1	0	0	0	3
FPSO, Oil	0	0	0	0	0	0	1	1
FSO, Oil	0	0	0	0	1	0	1	2
Offshore Support Vessel	0	4	4	4	0	0	0	12
Offshore Tug/Supply Ship	3	6	1	0	0	0	0	10
Pipe Burying Vessel	0	0	0	1	0	0	0	1
Pipe Layer	0	0	1	1	0	1	0	3
Platform Supply Ship	4	24	4	0	0	0	0	32
Standby Safety Vessel	7	1	0	0	0	0	0	8
Tankers	**7**	**82**	**28**	**89**	**77**	**59**	**14**	**356**
Asphalt/Bitumen Tanker	0	3	0	1	0	0	0	4
Chemical Tanker	3	9	2	3	0	0	0	17
Chemical/Products Tanker	1	45	17	67	46	0	0	176
Crude Oil Tanker	0	0	0	0	1	28	0	29
Crude/Oil Products Tanker	0	0	0	3	4	23	0	30
LNG Tanker	0	0	0	0	0	3	14	17
LPG Tanker	0	1	0	7	4	0	0	12
Products Tanker	2	23	9	8	17	2	0	61
Shuttle Tanker	0	0	0	0	5	3	0	8
Tanker (unspecified)	1	0	0	0	0	0	0	1
Vegetable Oil Tanker	0	1	0	0	0	0	0	1
Total	**1101**	**1195**	**331**	**640**	**1274**	**784**	**112**	**5437**

Appendix 15. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category.

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Bulk Carriers	**6**	**359**	**195**	**1565**	**2348**	**466**	**67**	**5006**
Bulk Carrier	0	201	4	1512	2295	458	67	4537
Bulk Carrier, Self-discharging	0	0	0	51	20	2	0	73
Cement Carrier	6	45	191	2	0	0	0	244
Limestone Carrier	0	15	0	0	0	0	0	15
Ore Carrier	0	0	0	0	0	6	0	6
Ore/Oil Carrier	0	98	0	0	0	0	0	98
Wood Chips Carrier	0	0	0	0	33	0	0	33
Dry Cargo/Passenger	**15149**	**16384**	**4420**	**3167**	**695**	**1845**	**263**	**41923**
Container Ship (Fully Cellular)	0	0	346	283	192	1514	212	2547
Deck Cargo Ship	438	0	0	0	0	0	0	438
General Cargo Ship	1989	6835	1306	463	27	0	0	10620
General Cargo Ship (with Ro-Ro facility)	0	0	5	142	0	0	0	147
General Cargo Ship, Self-discharging	0	789	0	0	0	0	0	789
General Cargo/Passenger Ship	183	230	162	0	0	0	0	575
Heavy Load Carrier	0	0	0	7	0	0	0	7
Heavy Load Carrier, semi submersible	0	0	0	6	10	3	0	19
Landing Craft	312	0	0	0	0	0	0	312
Livestock Carrier	0	9	0	0	0	0	0	9
Nuclear Fuel Carrier	0	13	2	0	0	0	0	15
Open Hatch Cargo Ship	0	0	0	70	127	0	0	197
Palletised Cargo Ship	240	676	0	0	0	0	0	916
Passenger Ship	6125	323	0	0	0	0	0	6448
Passenger/Cruise	758	723	438	447	204	155	51	2776
Passenger/Ro-Ro Ship (Vehicles)	4923	4045	1383	1639	0	0	0	11990
Refrigerated Cargo Ship	181	2524	658	73	0	0	0	3436
Ro-Ro Cargo Ship	0	217	120	37	0	0	0	374
Vehicles Carrier	0	0	0	0	135	173	0	308

Appendix 15. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Fishing	**38027**	**12325**	**673**	**48**	**20**	**0**	**0**	**51093**
Factory Stern Trawler	258	3554	473	0	0	0	0	4285
Fish Carrier	513	84	0	26	0	0	0	623
Fish Factory Ship	79	406	178	22	20	0	0	705
Fish Farm Support Vessel	242	272	0	0	0	0	0	514
Fishery Patrol Vessel	4	3	0	0	0	0	0	7
Fishery Research Vessel	223	47	0	0	0	0	0	270
Fishing Vessel	22967	2597	0	0	0	0	0	25564
Live Fish Carrier (Well Boat)	2540	815	0	0	0	0	0	3355
Seal Catcher	354	0	0	0	0	0	0	354
Stern Trawler	10057	4196	5	0	0	0	0	14258
Trawler	790	351	17	0	0	0	0	1158
Miscellaneous	**6916**	**2078**	**983**	**561**	**21**	**0**	**0**	**10559**
Articulated Pusher Tug	18	0	0	0	0	0	0	18
Bunkering Tanker	45	0	0	0	0	0	0	45
Buoy & Lighthouse Tender	126	0	0	0	0	0	0	126
Buoy Tender	13	62	0	0	0	0	0	75
Cable Layer	77	0	55	2	0	0	0	134
Crane Vessel	16	22	0	0	7	0	0	45
Cutter Suction Dredger	0	0	8	0	0	0	0	8
Hopper, Motor	102	116	0	0	0	0	0	218
Hopper/Dredger (unspecified)	32	0	0	0	0	0	0	32
Icebreaker	0	162	311	325	0	0	0	798
Icebreaker/Research	0	0	50	136	0	0	0	186
Patrol Vessel	632	397	118	0	0	0	0	1147
Pollution Control Vessel	289	14	0	0	0	0	0	303
Pusher Tug	87	0	0	0	0	0	0	87
Research Survey Vessel	413	918	249	15	0	0	0	1595
Salvage Ship	85	11	0	0	0	0	0	96
Search & Rescue Vessel	103	0	0	0	0	0	0	103
Suction Dredger	115	0	0	0	0	0	0	115
Suction Hopper Dredger	3	0	0	0	0	0	0	3
Supply Tender	69	0	0	0	0	0	0	69
Trailing Suction Hopper Dredger	0	94	65	83	14	0	0	256

Appendix 15. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Training Ship	2	0	0	0	0	0	0	2
Tug	4366	263	127	0	0	0	0	4756
Utility Vessel	101	0	0	0	0	0	0	101
Waste Disposal Vessel	222	0	0	0	0	0	0	222
Work/Repair Vessel	0	19	0	0	0	0	0	19
Offshore	**353**	**1910**	**681**	**167**	**11**	**3**	**8**	**3133**
Anchor Handling Tug Supply	38	672	387	51	0	0	0	1148
Crew/Supply Vessel	76	0	0	0	0	0	0	76
Diving Support Vessel	26	0	30	4	0	0	0	60
Drilling Ship	37	9	0	9	0	0	0	55
FPSO, Oil	0	0	0	0	0	0	5	5
FSO, Oil	0	0	0	0	11	0	3	14
Offshore Support Vessel	0	43	34	35	0	0	0	112
Offshore Tug/Supply Ship	36	177	1	0	0	0	0	214
Pipe Burying Vessel	0	0	0	55	0	0	0	55
Pipe Layer	0	0	17	13	0	3	0	33
Platform Supply Ship	40	948	212	0	0	0	0	1200
Standby Safety Vessel	100	61	0	0	0	0	0	161
Tankers	**184**	**1791**	**383**	**966**	**761**	**372**	**146**	**4603**
Asphalt/Bitumen Tanker	0	11	0	6	0	0	0	17
Chemical Tanker	19	218	16	5	0	0	0	258
Chemical/Products Tanker	8	945	252	698	145	0	0	2048
Crude Oil Tanker	0	0	0	0	3	207	0	210
Crude/Oil Products Tanker	0	0	0	122	13	133	0	268
LNG Tanker	0	0	0	0	0	10	146	156
LPG Tanker	0	1	0	25	17	0	0	43
Products Tanker	119	569	115	110	68	9	0	990
Shuttle Tanker	0	0	0	0	515	13	0	528
Tanker (unspecified)	38	0	0	0	0	0	0	38
Vegetable Oil Tanker	0	47	0	0	0	0	0	47
Total	**60635**	**34847**	**7335**	**6474**	**3856**	**2686**	**484**	**116317**

Appendix 16. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category.

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Bulk Carriers	**10709**	**3029**	**84716**	**140551**	**21170**	**2586**	**111**	**262871**
Bulk Carrier	6870	70	84056	138280	21100	2586	0	252962
Bulk Carrier, Self-discharging	0	0	653	313	22	0	0	989
Cement Carrier	404	2960	7	0	0	0	111	3481
Limestone Carrier	580	0	0	0	0	0	0	580
Ore Carrier	0	0	0	0	47	0	0	47
Ore/Oil Carrier	2856	0	0	0	0	0	0	2856
Wood Chips Carrier	0	0	0	1957	0	0	0	1957
Dry Cargo/Passenger	**299131**	**105801**	**95376**	**29646**	**80720**	**10954**	**107850**	**729478**
Container Ship (Fully Cellular)	0	6464	4216	8974	69981	10158	0	99793
Deck Cargo Ship	0	0	0	0	0	0	4962	4962
General Cargo Ship	157097	52797	30542	1571	0	0	25861	267868
General Cargo Ship (with Ro-Ro facility)	0	306	5380	0	0	0	0	5686
General Cargo Ship, Self-discharging	6655	0	0	0	0	0	0	6655
General Cargo/Passenger Ship	5645	3934	0	0	0	0	1461	11041
Heavy Load Carrier	0	0	866	0	0	0	0	866
Heavy Load Carrier, semi submersible	0	0	540	1116	97	0	0	1753
Landing Craft	0	0	0	0	0	0	6816	6816
Livestock Carrier	229	0	0	0	0	0	0	229
Nuclear Fuel Carrier	107	5	0	0	0	0	0	112
Open Hatch Cargo Ship	0	0	4724	7220	0	0	0	11943
Palletised Cargo Ship	12432	0	0	0	0	0	1674	14106
Passenger Ship	6596	0	0	0	0	0	25243	31839
Passenger/Cruise	13774	7908	9754	3643	2427	795	8977	47279
Passenger/Ro-Ro Ship (Vehicles)	44830	19654	37014	0	0	0	28806	130304
Refrigerated Cargo Ship	48096	13758	1548	0	0	0	4048	67450
Ro-Ro Cargo Ship	3671	975	793	0	0	0	0	5439
Vehicles Carrier	0	0	0	7123	8215	0	0	15338

Appendix 16. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Fishing	**920398**	**31553**	**4222**	**203**	**0**	**0**	**1300833**	**2257210**
Factory Stern Trawler	294223	27070	0	0	0	0	25563	346856
Fish Carrier	3510	0	542	0	0	0	16170	20222
Fish Factory Ship	7890	1905	3680	203	0	0	490	14167
Fish Farm Support Vessel	4361	0	0	0	0	0	1188	5549
Fishery Patrol Vessel	68	0	0	0	0	0	115	183
Fishery Research Vessel	2003	0	0	0	0	0	4872	6875
Fishing Vessel	118276	0	0	0	0	0	664263	782538
Live Fish Carrier (Well Boat)	9084	0	0	0	0	0	35572	44656
Seal Catcher	0	0	0	0	0	0	13975	13975
Stern Trawler	462861	530	0	0	0	0	512337	975728
Trawler	18122	2048	0	0	0	0	26289	46459
Miscellaneous	**95628**	**39590**	**32863**	**2483**	**0**	**0**	**127987**	**298551**
Articulated Pusher Tug	0	0	0	0	0	0	640	640
Bunkering Tanker	0	0	0	0	0	0	314	314
Buoy & Lighthouse Tender	0	0	0	0	0	0	996	996
Buoy Tender	2335	0	0	0	0	0	76	2412
Cable Layer	0	4508	19	0	0	0	832	5358
Crane Vessel	344	0	0	425	0	0	65	834
Cutter Suction Dredger	0	372	0	0	0	0	0	372
Hopper, Motor	4599	0	0	0	0	0	1300	5899
Hopper/Dredger (unspecified)	0	0	0	0	0	0	229	229
Icebreaker	3534	8688	17152	0	0	0	0	29374
Icebreaker/Research	0	2366	3917	0	0	0	0	6283
Patrol Vessel	9539	2435	0	0	0	0	7726	19700
Pollution Control Vessel	159	0	0	0	0	0	1566	1725
Pusher Tug	0	0	0	0	0	0	2195	2195
Research Survey Vessel	57250	12731	6858	0	0	0	17656	94495
Salvage Ship	422	0	0	0	0	0	839	1261
Search & Rescue Vessel	0	0	0	0	0	0	448	448
Suction Dredger	0	0	0	0	0	0	1082	1082
Suction Hopper Dredger	0	0	0	0	0	0	16	16
Supply Tender	0	0	0	0	0	0	434	434
Trailing Suction Hopper Dredger	5025	4651	4918	2058	0	0	0	16652

Appendix 16. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Training Ship	0	0	0	0	0	0	66	66
Tug	10754	3840	0	0	0	0	87076	101670
Utility Vessel	0	0	0	0	0	0	1522	1522
Waste Disposal Vessel	0	0	0	0	0	0	2908	2908
Work/Repair Vessel	1666	0	0	0	0	0	0	1666
Offshore	**40129**	**8933**	**2755**	**234**	**10**	**115**	**12088**	**64263**
Anchor Handling Tug Supply	19518	6695	1348	0	0	0	178	27739
Crew/Supply Vessel	0	0	0	0	0	0	1226	1226
Diving Support Vessel	0	277	64	0	0	0	359	699
Drilling Ship	242	0	431	0	0	0	478	1151
FPSO, Oil	0	0	0	0	0	14	0	14
FSO, Oil	0	0	0	234	0	101	0	334
Offshore Support Vessel	839	357	204	0	0	0	0	1400
Offshore Tug/Supply Ship	4507	1	0	0	0	0	1571	6079
Pipe Burying Vessel	0	0	457	0	0	0	0	457
Pipe Layer	0	72	252	0	10	0	0	334
Platform Supply Ship	14615	1531	0	0	0	0	316	16463
Standby Safety Vessel	408	0	0	0	0	0	7959	8367
Tankers	**38487**	**13967**	**40190**	**26631**	**11707**	**5844**	**2855**	**139681**
Asphalt/Bitumen Tanker	150	0	253	0	0	0	0	404
Chemical Tanker	5193	424	276	0	0	0	333	6226
Chemical/Products Tanker	16558	7968	25970	7507	0	0	133	58136
Crude Oil Tanker	0	0	0	81	6153	0	0	6235
Crude/Oil Products Tanker	0	0	6362	484	4804	0	0	11650
LNG Tanker	0	0	0	0	333	5844	0	6178
LPG Tanker	2	0	518	475	0	0	0	995
Products Tanker	15475	5576	6811	2780	152	0	2268	33062
Shuttle Tanker	0	0	0	15304	264	0	0	15567
Tanker (unspecified)	0	0	0	0	0	0	120	120
Vegetable Oil Tanker	1109	0	0	0	0	0	0	1109
Total	**1404483**	**202874**	**260121**	**199747**	**113607**	**19498**	**1551723**	**3752055**

Appendix 17. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category.

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Bulk Carriers	**1017**	**96371**	**35497**	**912388**	**1541667**	**225610**	**30062**	**2842612**
Bulk Carrier	0	65078	659	904701	1516385	224798	30062	2741683
Bulk Carrier, Self-discharging	0	0	0	7607	2726	242	0	10574
Cement Carrier	1017	4278	34838	81	0	0	0	40214
Limestone Carrier	0	5359	0	0	0	0	0	5359
Ore Carrier	0	0	0	0	0	570	0	570
Ore/Oil Carrier	0	21656	0	0	0	0	0	21656
Wood Chips Carrier	0	0	0	0	22557	0	0	22557
Dry Cargo/Passenger	**807826**	**2408172**	**1080818**	**1039735**	**416210**	**1311591**	**178842**	**7243194**
Container Ship (Fully Cellular)	0	0	77384	62399	134905	1141843	165112	1581643
Deck Cargo Ship	25175	0	0	0	0	0	0	25175
General Cargo Ship	200077	1379613	556764	348666	19011	0	0	2504131
General Cargo Ship (with Ro-Ro facility)	0	0	3710	61797	0	0	0	65507
General Cargo Ship, Self-discharging	0	53722	0	0	0	0	0	53722
General Cargo/Passenger Ship	10376	53380	38518	0	0	0	0	102274
Heavy Load Carrier	0	0	0	10530	0	0	0	10530
Heavy Load Carrier, semi submersible	0	0	0	6858	11634	919	0	19410
Landing Craft	46236	0	0	0	0	0	0	46236
Livestock Carrier	0	1122	0	0	0	0	0	1122
Nuclear Fuel Carrier	0	892	32	0	0	0	0	924
Open Hatch Cargo Ship	0	0	0	54982	90319	0	0	145300
Palletised Cargo Ship	11062	95103	0	0	0	0	0	106164
Passenger Ship	302516	48452	0	0	0	0	0	350968
Passenger/Cruise	53227	125819	76460	103786	52550	37689	13729	463259
Passenger/Ro-Ro Ship (Vehicles)	133326	135928	161741	362293	0	0	0	793288
Refrigerated Cargo Ship	25832	482476	154542	19028	0	0	0	681880
Ro-Ro Cargo Ship	0	31664	11667	9396	0	0	0	52728
Vehicles Carrier	0	0	0	0	107792	131140	0	238932

Appendix 17. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Fishing	**6049046**	**4506132**	**193298**	**24688**	**1339**	**0**	**0**	**10774504**
Factory Stern Trawler	122024	1475858	161606	0	0	0	0	1759487
Fish Carrier	104502	24218	0	4837	0	0	0	133558
Fish Factory Ship	3698	51084	14670	19851	1339	0	0	90642
Fish Farm Support Vessel	7116	33885	0	0	0	0	0	41001
Fishery Patrol Vessel	849	193	0	0	0	0	0	1042
Fishery Research Vessel	29999	14609	0	0	0	0	0	44608
Fishing Vessel	3018484	544714	0	0	0	0	0	3563198
Live Fish Carrier (Well Boat)	264352	73363	0	0	0	0	0	337715
Seal Catcher	62577	0	0	0	0	0	0	62577
Stern Trawler	2299898	2194318	4107	0	0	0	0	4498323
Trawler	135547	93891	12916	0	0	0	0	242353
Miscellaneous	**724553**	**565539**	**252985**	**255299**	**18308**	**0**	**0**	**1816684**
Articulated Pusher Tug	4040	0	0	0	0	0	0	4040
Bunkering Tanker	2314	0	0	0	0	0	0	2314
Buoy & Lighthouse Tender	6454	0	0	0	0	0	0	6454
Buoy Tender	458	20025	0	0	0	0	0	20483
Cable Layer	6761	0	16673	173	0	0	0	23607
Crane Vessel	239	2766	0	0	3805	0	0	6809
Cutter Suction Dredger	0	0	3423	0	0	0	0	3423
Hopper, Motor	7123	25605	0	0	0	0	0	32728
Hopper/Dredger (unspecified)	1571	0	0	0	0	0	0	1571
Icebreaker	0	26889	54977	163224	0	0	0	245090
Icebreaker/Research	0	0	18558	28933	0	0	0	47491
Patrol Vessel	43047	55054	17446	0	0	0	0	115548
Pollution Control Vessel	9668	1250	0	0	0	0	0	10918
Pusher Tug	13119	0	0	0	0	0	0	13119
Research Survey Vessel	94882	339184	80520	33704	0	0	0	548290
Salvage Ship	5179	2858	0	0	0	0	0	8036
Search & Rescue Vessel	4525	0	0	0	0	0	0	4525
Suction Dredger	6848	0	0	0	0	0	0	6848
Suction Hopper Dredger	127	0	0	0	0	0	0	127
Supply Tender	3164	0	0	0	0	0	0	3164
Trailing Suction Hopper Dredger	0	25645	24041	29265	14504	0	0	93455

Appendix 17. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and gross tonnage category (continued).

Vessel Type	<1000	1000-4999	5000-9999	10000-24999	25000-49999	50000-99999	> 100000	Total
Training Ship	488	0	0	0	0	0	0	488
Tug	482400	52996	37347	0	0	0	0	572743
Utility Vessel	6966	0	0	0	0	0	0	6966
Waste Disposal Vessel	25180	0	0	0	0	0	0	25180
Work/Repair Vessel	0	13266	0	0	0	0	0	13266
Offshore	**70830**	**265314**	**79501**	**20142**	**1351**	**103**	**981**	**438222**
Anchor Handling Tug Supply	825	120586	58431	6912	0	0	0	186754
Crew/Supply Vessel	5911	0	0	0	0	0	0	5911
Diving Support Vessel	2593	0	2903	906	0	0	0	6402
Drilling Ship	3469	1913	0	2622	0	0	0	8004
FPSO, Oil	0	0	0	0	0	0	151	151
FSO, Oil	0	0	0	0	1351	0	831	2182
Offshore Support Vessel	0	8907	3843	2382	0	0	0	15131
Offshore Tug/Supply Ship	7544	28041	10	0	0	0	0	35596
Pipe Burying Vessel	0	0	0	4871	0	0	0	4871
Pipe Layer	0	0	740	2449	0	103	0	3291
Platform Supply Ship	2350	104304	13574	0	0	0	0	120228
Standby Safety Vessel	48138	1562	0	0	0	0	0	49700
Tankers	**22629**	**343693**	**136710**	**457931**	**282227**	**108594**	**69244**	**1421028**
Asphalt/Bitumen Tanker	0	1698	0	3112	0	0	0	4810
Chemical Tanker	3007	51052	3611	3635	0	0	0	61304
Chemical/Products Tanker	1254	157409	80760	306568	82600	0	0	628591
Crude Oil Tanker	0	0	0	0	867	55327	0	56195
Crude/Oil Products Tanker	0	0	0	63928	6090	44271	0	114288
LNG Tanker	0	0	0	0	0	4926	69244	74170
LPG Tanker	0	21	0	7018	6638	0	0	13676
Products Tanker	17625	125890	52339	73671	32419	1737	0	303680
Shuttle Tanker	0	0	0	0	153614	2333	0	155946
Tanker (unspecified)	744	0	0	0	0	0	0	744
Vegetable Oil Tanker	0	7624	0	0	0	0	0	7624
Total	**7675901**	**8185221**	**1778809**	**2710183**	**2261103**	**1645897**	**279129**	**24536244**

Appendix 18. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and month.

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bulk Carriers	**308**	**240**	**267**	**225**	**286**	**260**	**283**	**275**	**247**	**291**	**209**	**275**
Bulk Carrier	297	229	263	217	277	254	272	260	235	279	200	265
Bulk Carrier, Self-discharging	4	3	0	2	1	1	2	4	2	1	1	3
Cement Carrier	2	5	1	4	3	3	3	5	4	5	4	3
Limestone Carrier	0	1	1	0	0	0	0	1	1	1	1	1
Ore Carrier	1	0	0	0	0	0	0	0	1	0	1	0
Ore/Oil Carrier	0	0	0	0	0	2	4	4	4	3	1	0
Wood Chips Carrier	4	2	2	2	5	0	2	1	0	2	1	3
Dry Cargo/Passenger	**536**	**452**	**553**	**456**	**615**	**580**	**657**	**663**	**623**	**623**	**447**	**449**
Container Ship (Fully Cellular)	203	139	198	133	205	136	134	138	113	183	103	120
Deck Cargo Ship	3	3	3	3	3	3	2	2	2	1	2	3
General Cargo Ship	142	138	152	154	169	185	218	237	242	239	178	160
General Cargo Ship (with Ro-Ro facility)	2	3	3	4	4	3	4	4	5	4	4	3
General Cargo Ship, Self-discharging	2	2	2	2	2	2	2	2	2	2	2	2
General Cargo/Passenger Ship	3	4	5	3	4	6	7	6	6	4	4	3
Heavy Load Carrier	0	0	0	0	0	0	1	2	2	0	0	0
Heavy Load Carrier, semi submersible	0	0	0	1	0	0	1	0	4	2	0	0
Landing Craft	0	2	0	2	5	5	5	8	6	6	3	1
Livestock Carrier	0	0	0	0	0	0	0	0	1	1	0	0
Nuclear Fuel Carrier	0	0	1	0	1	0	0	0	0	2	1	1
Open Hatch Cargo Ship	16	14	16	12	17	13	14	17	16	12	7	14
Palletised Cargo Ship	7	7	7	6	6	7	8	9	9	8	8	7
Passenger Ship	19	17	18	20	24	25	28	27	26	21	21	22
Passenger/Cruise	3	6	13	4	29	53	61	53	36	7	3	2
Passenger/Ro-Ro Ship (Vehicles)	46	47	47	45	54	53	50	53	53	50	43	49
Refrigerated Cargo Ship	39	43	49	47	51	64	97	76	74	64	50	41
Ro-Ro Cargo Ship	5	2	7	5	5	4	4	6	7	5	4	2
Vehicles Carrier	46	25	32	15	36	21	21	23	19	12	14	19

Appendix 18. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fishing	**679**	**639**	**681**	**570**	**556**	**742**	**714**	**679**	**700**	**675**	**620**	**480**
Factory Stern Trawler	85	75	76	50	74	106	123	126	119	96	82	70
Fish Carrier	6	6	6	8	6	14	12	11	10	8	7	7
Fish Factory Ship	8	7	6	10	8	15	15	7	7	8	7	5
Fish Farm Support Vessel	4	5	4	2	4	5	4	5	5	5	4	5
Fishery Patrol Vessel	0	0	0	0	0	1	1	0	0	0	0	0
Fishery Research Vessel	2	2	4	3	7	4	6	4	5	5	3	1
Fishing Vessel	306	287	312	252	218	317	280	232	249	268	261	184
Live Fish Carrier (Well Boat)	17	16	18	19	24	24	20	22	19	22	22	20
Seal Catcher	4	2	3	4	3	4	3	3	2	2	2	2
Stern Trawler	217	211	219	205	203	242	239	252	259	240	209	175
Trawler	30	28	33	17	9	10	11	17	25	21	23	11
Miscellaneous	**63**	**66**	**77**	**90**	**102**	**151**	**211**	**229**	**229**	**191**	**94**	**69**
Articulated Pusher Tug	0	0	0	0	0	1	1	0	0	0	1	0
Bunkering Tanker	1	1	1	2	1	2	1	1	1	2	2	1
Buoy & Lighthouse Tender	0	0	0	0	0	2	2	3	3	1	0	0
Buoy Tender	0	0	0	0	1	1	3	2	3	3	0	0
Cable Layer	2	2	3	3	4	3	3	3	3	2	2	2
Crane Vessel	0	0	1	1	1	0	2	2	2	1	0	0
Cutter Suction Dredger	0	0	0	0	0	0	1	0	0	1	0	0
Hopper, Motor	1	2	1	3	0	0	5	6	7	7	5	3
Hopper/Dredger (unspecified)	0	0	0	0	0	1	1	1	1	1	1	0
Icebreaker	5	6	7	9	8	11	11	14	14	12	7	8
Icebreaker/Research	0	0	0	0	2	2	3	4	4	3	0	0
Patrol Vessel	8	8	10	8	8	7	8	10	9	10	8	8
Pollution Control Vessel	3	4	4	3	3	3	3	3	4	3	3	4
Pusher Tug	0	0	0	0	0	2	1	3	3	3	0	0
Research Survey Vessel	6	6	9	14	17	37	48	49	48	35	12	4
Salvage Ship	4	2	3	3	2	1	2	1	1	1	2	3
Search & Rescue Vessel	2	2	2	1	1	2	2	2	1	2	2	2
Suction Dredger	1	0	1	1	0	1	2	2	1	2	2	1
Suction Hopper Dredger	0	0	0	0	1	0	0	0	1	1	0	0
Supply Tender	0	0	0	1	1	0	1	1	1	1	1	1
Trailing Suction Hopper Dredger	0	0	0	0	0	0	10	11	11	8	1	0

Appendix 18. Unique vessel counts for the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training Ship	0	1	0	0	0	1	0	0	0	0	0	0
Tug	28	30	34	39	50	72	99	108	106	87	41	29
Utility Vessel	0	1	0	0	0	0	1	1	3	2	2	2
Waste Disposal Vessel	2	1	1	1	1	1	1	1	1	2	2	1
Work/Repair Vessel	0	0	0	1	1	1	0	1	1	1	0	0
Offshore	**12**	**16**	**22**	**33**	**41**	**39**	**50**	**52**	**64**	**54**	**32**	**28**
Anchor Handling Tug Supply	6	7	9	15	19	15	19	18	20	18	16	13
Crew/Supply Vessel	0	0	0	0	0	0	1	1	2	2	0	0
Diving Support Vessel	0	0	0	1	2	1	2	2	2	1	0	0
Drilling Ship	0	0	0	0	0	0	2	3	2	3	0	0
FPSO, Oil	0	0	0	0	0	0	1	0	1	0	0	0
FSO, Oil	0	0	0	0	0	0	0	0	1	1	0	1
Offshore Support Vessel	1	1	1	2	1	2	5	2	2	4	3	2
Offshore Tug/Supply Ship	2	2	4	3	2	5	4	4	6	6	2	3
Pipe Burying Vessel	1	1	0	0	0	0	0	1	1	1	1	1
Pipe Layer	0	0	0	2	2	2	1	1	2	0	0	0
Platform Supply Ship	1	2	5	8	13	10	11	17	21	14	8	7
Standby Safety Vessel	1	3	3	2	2	4	4	3	4	4	2	1
Tankers	**82**	**78**	**88**	**88**	**88**	**94**	**115**	**124**	**120**	**106**	**84**	**84**
Asphalt/Bitumen Tanker	0	1	3	1	1	1	1	1	1	0	0	0
Chemical Tanker	2	4	5	4	4	5	6	9	9	8	5	3
Chemical/Products Tanker	42	37	38	37	46	47	56	65	54	43	32	37
Crude Oil Tanker	5	5	4	4	3	3	4	4	6	5	5	3
Crude/Oil Products Tanker	5	4	7	9	7	7	6	5	7	6	5	7
LNG Tanker	7	5	7	6	6	7	6	7	7	8	7	8
LPG Tanker	3	3	4	2	1	1	3	1	2	2	2	2
Products Tanker	13	14	14	19	14	17	26	24	26	26	22	19
Shuttle Tanker	5	5	5	5	5	4	5	6	6	6	5	5
Tanker (unspecified)	0	0	1	1	1	1	1	1	1	1	1	0
Vegetable Oil Tanker	0	0	0	0	0	1	1	1	1	1	0	0
Total	**1680**	**1491**	**1688**	**1462**	**1688**	**1866**	**2030**	**2022**	**1983**	**1940**	**1486**	**1385**

Appendix 19. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and month.

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bulk Carriers	**468**	**362**	**430**	**395**	**470**	**414**	**488**	**532**	**464**	**465**	**371**	**465**
Bulk Carrier	439	329	409	368	437	382	434	467	397	415	336	434
Bulk Carrier, Self-discharging	6	6	0	8	6	9	8	15	6	2	2	6
Cement Carrier	16	20	15	15	20	17	21	28	24	25	24	20
Limestone Carrier	0	4	2	0	0	0	0	1	3	2	3	1
Ore Carrier	3	0	0	0	0	0	0	0	2	0	1	0
Ore/Oil Carrier	0	0	0	0	0	6	22	20	32	19	4	0
Wood Chips Carrier	4	3	4	4	7	0	3	1	0	2	1	4
Dry Cargo/Passenger	**2873**	**2568**	**3090**	**2911**	**3541**	**4217**	**4829**	**4812**	**4222**	**3701**	**3053**	**2923**
Container Ship (Fully Cellular)	269	180	254	204	286	213	241	243	189	263	161	185
Deck Cargo Ship	27	68	77	53	41	37	22	27	26	24	21	19
General Cargo Ship	584	605	639	680	814	1026	1115	1363	1306	1151	911	738
General Cargo Ship (with Ro-Ro facility)	11	4	12	21	20	8	15	12	15	10	14	14
General Cargo Ship, Self-discharging	64	66	59	56	66	72	70	72	81	73	60	62
General Cargo/Passenger Ship	30	29	50	36	44	76	83	82	54	35	35	36
Heavy Load Carrier	0	0	0	0	0	0	1	5	4	0	0	0
Heavy Load Carrier, semi submersible	0	0	0	3	0	0	4	0	10	4	0	0
Landing Craft	0	4	0	18	35	52	41	51	62	49	11	2
Livestock Carrier	0	0	0	0	0	0	0	0	6	3	0	0
Nuclear Fuel Carrier	0	0	2	0	3	0	0	0	0	4	4	2
Open Hatch Cargo Ship	20	17	21	20	21	14	22	27	19	13	9	20
Palletised Cargo Ship	71	65	70	73	63	80	86	91	86	91	92	65
Passenger Ship	432	362	474	453	570	599	759	668	571	553	484	531
Passenger/Cruise	23	32	82	44	187	588	724	690	384	64	22	14
Passenger/Ro-Ro Ship (Vehicles)	1074	875	1027	972	1049	1059	1118	1060	966	970	925	962
Refrigerated Cargo Ship	184	210	238	234	274	342	465	351	376	343	263	242
Ro-Ro Cargo Ship	31	25	48	26	24	28	33	44	47	37	27	9
Vehicles Carrier	53	26	37	18	44	23	30	26	20	14	14	22

Appendix 19. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fishing	**4093**	**4693**	**5452**	**3872**	**3946**	**5376**	**6049**	**4891**	**4733**	**4386**	**3763**	**2479**
Factory Stern Trawler	289	392	465	263	234	413	634	548	534	372	305	257
Fish Carrier	20	31	46	54	42	70	79	73	65	56	52	59
Fish Factory Ship	26	46	42	70	71	70	123	51	83	57	44	39
Fish Farm Support Vessel	21	38	48	30	30	57	42	38	55	63	61	40
Fishery Patrol Vessel	0	0	0	0	0	3	4	0	0	0	0	0
Fishery Research Vessel	7	10	25	13	22	44	43	55	25	27	4	4
Fishing Vessel	2330	2446	2861	1886	1938	2720	3161	2144	2024	2094	1865	966
Live Fish Carrier (Well Boat)	216	180	203	226	345	319	253	303	306	398	353	299
Seal Catcher	31	18	19	54	37	61	49	37	14	23	12	19
Stern Trawler	1031	1339	1509	1189	1178	1567	1594	1578	1527	1197	965	753
Trawler	122	193	234	87	49	52	67	64	100	99	102	43
Miscellaneous	**468**	**398**	**584**	**591**	**632**	**997**	**1456**	**1845**	**1867**	**1131**	**554**	**404**
Articulated Pusher Tug	0	0	0	0	0	8	7	0	0	0	4	0
Bunkering Tanker	3	1	1	3	3	6	7	10	2	3	4	2
Buoy & Lighthouse Tender	0	0	0	0	0	7	38	34	31	16	0	0
Buoy Tender	0	0	0	0	5	1	19	19	26	10	0	0
Cable Layer	16	7	19	8	10	14	16	17	10	7	8	6
Crane Vessel	0	0	6	6	3	0	7	12	12	1	0	0
Cutter Suction Dredger	0	0	0	0	0	0	4	0	0	4	0	0
Hopper, Motor	13	9	4	13	0	0	13	21	80	54	13	4
Hopper/Dredger (unspecified)	0	0	0	0	0	6	1	4	8	6	7	0
Icebreaker	37	44	71	78	66	78	64	115	119	62	46	50
Icebreaker/Research	0	0	0	0	14	22	22	67	47	20	0	0
Patrol Vessel	109	86	113	118	83	94	102	99	96	93	98	77
Pollution Control Vessel	24	19	24	22	34	36	29	22	34	19	22	18
Pusher Tug	0	0	0	0	0	11	5	32	30	12	0	0
Research Survey Vessel	32	24	61	75	65	185	318	376	341	198	34	11
Salvage Ship	8	2	13	3	8	5	2	15	4	2	19	16
Search & Rescue Vessel	4	10	11	13	10	16	10	8	6	3	9	3
Suction Dredger	4	0	5	3	0	22	21	9	15	18	15	4
Suction Hopper Dredger	0	0	0	0	1	0	0	0	1	1	0	0
Supply Tender	0	0	0	2	5	0	2	1	3	5	30	21
Trailing Suction Hopper Dredger	0	0	0	0	0	0	36	68	117	55	2	0

Appendix 19. Transit counts for the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training Ship	0	1	0	0	0	1	0	0	0	0	0	0
Tug	191	175	221	220	303	465	720	895	850	486	202	163
Utility Vessel	0	1	0	0	0	0	3	13	29	26	18	12
Waste Disposal Vessel	27	19	35	26	17	18	10	2	2	26	23	17
Work/Repair Vessel	0	0	0	1	5	2	0	6	4	4	0	0
Offshore	**94**	**146**	**163**	**193**	**248**	**244**	**341**	**450**	**566**	**371**	**215**	**174**
Anchor Handling Tug Supply	56	72	80	64	70	84	125	156	189	128	84	74
Crew/Supply Vessel	0	0	0	0	0	0	8	31	31	6	0	0
Diving Support Vessel	0	0	0	1	12	4	14	14	11	4	0	0
Drilling Ship	0	0	0	0	0	0	7	15	25	9	0	0
FPSO, Oil	0	0	0	0	0	0	1	0	4	0	0	0
FSO, Oil	0	0	0	0	0	0	0	0	5	6	0	3
Offshore Support Vessel	2	6	5	5	6	11	19	13	11	13	13	11
Offshore Tug/Supply Ship	12	22	31	20	14	18	14	19	21	24	20	9
Pipe Burying Vessel	2	14	0	0	0	0	0	5	6	9	15	5
Pipe Layer	0	0	0	6	11	10	2	1	3	0	0	0
Platform Supply Ship	19	23	36	84	118	99	135	185	236	135	77	68
Standby Safety Vessel	3	9	11	13	17	18	16	11	24	37	6	4
Tankers	**317**	**320**	**309**	**310**	**327**	**379**	**508**	**582**	**550**	**450**	**362**	**342**
Asphalt/Bitumen Tanker	0	1	4	3	2	2	1	2	2	0	0	0
Chemical Tanker	7	13	10	17	17	17	36	33	55	36	17	7
Chemical/Products Tanker	133	112	100	114	168	190	244	289	252	176	172	156
Crude Oil Tanker	14	28	23	9	8	4	12	18	16	37	20	27
Crude/Oil Products Tanker	22	23	25	29	21	25	27	21	31	22	18	14
LNG Tanker	12	14	16	13	14	13	12	16	13	14	14	16
LPG Tanker	8	4	5	3	2	2	5	2	4	4	3	3
Products Tanker	58	68	76	77	47	82	117	131	126	108	69	70
Shuttle Tanker	63	57	48	40	43	32	39	47	41	41	47	49
Tanker (unspecified)	0	0	2	5	5	4	7	4	7	2	2	0
Vegetable Oil Tanker	0	0	0	0	0	8	8	19	3	10	0	0
Total	**8313**	**8487**	**10028**	**8272**	**9164**	**11627**	**13671**	**13112**	**12402**	**10504**	**8318**	**6787**

Appendix 20. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and month.

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bulk Carriers	**24562**	**19317**	**22584**	**17956**	**23674**	**19879**	**23098**	**22761**	**20916**	**25229**	**18805**	**24090**
Bulk Carrier	23930	18533	22101	17519	22707	19493	21844	21403	19531	24171	18188	23542
Bulk Carrier, Self-discharging	85	105	0	110	77	112	104	136	85	38	40	95
Cement Carrier	229	329	199	201	374	220	323	414	321	334	273	265
Limestone Carrier	0	153	82	0	0	0	0	2	156	15	170	2
Ore Carrier	26	0	0	0	0	0	0	0	12	0	10	0
Ore/Oil Carrier	0	0	0	0	0	54	696	724	811	519	52	0
Wood Chips Carrier	292	196	202	125	517	0	131	82	0	152	72	187
Dry Cargo/Passenger	**50907**	**41458**	**53845**	**48018**	**60420**	**66642**	**80289**	**85820**	**77117**	**66604**	**49430**	**48927**
Container Ship (Fully Cellular)	10317	6685	10388	6649	11721	7505	7859	8086	7001	10721	5670	7189
Deck Cargo Ship	681	643	770	503	391	436	279	262	362	271	167	197
General Cargo Ship	15107	14064	17184	17318	19195	21047	26133	33214	34356	29296	22024	18929
General Cargo Ship (with Ro-Ro facility)	341	151	434	513	749	290	705	317	866	641	417	263
General Cargo Ship, Self-discharging	455	489	667	639	448	445	438	557	553	747	702	513
General Cargo/Passenger Ship	757	504	818	763	830	1501	1466	1420	954	688	599	741
Heavy Load Carrier	0	0	0	0	0	0	86	377	404	0	0	0
Heavy Load Carrier, semi submersible	0	0	0	97	0	0	162	0	1162	332	0	0
Landing Craft	0	11	0	267	863	1094	808	1307	1172	1100	158	35
Livestock Carrier	0	0	0	0	0	0	0	0	198	31	0	0
Nuclear Fuel Carrier	0	0	5	0	41	0	0	0	0	46	14	6
Open Hatch Cargo Ship	1121	868	1032	864	1204	691	1164	1415	966	770	638	1210
Palletised Cargo Ship	999	942	1175	1191	818	1157	1114	1589	1136	1523	1363	1099
Passenger Ship	1660	1400	1740	1740	2522	3613	4841	4264	3432	2607	1949	2071
Passenger/Cruise	762	688	1646	907	2997	9037	11437	11968	6151	1187	235	266
Passenger/Ro-Ro Ship (Vehicles)	11390	9186	10780	10348	10734	12284	13762	12496	9749	9428	9752	10395
Refrigerated Cargo Ship	4200	4258	4813	5109	5503	6002	8419	6421	7012	6320	4600	4795
Ro-Ro Cargo Ship	372	277	758	334	458	462	459	944	686	255	288	147
Vehicles Carrier	2744	1292	1637	776	1947	1079	1157	1183	959	641	854	1070

Appendix 20. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fishing	**164499**	**172586**	**202034**	**159595**	**176361**	**197730**	**202888**	**197446**	**214471**	**217159**	**197718**	**154722**
Factory Stern Trawler	20281	26556	29719	18854	26651	31060	30496	32783	35939	38284	29885	26349
Fish Carrier	724	1413	1642	1864	1238	1507	1969	1964	2261	2165	1872	1605
Fish Factory Ship	848	984	1208	1025	852	1504	1958	1260	2084	1078	802	564
Fish Farm Support Vessel	300	442	537	248	330	489	553	587	543	561	620	340
Fishery Patrol Vessel	0	0	0	0	0	68	115	0	0	0	0	0
Fishery Research Vessel	282	197	525	278	806	775	636	1494	959	662	199	62
Fishing Vessel	68809	67989	80703	55050	58582	68577	70776	59837	66804	72801	70633	41977
Live Fish Carrier (Well Boat)	2505	2273	2712	2825	5110	5125	3588	3686	3832	4939	4341	3720
Seal Catcher	1276	762	1269	1533	1281	1237	1438	1010	1198	1206	1072	694
Stern Trawler	65613	67165	76594	75086	78988	85452	88867	91243	96138	90307	83812	76461
Trawler	3861	4805	7125	2833	2524	1935	2494	3582	4714	5156	4481	2949
Miscellaneous	**6796**	**6786**	**10131**	**12984**	**18991**	**24778**	**47100**	**59879**	**58343**	**35687**	**10739**	**6337**
Articulated Pusher Tug	0	0	0	0	0	327	283	0	0	0	30	0
Bunkering Tanker	10	1	1	12	8	49	20	40	12	6	82	74
Buoy & Lighthouse Tender	0	0	0	0	0	123	270	196	329	78	0	0
Buoy Tender	0	0	0	0	113	29	820	348	814	287	0	0
Cable Layer	527	421	558	749	754	291	577	809	398	80	99	96
Crane Vessel	0	0	13	34	15	0	208	302	197	65	0	0
Cutter Suction Dredger	0	0	0	0	0	0	181	0	0	190	0	0
Hopper, Motor	19	34	10	117	0	0	566	1661	1681	1522	255	35
Hopper/Dredger (unspecified)	0	0	0	0	0	17	17	36	81	39	40	0
Icebreaker	1150	1725	2354	2545	1978	1699	2285	4587	4143	3211	1847	1852
Icebreaker/Research	0	0	0	0	509	608	561	1631	1951	1023	0	0
Patrol Vessel	1782	1697	1941	2281	1493	1346	1571	1488	1476	1534	1777	1315
Pollution Control Vessel	120	116	151	122	207	211	98	99	175	93	149	183
Pusher Tug	0	0	0	0	0	216	207	593	834	345	0	0
Research Survey Vessel	938	812	1611	3160	6952	10173	17922	19527	19979	11197	1887	338
Salvage Ship	89	14	382	19	56	152	17	136	58	2	151	185
Search & Rescue Vessel	10	43	65	48	30	108	59	28	15	6	33	3
Suction Dredger	35	0	32	28	0	219	287	95	106	161	94	25
Suction Hopper Dredger	0	0	0	0	6	0	0	0	5	5	0	0
Supply Tender	0	0	0	9	52	0	14	16	24	58	125	137
Trailing Suction Hopper Dredger	0	0	0	0	0	0	2163	6194	5113	3127	56	0

Appendix 20. Operational hours in the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training Ship	0	34	0	0	0	32	0	0	0	0	0	0
Tug	1718	1612	2628	3584	6031	8921	18613	21308	19974	11857	3614	1810
Utility Vessel	0	2	0	0	0	0	260	463	272	353	112	60
Waste Disposal Vessel	398	274	385	275	217	194	100	75	76	301	388	225
Work/Repair Vessel	0	0	0	2	572	63	0	248	633	148	0	0
Offshore	**1007**	**1828**	**2260**	**3455**	**3974**	**4646**	**9010**	**10597**	**11810**	**8726**	**4075**	**2876**
Anchor Handling Tug Supply	626	1007	1233	1685	1657	1459	3481	4150	4806	3420	2359	1858
Crew/Supply Vessel	0	0	0	0	0	0	194	360	355	316	0	0
Diving Support Vessel	0	0	0	39	119	30	224	68	84	135	0	0
Drilling Ship	0	0	0	0	0	0	335	127	191	498	0	0
FPSO, Oil	0	0	0	0	0	0	3	0	11	0	0	0
FSO, Oil	0	0	0	0	0	0	0	0	132	102	0	101
Offshore Support Vessel	34	68	34	23	33	109	295	90	46	266	281	122
Offshore Tug/Supply Ship	155	250	316	137	106	263	969	1331	1614	545	326	65
Pipe Burying Vessel	46	127	0	0	0	0	0	21	14	64	135	50
Pipe Layer	0	0	0	69	137	105	7	3	13	0	0	0
Platform Supply Ship	101	154	297	969	1362	918	1913	3005	3638	2592	867	647
Standby Safety Vessel	44	223	379	533	561	1761	1588	1442	905	789	107	33
Tankers	**8633**	**9508**	**10366**	**9227**	**9683**	**9978**	**13946**	**16985**	**18027**	**13770**	**9665**	**9893**
Asphalt/Bitumen Tanker	0	6	82	42	93	28	5	8	141	0	0	0
Chemical Tanker	138	205	224	180	213	313	623	1206	1498	1157	323	146
Chemical/Products Tanker	3959	4146	4110	3412	4374	4814	6198	7516	7403	4754	3557	3892
Crude Oil Tanker	518	660	697	356	308	270	390	492	679	621	615	629
Crude/Oil Products Tanker	670	717	1154	1074	1032	464	1502	1315	1349	931	604	838
LNG Tanker	459	759	656	434	452	364	398	505	515	429	583	624
LPG Tanker	98	78	100	61	72	65	131	61	70	83	63	111
Products Tanker	1458	1754	2168	2423	1760	2453	3191	4188	4910	4105	2628	2024
Shuttle Tanker	1332	1183	1173	1232	1372	1065	1248	1395	1310	1341	1287	1629
Tanker (unspecified)	0	0	2	12	8	9	33	14	29	9	4	0
Vegetable Oil Tanker	0	0	0	0	0	132	227	285	124	340	0	0
Total	**256404**	**251483**	**301220**	**251236**	**293104**	**323653**	**376332**	**393488**	**400684**	**367176**	**290431**	**246845**

Appendix 21. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and month.

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bulk Carriers	**255081**	**199963**	**235725**	**188184**	**263315**	**229044**	**264678**	**262174**	**237757**	**275548**	**187464**	**243679**
Bulk Carrier	248037	192697	230748	182878	251485	224858	252662	249263	225350	265424	181045	237236
Bulk Carrier, Self-discharging	729	905	0	1302	950	1152	1179	1627	950	360	348	1073
Cement Carrier	2416	3154	2305	2427	4561	2628	3842	4803	3857	3965	3214	3041
Limestone Carrier	0	1436	745	0	0	0	0	16	1445	151	1550	15
Ore Carrier	321	0	0	0	0	0	0	0	147	0	103	0
Ore/Oil Carrier	0	0	0	0	0	407	5261	5558	6008	4095	326	0
Wood Chips Carrier	3578	1771	1927	1576	6319	0	1734	907	0	1552	878	2314
Dry Cargo/Passenger	**520055**	**397493**	**547293**	**467194**	**637471**	**661457**	**790490**	**839375**	**760674**	**672447**	**473171**	**476073**
Container Ship (Fully Cellular)	163462	106648	160840	104144	186451	120142	126677	130879	112324	165766	89278	115033
Deck Cargo Ship	2330	2293	2970	2023	1644	2629	2115	1910	2704	1963	1112	1483
General Cargo Ship	139839	119021	157436	164708	189056	202012	248661	310162	320956	276792	202013	173475
General Cargo Ship (with Ro-Ro facility)	3418	1787	4452	5441	8496	3468	8789	4132	11072	7413	4317	2721
General Cargo Ship, Self-discharging	3651	4142	5266	5334	3411	3694	3479	4576	4382	6004	5712	4072
General Cargo/Passenger Ship	7234	4777	7830	7216	8002	13775	13214	12854	8653	6328	5490	6901
Heavy Load Carrier	0	0	0	0	0	0	1168	4640	4722	0	0	0
Heavy Load Carrier, semi submersible	0	0	0	919	0	0	1529	0	13399	3563	0	0
Landing Craft	0	85	0	1840	5663	7668	5598	8659	7903	7384	1110	327
Livestock Carrier	0	0	0	0	0	0	0	0	879	244	0	0
Nuclear Fuel Carrier	0	0	32	0	346	0	0	0	0	373	136	37
Open Hatch Cargo Ship	13531	10516	12641	9703	15323	8652	14236	17340	12703	9673	6700	14282
Palletised Cargo Ship	7197	6943	8553	8667	5597	8421	8662	12889	8548	12045	10518	8124
Passenger Ship	22234	17721	21770	20506	29640	36845	45515	40755	34921	29859	24809	26395
Passenger/Cruise	7376	7246	18434	7601	27779	91061	113983	116229	57292	11010	2008	3240
Passenger/Ro-Ro Ship (Vehicles)	69120	55309	66254	63543	64689	74915	82121	76651	60936	57389	59038	63324
Refrigerated Cargo Ship	36582	38120	46425	50190	55563	65918	92381	71808	76696	63727	45280	39191
Ro-Ro Cargo Ship	3899	2764	7822	3552	4757	4622	4113	6633	7256	3019	2978	1312
Vehicles Carrier	40183	20121	26568	11808	31057	17635	18250	19257	15327	9897	12672	16157

Appendix 21. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and month(continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fishing	**764901**	**818832**	**973653**	**725910**	**818563**	**970672**	**1021370**	**970986**	**1040492**	**1040389**	**918119**	**710617**
Factory Stern Trawler	102223	128940	148493	91530	131317	155174	161610	176604	191674	197260	147664	126998
Fish Carrier	4632	7424	9596	12808	8806	11200	14554	15215	15217	13827	11221	9058
Fish Factory Ship	4983	5507	7517	7805	6506	10166	12722	7908	11645	6528	5642	3713
Fish Farm Support Vessel	2331	3424	4266	1872	2392	3568	4024	4390	4023	4018	4374	2318
Fishery Patrol Vessel	0	0	0	0	0	193	849	0	0	0	0	0
Fishery Research Vessel	2199	1387	3099	2138	5782	4774	3899	7861	7233	4221	1579	434
Fishing Vessel	302692	306040	379022	244443	267608	337209	352871	282810	295973	314274	302788	177467
Live Fish Carrier (Well Boat)	17225	16953	20492	21789	38469	40836	28530	28186	28097	37308	31832	27996
Seal Catcher	4842	3260	5200	5967	5847	6072	8007	6084	5183	5135	4092	2887
Stern Trawler	302365	319102	357461	324671	339477	390783	420871	422786	458445	431569	386236	344557
Trawler	21408	26795	38506	12886	12357	10696	13435	19140	23001	26250	22690	15188
Miscellaneous	**42095**	**42462**	**62345**	**81551**	**111268**	**153562**	**295109**	**341290**	**331336**	**230441**	**79785**	**45441**
Articulated Pusher Tug	0	0	0	0	0	1993	1780	0	0	0	268	0
Bunkering Tanker	19	6	7	44	48	343	170	342	97	47	612	579
Buoy & Lighthouse Tender	0	0	0	0	0	924	1290	1330	2345	565	0	0
Buoy Tender	0	0	0	0	1028	398	7933	2674	5689	2761	0	0
Cable Layer	2329	1381	2551	2992	3350	956	2313	3513	1954	648	825	794
Crane Vessel	0	0	72	114	46	0	1655	2556	1847	520	0	0
Cutter Suction Dredger	0	0	0	0	0	0	1724	0	0	1699	0	0
Hopper, Motor	94	180	32	877	0	0	4316	8176	7166	9500	2189	200
Hopper/Dredger (unspecified)	0	0	0	0	0	133	145	251	514	290	237	0
Icebreaker	7444	13210	17091	20461	16570	17127	24076	32279	30881	30780	17797	17375
Icebreaker/Research	0	0	0	0	3752	2367	4381	12604	14671	9716	0	0
Patrol Vessel	9379	9564	10778	13050	9016	8154	9664	9048	9635	9345	10642	7273
Pollution Control Vessel	624	686	1005	760	1404	1261	510	502	1043	704	1113	1306
Pusher Tug	0	0	0	0	0	1296	1420	3555	5024	1824	0	0
Research Survey Vessel	6388	4621	9820	20184	35214	57238	105303	114054	113587	67890	12261	1732
Salvage Ship	625	94	2012	98	377	1079	89	805	261	25	1325	1246
Search & Rescue Vessel	76	392	570	513	509	1038	619	291	107	40	323	50
Suction Dredger	216	0	240	215	0	1463	1890	591	556	995	510	173
Suction Hopper Dredger	0	0	0	0	49	0	0	0	47	31	0	0
Supply Tender	0	0	0	70	369	0	116	137	193	430	808	1041
Trailing Suction Hopper Dredger	0	0	0	0	0	0	19841	32232	21834	18874	674	0

Appendix 21. Distance travelled (nm) in the Arctic by vessel type (vessel type class totals provided in bold) and month (continued).

Vessel Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training Ship	0	244	0	0	0	244	0	0	0	0	0	0
Tug	11424	9897	15093	19812	33809	55331	103056	112528	107167	67540	25730	11356
Utility Vessel	0	26	0	0	0	0	1908	565	1109	2137	864	357
Waste Disposal Vessel	3479	2160	3075	2341	1893	1700	910	705	700	2650	3607	1961
Work/Repair Vessel	0	0	0	20	3833	519	0	2552	4911	1431	0	0
Offshore	**7146**	**12372**	**16454**	**25704**	**32680**	**32155**	**61812**	**64694**	**70465**	**59652**	**32629**	**22459**
Anchor Handling Tug Supply	4451	6252	8532	13230	13941	9646	24103	26050	28371	21778	17336	13066
Crew/Supply Vessel	0	0	0	0	0	0	2008	1302	817	1783	0	0
Diving Support Vessel	0	0	0	381	1513	310	1671	640	765	1123	0	0
Drilling Ship	0	0	0	0	0	0	2629	495	1410	3471	0	0
FPSO, Oil	0	0	0	0	0	0	36	0	115	0	0	0
FSO, Oil	0	0	0	0	0	0	0	0	692	659	0	831
Offshore Support Vessel	427	703	300	256	385	1332	3436	1065	288	2822	2966	1153
Offshore Tug/Supply Ship	939	1484	2627	1051	708	2013	4936	7310	8864	3181	1907	576
Pipe Burying Vessel	420	1010	0	0	0	0	0	284	183	707	1673	596
Pipe Layer	0	0	0	780	1293	982	75	26	135	0	0	0
Platform Supply Ship	807	1284	2445	7111	11492	7801	13429	18762	23139	19571	8253	6136
Standby Safety Vessel	103	1639	2551	2896	3348	10072	9489	8761	5687	4558	495	102
Tankers	**87471**	**89097**	**96516**	**99035**	**103713**	**106465**	**146870**	**180546**	**188977**	**133172**	**93359**	**95807**
Asphalt/Bitumen Tanker	0	74	1003	470	1017	318	67	100	1762	0	0	0
Chemical Tanker	1504	1890	2225	1816	1666	3180	6087	12169	14792	10990	3586	1399
Chemical/Products Tanker	43854	42324	42103	39330	48990	54091	67924	83119	82609	48993	35932	39321
Crude Oil Tanker	4066	5998	5028	4044	3660	2774	4099	4317	6240	5697	5454	4818
Crude/Oil Products Tanker	6438	5435	10289	11166	11539	4822	14135	14355	14200	8328	5459	8122
LNG Tanker	5439	7302	6888	5441	6142	5412	5049	6939	6575	5933	6342	6708
LPG Tanker	1267	1211	1423	899	999	989	1918	940	958	973	957	1144
Products Tanker	12076	13192	15959	22934	16054	22467	32830	42441	47558	37084	22814	18271
Shuttle Tanker	12828	11671	11586	12901	13593	11383	12899	13863	13281	13117	12800	16025
Tanker (unspecified)	0	0	11	35	52	63	206	70	220	71	15	0
Vegetable Oil Tanker	0	0	0	0	0	966	1657	2232	782	1987	0	0
Total	**1676750**	**1560218**	**1931987**	**1587578**	**1967010**	**2153355**	**2580329**	**2659064**	**2629702**	**2411649**	**1784527**	**1594075**