Enclosure 1 to the Port Access Route Study: Seacoast of North Carolina Including Offshore Approaches to the Cape Fear River and Beaufort Inlet, North Carolina – Vessel Traffic Analysis

Analysis conducted by the USCG Navigation Center (NAVCEN) in Alexandria, VA

Waterways Risk Assessment and Support Division

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Introduction and Background

This traffic analysis examines data from the years 2017-2020 to identify trends and unique or significant variations of vessel transits and characteristics in consideration of the Port Access Route Study: Seacoast of North Carolina Including Offshore Approaches to the Cape Fear River and Beaufort Inlet, North Carolina (NC PARS). The study area for this traffic analysis is the same as the study area defined in the Federal Register, Agency Docket Number USCG-2020-0093 and shown in Figure 1. The ACPARS-proposed fairways and Bureau of Ocean Energy Management (BOEM) wind energy areas are also shown in this figure.

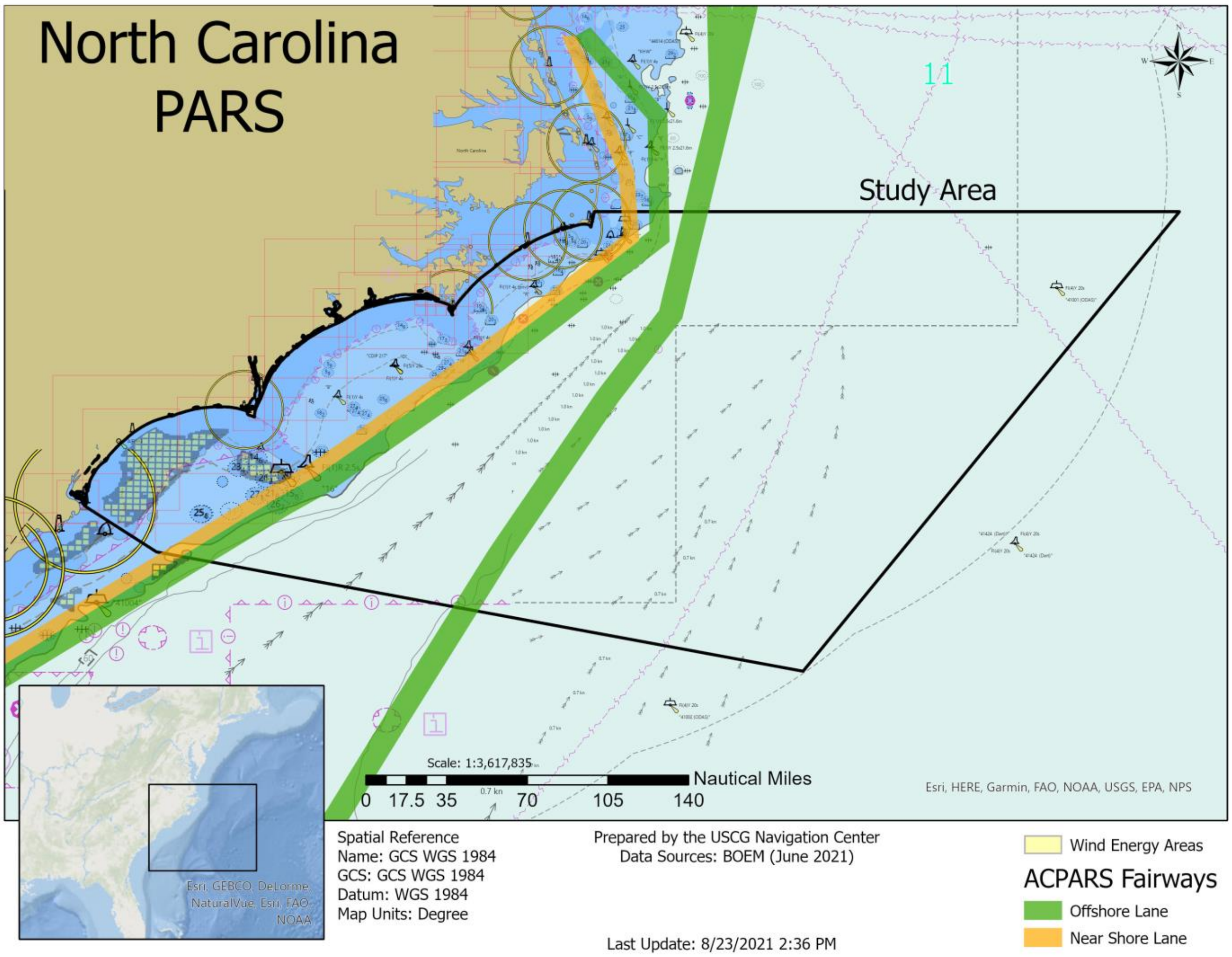

Figure 1: NC PARS Overview

Materials and Data

Nationwide Automated Identification System (NAIS) Data

Traffic data from 01 January 2017 to 31 December 2020 is from the NAIS and provided by the United States Coast Guard (USCG). All dimensions are originally reported in meters; subsequently, draft and length dimensions are converted to feet for use in this report.

Column Header	User-Defined?	Explanatory Information
MSG_TYPE	No	Identifies AIS unit as either Class A or Class B
MMSI	No	Maritime Mobile Service Identity, unique identifier for the ship, can change over time
IMO_NUMBER	Yes	International Maritime Organization Number, remains the same for the vessel's life (not used in this report).
CALL_SIGN	Yes	Not used.
LAT_AVG	No	Aggregate of latitude reports for 2.5 min on either side of time in PERIOD field.
LONG_AVG	No	Aggregate of longitude reports for 2.5 min on either side of time in PERIOD field.
PERIOD	No	Date/Time Stamp of AIS transmission.
SPEED_KNOTS	No	Speed of vessel at time of transmission
COG_DEG	No	Course over ground of vessel at time of transmission
HEADING_DEG	No	True heading of vessel at time of transmission if fitted with gyro compass
SHIP_AND_CARGO_TYPE	Yes	A numerical value between 10 and 99, delineating the vessel's service
DRAUGHT	Yes	Vessel Draft
DIM_BOW	Yes	"Bow Dimension" Distance from transceiver antenna to bow. Used to calculate vessel length.
DIM_STERN	Yes	"Stern Dimension" Distance from transceiver antenna to stern. Used to calculate vessel length.
DIM_PORT	Yes	"Port Dimension" Distance from transceiver antenna to port side. Used to calculate vessel beam.
DIM_STARBOARD	Yes	"Starboard Dimension" Distance from transceiver antenna to starboard side. Used to calculate vessel beam.
DESTINATION	Yes	

Table 1: AIS Data Overview

AIS data fields include fields that are both user-defined and non-user defined as indicated in Table 1. User defined data can be prone to error and missing inputs. Additionally, while AIS accepts user inputs of ship types 1-99, for this analysis, these ship types have been aggregated into nine categories, shown in Table 2.

AIS Ship Type Code	Vessel Group
70-79	Cargo
30	Fishing
0/ Null	Not Available
1-20, 23-29, 33-34, 38-51, 53-56, 58-59, 90-99	Others
60-69	Passenger
36,37	Pleasure Craft / Sailing
35	Military
80-89	Tanker
21-22, 31-32, 52, 57	Tug / Tow

Table 2: AIS Ship Types to Vessel Groups

The group "Not Available" categorizes vessels in which either the type was not recorded by NAIS correctly or the user defined a ship type that is invalid, or unrecognized. The group "Others" includes ships transmitting ship type “Other” (90-99) and various other specified ship types such as dredging, diving, and law enforcement vessels.

AIS traffic data does not capture all vessels that operate in the study area. Federal and international carriage regulations stipulate only certain vessels are required to send and/or receive AIS signals. This includes, but is not limited to: vessels of 65 feet or greater, towing vessels of 26 feet or greater, vessels certificated for 150 or more passengers, dredging vessels near a channel, fishing vessels, and vessels over 300 gross tons on an international voyage. A full description of applicability and general United States requirements can be found in 33 CFR 164.46.

Despite these limitations, AIS traffic data provides a satisfactory representation of the traffic in the study area. Deep draft and large vessels are required to broadcast an AIS signal; the counts of these vessels as well as their geographic locations are assumed to be accurate. The transit patterns for vessels that are not required to broadcast on AIS, such as small recreational vessels, are apparent even if these vessels are undercounted in the data set. This is based on the assumption that since a portion of the population of vessels not required by law to carry AIS voluntarily comply, these vessels provide a representative sample of the whole population. Overall, since not all vessels are required to broadcast on AIS, the population of all vessels in the study area is presumed greater than what is shown in this report.

Software

Track lines were constructed in the International Lighthouse Association’s Risk Assessment (IALA) Software, IWRAP. Track line data extracted from IWRAP were used to create charts in Microsoft Excel, which are found in this study. Traffic densities and passage line diagrams were created using ArcGIS.

Methodology

Traffic Composition Analysis

The traffic composition section provides counts of vessel tracks anywhere in the study area. AIS transmission data was imported to IWRAP and used to construct and enumerate these tracks. In this report, a trip or track is defined as a continual passage through the study area which starts when the vessel enters the area and ends when either it exits the study area or remains stationary for greater than one hour.

This section includes counts of all tracks by vessel type in an area over a given year. This means that if a ship transits in the area multiple times, each transit is counted as a track. For example, if the container ship CGALLTHEWAY transits near the North Carolina shoreline, moors for greater than one hour while discharging cargo, after cargo discharge leaves the berth and anchors for greater than one hour, and finally weighs anchor and transits out of the study area, three tracks are tallied under the type “Cargo.” The first is for the entrance transit, the second for the transit to anchorage, and the third is for the exit transit.

In addition to these track counts, unique vessel counts are also provided. This metric informs the study to differentiate total tracks and vessels responsible for those tracks. This tally indicates the number of unique vessels by type. In respect to the unique vessel counts, CGALLTHEWAY is counted only once under “Cargo,” regardless of the number of transits it makes in the study area. These counts provide a broad overview of the vessels present in the study area.

Passage Line Analysis

While transit counts give a broad idea of traffic composition over the total study area, they dilute the information because the study area is very large. A passage line analysis allows for more specific study of the major routes present. This is accomplished by counting the transits across a gate placed in the areas with the highest traffic density. A transit is counted every time a vessel crosses a passage line then enumerated and reported by vessel type.

Passage lines were placed in areas that appear to have a high traffic volume or because they are of interest due to their geographical location. Entrances and exits to inlets were of interest because of the likelihood of many vessel transits in these areas. Additionally, passage lines were also placed across the width of the traffic lanes approaching Wilmington. Finally, some passage lines were selected to capture coastline traffic in or near the proposed ACPARS fairways.

Figure 2 and Figure 3 depict the locations of passsage lines used in this analysis along with traffic density of all vessels from 2019. Traffic density is shown on a black, purple, orange, to yellow scale with black as lowest density and yellow as highest. Passage lines are teal. Table 3 provides the name and number used to refer to each passage line throughout the study.

Continuing the previous example, in the passage line analysis conducted for North Carolina PARS, the CGALLTHEWAY is counted every time it crosses each passage lines. If that vessel crosses the Separation Zone Approaching/Exiting Cape Fear River and also crosses the Southern Traffic Near Frying Pan Shoals line in the same trip, two crossings are counted under "Cargo," one for each passage line.

Number	Name
1	Winyah Bay Entrance
2	Murrells Inlet
3	Little River Inlet
4	Cape Fear River Entrance Near Bald Head Shoal
5	Cape Fear River Entrance Split
6	Separation Zone Approaching/Exiting Cape Fear River
7	Frying Pan Shoals
8	Masonboro Inlet
9	Beaufort Inlet
10	Lookout Shoals South
11	Near Diamond Shoals
12	Northern Traffic Near Cape Hatteras, Inland ACPARS Fairway
13	Northern Traffic Near Cape Hatteras, Middle ACPARS Fairway
14	Southern Traffic Near Frying Pan Shoals
15	ACPARS St. Lucie to New York Fairway, Northern Line
16	ACPARS St. Lucie to New York Fairway, Southern Line

Table 3: Passage Lines by Name and Number

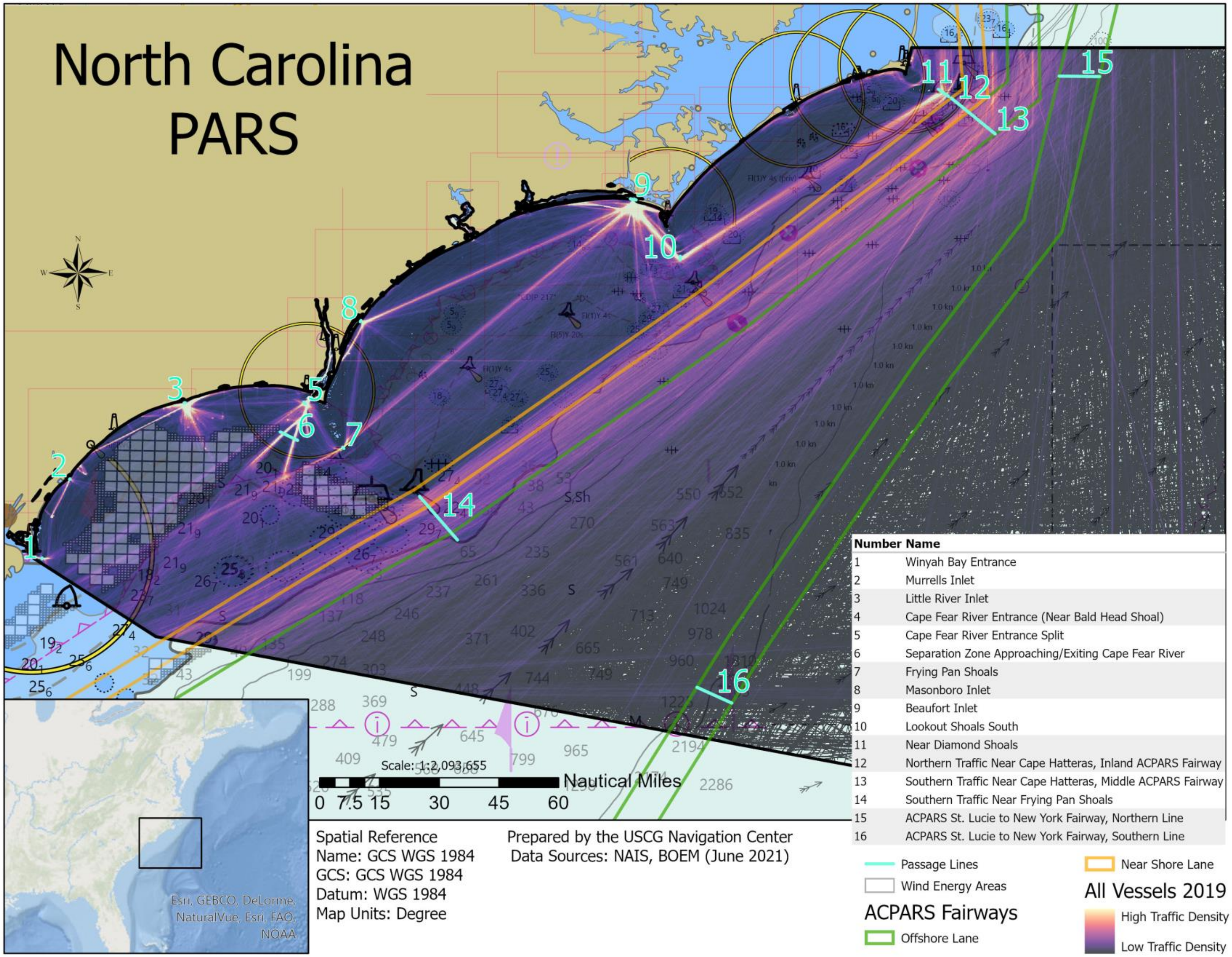

Figure 2: Geographical Locations of Passage Lines
Note: All passage lines are displayed above, some are smaller than others. The number labels are approximately centered on each passage line

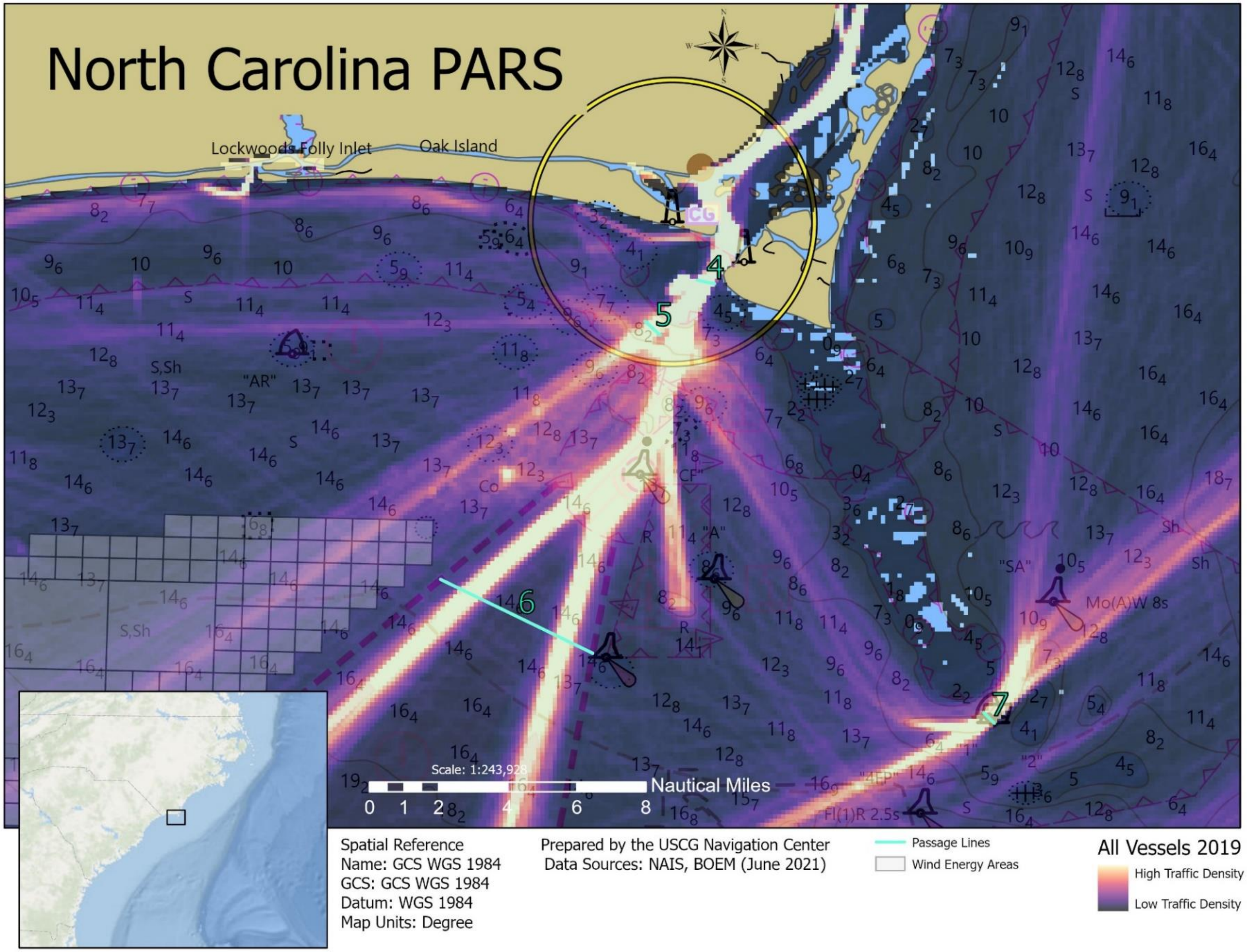

Figure 3: Geographical Locations of Passage Lines 4-7

Comparing Traffic Composition and Passage Line Analyses

The traffic composition figures (under the "Analysis" section titled "Traffic Composition Analysis") examine the study area as a whole, while the passage line analysis examines subsets of the area that are of particular interest. Passage line analysis subsets do not together encompass the entire study area. Therefore, the sum of the number of transits recorded in the passage line analysis will not equal the total number of transits in the traffic composition section. For example, in the passage line analysis section, if across all passage lines there are a total of 200 Pleasure Craft vessel transits in 2018, there will be more than 200 transits recorded in the traffic composition section for this vessel type. Although each analysis is informative, each should be considered separately since it is not expected that the traffic shown in the passage line analysis will reflect all traffic in the study area.

Vessel Length Distributions

The vessel length distributions report the sizes of vessels that transited the study area. For these histograms, any length less than or equal to zero and greater than or equal to 400 meters was removed as erroneous. Lengths were the converted from meters to feet.

Two histograms are included for each year of data. The first shows counts of the number of unique vessels reporting particular lengths. The second shows the count of the number of transits recorded by vessels of particular lengths. The vessel length from every track line is counted, so a vessel that visits the study area multiple times is counted each time. Histograms of vessel lengths by vessel type are also included in Attachment 2 – Vessel Length Histograms.

Traffic Densities

The charts in the traffic density section were created using ArcGIS's line density function. The same data used in the traffic composition section were used to create track lines, and subsequently used to construct density plots. The density graphics show all vessel traffic for the key listed attribute over the course of a year. For example, the All Vessels density shows the conglomerate of the track lines of all the vessel groups combined, while the Cargo Ship density shows only the track lines associated with cargo ships. Densities are calculated by enumerating the length of transits per square mile ($\frac{\text{Miles transited(year)}}{mile^2}$) and are represented on a black, purple, orange, to yellow scale with black as lowest density and yellow as highest. These calculations are carried out independently for each traffic density, thus each density is shown on a different scale that best represents the data in each case.

Traffic densities were also created to show patterns of vessel traffic crossing the passage lines. For these densities, tracks were sorted based on whether or not they intersected the passage line of interest, then only these tracks were used to derive a traffic density for that passage line.

Analysis of Vessel Tracks in a Geographic Area

This section provides additional graphics detailing vessel track line counts for the type "Tug Tow" in the study area. Vessel tracks are enumerated in one-half nautical mile square bins and displayed on a color scale from black, purple, orange, to yellow in ArcGIS. Separate graphics are included for each year of data. Between the years, the same scale and colors are used to display the vessel track counts. Thus, the graphics for each year can be directly compared to one another.

Vessel Monitoring System (VMS) Data Analysis

Additional VMS fishing vessel data was analyzed in comparison to the AIS data. These data were provided by National Oceanic and Atmospheric Administration (NOAA) Fisheries for January 2017, July 2019, and

December 2020. The sharing and use of these data satisfies the criteria of section 1881a(b)(1)(H) of the Magnuson-Stevens Fisheries Management and Conservation Act.

Results

Results for this analysis are maintained by NAVCEN in Word, Excel, PDF, ArcGIS and IWRAP files. For more information, please contact NAVCEN:

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Analysis

This section includes the Traffic Composition Analysis, Passage Line Analysis, Vessel Length Distributions, Traffic Densities, and Analysis of Vessel Tracks in a Geographic Area.

Traffic Composition Analysis

The Traffic Composition charts indicate how many transits each vessel type made in the study area over the identified year. These charts (Figure 4-Figure 7) also show a count of the number of unique vessels in the identified year by type. For example, in 2017, 1729 unique Cargo vessels conducted 8103 total transits in the study area as depicted in Figure 4.

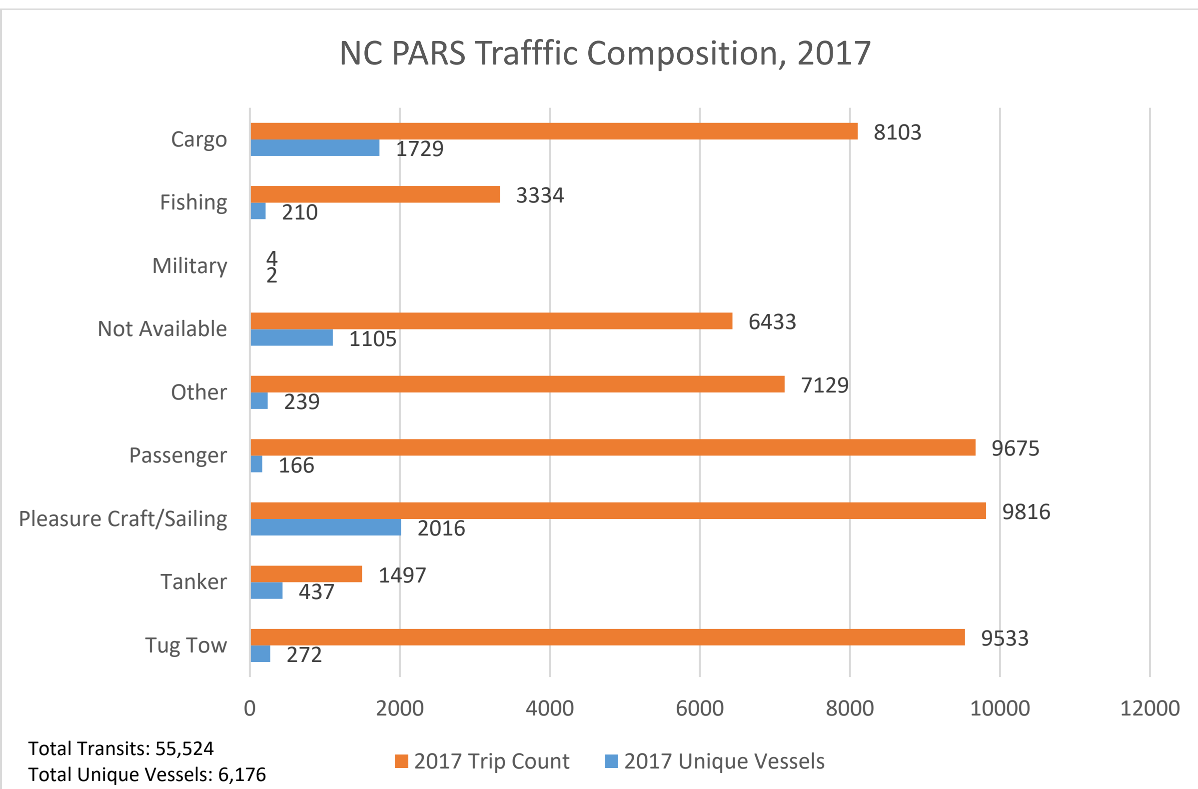


Figure 4: Traffic Composition Chart, 2017

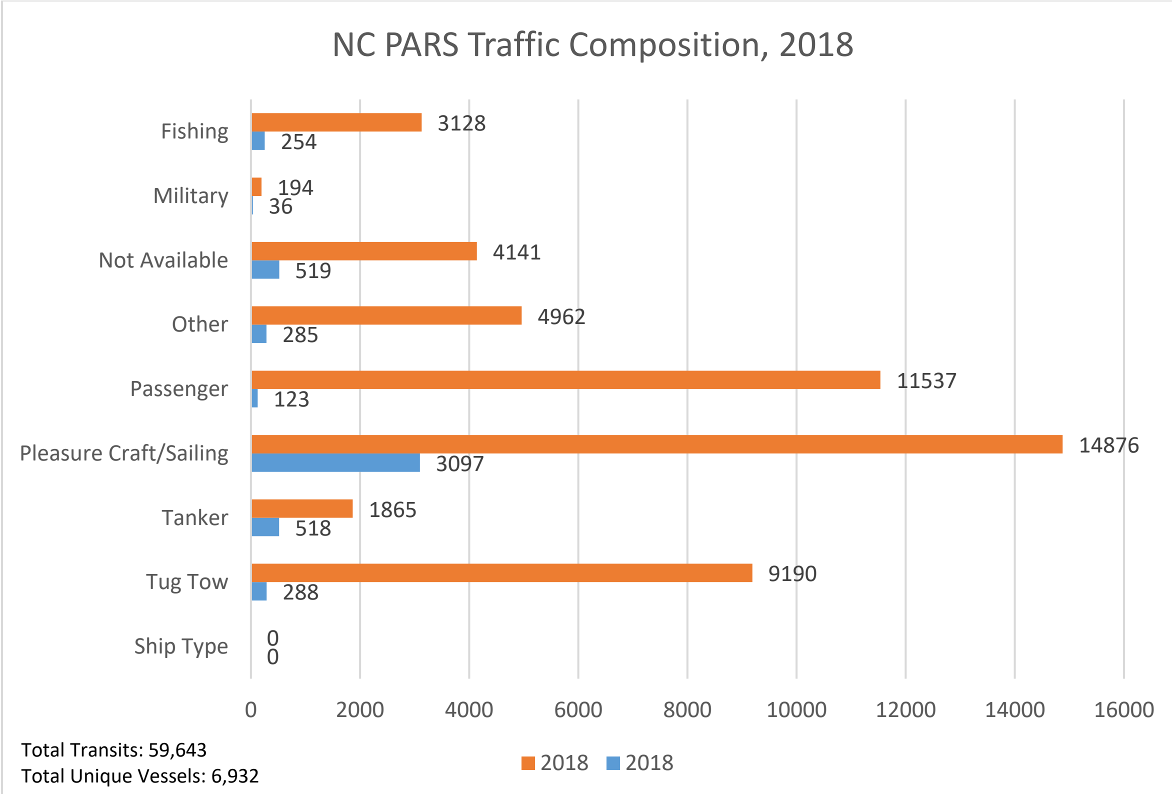


Figure 5: Traffic Composition Chart, 2018

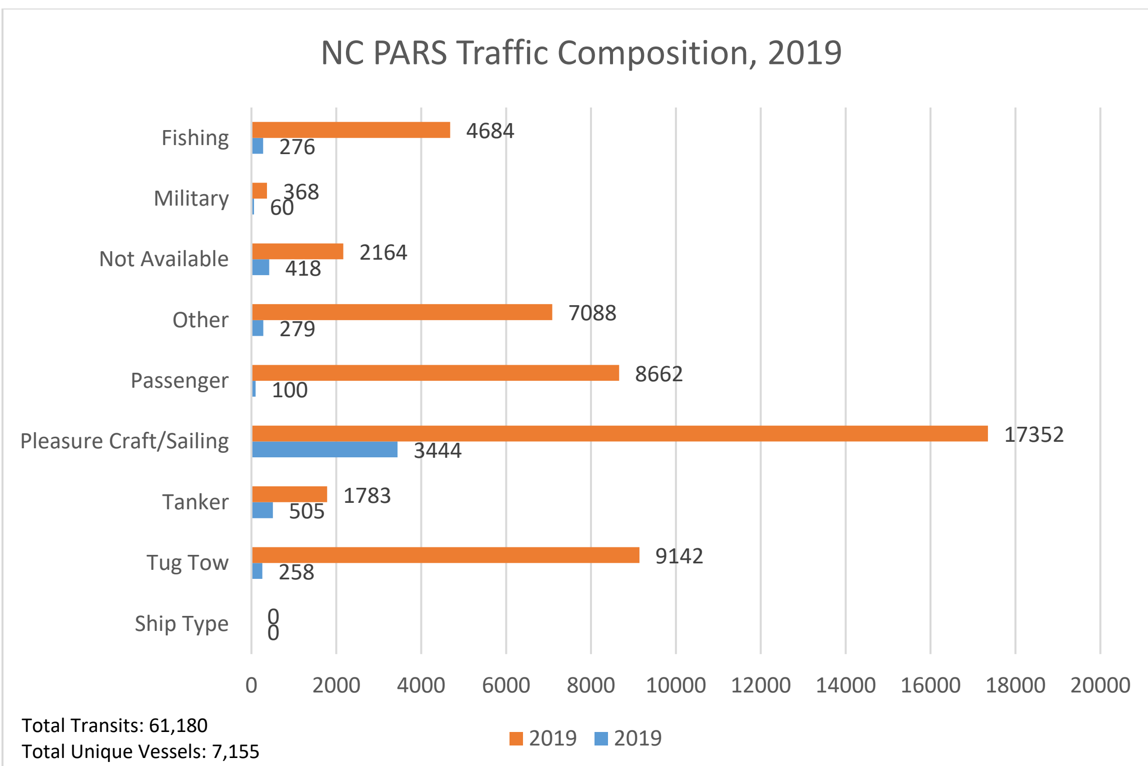


Figure 6: Traffic Composition Chart, 2019

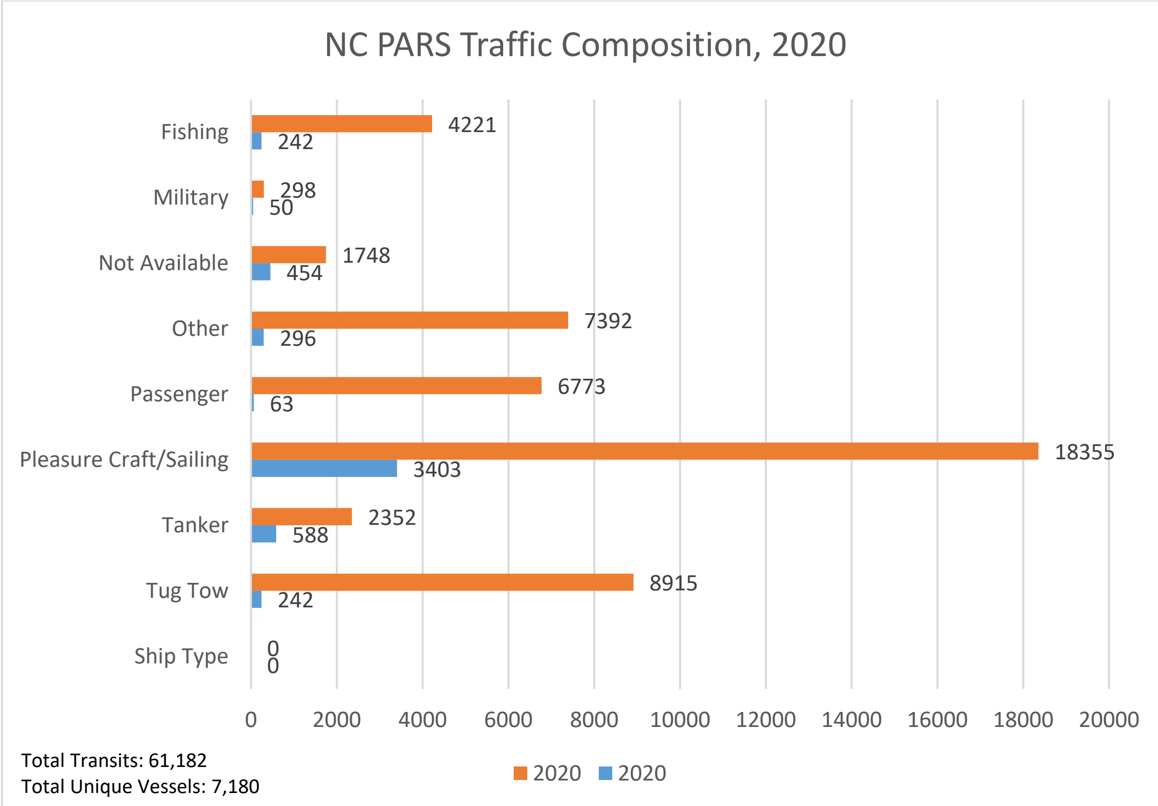


Figure 7: Traffic Composition Chart, 2020

Information in in Figure 8 and Figure 9 is the same information shown in Figure 4-Figure 7. However, these charts allow a direct comparison of total trips and unique vessels counted between the four years of data. For example, in Figure 8, the number of trips counted for tug/tows in 2017, 2018, and 2019 remained consistent within a range of 618 trips.

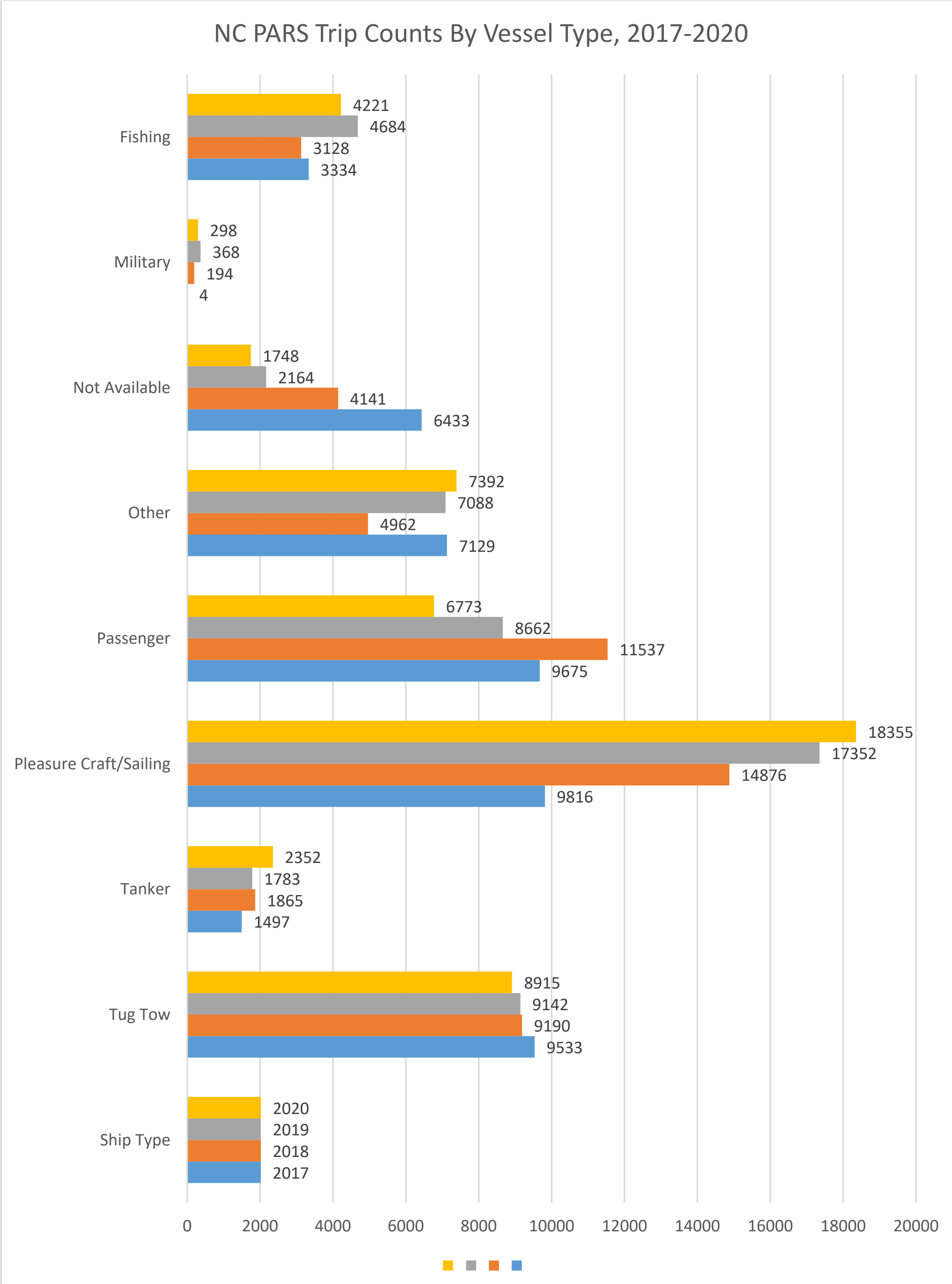


Figure 8: Trip Counts by Vessel Type Chart, 2017-2020

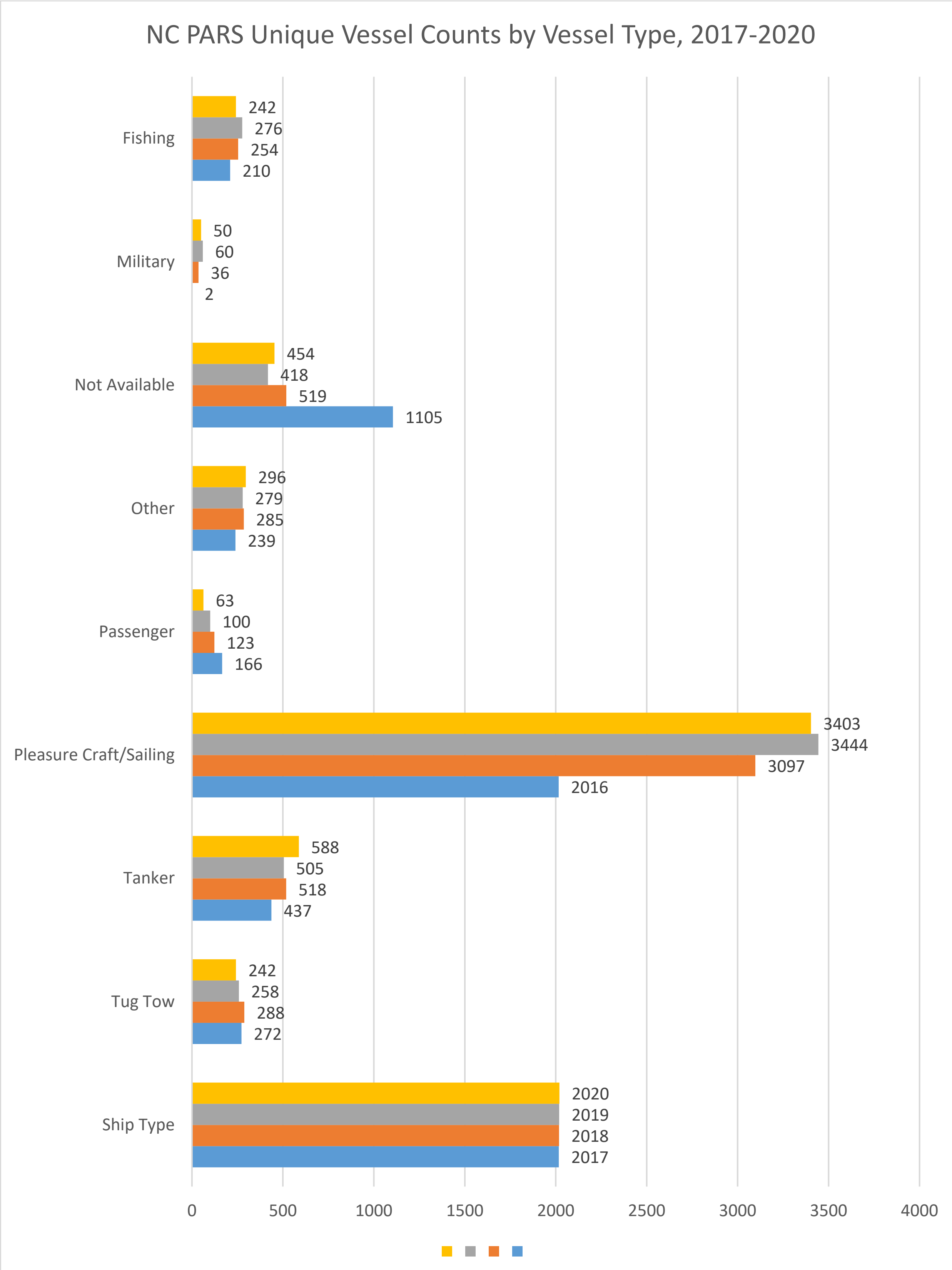
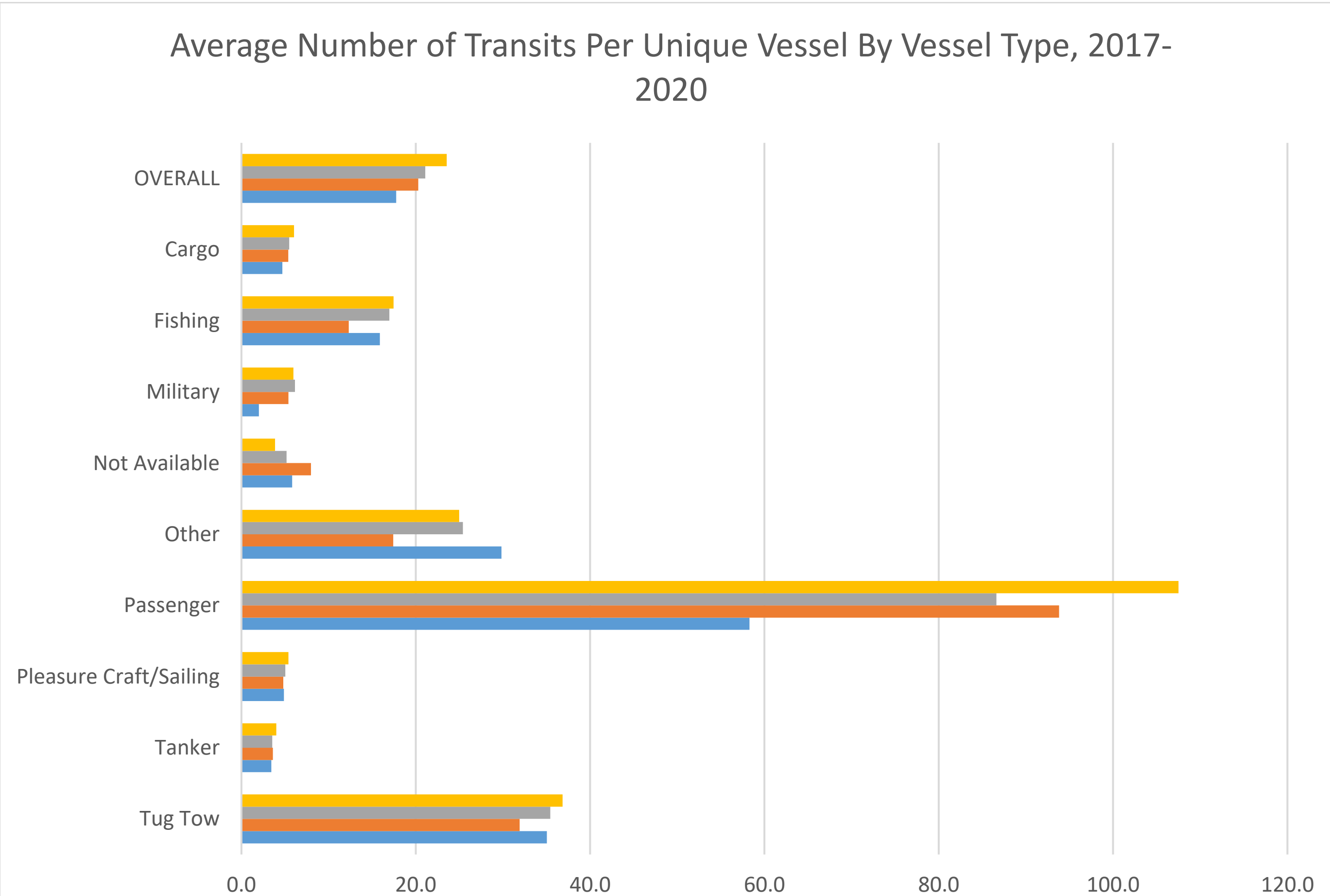


Figure 9: Unique Vessel Counts by Vessel Type Chart, 2017-2020

Calculating transits per unique vessel is a way to compare the traffic distribution between the four years of data. The overall average number of transits per vessel per year are shown in Table 4 (also represented by the "OVERALL" column in the chart). The average number of transits conducted by each unique vessel by type per year is calculated by dividing the total number of transits by the total number of unique vessels, shown in Figure 10. In practice, some vessels visit the study area more frequently than others.

Year	Average Number of Transits per Unique Vessel
2017	17.8
2018	20.3
2019	21.1
2020	23.6

Table 4: Average Number of Transits per Unique Vessel by Year



	Tug Tow	Tanker	Pleasure Craft/Sailing	Passenger	Other	Not Available	Military	Fishing	Cargo	OVERALL
2020	36.8	4.0	5.4	107.5	25.0	3.9	6.0	17.4	6.0	23.6
2019	35.4	3.5	5.0	86.6	25.4	5.2	6.1	17.0	5.5	21.1
2018	31.9	3.6	4.8	93.8	17.4	8.0	5.4	12.3	5.4	20.3
2017	35.0	3.4	4.9	58.3	29.8	5.8	2.0	15.9	4.7	17.8

Figure 10: Average Number of Transits per Unique Vessel by Vessel Type Chart, 2017-2020

Observations About the Traffic Composition From Year to Year

Overall, the number of unique vessels in the study area showed a steady increase from 2017-2020. For most vessel types, the number of trips attributed to each unique vessel (Figure 10) increased slightly each year as well.

In terms of yearly variations, there are more vessels with the type not available in 2017 than in the other years analyzed. There are also fewer pleasure craft in 2017; it is possible that a large percentage of these "Not Available" vessels are pleasure craft. Another observation is that the number of unique passenger ships that visited the study area in 2020 is lower than the other years presented, which is possibly attributable to the COVID-19 pandemic. However, the number of trips on average that each of these passenger vessels completed was much higher in 2020 than other years. This might suggest that even though fewer passenger vessels were operating, the demand for passenger vessel services in the area did not change appreciably in 2020 but was fulfilled by fewer vessels.

Although these observations are informative, data across a longer timeframe is needed to make definitive conclusions about the traffic trends for this area over the years.

Passage Line Analysis

Full-page traffic density graphics for each passage line shown in Figure 2 and Figure 3, including charts with crossing counts, are included in Attachment 1 – Passage Line Data. The data shown in the traffic density for each passage line spans 2017-2020. The number of crossings by type are shown in the chart included in the right hand corner of each graphic. These charts are further divided by year. The total crossings and figure numbers for these graphics and charts are shown in Table 5. The Total Crossings chart (Figure 11) shows the number of crossings across all vessel types for each of the designated passage lines. A discussion of observations about these passage lines is also included in the following sections.

Number	Name	Figure Number (In Attachment 1)	Figure Number (In-Line)	Total Crossings (2017-2020)
N/A	All Crossings Totals	N/A	Figure 11	134,291
1	Winyah Bay Entrance	Passage Line Figure 1	Figure 12	2,797
2	Murrells Inlet	Passage Line Figure 2	Figure 12	2,309
3	Little River Inlet	Passage Line Figure 3	Figure 13	12,344
4	Cape Fear River Entrance Near Bald Head Shoal	Passage Line Figure 4	Figure 16	26,094
5	Cape Fear River Entrance Split	Passage Line Figure 5	Figure 17	1,539
6	Separation Zone Approaching/Exiting Cape Fear River	Passage Line Figure 6	Figure 18	6,330
7	Frying Pan Shoals	Passage Line Figure 7	Figure 15	2,475
8	Masonboro Inlet	Passage Line Figure 8	Figure 12	7,043
9	Beaufort Inlet	Passage Line Figure 9	Figure 14	34,200

10	Lookout Shoals South	Passage Line Figure 10	Figure 15	3,530
11	Near Diamond Shoals	Passage Line Figure 11	Figure 15	6,670
12	Northern Traffic Near Cape Hatteras, Inland ACPARS Fairway	Passage Line Figure 12	Figure 19	5,142
13	Northern Traffic Near Cape Hatteras, Middle ACPARS Fairway	Passage Line Figure 13	Figure 19	10,371
14	Southern Traffic Near Frying Pan Shoals	Passage Line Figure 14	Figure 19	13,447
15	ACPARS St. Lucie to New York Fairway, Northern Line	Passage Line Figure 15	Figure 20	2,162
16	ACPARS St. Lucie to New York Fairway, Southern Line	Passage Line Figure 16	Figure 20	465

Table 5: Passage Line Charts' Figure Numbers and Overall Totals

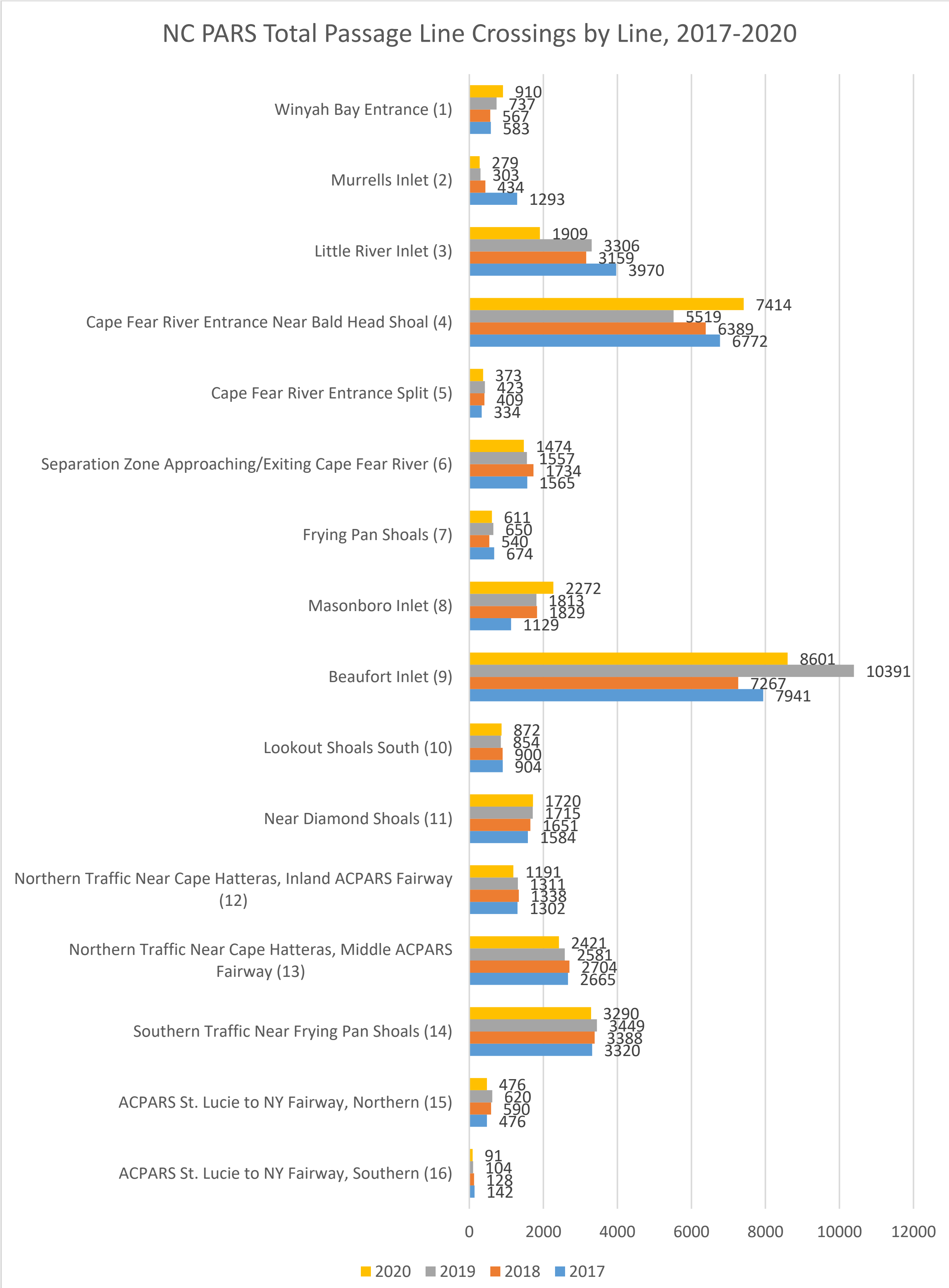


Figure 11: Overall Passage Line Crossings, 2017-2020

Inlet Passage Lines – Numbers 1, 2, 3, 8, and 9

Passage line data for the various inlets in the study area typically showed a high percentage of pleasure craft and other smaller vessels of various types.

Winyah Bay Entrance (1), Murrells Inlet (2), and Masonboro Inlet (8)

For these three inlets, the crossings consist primarily of pleasure craft, with some of type other and tug-tow (Figure 12). In 2017 and 2018, Murrells Inlet had a larger number of passenger vessel crossings, although this pattern does not hold for the more recent years. The vessels fan out from the respective passage lines and remain near shore. There are also vessels that appear to transit between inlets, with some traffic crossing the wind energy areas in the southern part of the study area.

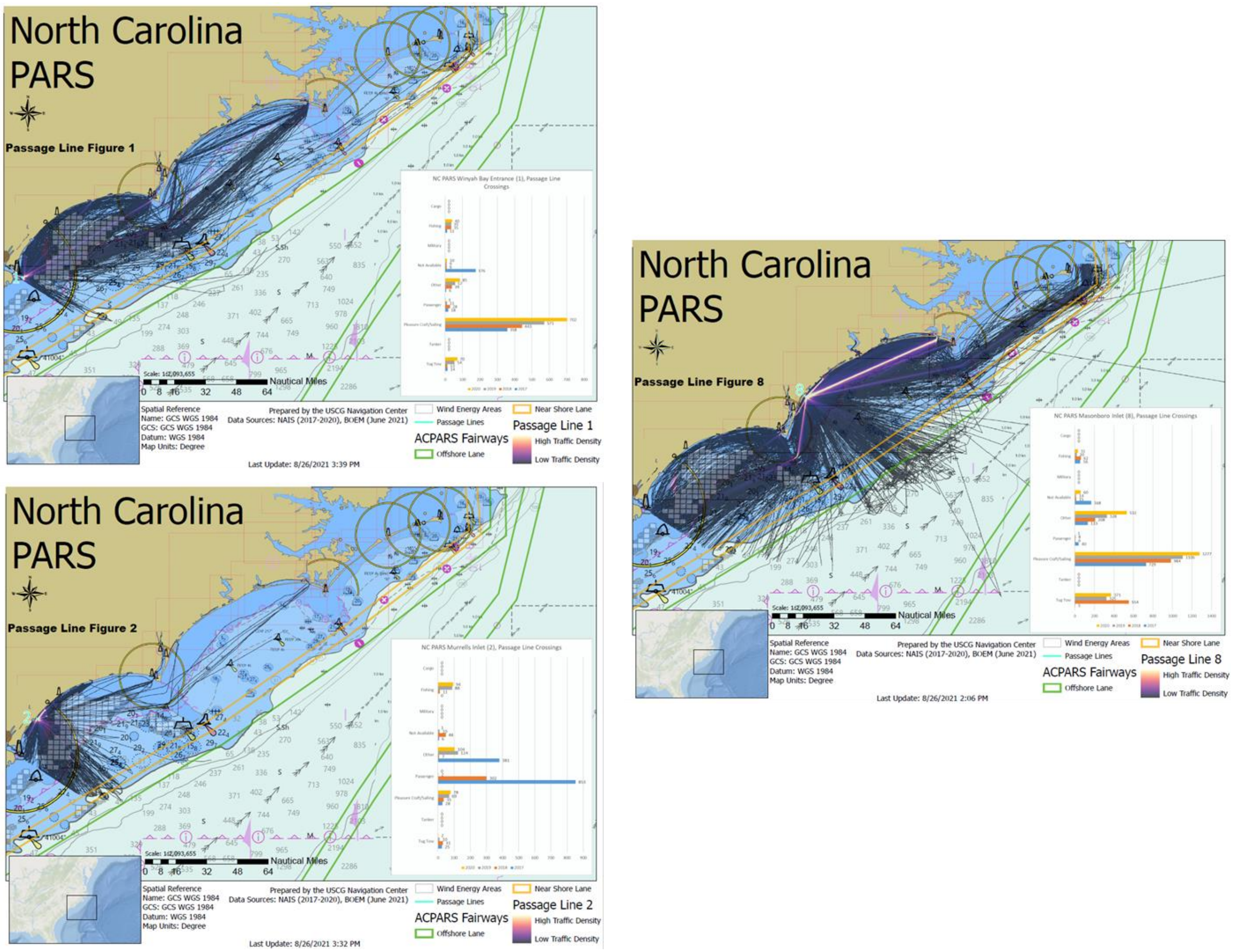


Figure 12: Winyah Bay Entrance (1), Murrells Inlet (2), and Masonboro Inlet (8) Passage Line Graphic

Little River Inlet (3)

Fewer pleasure craft crossings were recorded for this inlet, while many passenger vessel crossings were recorded. The passenger vessel crossings trend downward from 2017 to 2020, with 2020 having the lowest passenger vessel count. This decrease in passenger vessel traffic may be attributable to the COVID-19 pandemic during this time period. Additionally, unlike other years, in 2020 there were no tug-tow vessel crossings recorded for this passage line. Similar to lines 1, 2, and 8, the traffic creates a fan pattern from the passage line location. Vessels also appear to transit from this inlet to other locations along the coast. See Figure 13.

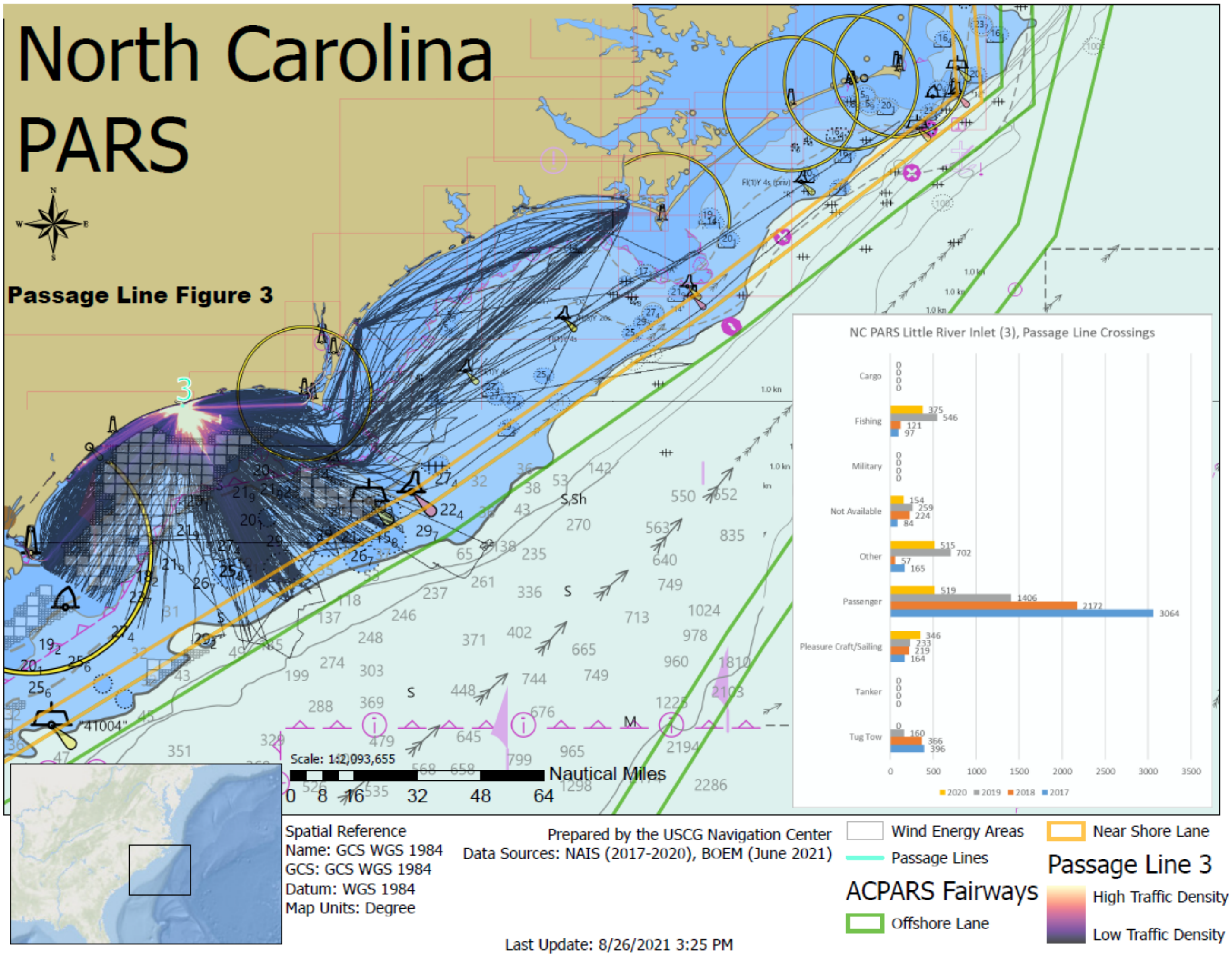


Figure 13: Little River Inlet (3) Passage Line Graphic

Beaufort Inlet (9)

Beaufort Inlet has a significant number of crossings by most vessel types, including fishing, not available, other, passenger, pleasure craft, and tug-tow, as shown in Figure 14. There are also some crossings by cargo ships or tankers and military vessels. The highest number of crossings for this line, similar to most of the other inlets, is pleasure craft. Similar to line 3, far fewer passenger vessel crossings were recorded in 2020 as compared to other years.

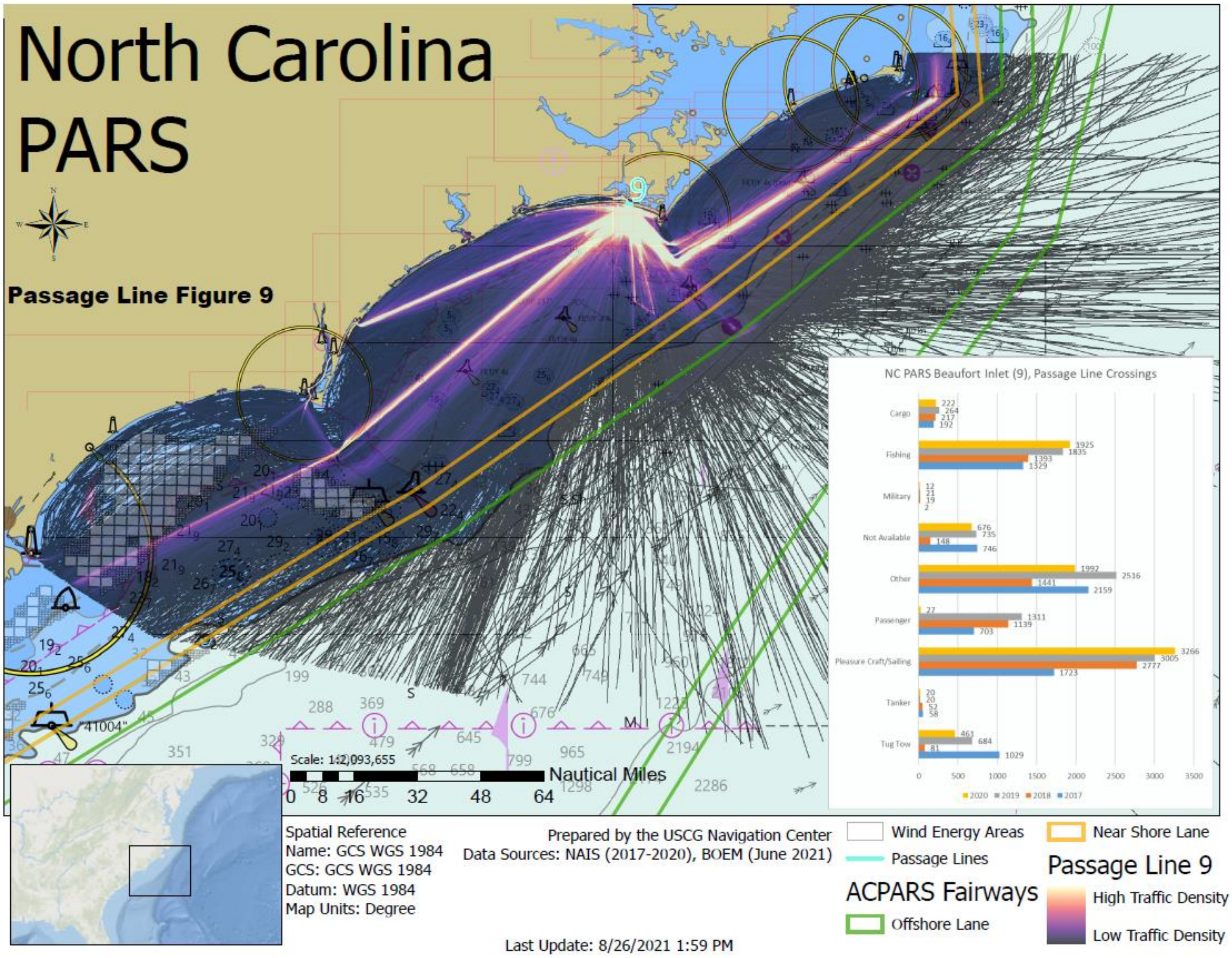


Figure 14: Beaufort Inlet (9) Crossings Graphic

Shoal Passage Lines – Frying Pan Shoals (7), Lookout Shoals South (10), and Diamond Shoals (11)

For passage lines 7, 10, and 11, there are a large number of pleasure craft crossings (Figure 15). In addition, tug-tow and fishing vessels transit in these areas with higher frequency than other types. The most fishing vessels, exceeding the pleasure craft crossing counts in some years, are seen for passage line 10. Few larger cargo or tank ships transit near these shoals. The origination or destination locations of the crossing vessels appear similar to those observed in the pleasure craft traffic densities (discussed in the “Analysis” and “Traffic Densities” section). Most of the vessels that cross these lines remain near-shore.

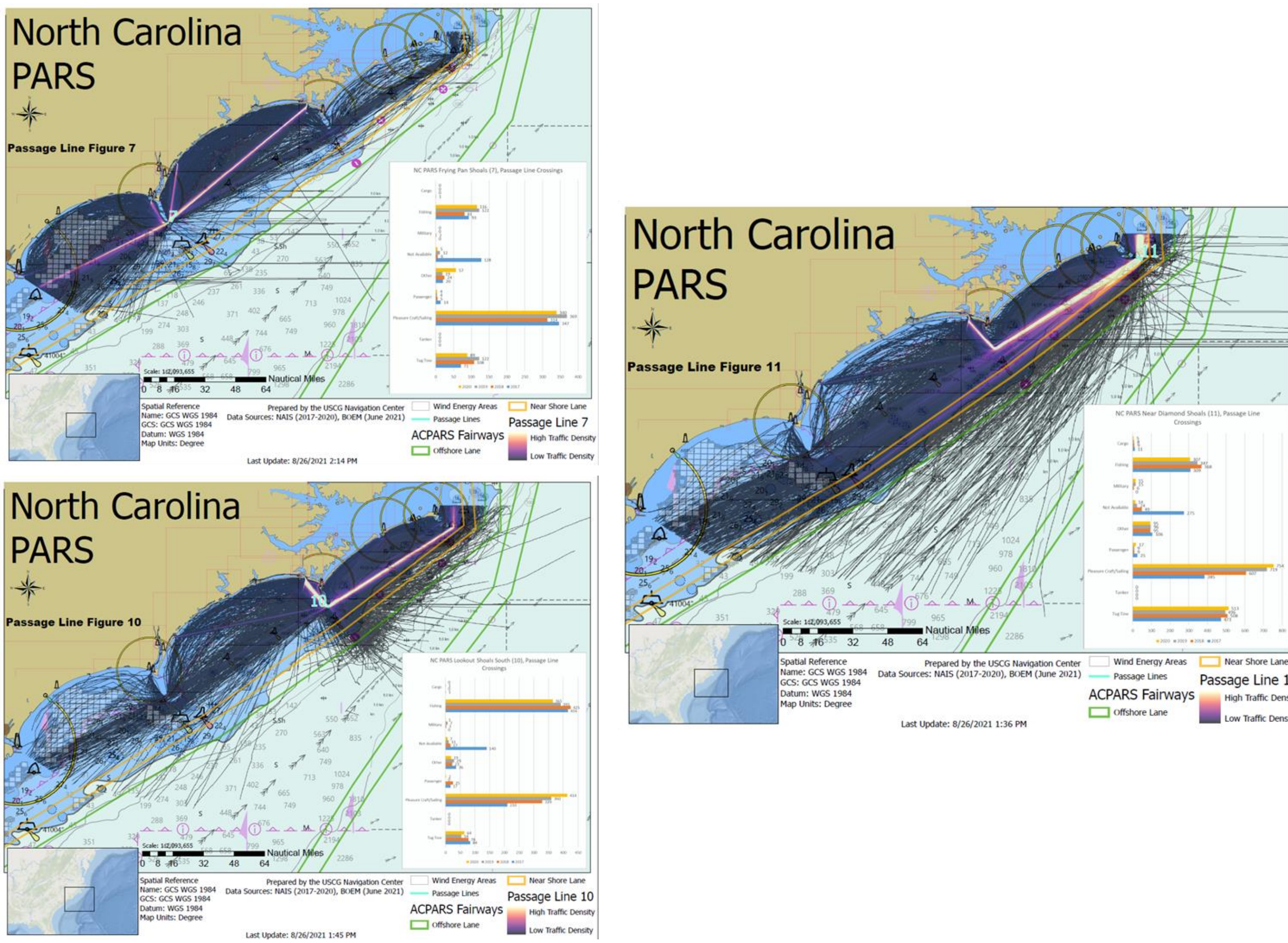


Figure 15: Frying Pan Shoals (7), Lookout Shoals South (10), and Diamond Shoals (11) Passage Lines Graphic

Existing or Near Existing Routing Measures Passage Lines - Numbers 4, 5, and 6

The passage lines near the existing TSS approaching the Cape Fear River show a mixture of vessel types.

Cape Fear River Entrance Near Bald Head Shoal (4)

The crossings of this line show the greatest mixture of different vessel types, including pleasure craft, cargo, tanker, other, not available, and tug-tow. This can be seen in Figure 16. Due to the placement of this line north of the TSS, but south of the Cape Fear River, this passage line was expected to capture many vessel types that either use the TSS or break-off and transit in other areas near the coast. High traffic density areas include through the TSS, approaching Little River Inlet, and crossing both the wind energy areas.

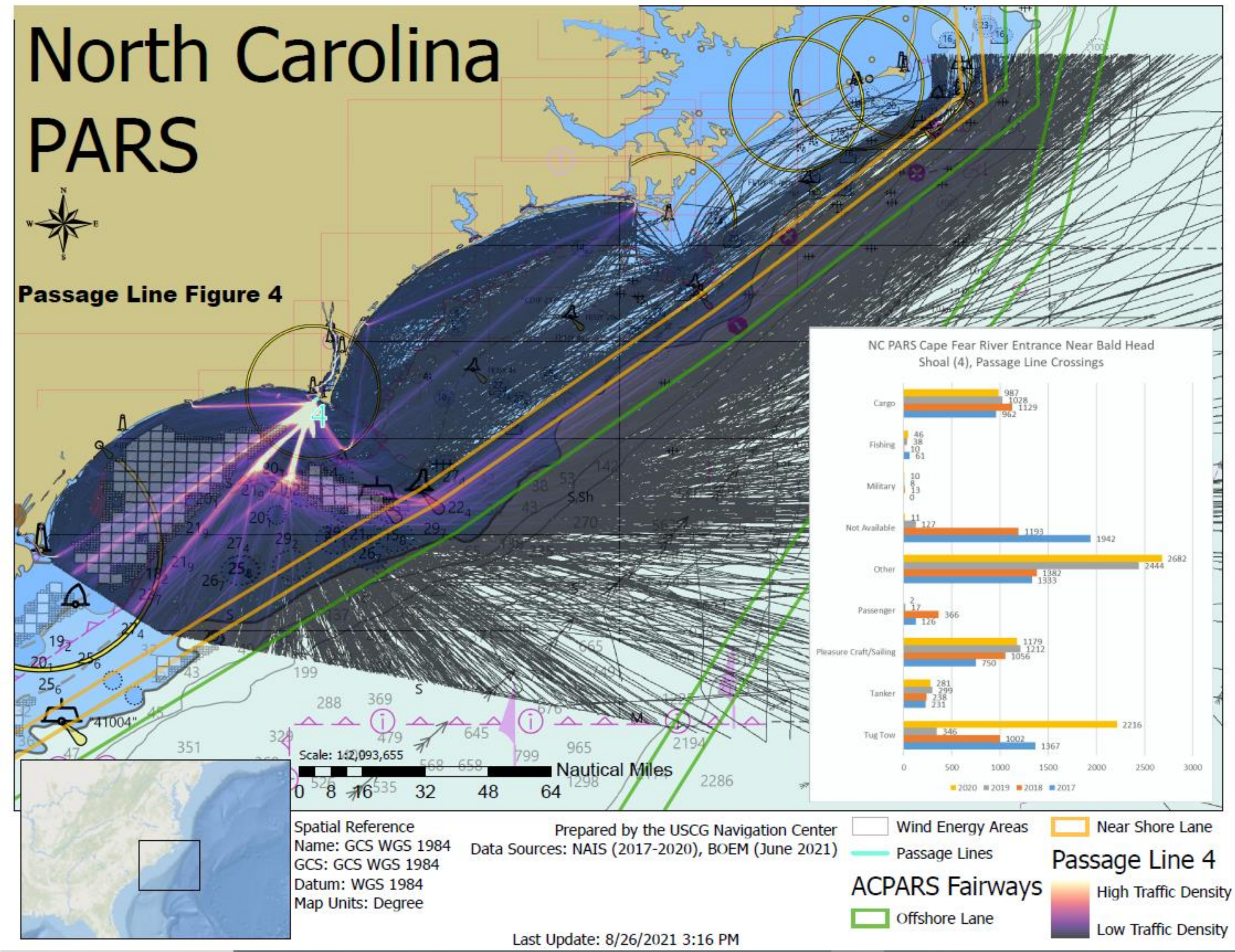


Figure 16: Cape Fear River Entrance Near Bald Head Shoal (4) Passage Line Graphic

Cape Fear River Entrance Split (5)

Line 5 was placed to specifically examine the traffic that does not use the TSS near the Cape Fear River Entrance and is shown in Figure 17. These vessels are primarily pleasure craft, many of which transit through the wind energy area to the south.

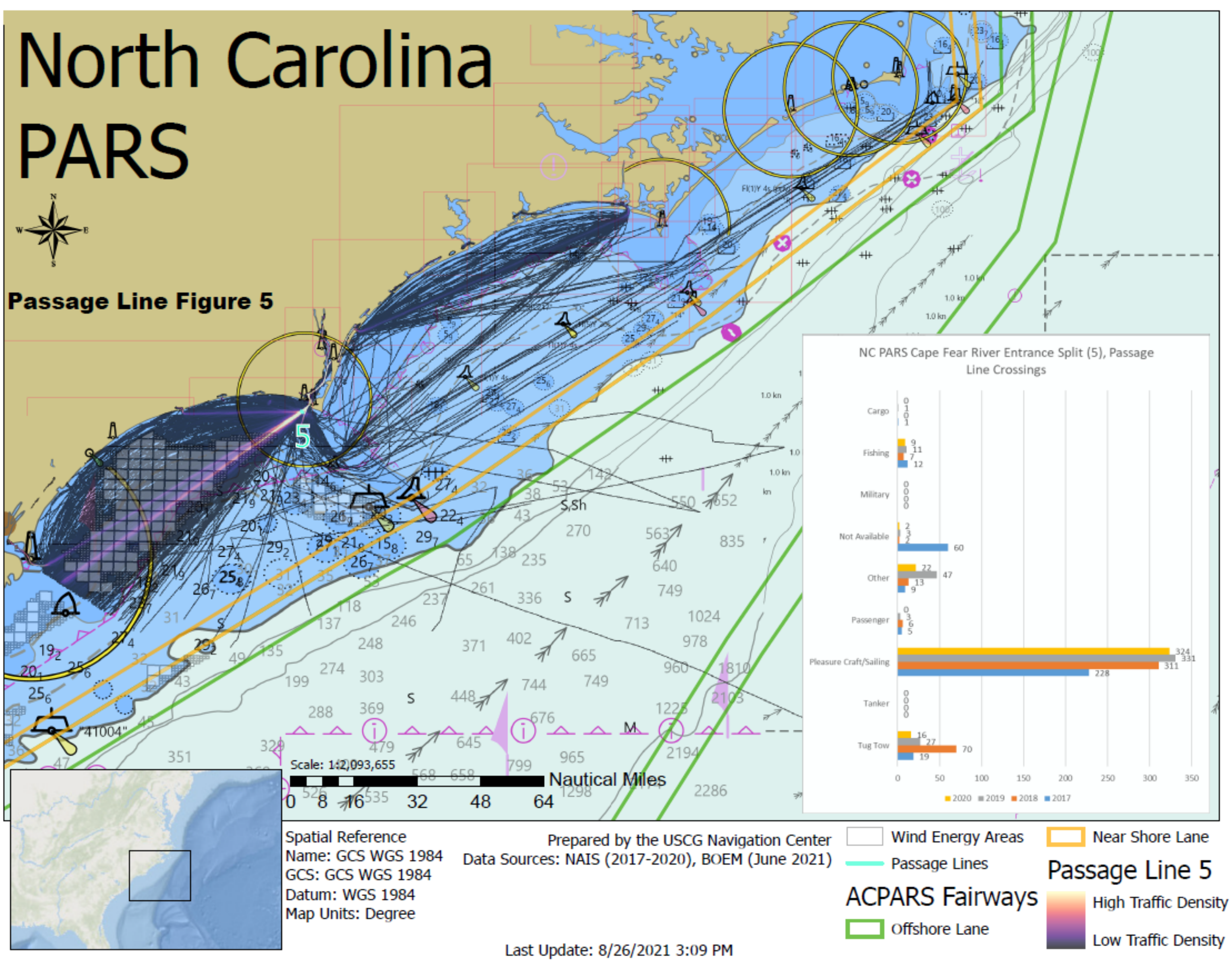


Figure 17: Cape Fear River Entrance Split (5) Passage Line Graphic

Separation Zone Approaching or Exiting Cape Fear River (6)

There are a significant number of cargo and tanker crossings noted for the Separation Zone, Approaching or Exiting Cape Fear River (6). While a large volume of this traffic appears to transit either north or southward between the two wind energy areas, there is also high traffic density through the wind energy area to the east of the TSS. These transit patterns are visible in Figure 18.

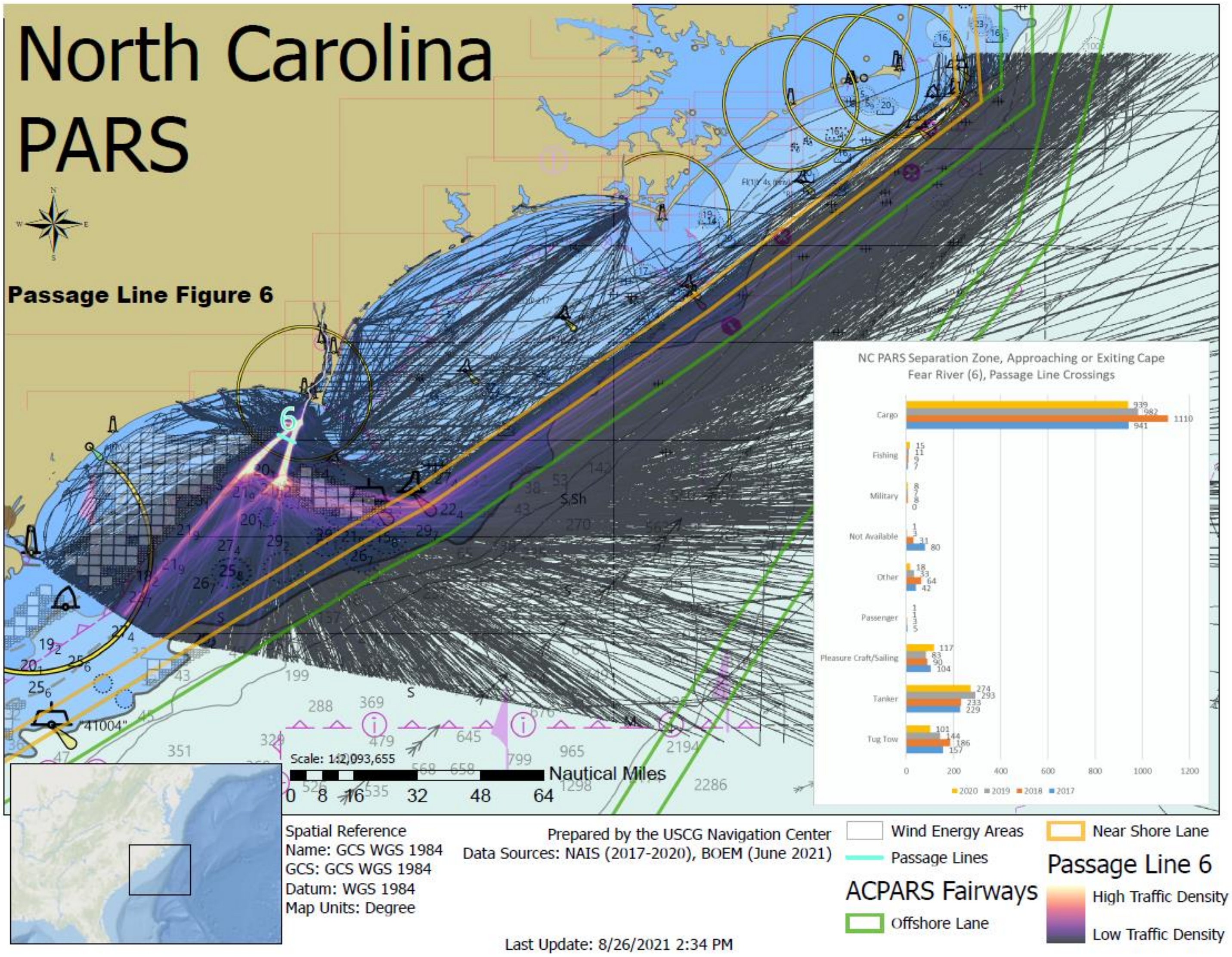


Figure 18: Separation Zone, Approaching or Exiting Cape Fear River (6) Passage Line Graphic

Proposed or Near Proposed Routing Measures Passage Lines – Numbers 12, 13, 14, 15, and 16

These passage lines were selected due to their proximity to the ACPARS proposed fairways. The majority of these crossings appear to be from vessels on coastwise transits.

Northern Traffic Near Cape Hatteras, Inland ACPARS Fairway (12), Northern Traffic Near Cape Hatteras, Middle ACPARS Fairway (13), and Southern Traffic Near Frying Pan Shoals (14)

For these passage lines, the lines furthest east have the highest number of cargo and tank vessel crossings compared to other types. Line 12 shows a variety of vessel types, although cargo crossings are still the most prevalent across this line. This traffic appears to either pass through the study area on north or southbound coastwise transits, approach Wilmington through the TSS, or approach Beaufort Inlet. These areas are shown in Figure 19.

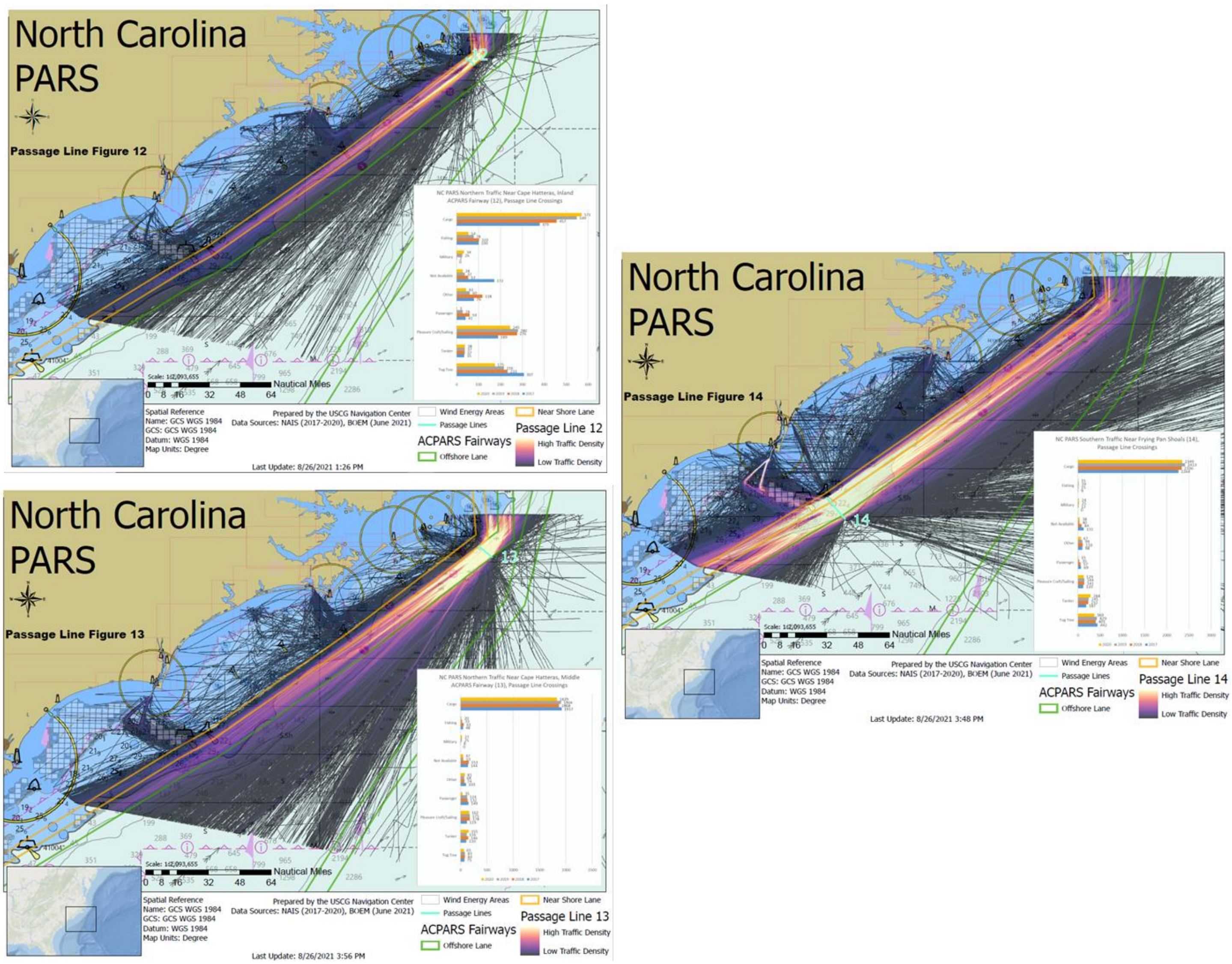


Figure 19: Northern Traffic Near Cape Hatteras, Inland ACPARS Fairway (12), Northern Traffic Near Cape Hatteras, Middle ACPARS Fairway (13), and Southern Traffic Near Frying Pan Shoals (14)

ACPARS St. Lucie to New York Fairway, Northern Line (15) and ACPARS St. Lucie to New York Fairway, Southern Line (16)

The majority of the vessels that transit through the proposed ACPARS St. Lucie to New York Fairway are cargo and tank ships. Most of these vessels transit through the study area, although some transit to Beaufort Inlet and the TSS.

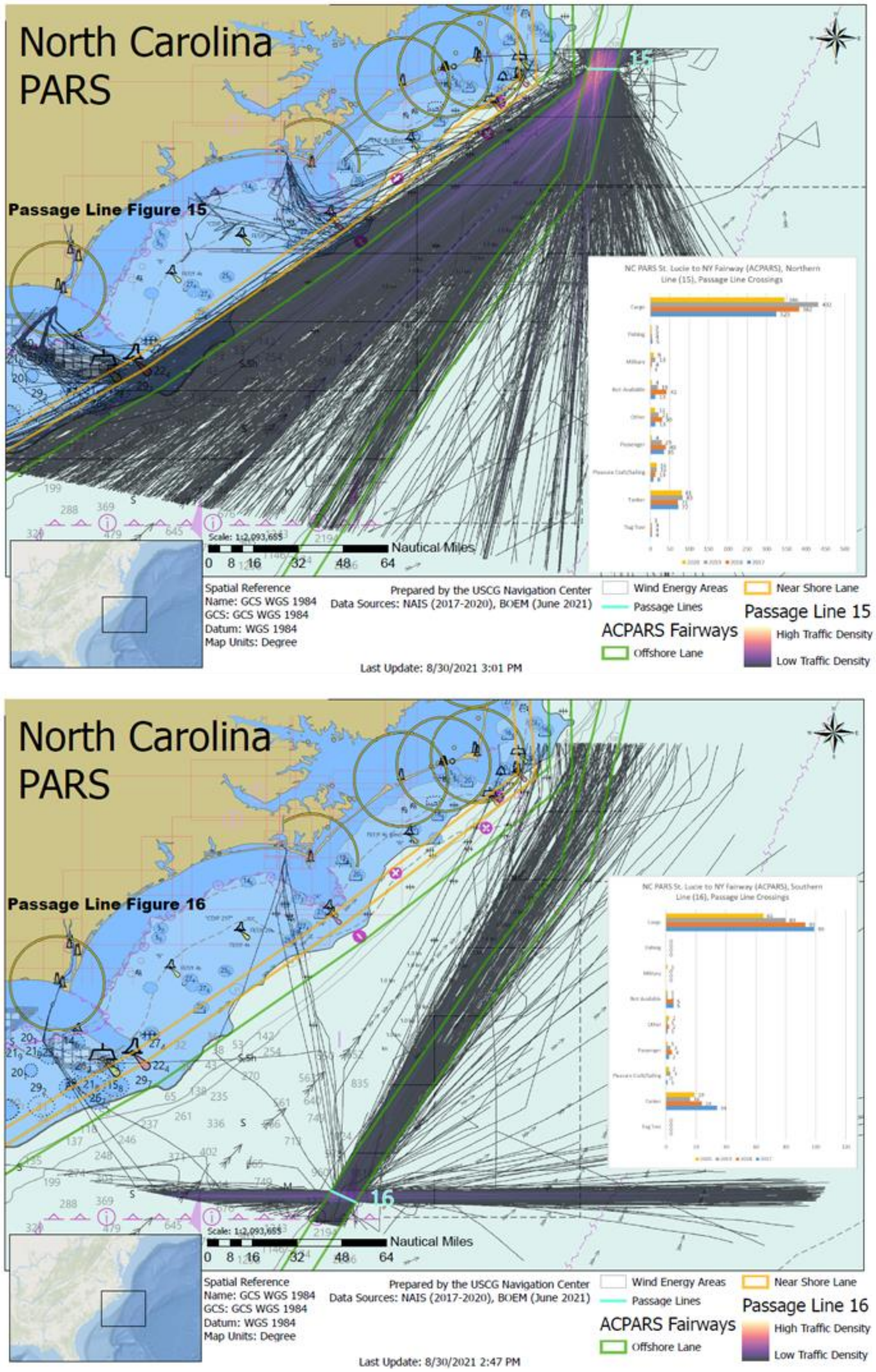


Figure 20: ACPARS St. Lucie to New York Fairway, Northern Line (15) and ACPARS St. Lucie to New York Fairway, Southern Line (16) Passage Line Graphic

Vessel Length Distributions

Vessel length distributions are reported by year in Figure 21-Figure 28. Most vessels in the study area are between zero and 200 feet in length, which remained consistent over the years. In these figures, bins are defined by the highest value counted. For example, Bin 50 counts vessel lengths less than or equal to 50 feet, and Bin 100 counts vessel lengths greater than 50 and less than or equal to 100 feet. Additional histograms of vessel lengths by vessel type are also included in Attachment 2 – Vessel Length Histograms by Vessel Type.

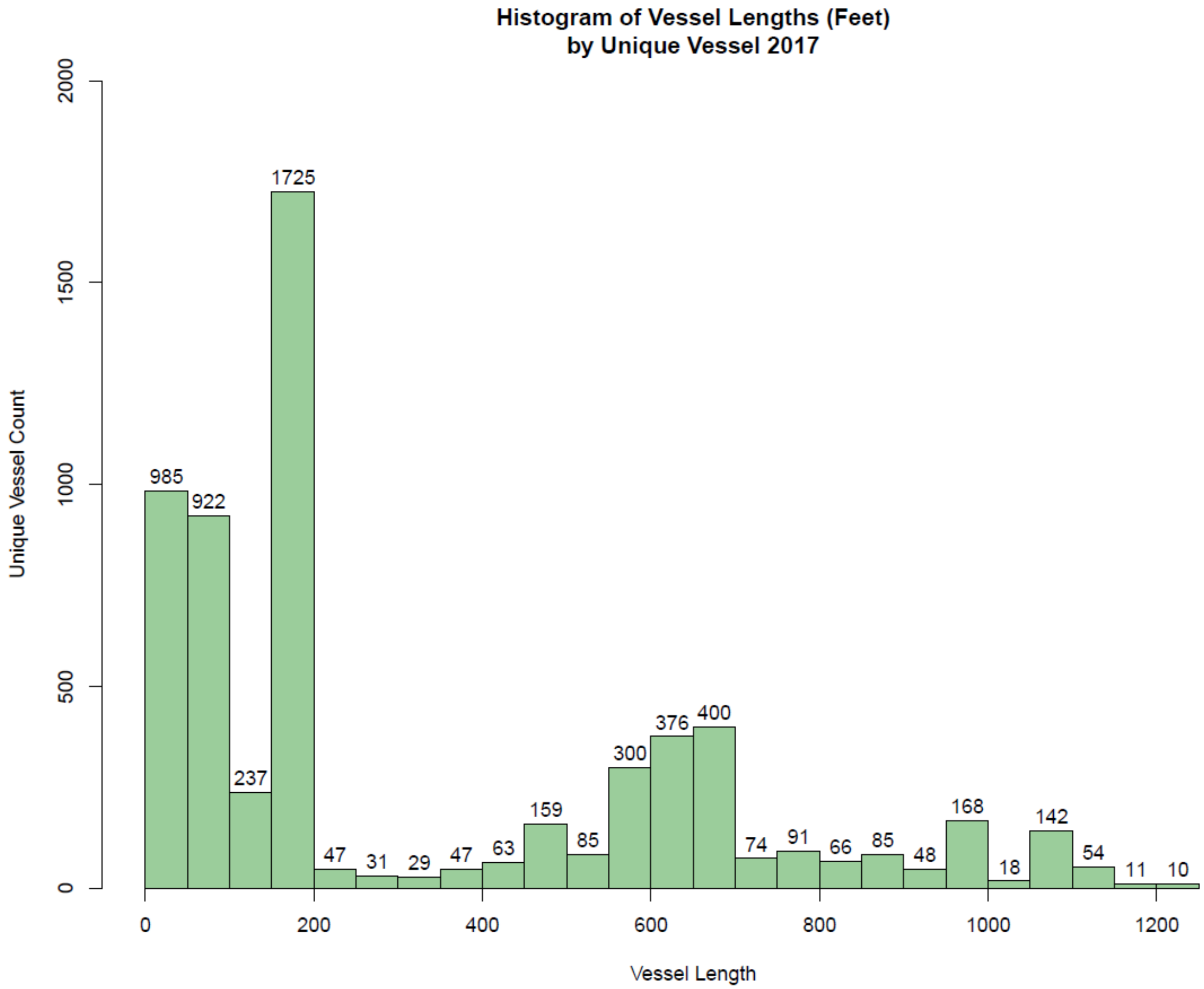


Figure 21: Histogram of Vessel Lengths (Feet) by Unique Vessel, 2017

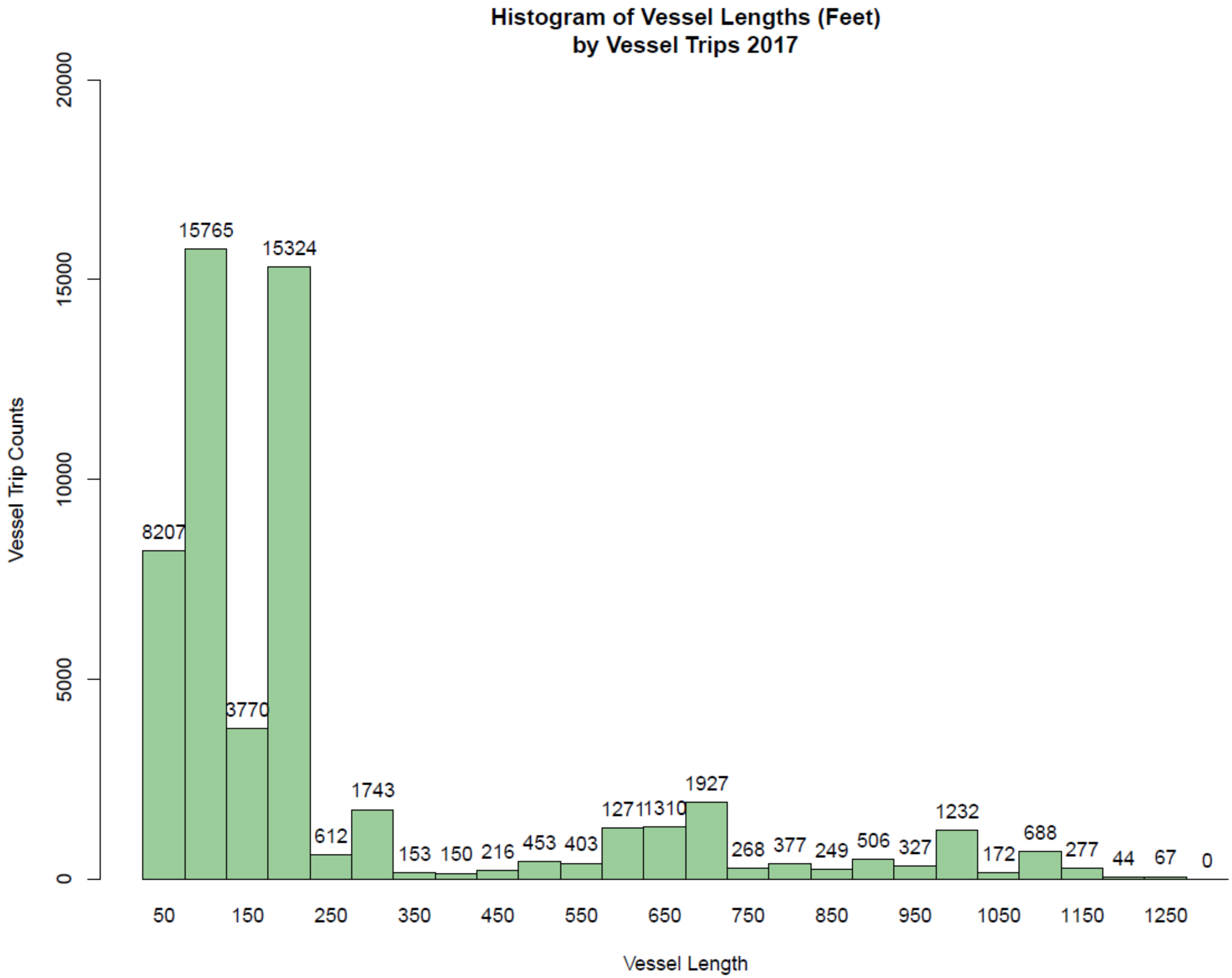


Figure 22: Histogram of Vessel Lengths (Feet) by Vessel Trips, 2017

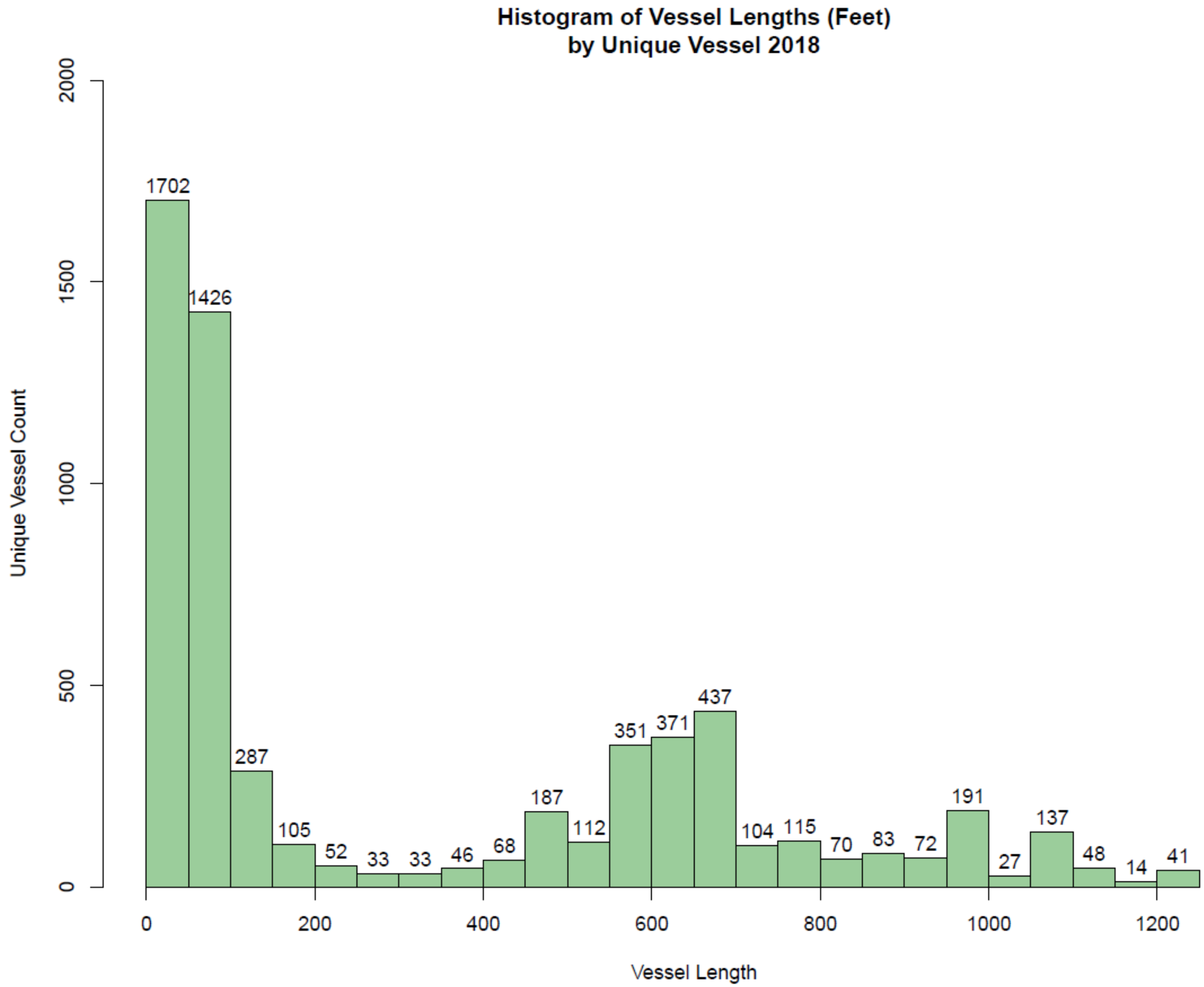


Figure 23: Histogram of Vessel Lengths (Feet) by Unique Vessel, 2018

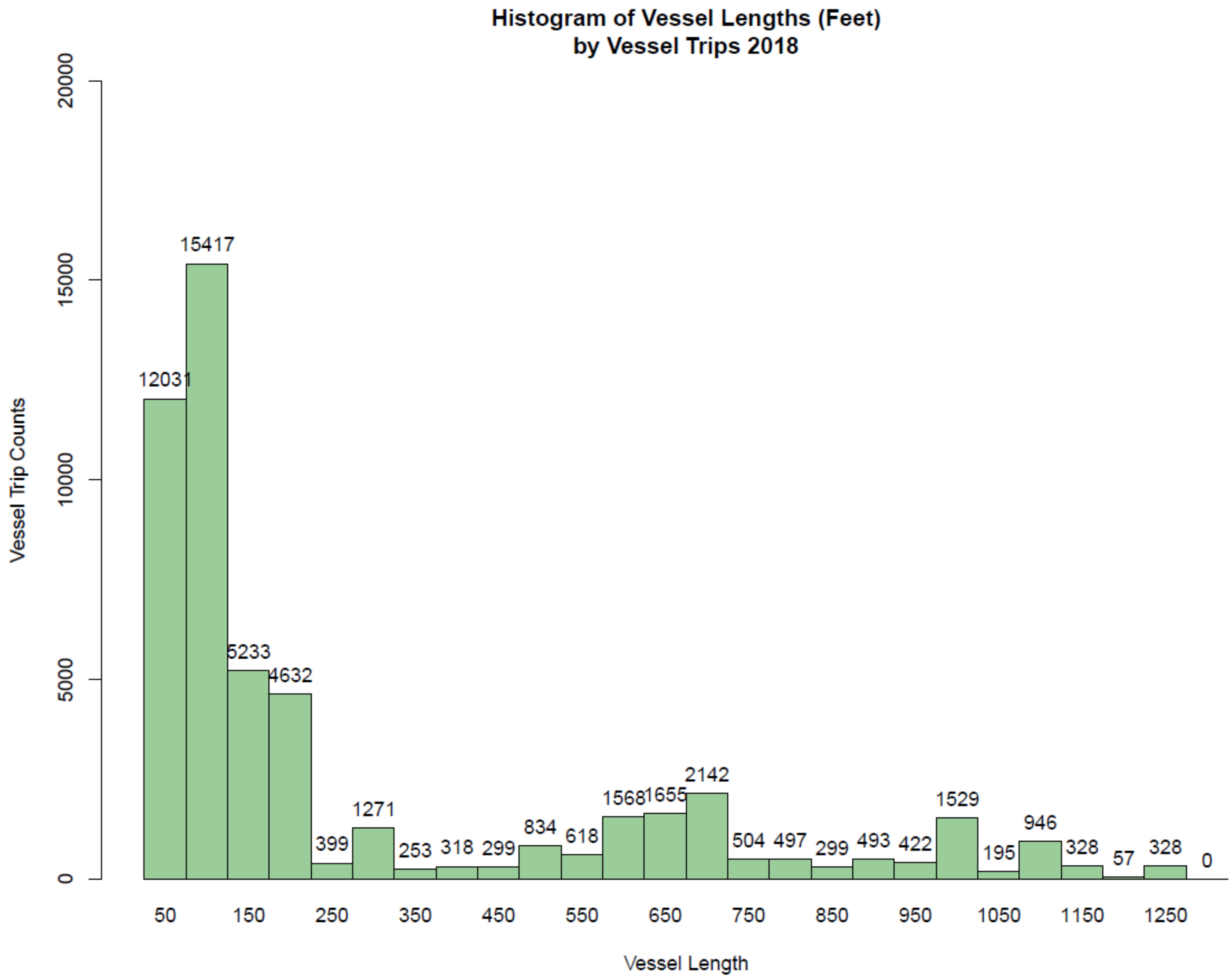


Figure 24: Histogram of Vessel Lengths (Feet) by Vessel Trips, 2018

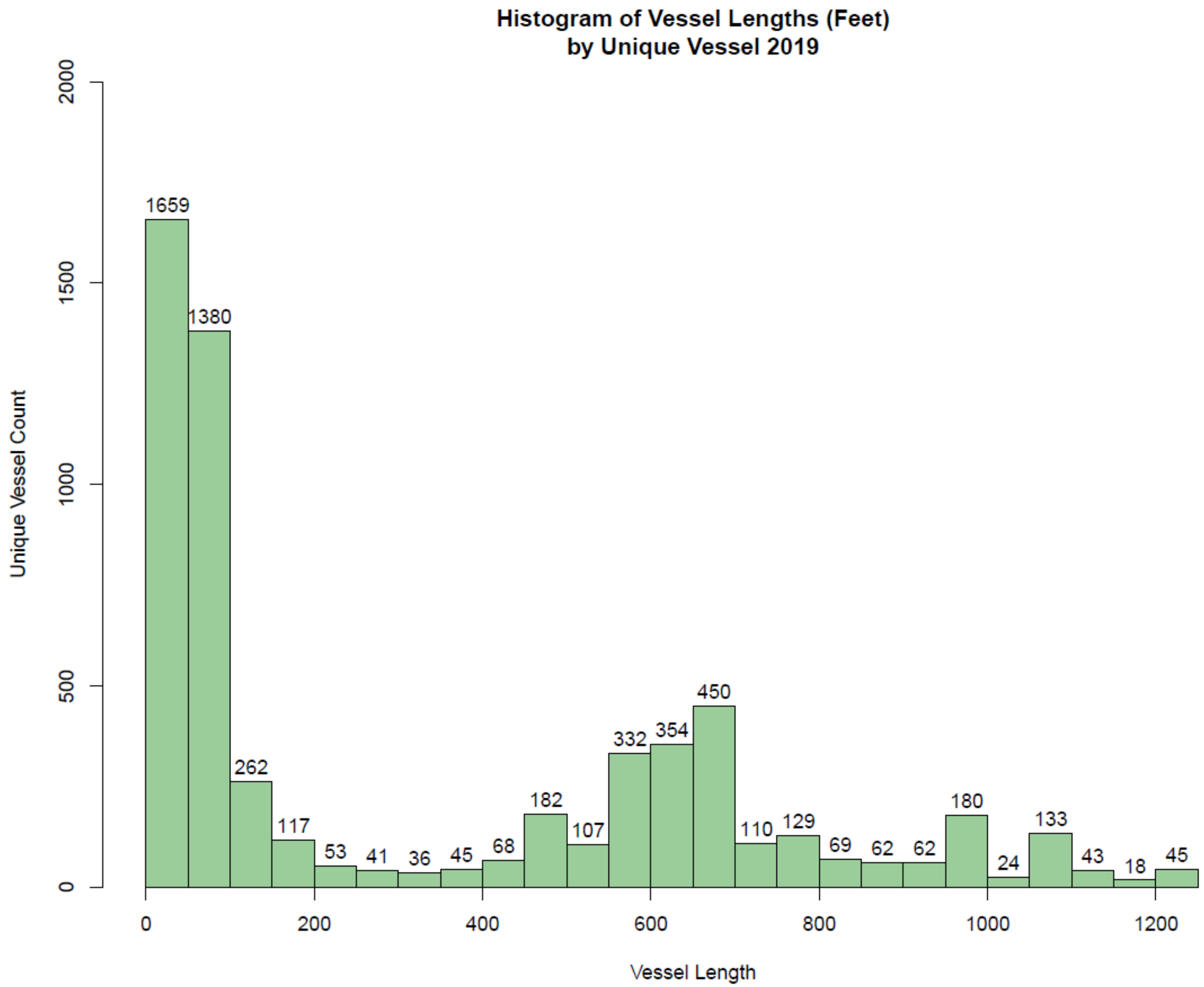


Figure 25: Histogram of Vessel Lengths (Feet) by Unique Vessel, 2019

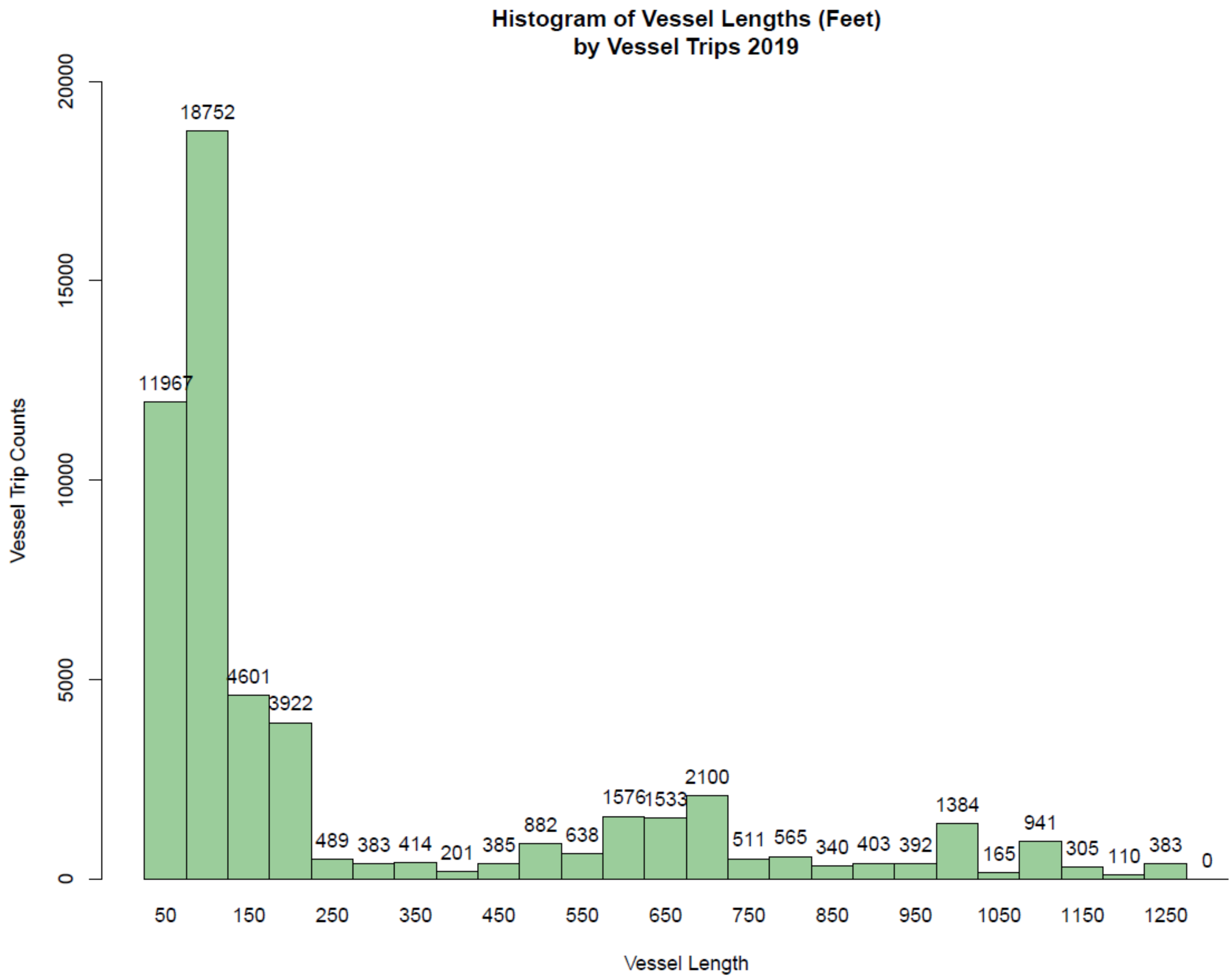


Figure 26: Histogram of Vessel Lengths (Feet) by Vessel Trips, 2019

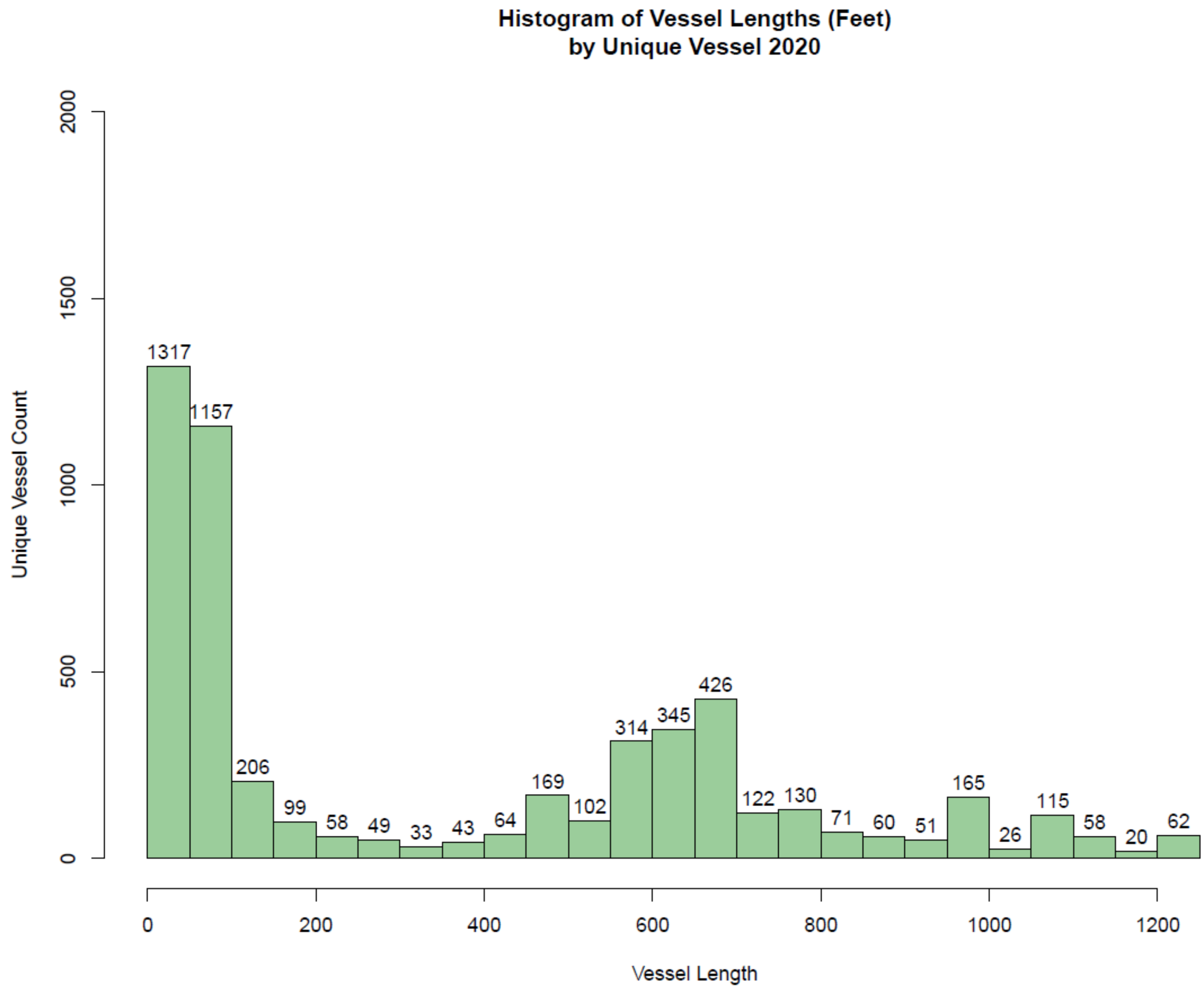


Figure 27: Histogram of Vessel Lengths (Feet) by Unique Vessel, 2020

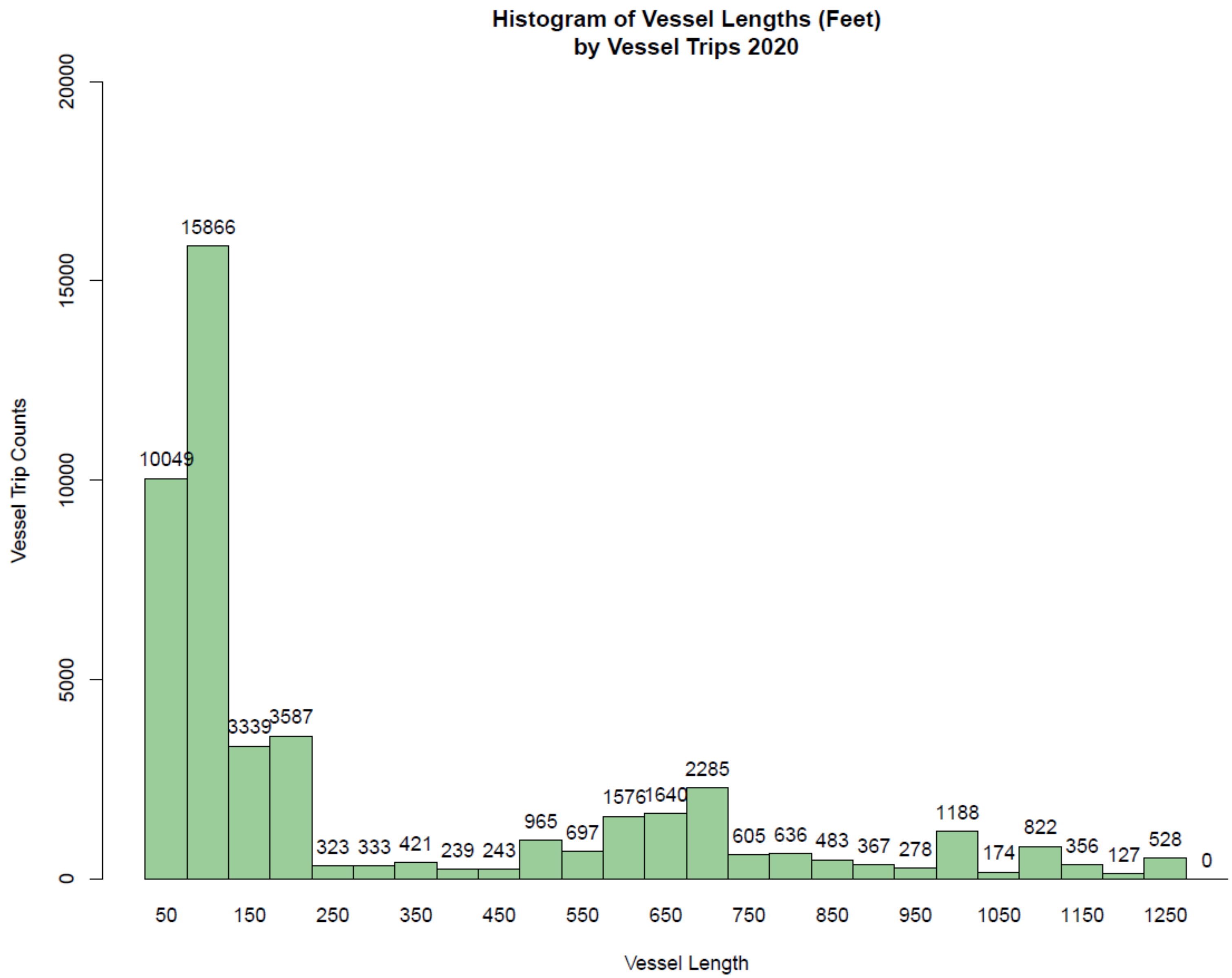


Figure 28: Histogram of Vessel Lengths (Feet) by Vessel Trips, 2020

Traffic Densities

A set of traffic densities by vessel type is provided in Attachment 3 – Vessel Traffic Densities. The densities also include the following layers: wind energy areas and the ACPARS proposed fairways. The traffic density charts are organized by year and type in the attachment and are labelled as listed in Table 6.

The traffic patterns observed in the traffic densities for each year are consistent with the findings in the passage line and traffic composition analyses. For example, if a large number of passenger vessel transits were counted in the passage line section for a particular inlet, the traffic density for that area also reflected a high density of passenger vessels. Specific observations from these densities about each vessel type are discussed in the following pages. It is important to note when analyzing the traffic densities that the color scale on each map is relative and similar colors cannot be directly compared between maps.

	Year			
Vessel Type	**2017**	**2018**	**2019**	**2020**
All Vessels	17:1	18:1	19:1	20:1
Cargo	17:2	18:2	19:2	20:2
Fishing	17:3	18:3	19:3	20:3
Not Available	17:4	18:4	19:4	20:4
Other	17:5	18:5	19:5	20:5
Passenger	17:6	18:6	19:6	20:6
Pleasure Craft / Sailing	17:7	18:7	19:7	20:7
Tankers	17:8	18:8	19:8	20:8
Tug / Tow	17:9	18:9	19:9	20:9

Table 6: Traffic Density Labels Shown in Attachment 3

All Vessels

The all vessels traffic densities (Figures 17-20:1) show consistent traffic patterns year to year. There are hotspots found transiting near the inlets along the coast, avoiding shoal areas, and approaching and exiting Wilmington through the traffic separation scheme. These areas are emphasized in Figure 29.

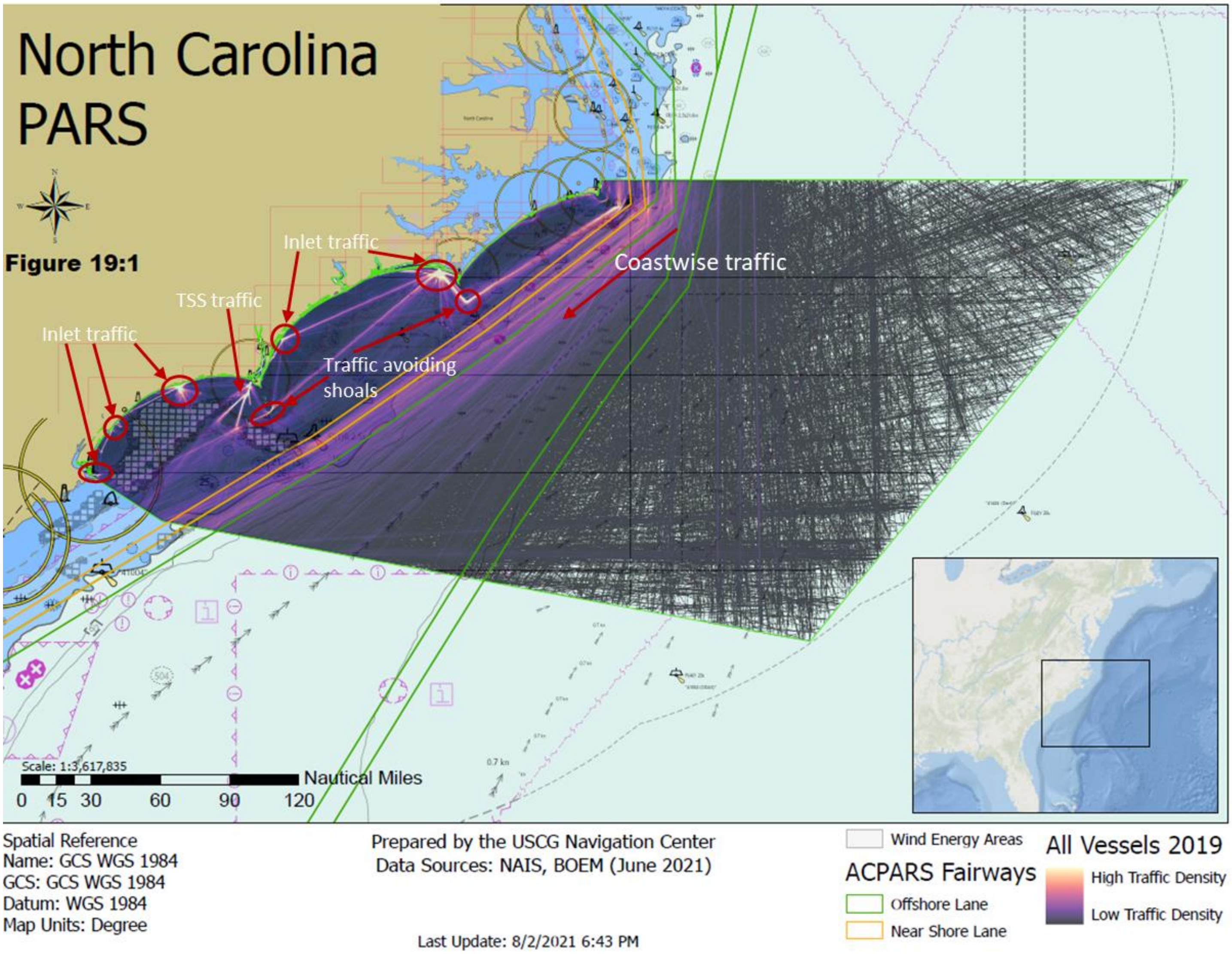


Figure 29: All Vessels Traffic Density Sample

Cargo and Tanker

Cargo vessels and tank ships consistently transit coastwise through the study area or through the TSS, as shown in Figure 30 (see Figures 17-20:2 and 17-20:8 in Attachment 3 for densities for each year). Some traffic is also noted near Beaufort inlet. These results were anticipated for these vessel types. Passage lines 4, 6, 12, 13, and 14 also support these results.

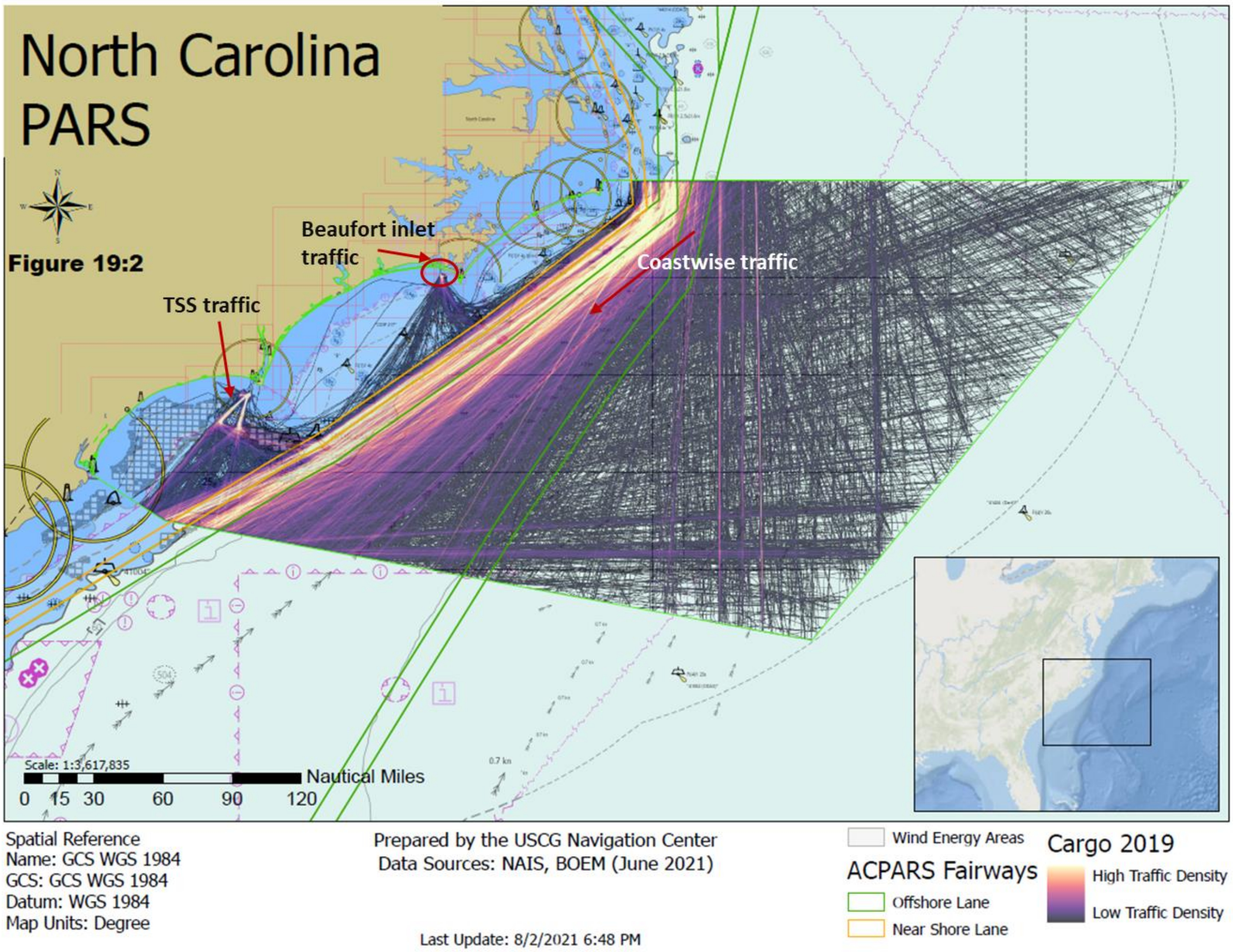


Figure 30: Cargo Vessels' Traffic Density Sample

Fishing

For fishing vessels, Beaufort Inlet is heavily trafficked. There also appears to be consistent traffic travelling to or from this inlet to outside the study area to the north. Additionally, while there are higher density areas noted in other inlets along the coast, these patterns vary from year-to-year. These areas of interest are circled in Figure 31 and can be seen in further detail in Figures 17-20:3. Results from passage lines 9 and 10 also support these conclusions.

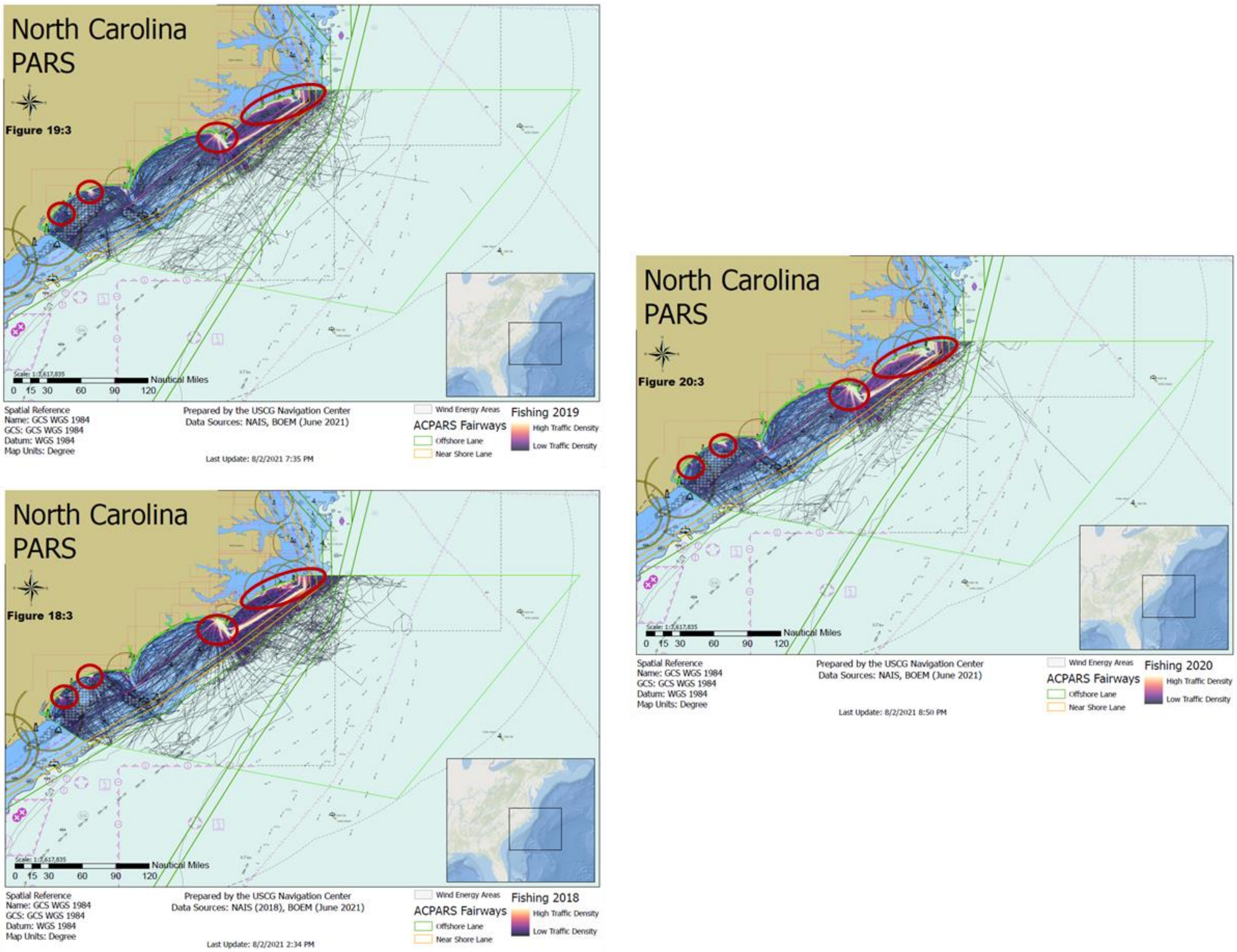
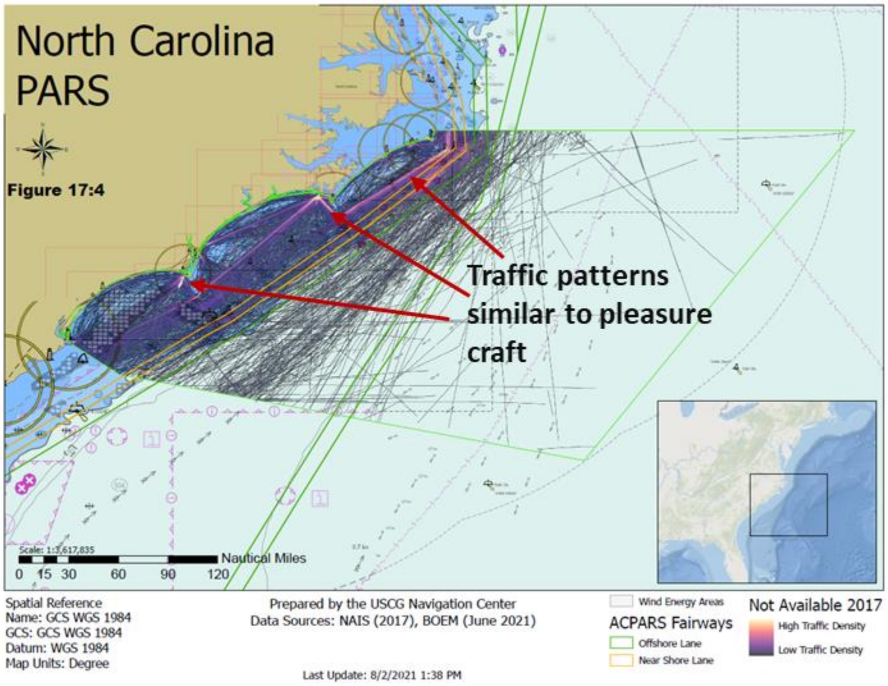


Figure 31: Fishing Vessels' Traffic Densities Comparison

Not Available

The traffic density for vessels without a declared type in 2017 (Figure 17:4) appears similar to the traffic density for all vessels for the study area, with less coastwise traffic and lower density in the TSS. The high density areas are especially similar to the patterns noted in the pleasure craft densities but could include other types. However, the traffic densities for 2018-2020 (Figures 18-20:4) show more noise and less consistent patterns. There does appear to be higher traffic density near Beaufort Inlet, suggesting these vessels are a mixture of vessel types. A comparison is shown in Figure 32.



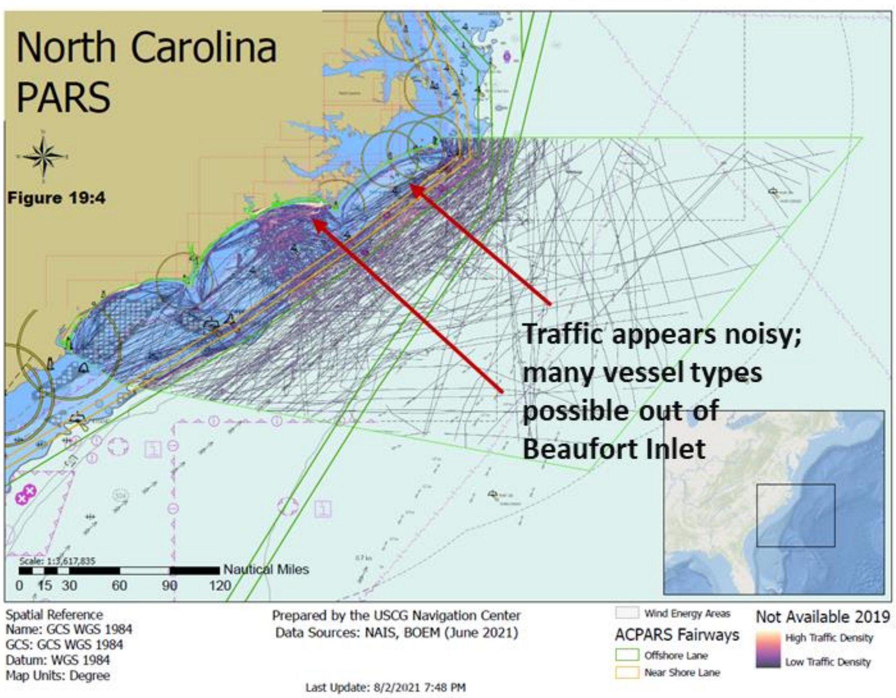


Figure 32: Not Available Vessels' Traffic Densities Comparison

Other

The traffic densities for Other vessels are consistent from 2017-2020 (see Figure 33 and Figures 17-20:5). There are hotspots noted along the coast, approaching the Cape Fear River, and at Beaufort Inlet. Passage line 9 also shows a large number of other vessel crossings at Beaufort Inlet.

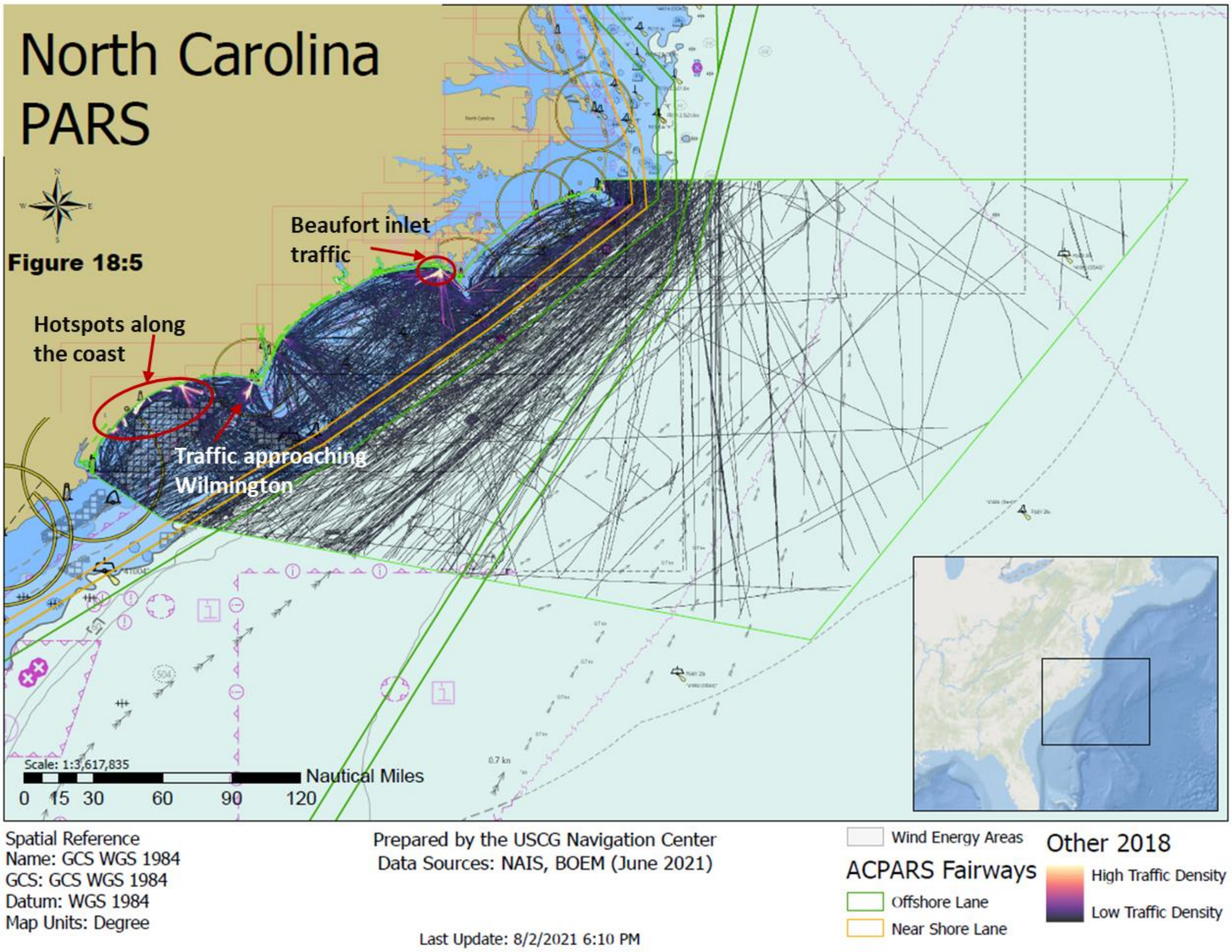


Figure 33: Other Vessels' Traffic Density Sample

Passenger

Overall, passenger vessels exhibit the same transit patterns from 2017-2020 as shown in Attachment 3 Figures 17-20:6. There is heavy traffic density at Little River Inlet and some coastwise traffic offshore. However, there does appear to be lower traffic density in 2020 compared to the other years analyzed, as shown in Figure 34. This observation is consistent with the findings of the passage line analysis, especially line 3 and lines 12, 13, and 14, where fewer passenger vessel crossings were recorded in 2020 than previous years.

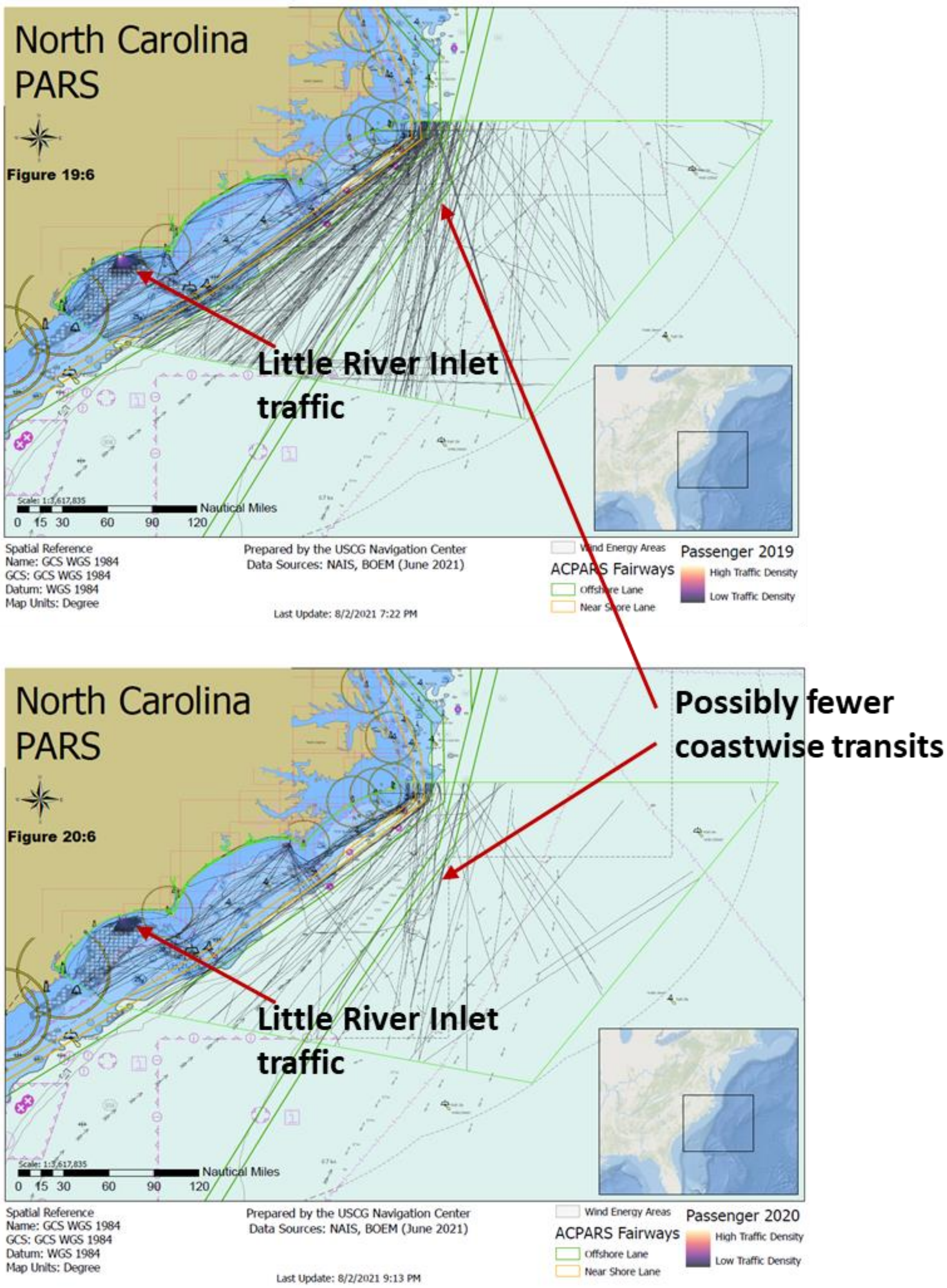


Figure 34: Passenger Vessels' Traffic Densities Comparison

Pleasure Craft/Sailing

Pleasure craft and sailing vessels are prevalent in this study area. Throughout the timespan analyzed, the traffic patterns exhibited by these vessels remained consistent. The boats typically remain near shore, with transits between inlets in the study area and outside the study area to the north. There is especially high pleasure craft activity out of Beaufort Inlet (see passage line 9). These patterns are shown in Figure 35 as well as Figures 17-20:7.

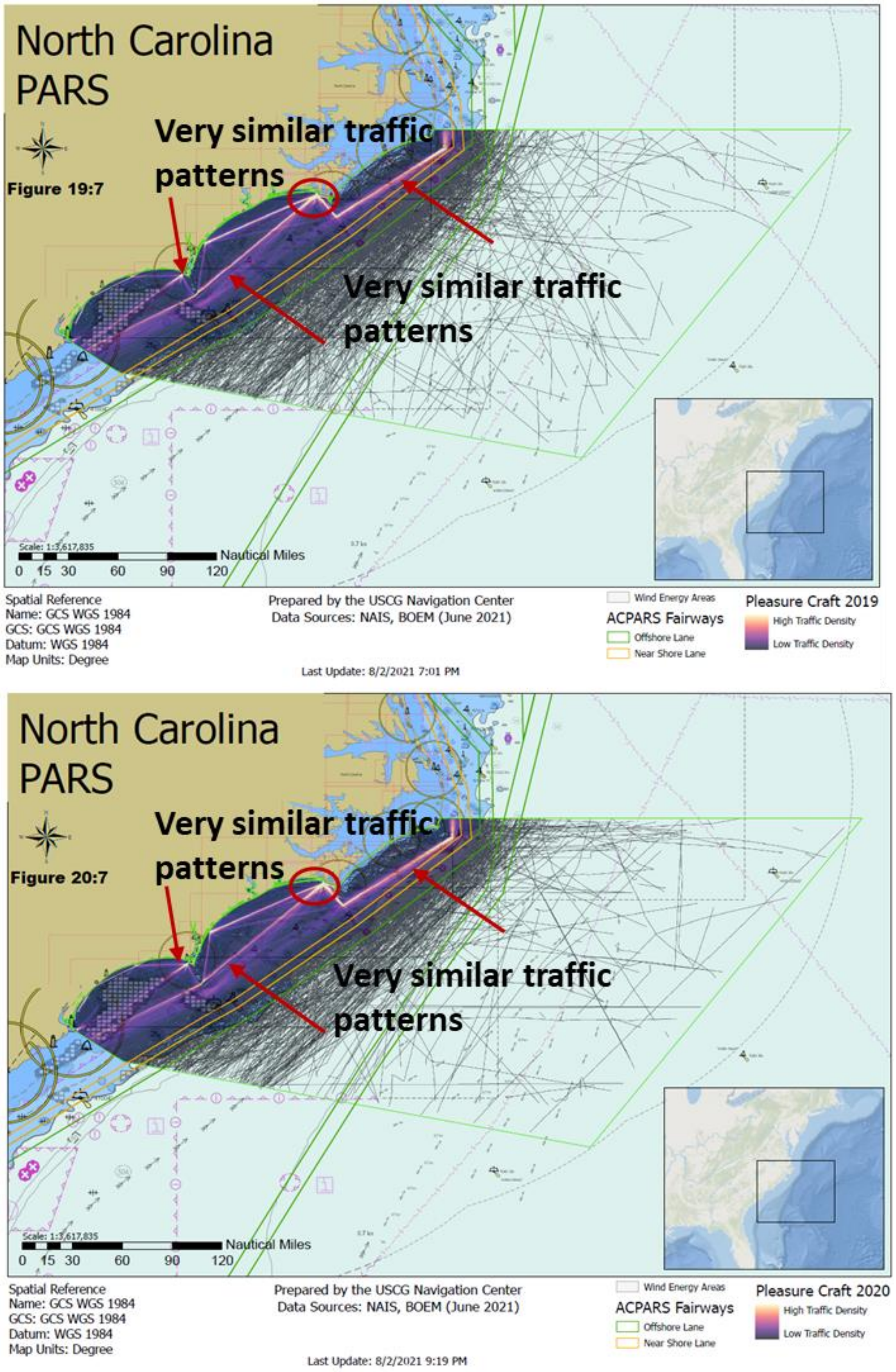


Figure 35: Pleasure Crafts' Traffic Densities Comparison

Tug/Tow

Tug tow vessels are found in the ACPARS proposed near-shore lane, shown in Figure 36 in orange. There is also a higher density area near the approach to the Cape Fear River. These patterns are consistent from year-to-year (Figures 17-20:9).

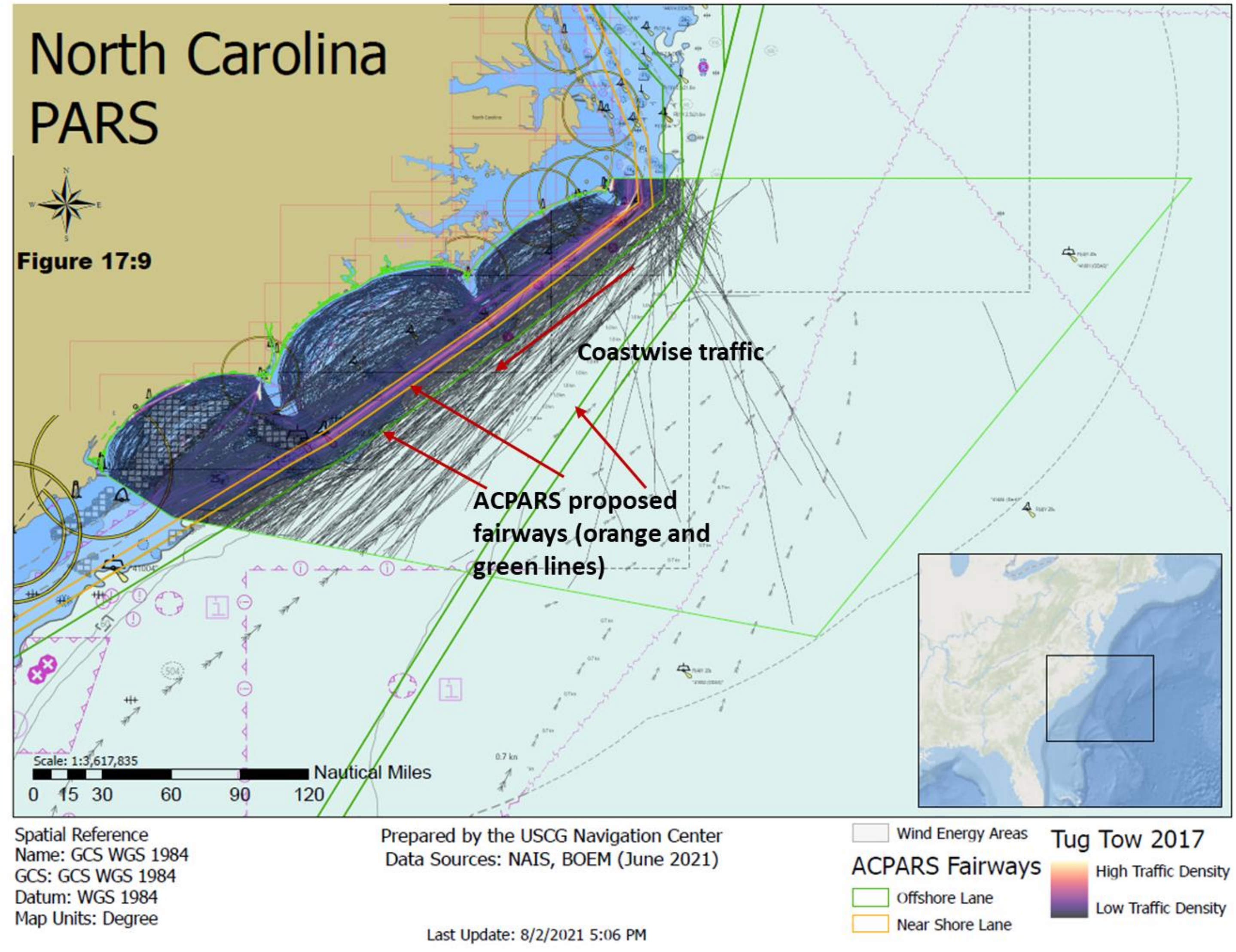


Figure 36: Tug Tow Vessels' Traffic Density Sample

Analysis of Vessel Tracks in a Geographic Area

The number of tracks counted in 0.5 NM square bins were enumerated throughout the study area and color coded in the figures listed in Table 7 and included in Attachment 4 – Tug-Tow Traffic Graphics. These graphics detail the volume of tug-tow traffic observed between 2017 and 2020. As shown in the example from 2019 in Figure 37, and supported by the passage line and traffic densities analyzed previously, these vessels transit in the ACPARS proposed near shore lane, as well as through the TSS approaching Cape Fear River, and in and out of the inlets.

2017	Track Counts Figure 1
2018	Track Counts Figure 2
2019	Track Counts Figure 3
2020	Track Counts Figure 4

Table 7: Tug-Tow Track Line Count Graphics

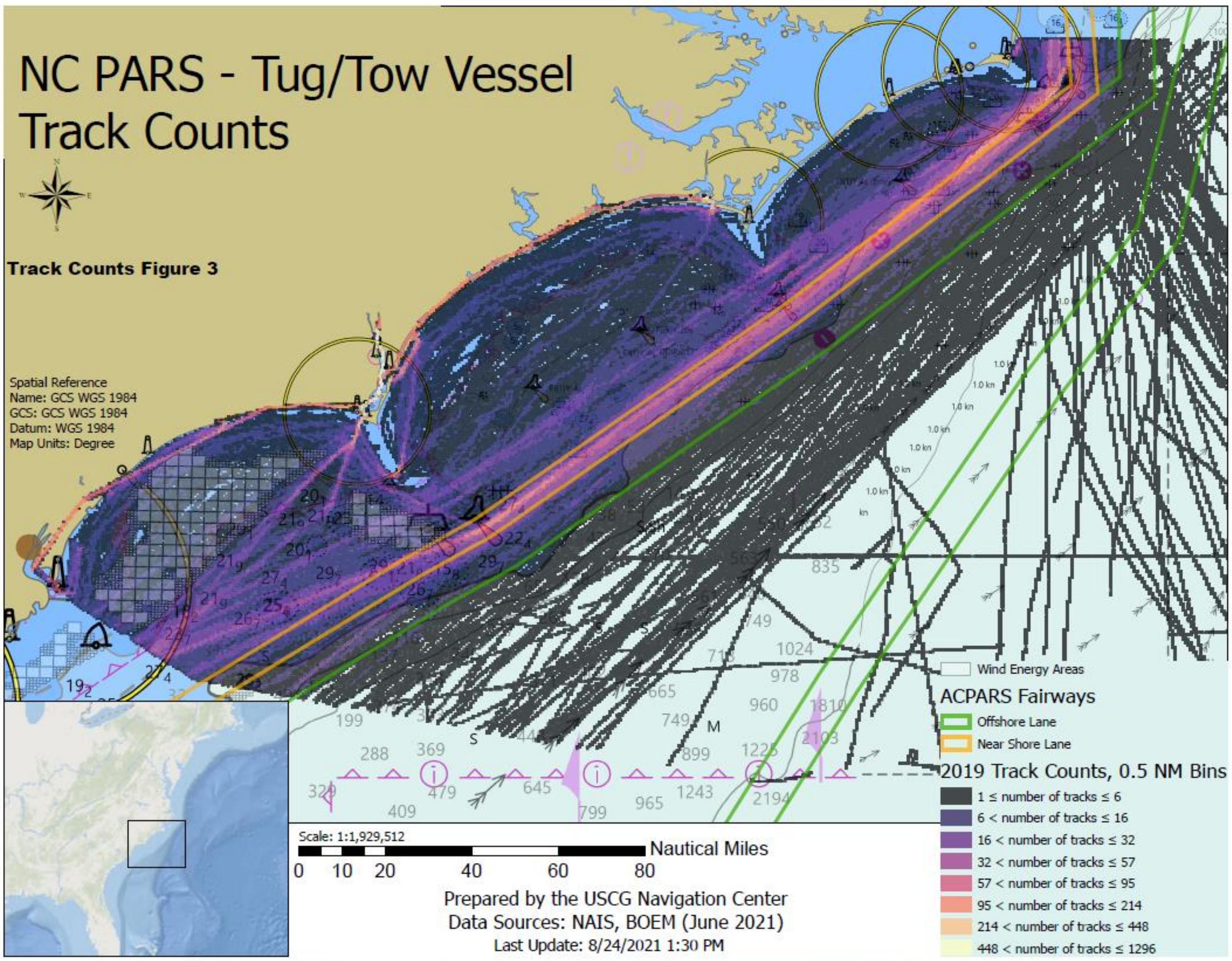


Figure 37: Tug/Tow Vessel Track Counts Graphic, 2019

Vessel Monitoring System (VMS) Data Analysis

Fishing vessels in the southeast are required to carry a VMS if they fish highly migratory species, South Atlantic Rock Shrimp, or Gulf Reef Fish. Gulf Reef Fish vessels must report hourly. Reference 50 CFR § Part 622 for the full VMS requirements for fishing vessels in the Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic in the United States.

For this report, VMS data for three months (January 2017, July 2019, and December 2020) was compared to AIS fishing vessel data during the same time-period in the same geographic region. The VMS data showed very similar traffic patterns to the AIS vessels; an example is shown in Figure 38 and Figure 39. This indicates that the VMS data set does not provide additional information about vessel transit patterns that is not already apparent in the AIS data.

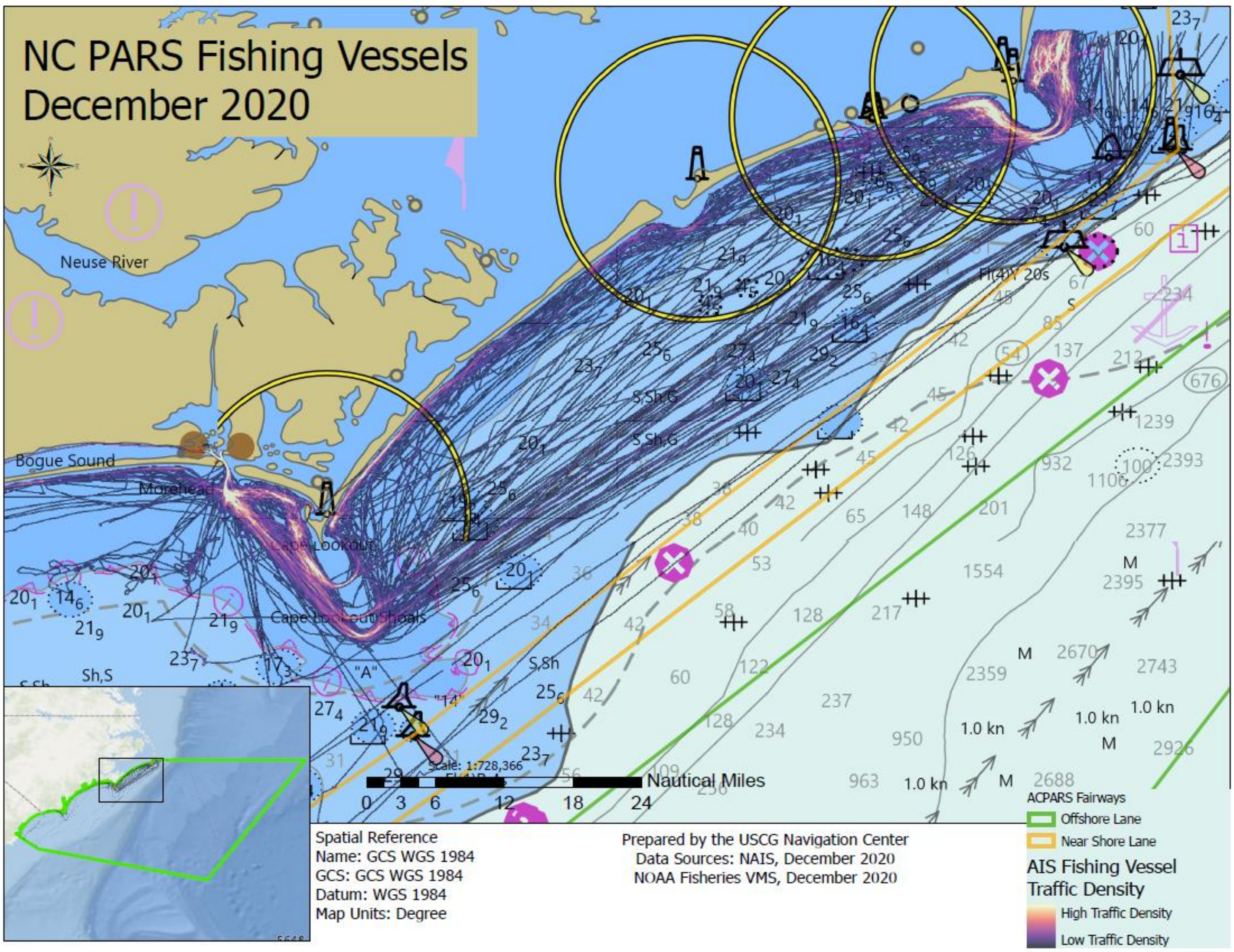


Figure 38: AIS Fishing Vessel Traffic Density, December 2020

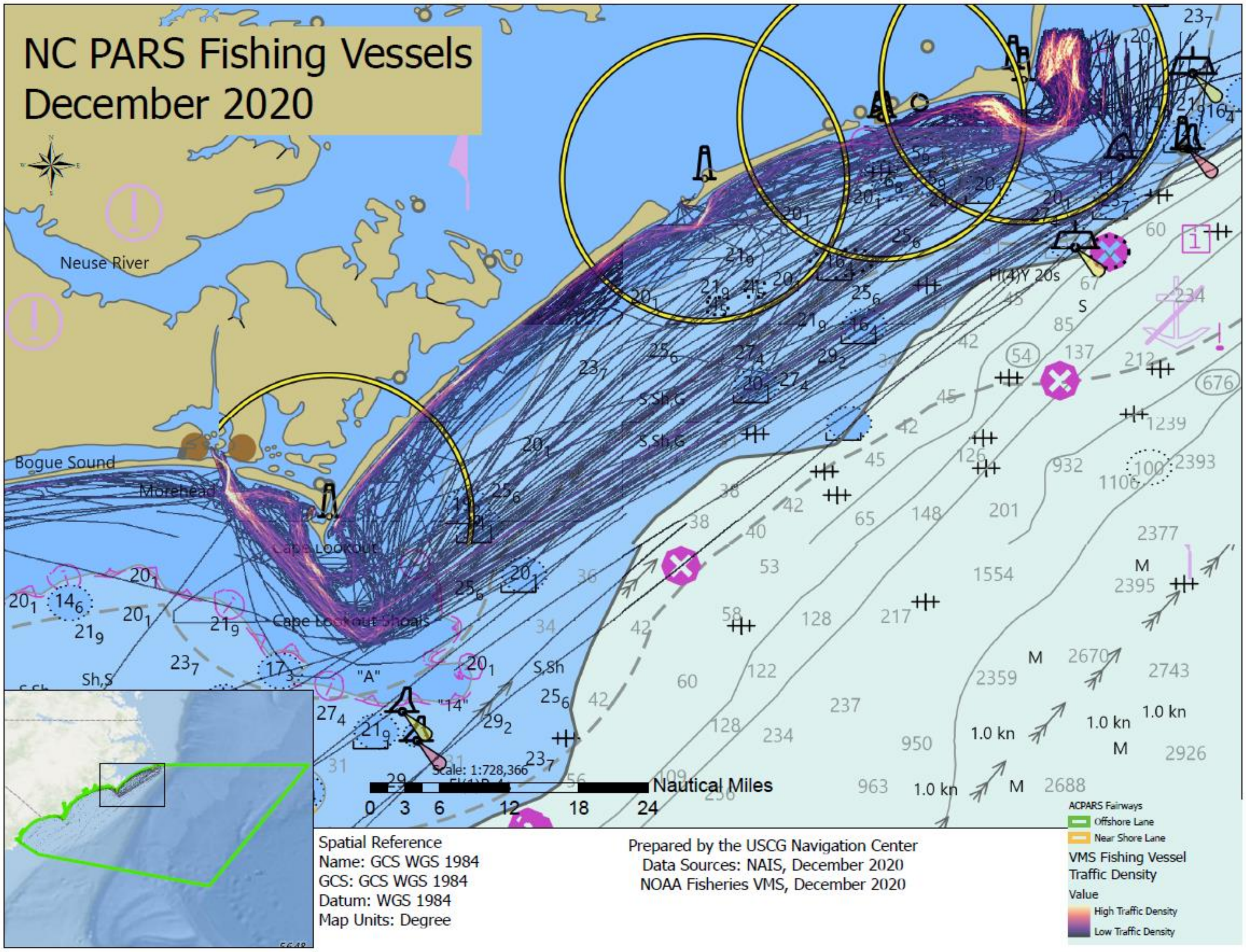


Figure 39: VMS Fishing Vessel Traffic Density, December 2020

Additionally, the number of unique vessel tracks and unique vessel counts were compared. Tracks were created using a time-boundary split of one day for each dataset. Unique vessels were determined by MMSI number. While not all vessels in the VMS data were associated with an MMSI, this field is the only direct overlap between the datasets and thus was used for comparison.

The AIS and VMS data produced similar numbers of tracks in December 2020 and January 2017, and fewer VMS tracks were noted in July of 2019 than AIS. Fewer unique vessels were found overall in the VMS data than the AIS data. Overall, VMS shows about a 20% increase in number of unique fishing vessels present in the study area that are not captured by AIS, see Table 8. However, not all fishing vessels use either AIS or VMS, so the unique fishing vessel counts will be higher in reality than reflected in either or both datasets.

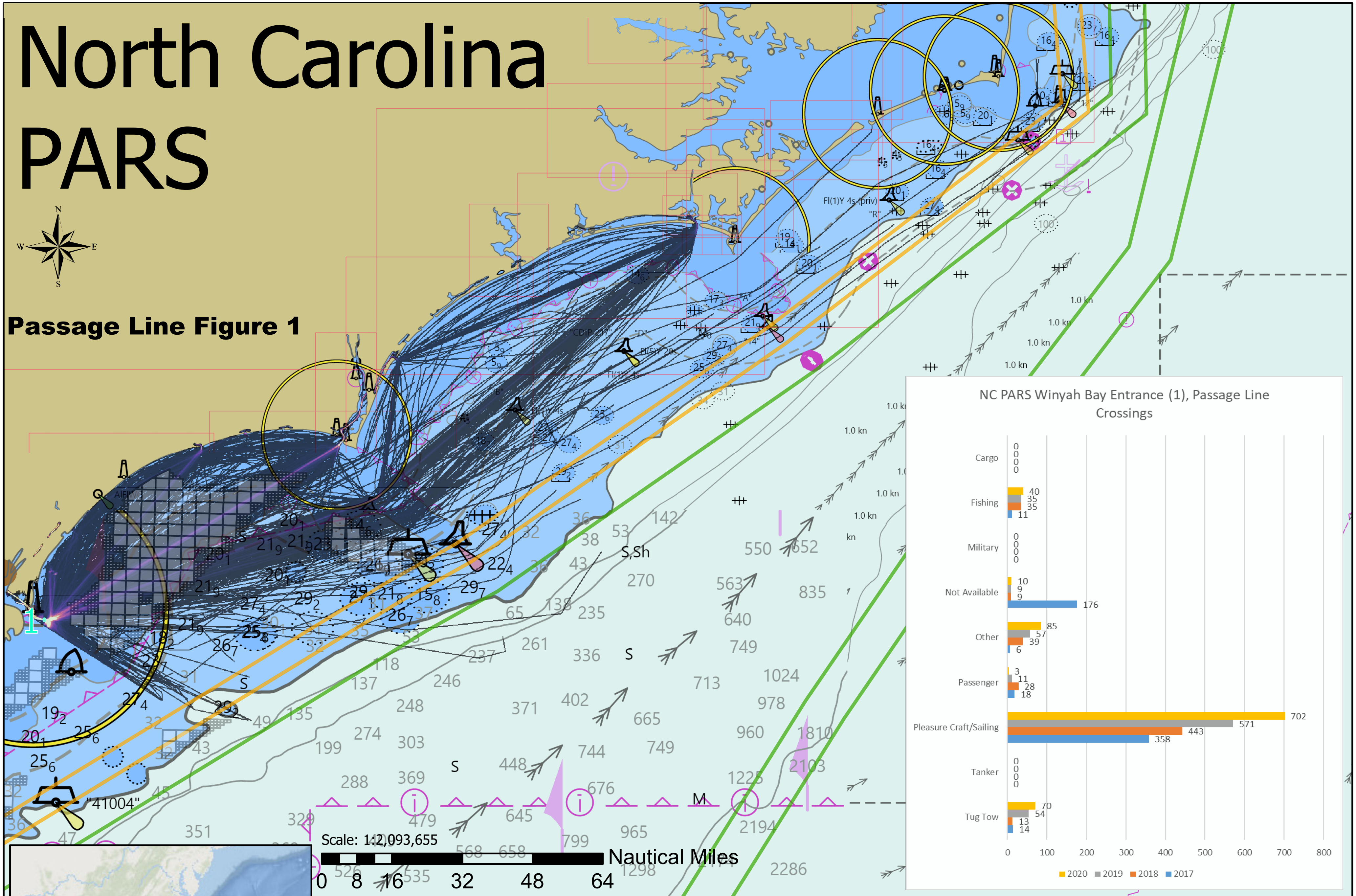
Unique Fishing Vessel Counts, VMS and AIS			
	December 2020	July 2019	January 2017
AIS	80	56	105
VMS	58	23	74
Combined	98	69	128
	VMS added 18 vessels to the AIS unique vessel count	**VMS added 13 vessels to the AIS unique vessel count**	**VMS added 23 vessels to the AIS unique vessel count**

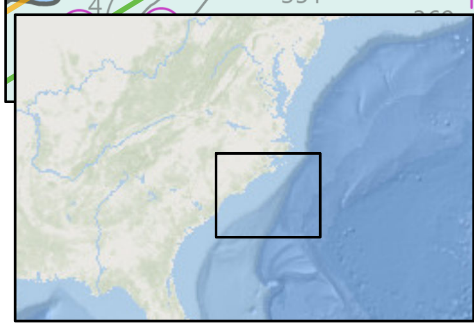
Table 8:Unique Fishing Vessels, VMS and AIS

Attachment 1 – Passage Line Data

North Carolina PARS

Passage Line Figure 1





Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

ACPARS Fairways
Offshore Lane

Near Shore Lane

Passage Line 1
High Traffic Density
Low Traffic Density

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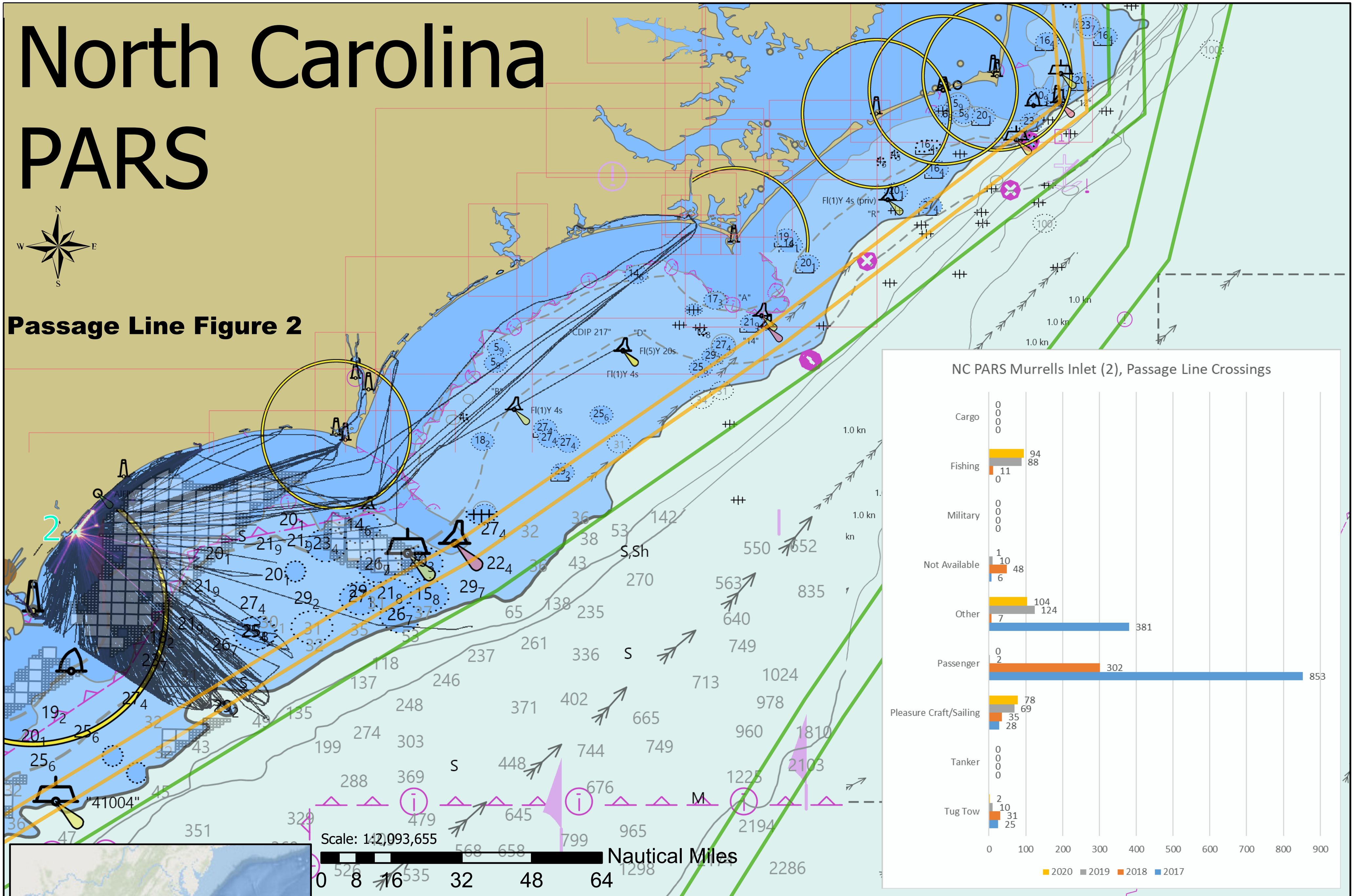
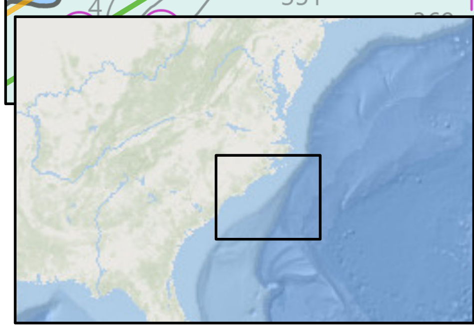
North Carolina PARS

Passage Line Figure 2





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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

ACPARS Fairways

Offshore Lane

Near Shore Lane

Passage Line 2

High Traffic Density

Low Traffic Density

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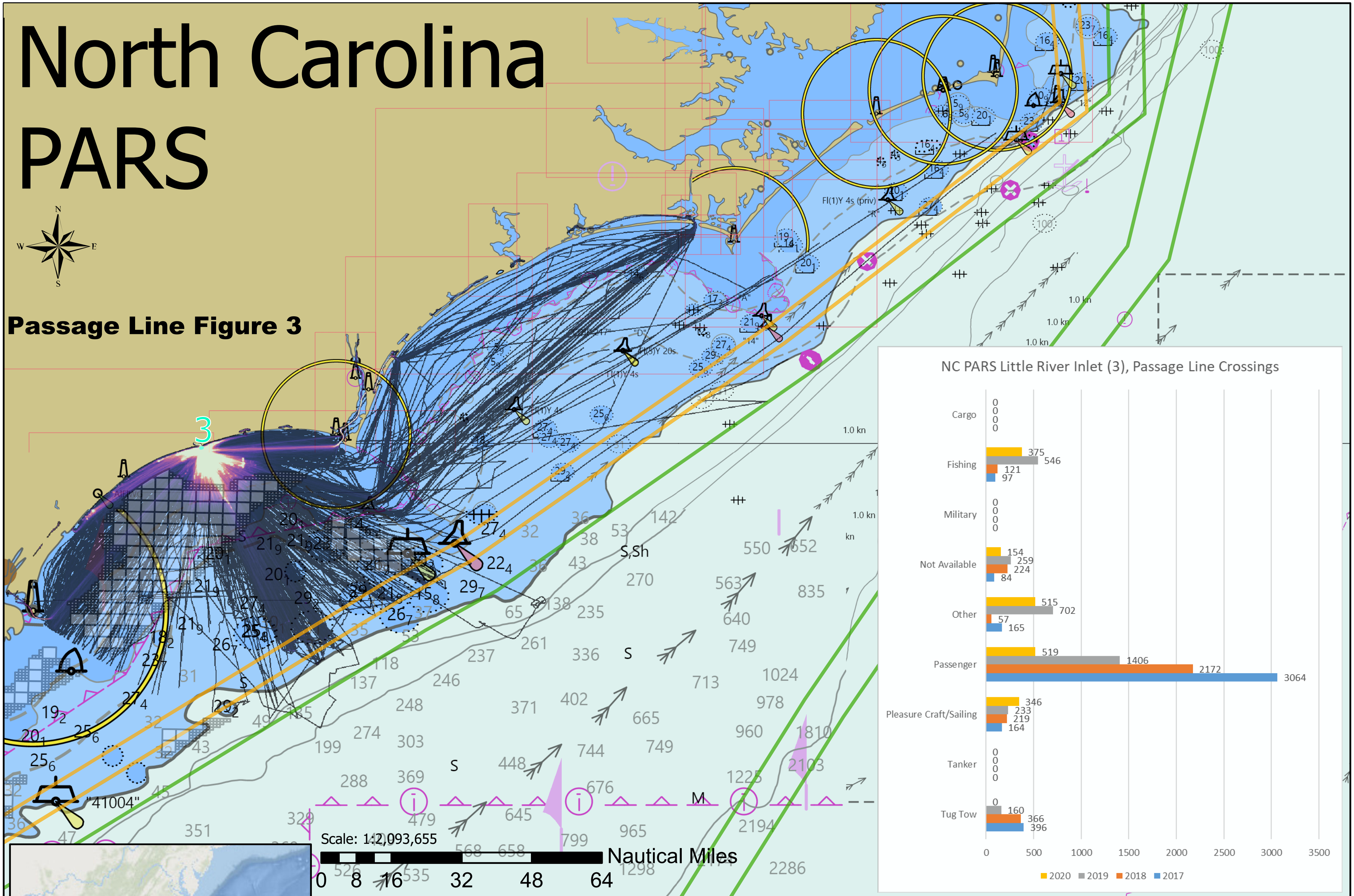
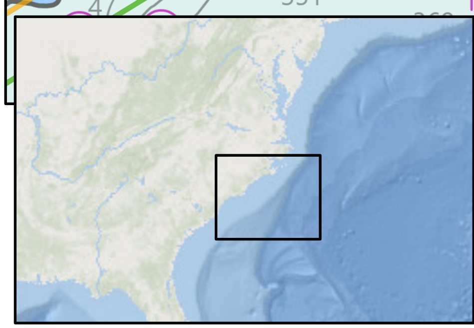
North Carolina PARS

Passage Line Figure 3





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Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

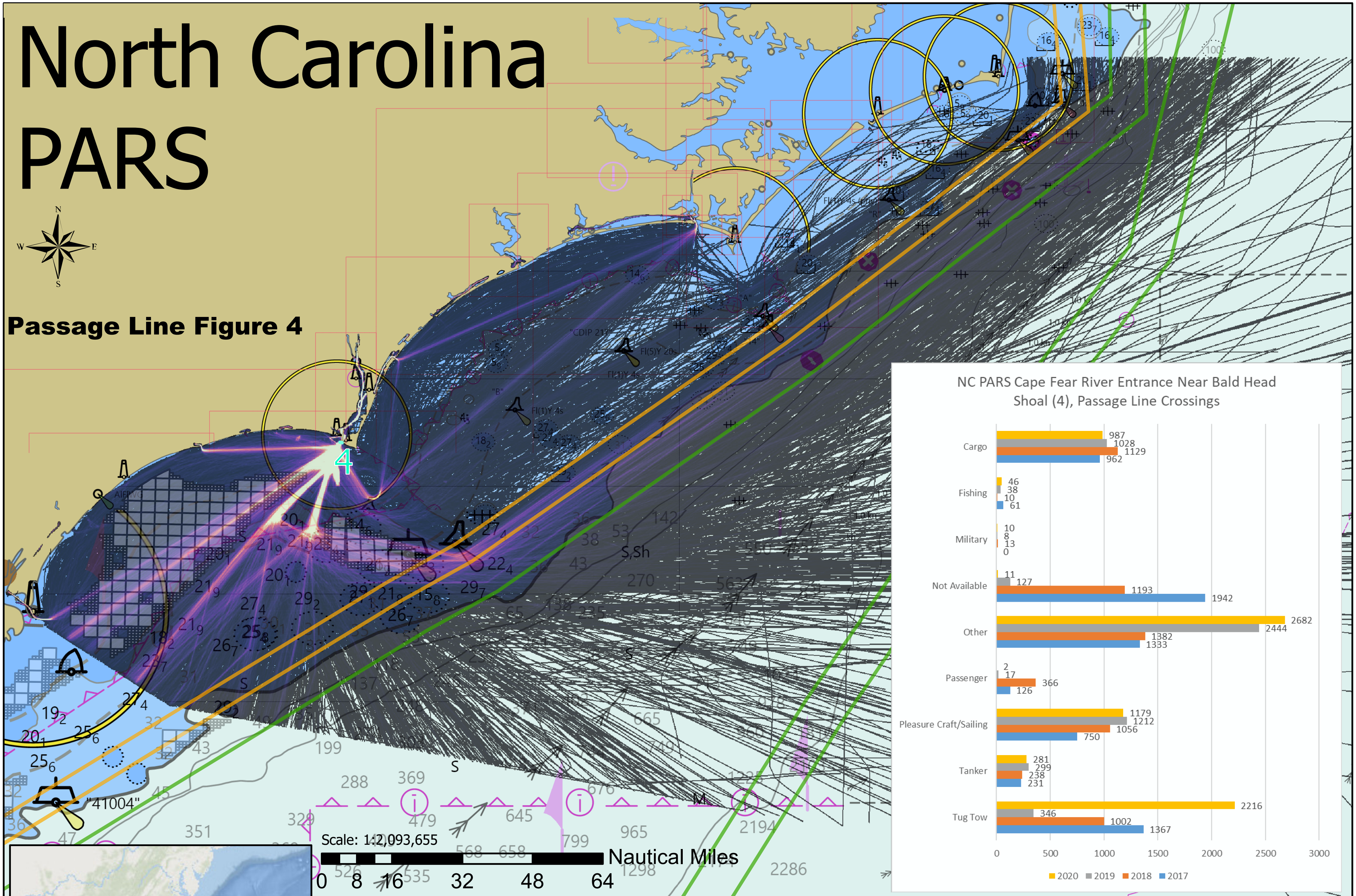
Wind Energy Areas
Passage Lines

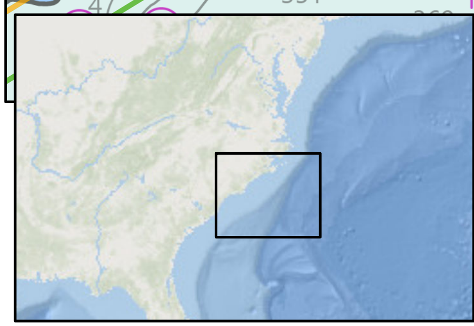
ACPARS Fairways
Offshore Lane

Near Shore Lane

Passage Line 3
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 3:25 PM





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Datum: WGS 1984
Map Units: Degree

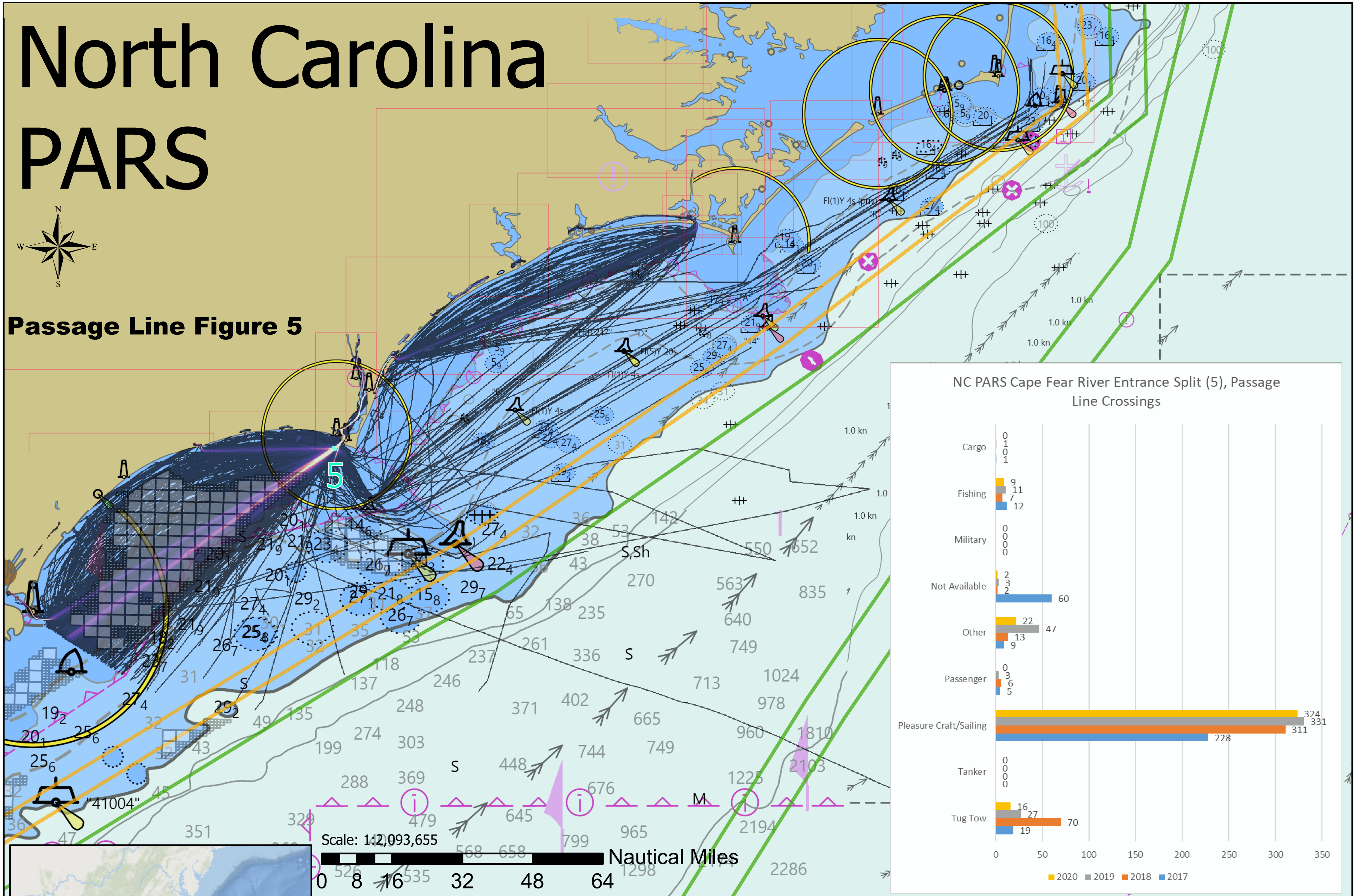
Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

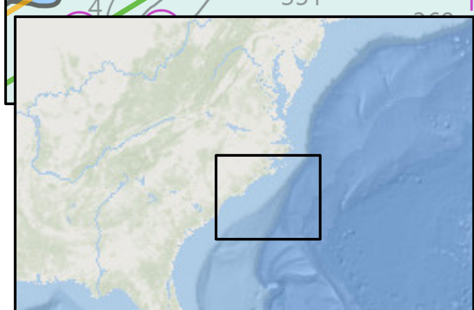
Wind Energy Areas
Passage Lines

ACPARS Fairways
Offshore Lane
Near Shore Lane

Passage Line 4
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 3:16 PM





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Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

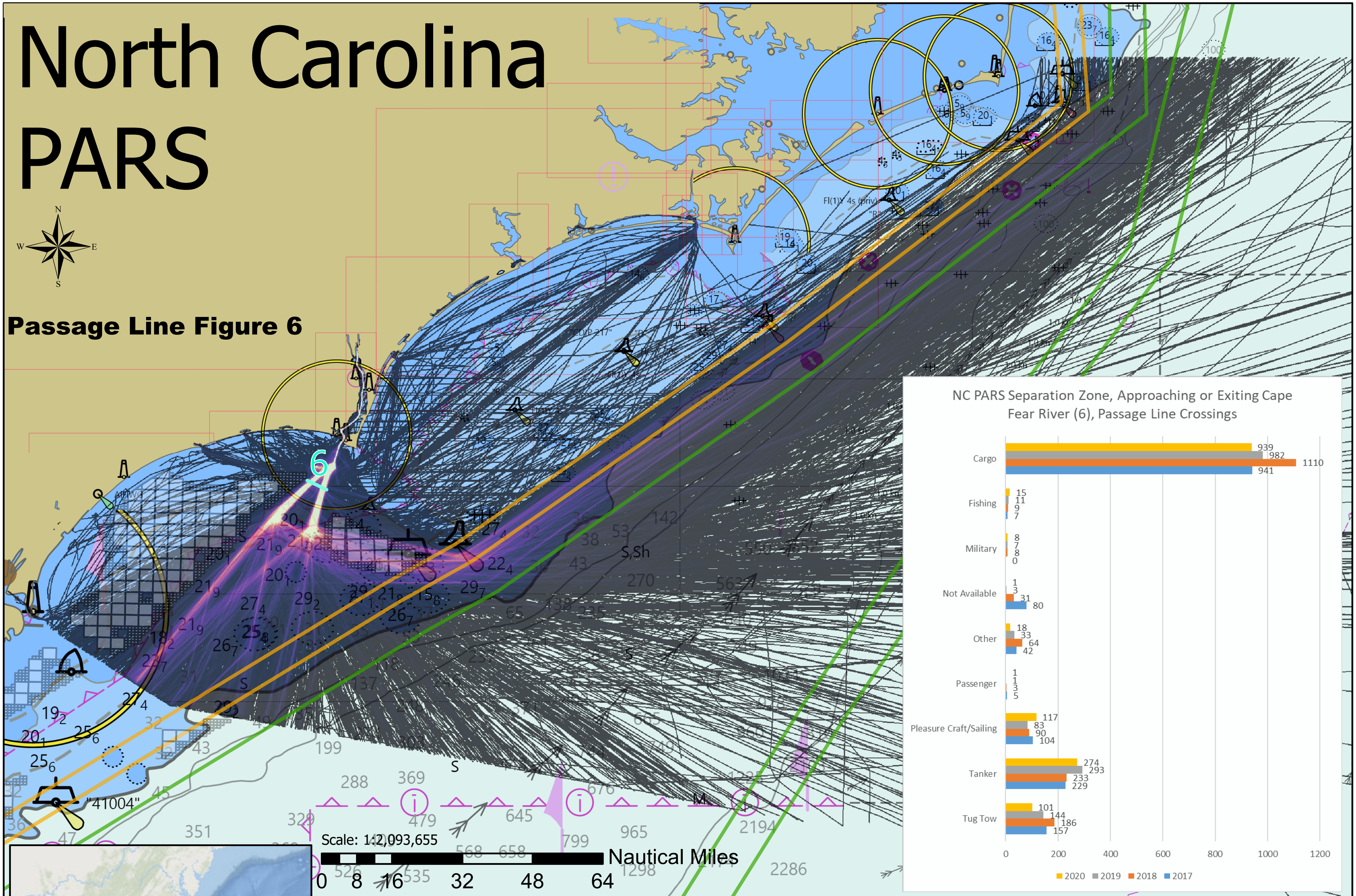
ACPARS Fairways

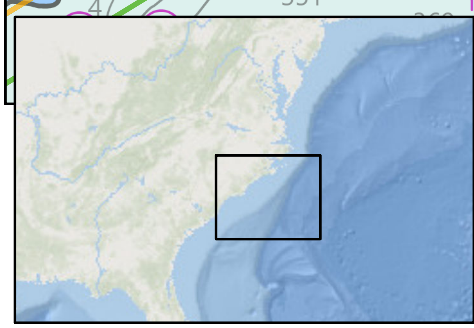
Offshore Lane
Near Shore Lane

Passage Line 5

High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 3:09 PM





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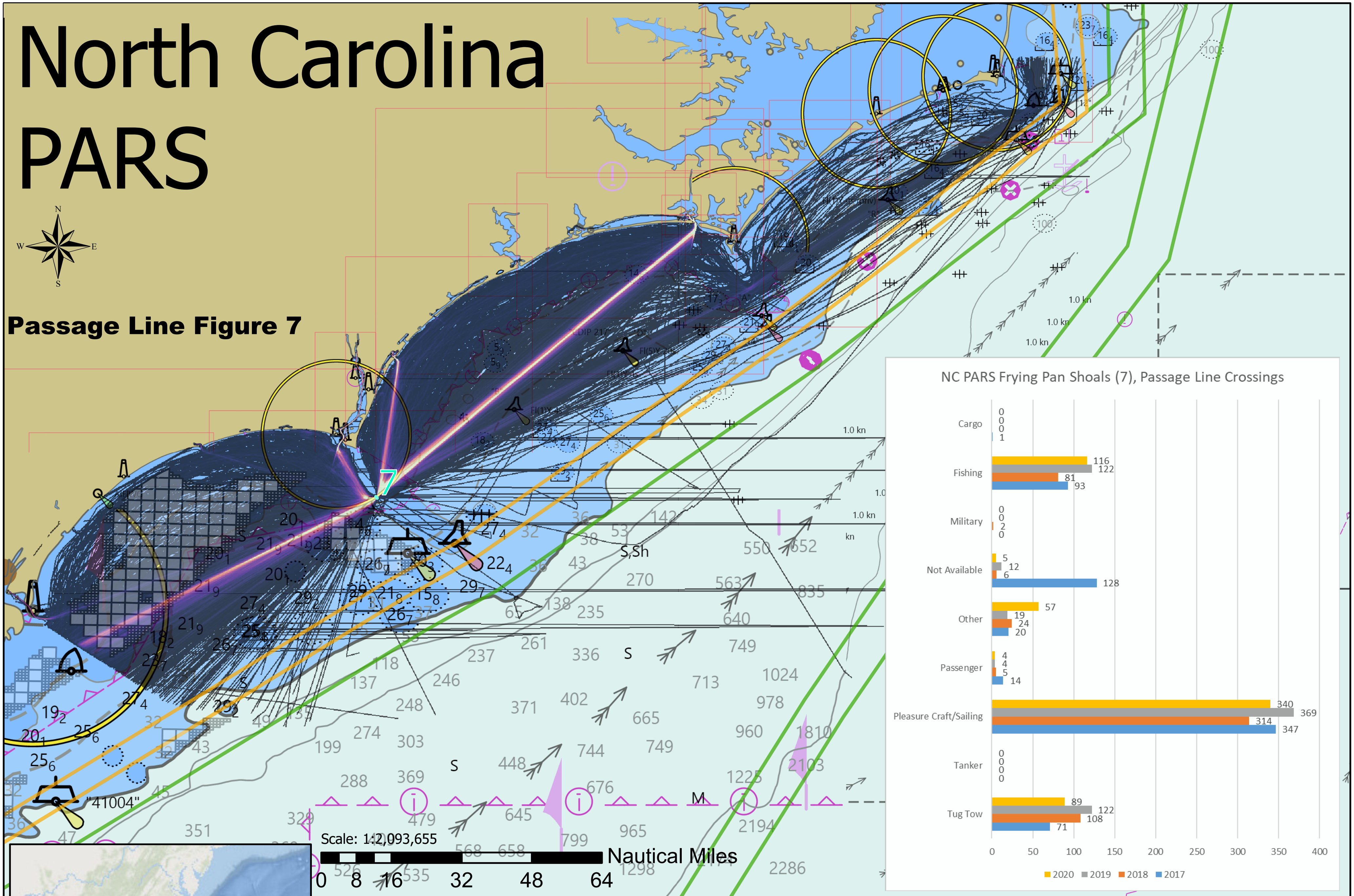
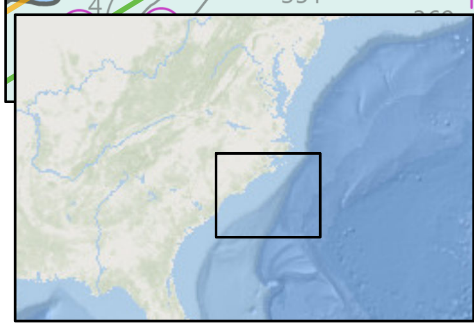
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines
ACPARS Fairways
Offshore Lane
Near Shore Lane
Passage Line 6
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 2:34 PM





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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

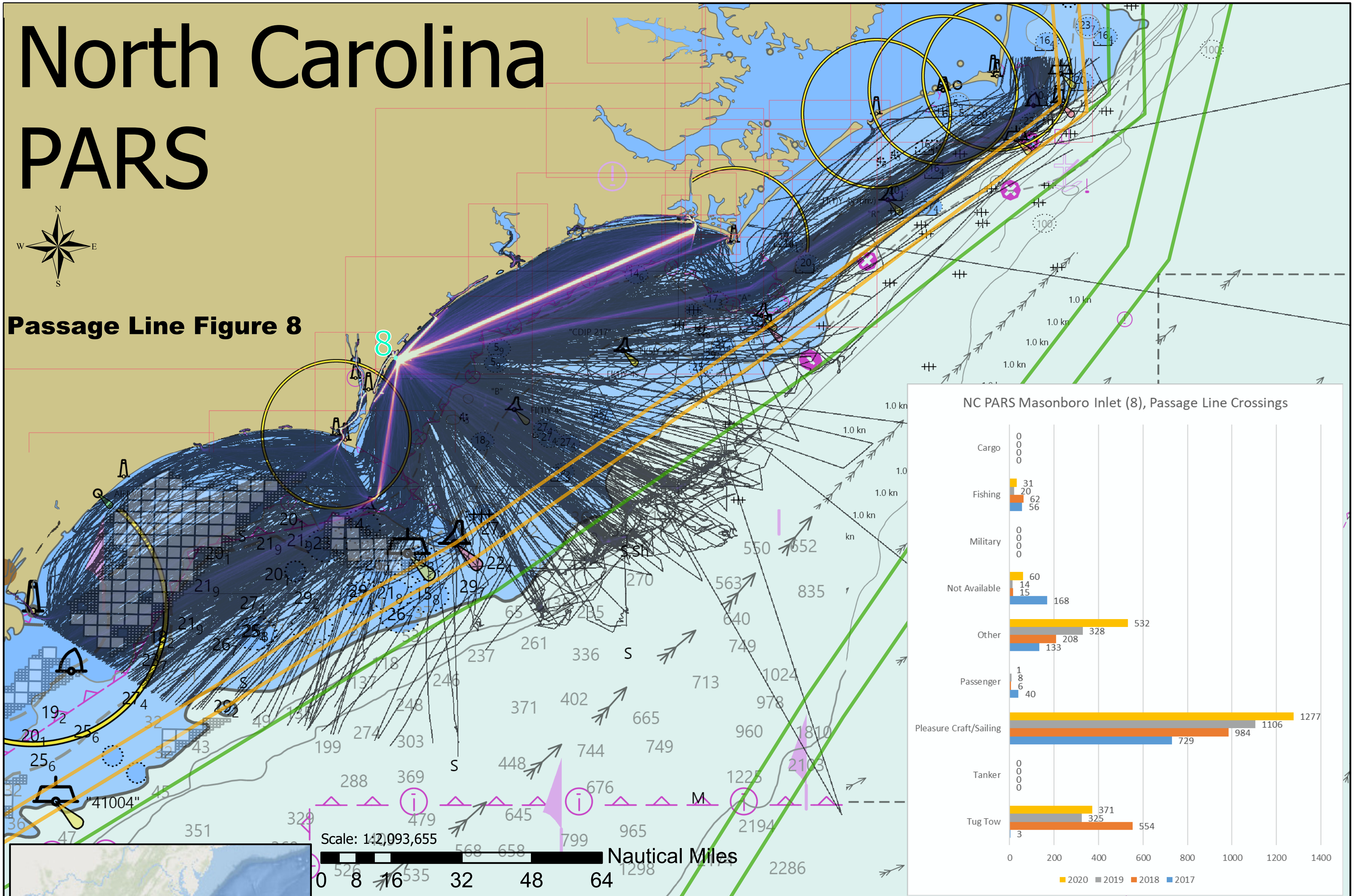
ACPARS Fairways

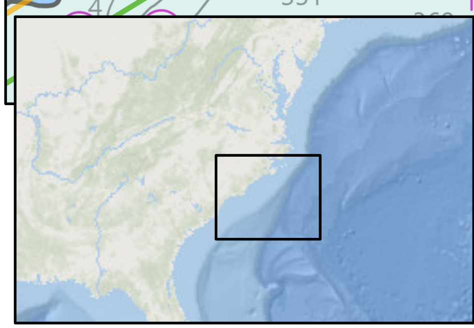
Offshore Lane
Near Shore Lane

Passage Line 7

High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 2:14 PM





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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

ACPARS Fairways

Offshore Lane

Near Shore Lane

Passage Line 8

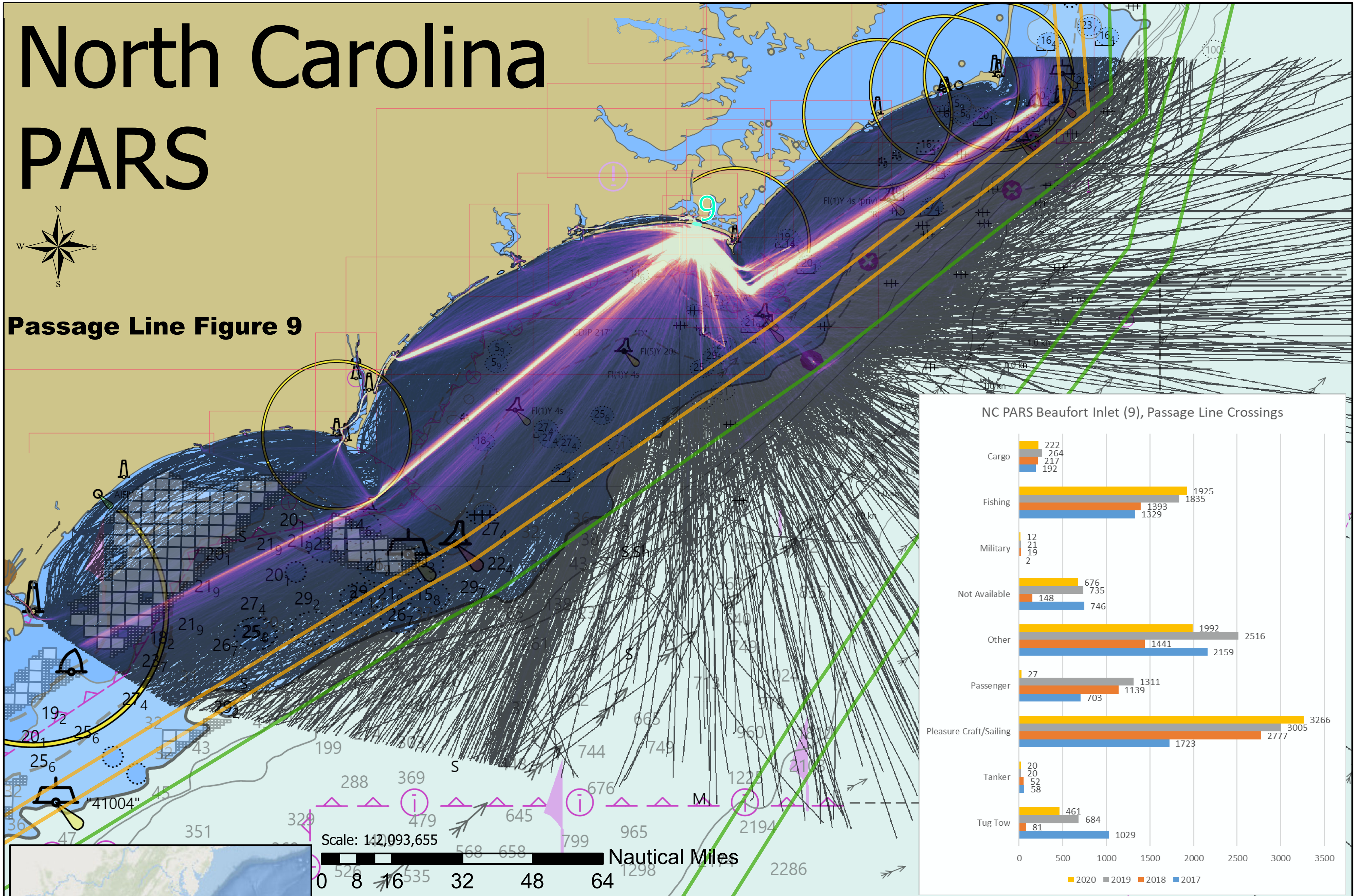
High Traffic Density

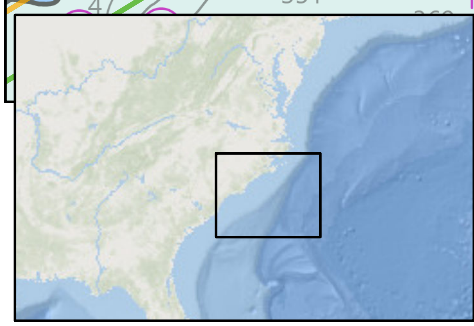
Low Traffic Density

Last Update: 8/26/2021 2:06 PM

North Carolina PARS

Passage Line Figure 9





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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

Near Shore Lane

ACPARS Fairways

Offshore Lane

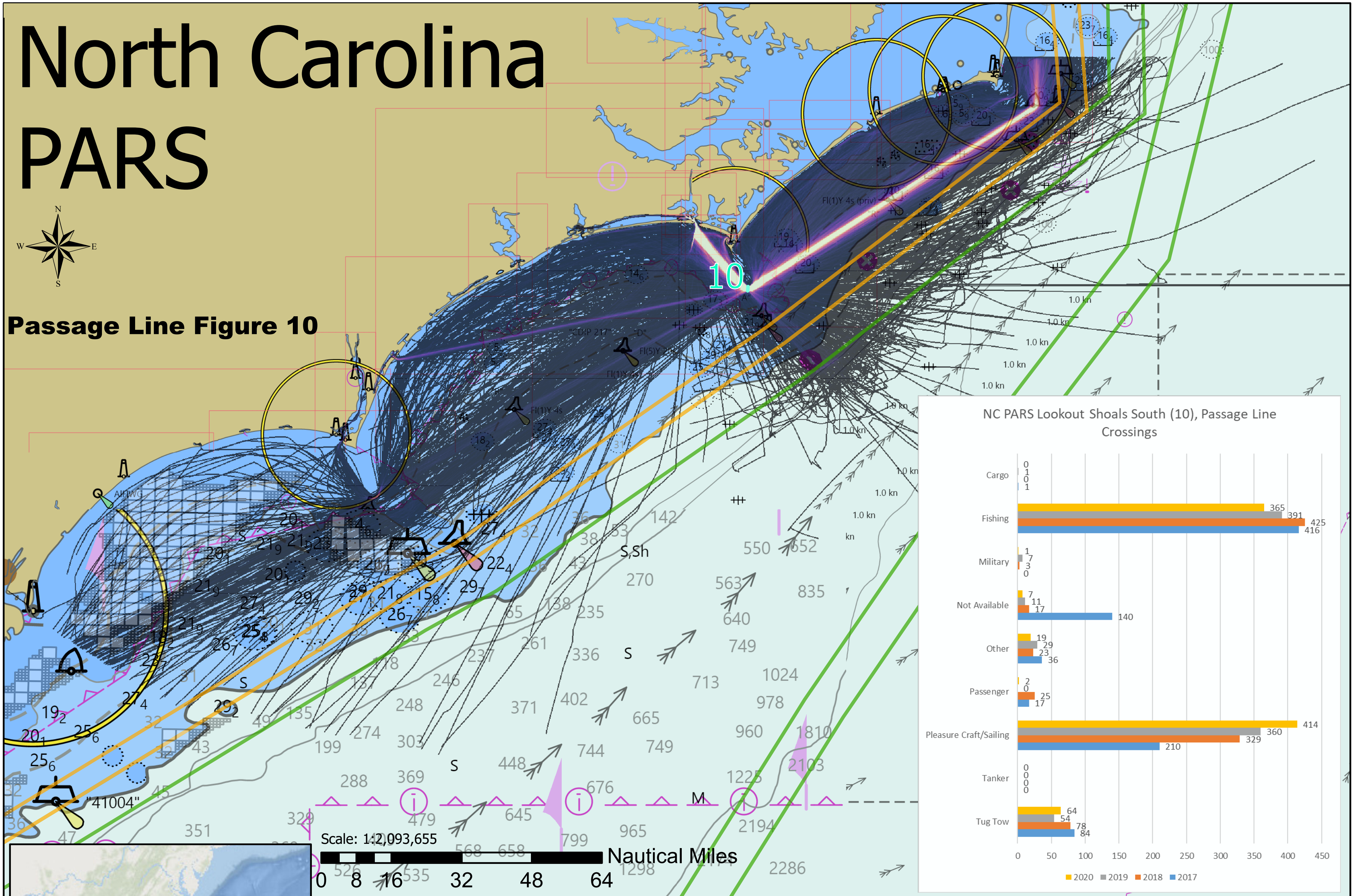
Passage Line 9

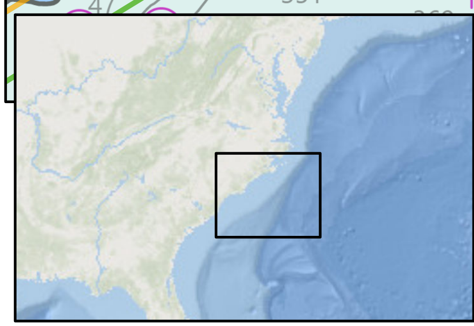
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 1:59 PM

North Carolina PARS

Passage Line Figure 10





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Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

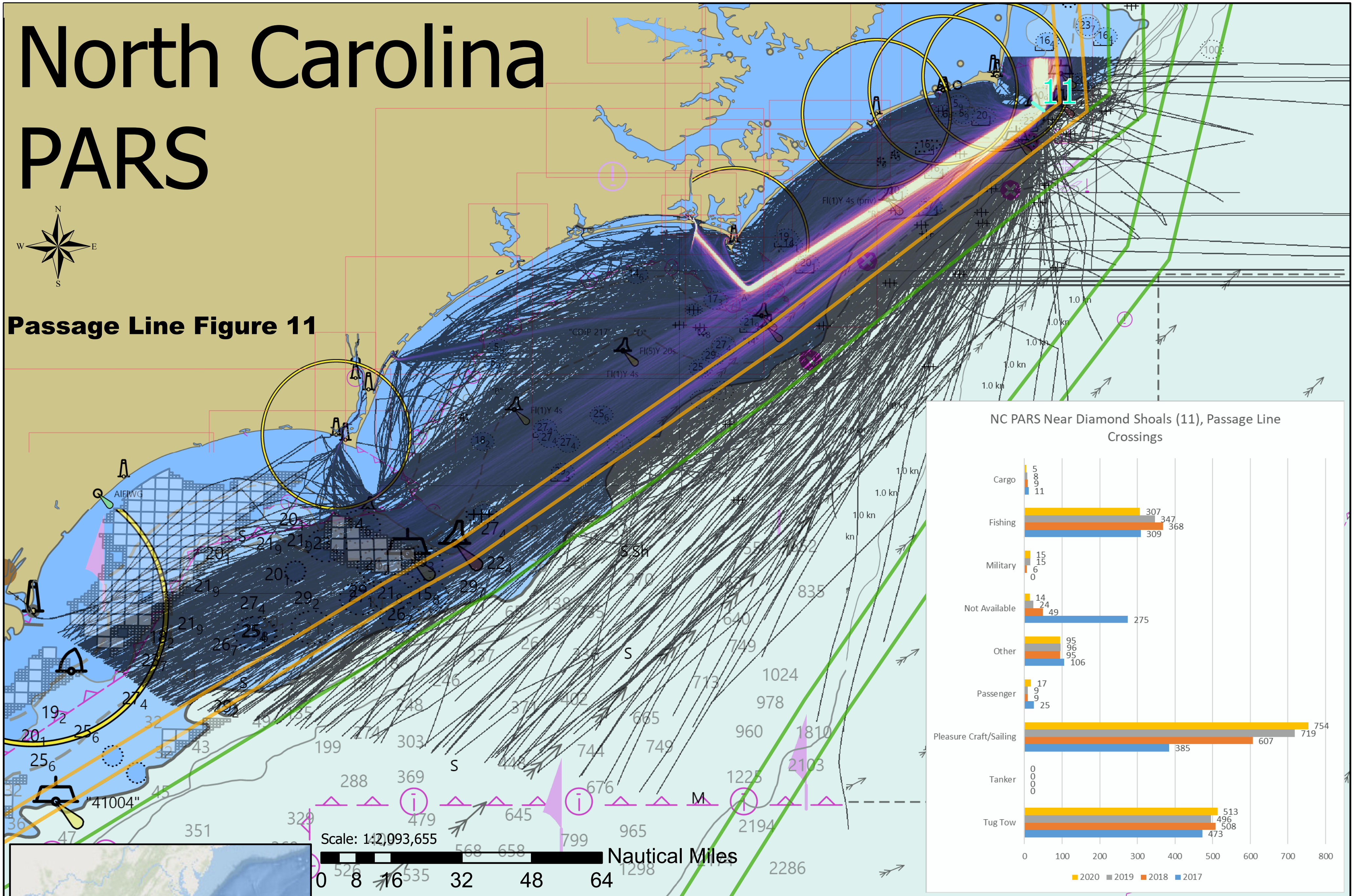
Wind Energy Areas
Passage Lines

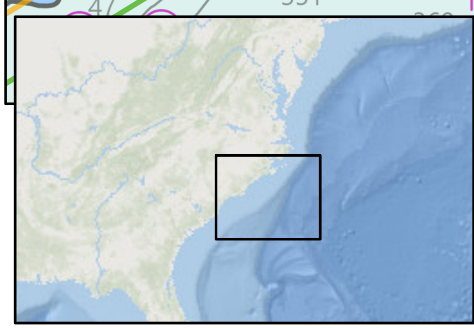
ACPARS Fairways
Offshore Lane

Near Shore Lane

Passage Line 10
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 1:45 PM





Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

ACPARS Fairways

Offshore Lane

Near Shore Lane

Passage Line 11

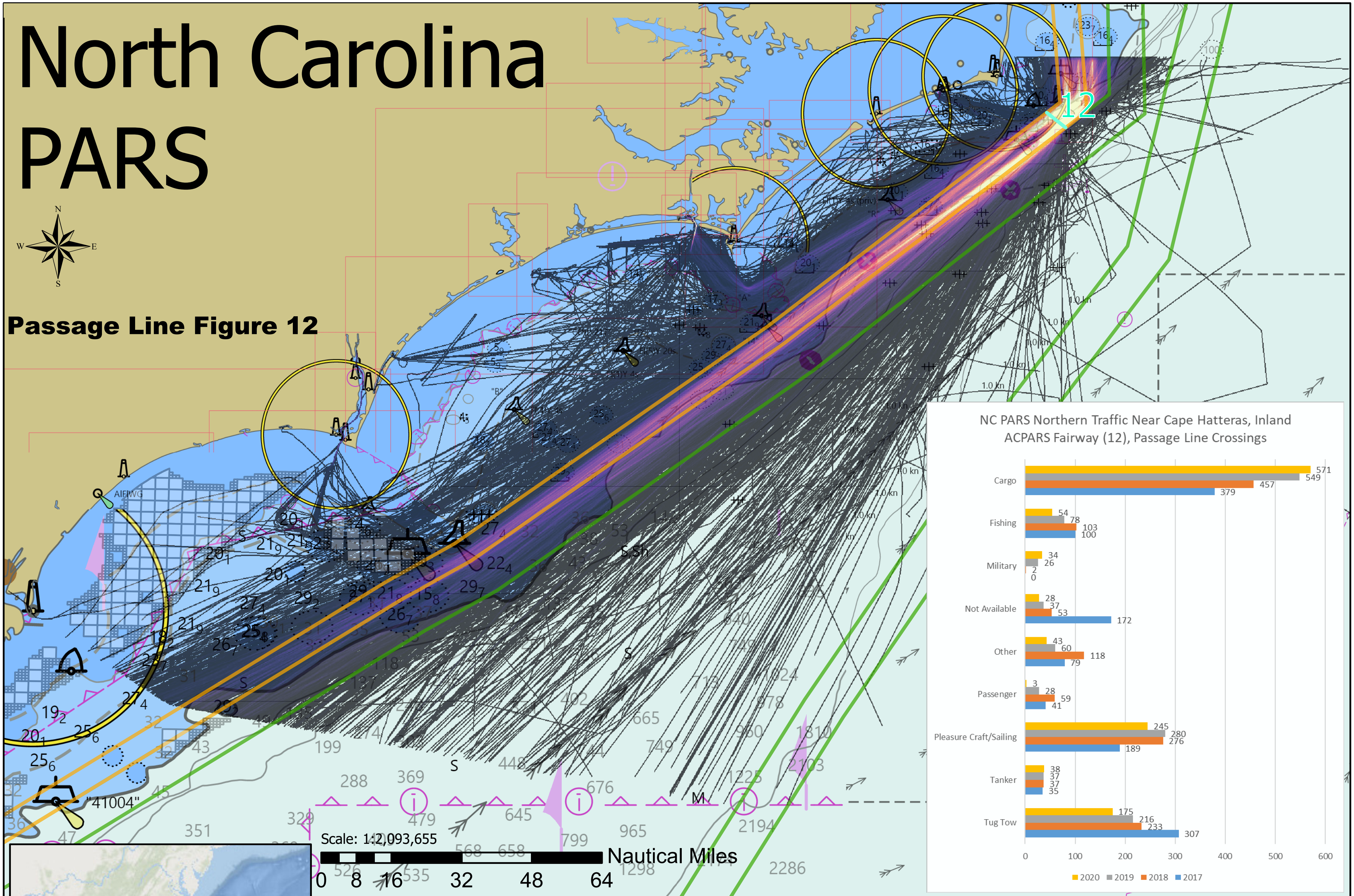
High Traffic Density

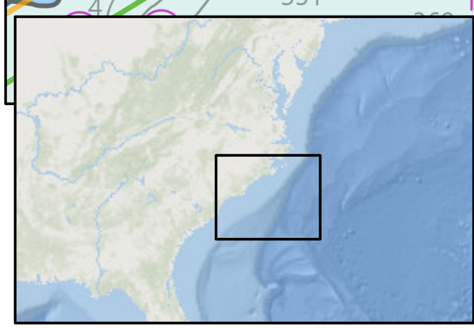
Low Traffic Density

Last Update: 8/26/2021 1:36 PM

North Carolina PARS

Passage Line Figure 12





Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines

ACPARS Fairways
Offshore Lane

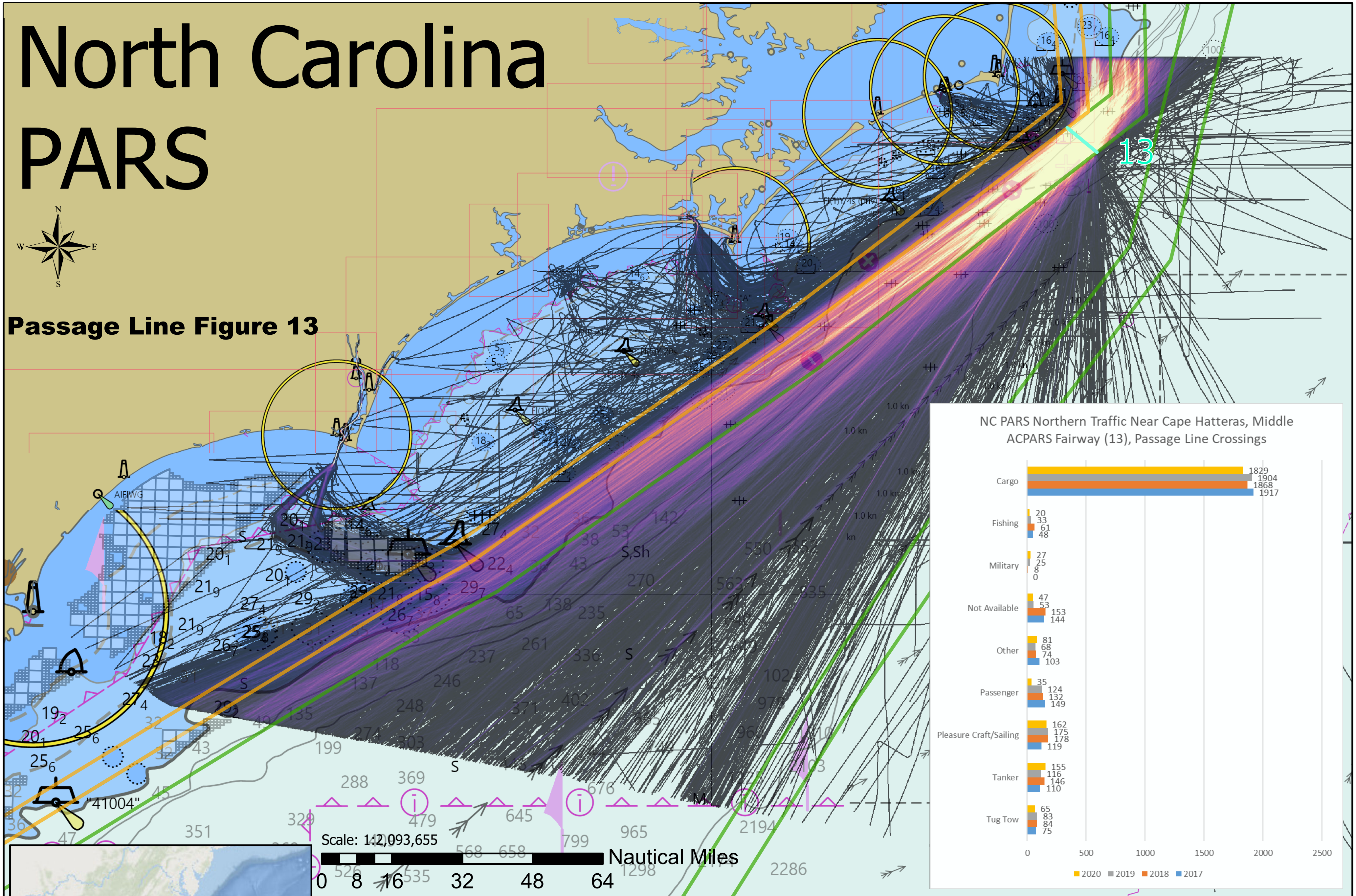
Near Shore Lane

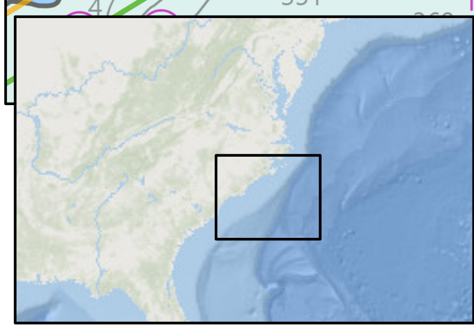
Passage Line 12
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 1:26 PM

North Carolina PARS

Passage Line Figure 13





Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

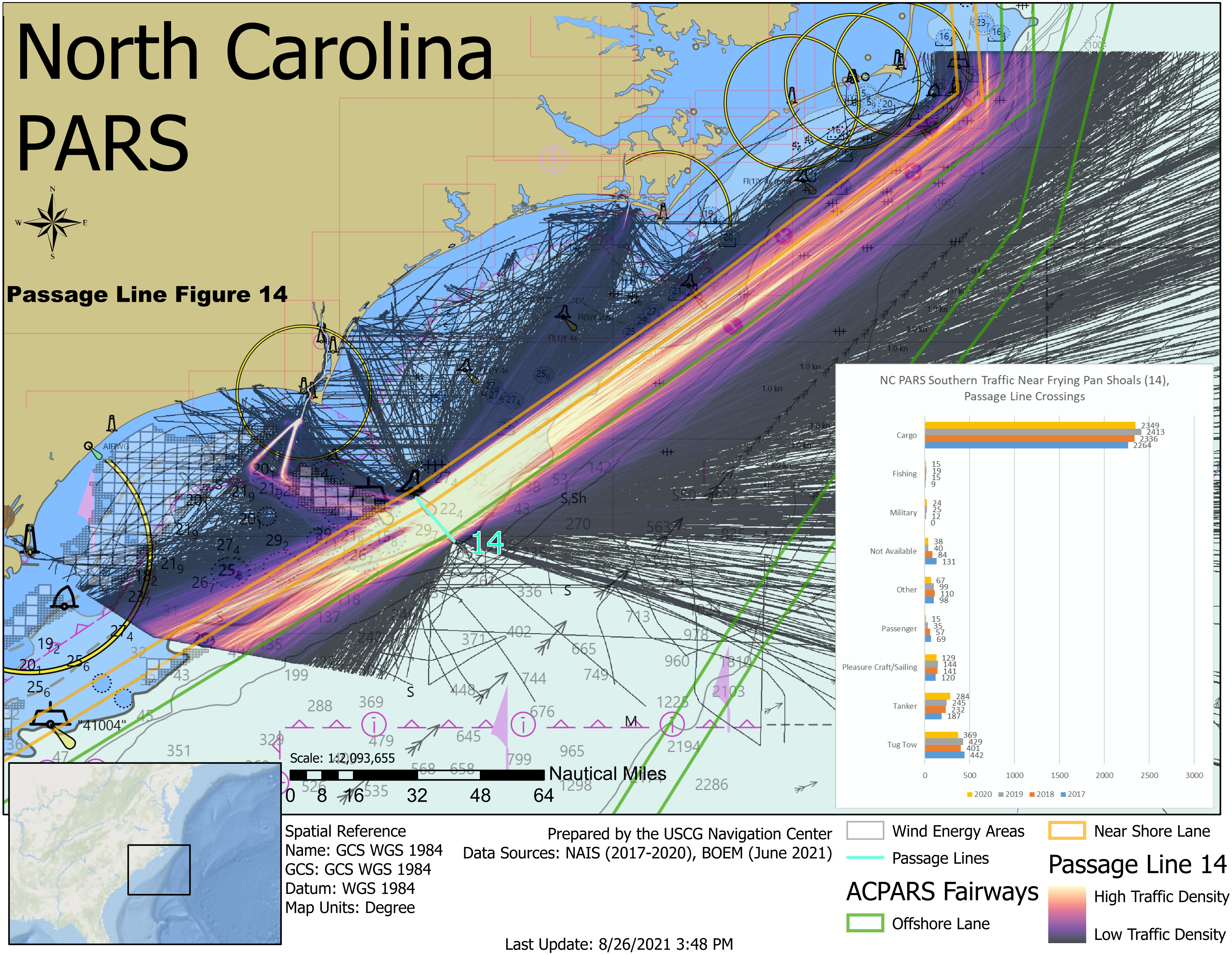
Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

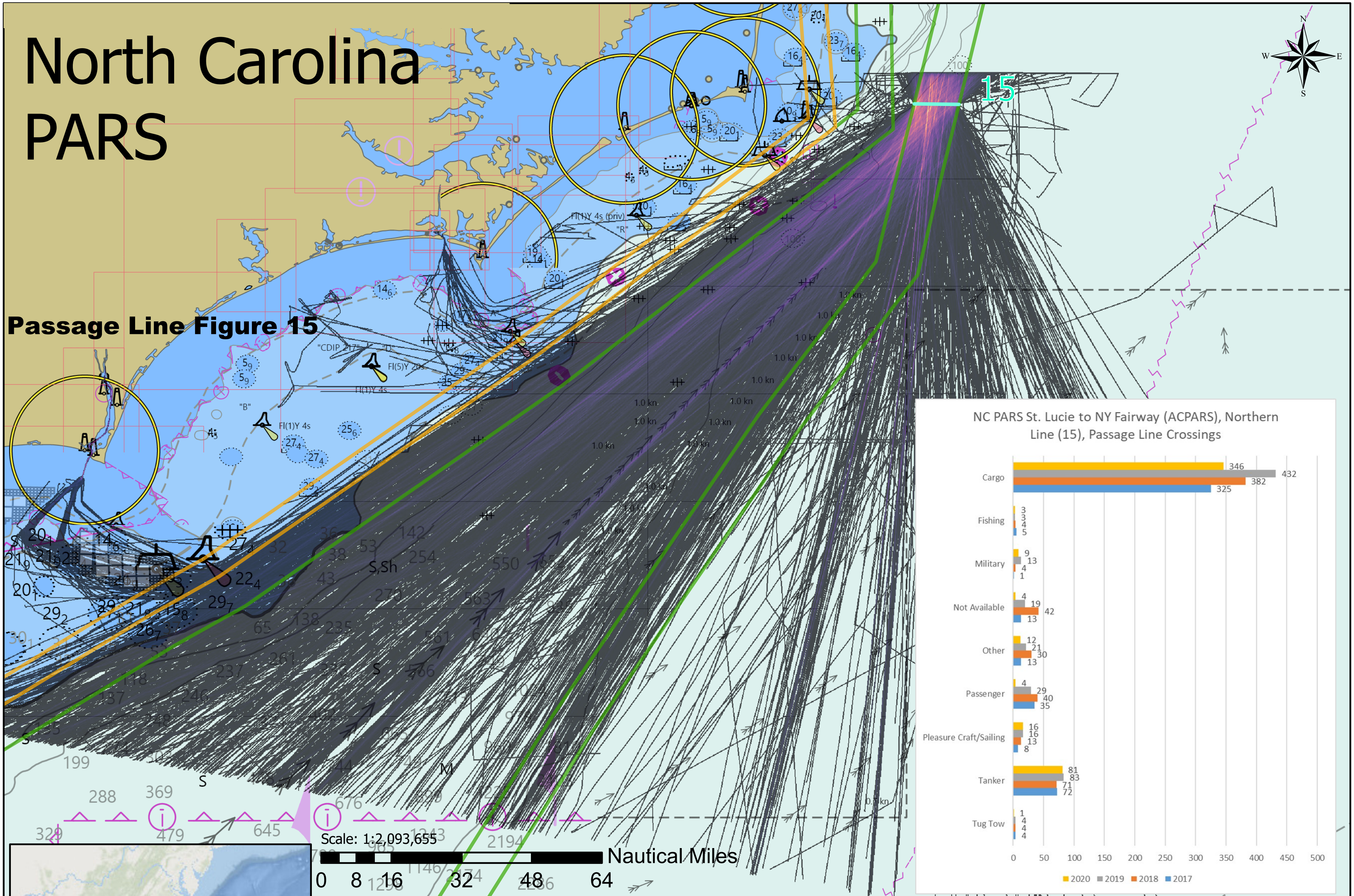
Wind Energy Areas
Passage Lines

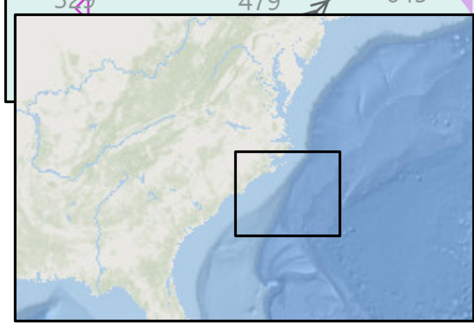
ACPARS Fairways
Near Shore Lane
Offshore Lane

Passage Line 13
High Traffic Density
Low Traffic Density

Last Update: 8/26/2021 3:56 PM


North Carolina PARS
Passage Line Figure 14
N
S
E
W
14
NC PARS Southern Traffic Near Frying Pan Shoals (14), Passage Line Crossings
Cargo 2349 2413 2336 2264
Fishing 15 19 15 9
Military 24 25 12 0
Not Available 38 40 84 131
Other 67 99 110 98
Passenger 15 35 57 69
Pleasure Craft/Sailing 129 144 141 120
Tanker 284 245 232 187
Tug Tow 369 429 401 442
0 500 1000 1500 2000 2500 3000
2020 2019 2018 2017
Scale: 1:2,093,655
0 8 16 32 48 64 Nautical Miles
Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree
Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)
Wind Energy Areas
Passage Lines
ACPARS Fairways
Offshore Lane
Near Shore Lane
Passage Line 14
High Traffic Density
Low Traffic Density
Last Update: 8/26/2021 3:48 PM



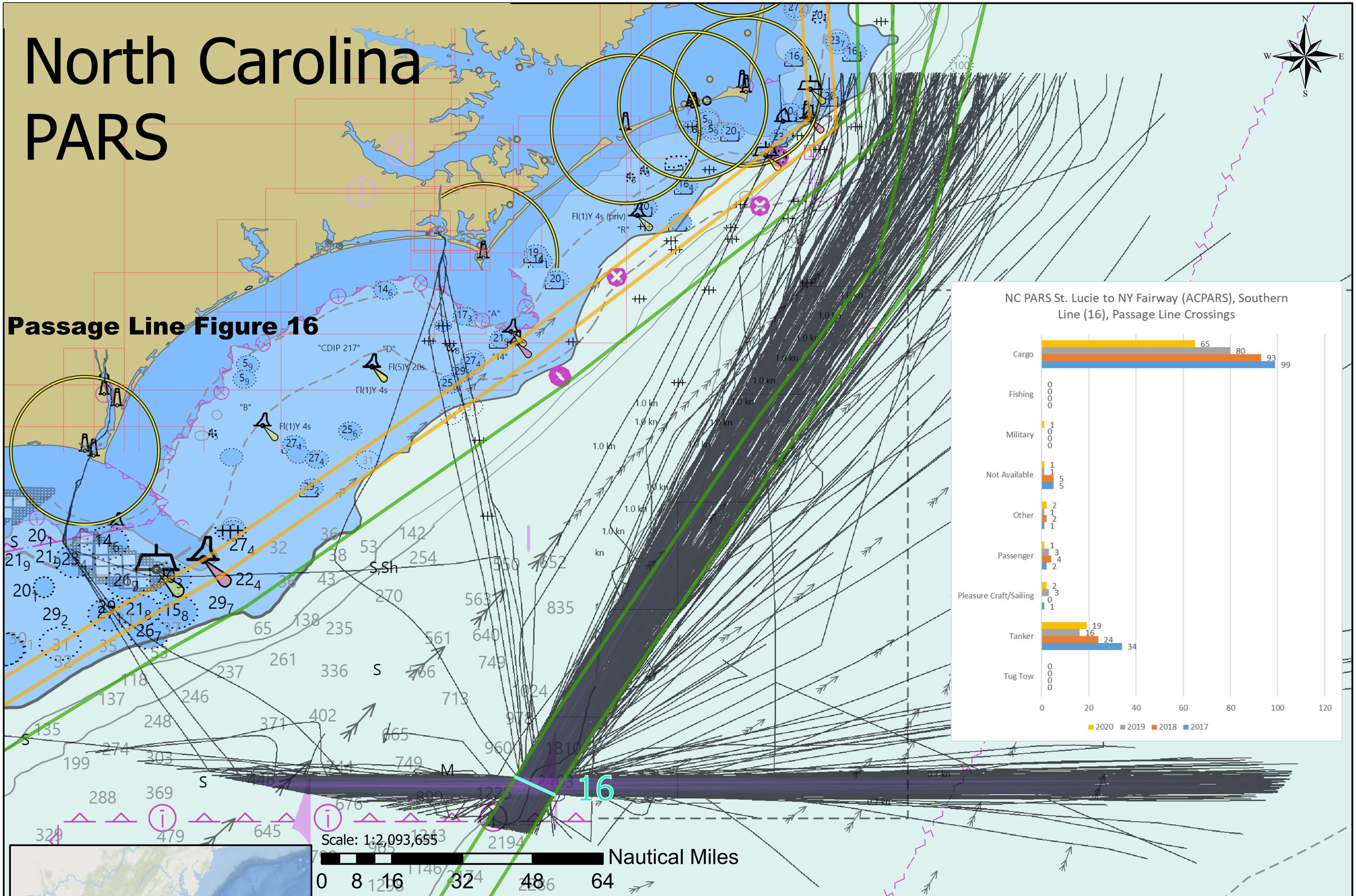


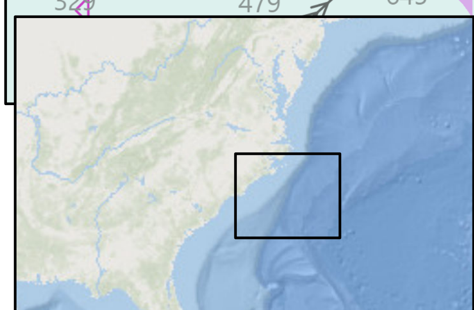
Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

Wind Energy Areas
Passage Lines
ACPARS Fairways
Offshore Lane
Near Shore Lane
Passage Line 15
High Traffic Density
Low Traffic Density

Last Update: 8/30/2021 3:01 PM





Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017-2020), BOEM (June 2021)

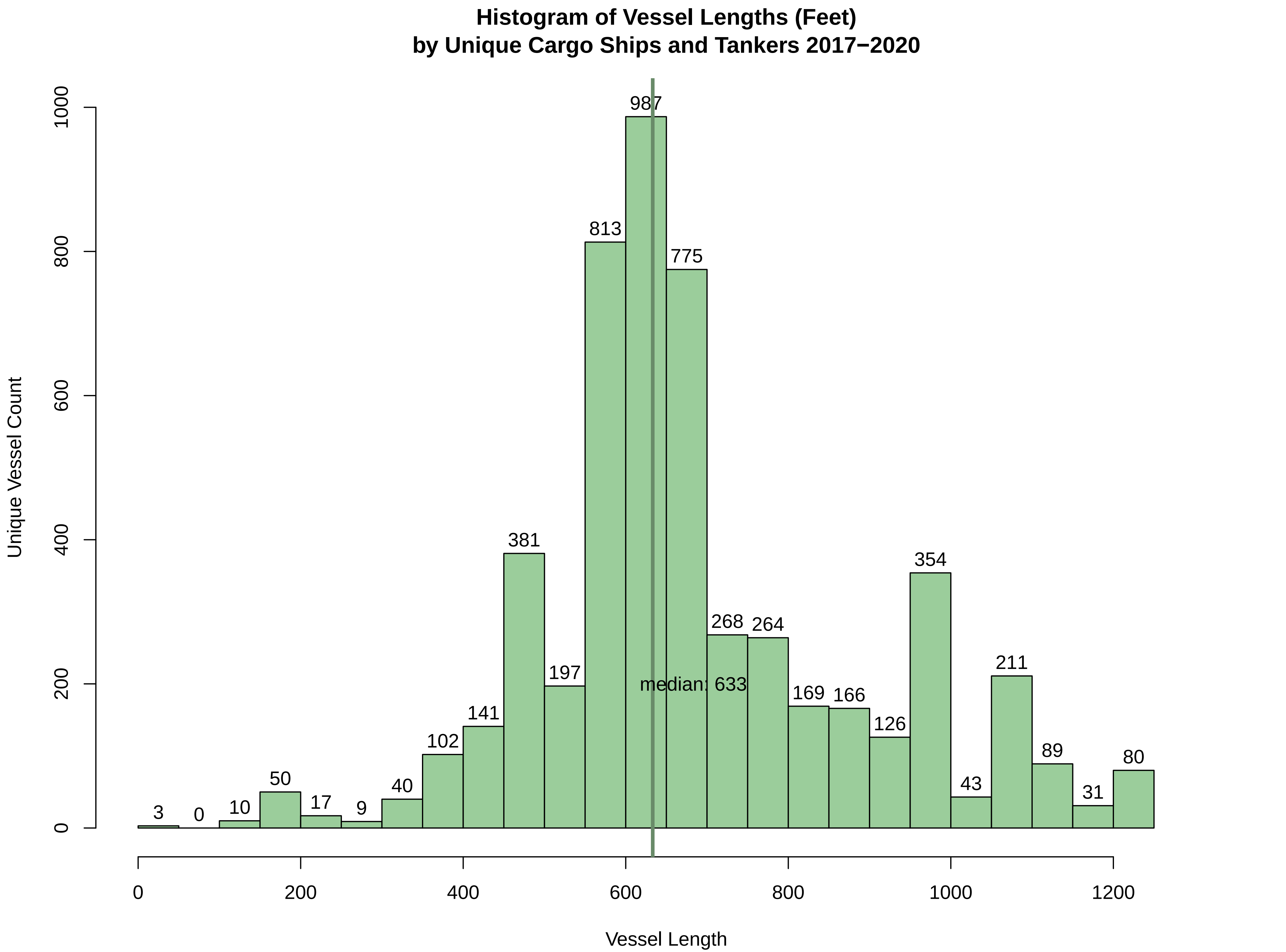
Wind Energy Areas
Passage Lines

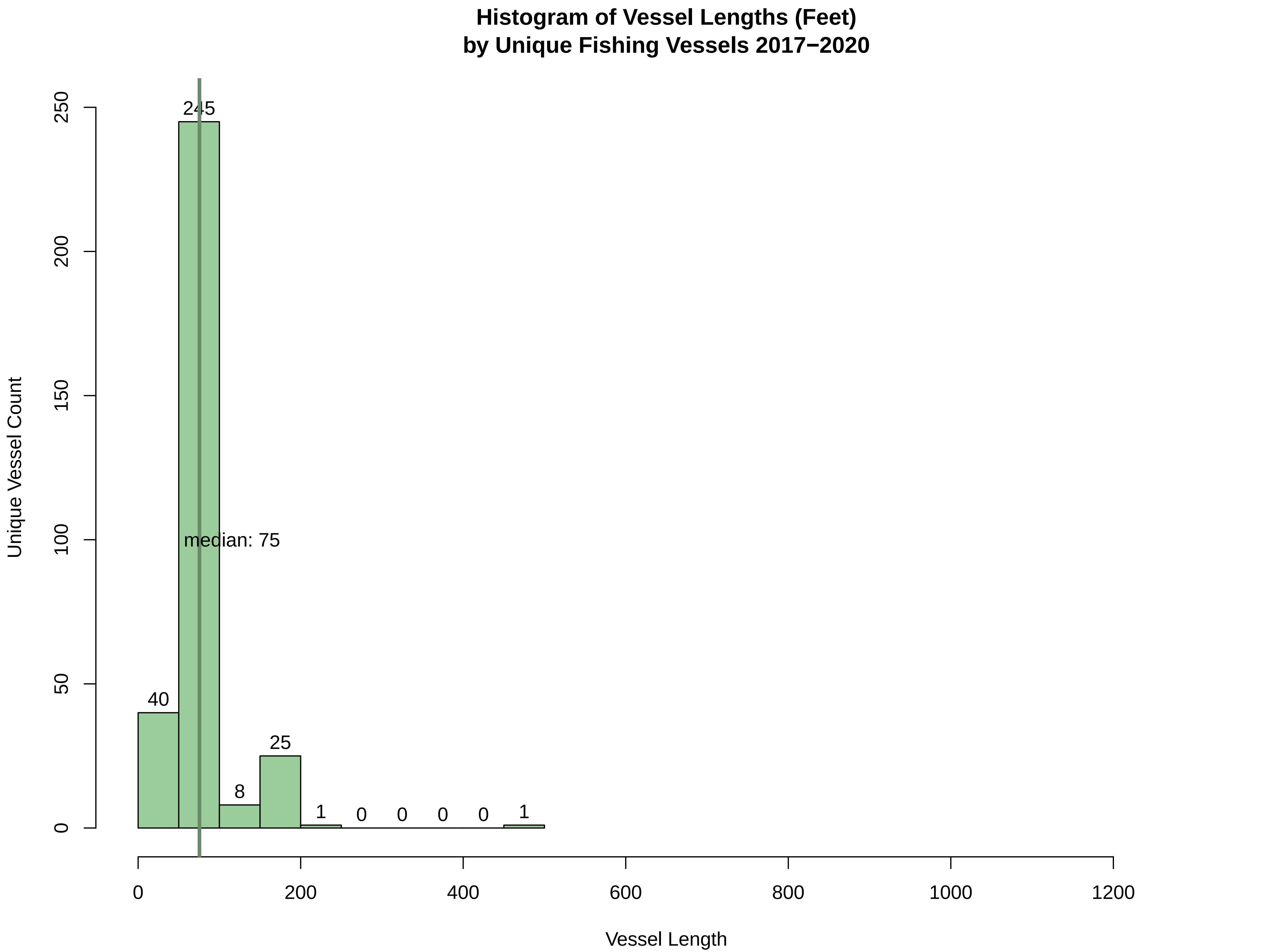
ACPARS Fairways
Offshore Lane
Near Shore Lane

Passage Line 16
High Traffic Density
Low Traffic Density

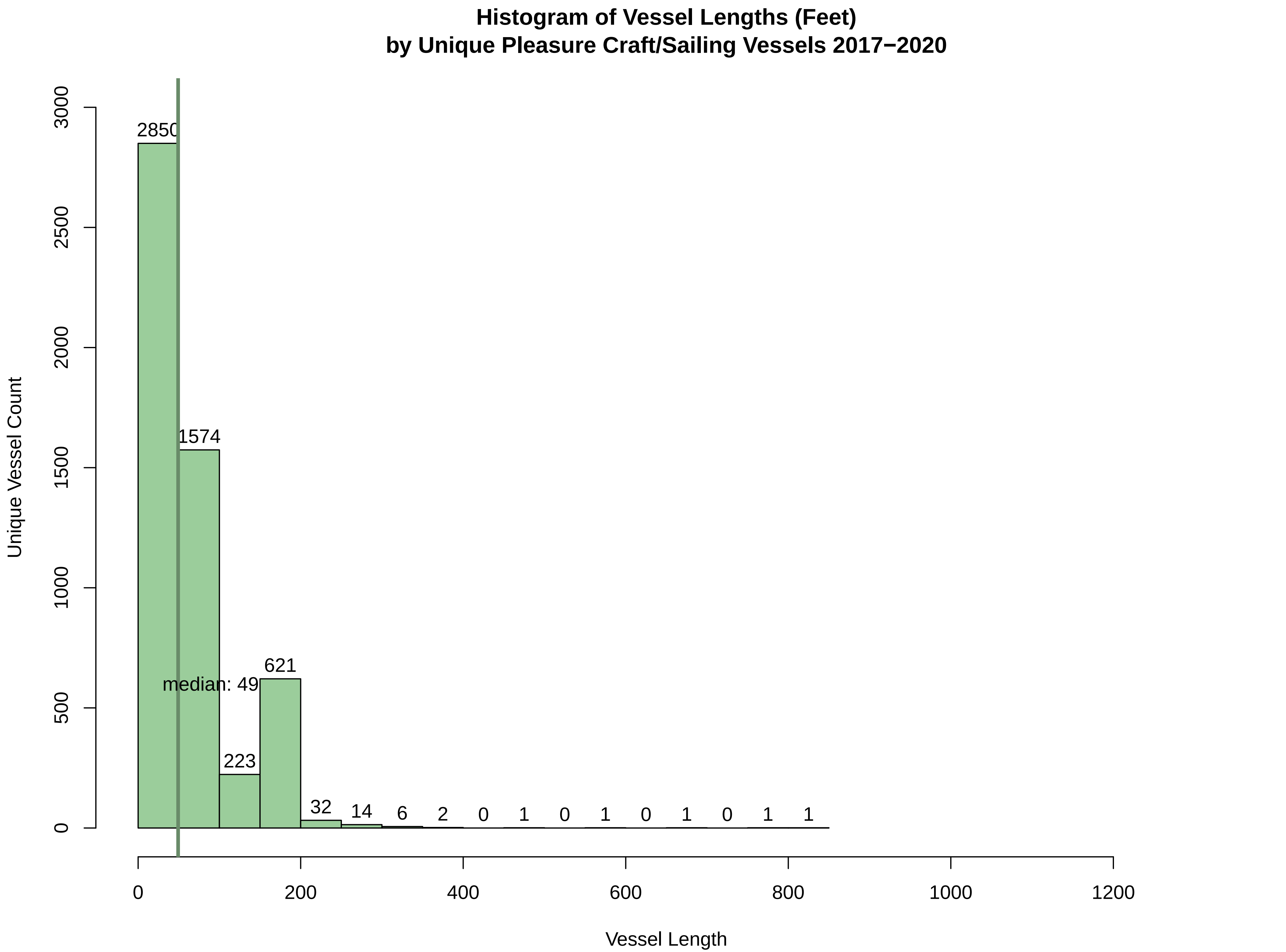
Last Update: 8/30/2021 2:47 PM

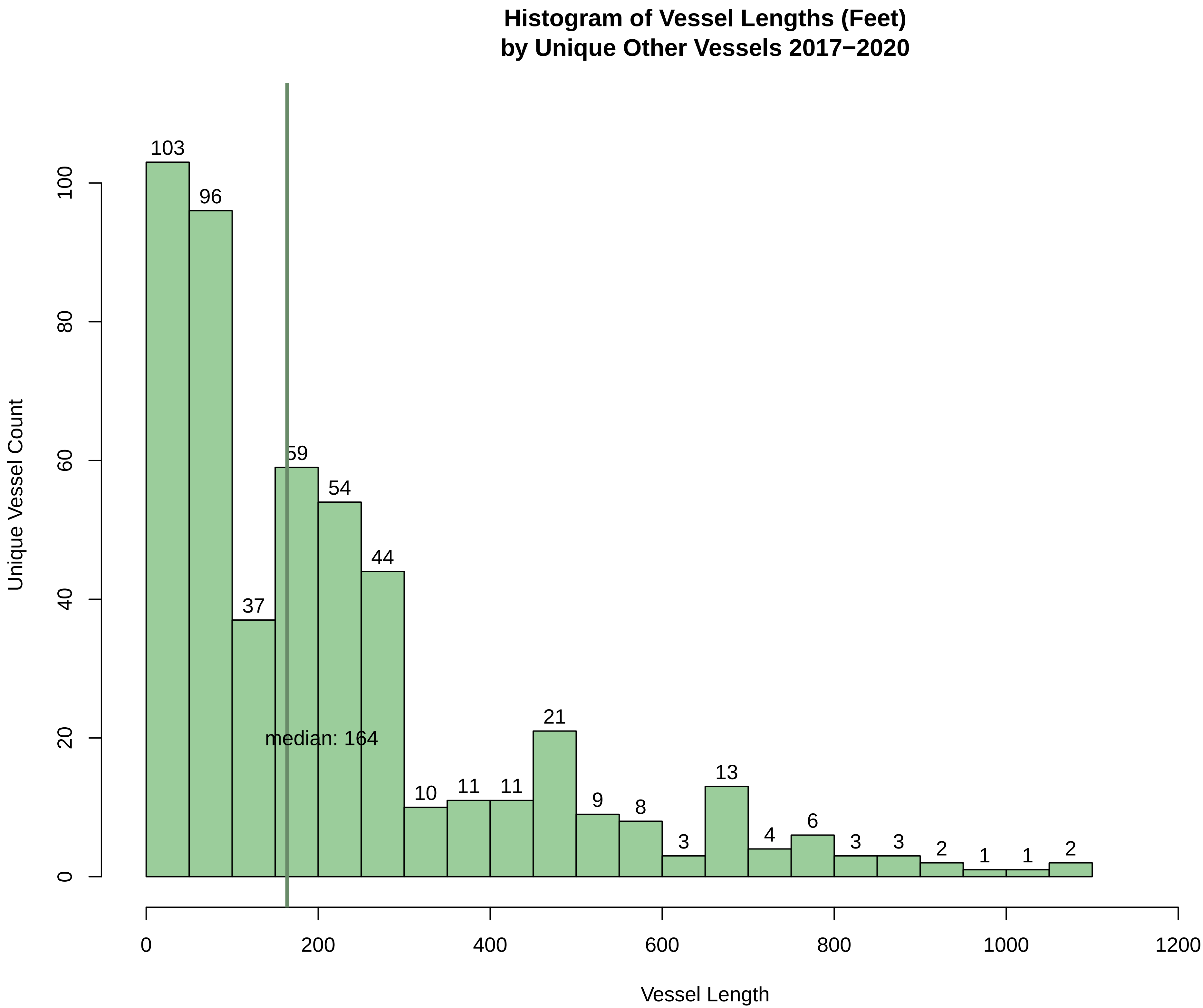
Attachment 2 – Vessel Length Histograms by Vessel Type


Histogram of Vessel Lengths (Feet)
by Unique Cargo Ships and Tankers 2017−2020
Unique Vessel Count
Vessel Length
median: 633
0
200
400
600
800
1000
1200
3
0
10
50
17
9
40
102
141
381
197
813
987
775
268
264
169
166
126
354
43
211
89
31
80

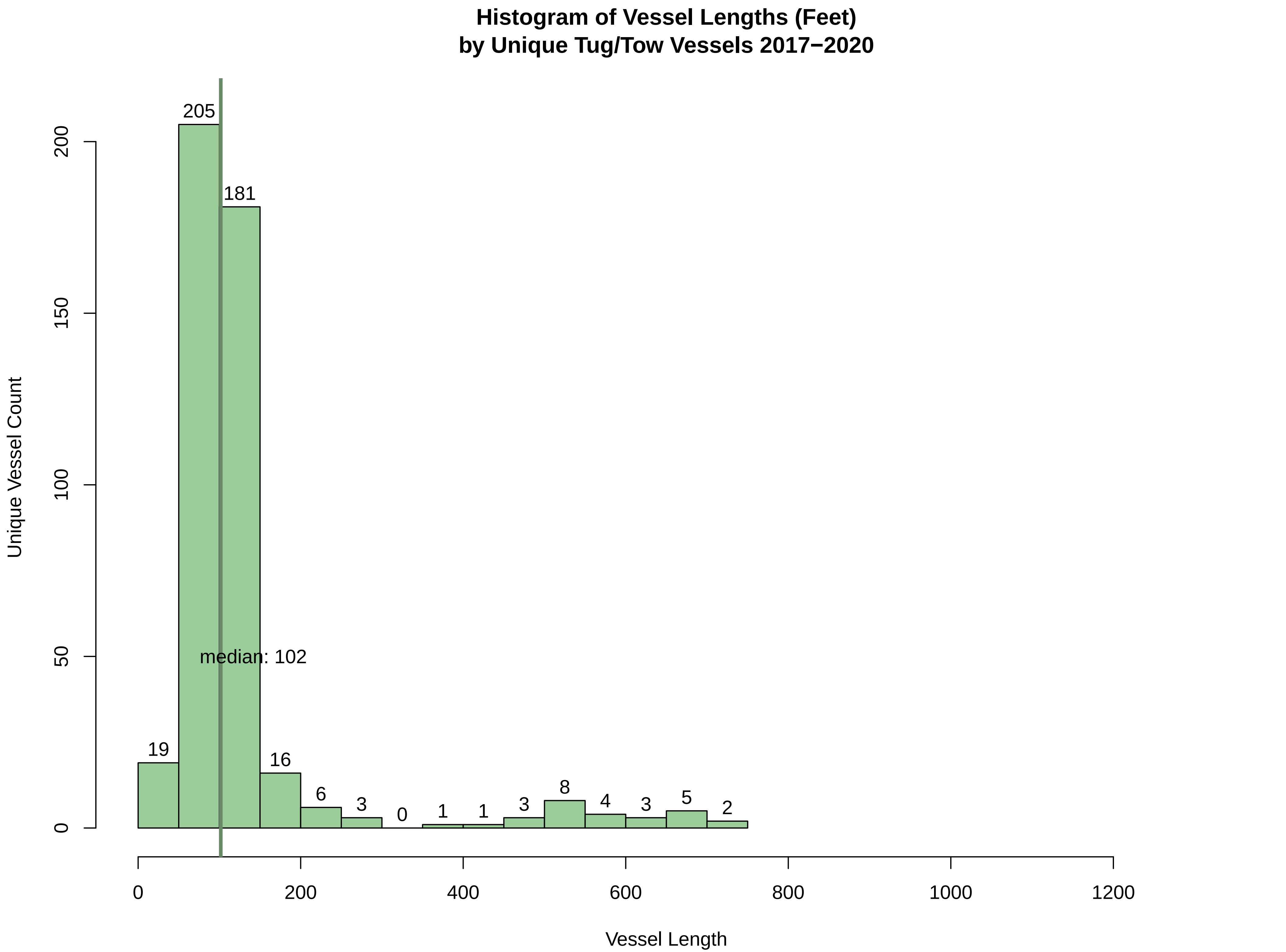


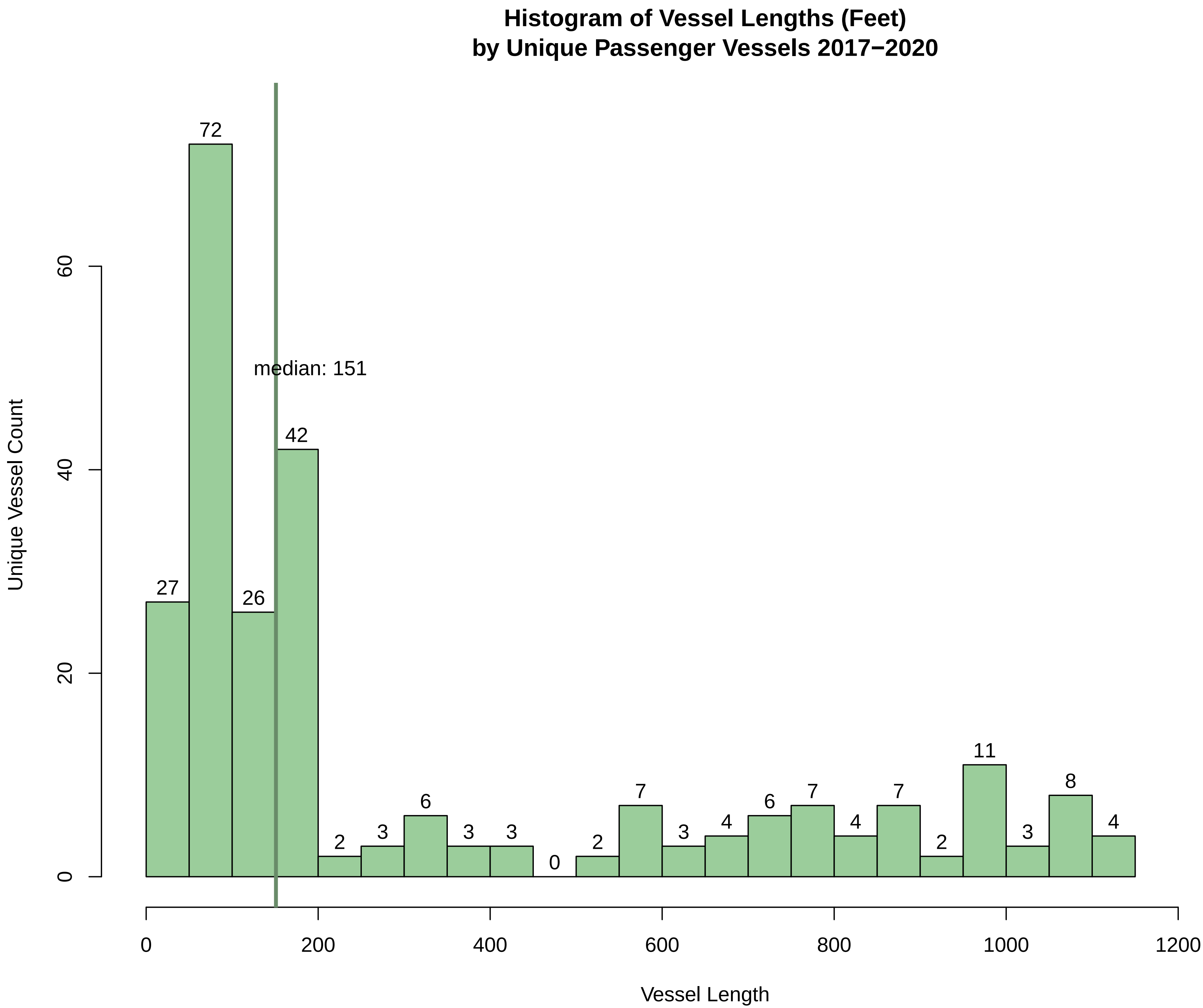
Histogram of Vessel Lengths (Feet)
by Unique Fishing Vessels 2017−2020
Unique Vessel Count
0
50
100
150
200
250
245
40
8
25
1
0
0
0
0
1
median: 75
0
200
400
600
800
1000
1200
Vessel Length


Histogram of Vessel Lengths (Feet)
by Unique Pleasure Craft/Sailing Vessels 2017−2020
Unique Vessel Count
0
500
1000
1500
2000
2500
3000
2850
1574
621
median: 49
223
32
14
6
2
0
1
0
1
0
1
0
1
1
0
200
400
600
800
1000
1200
Vessel Length



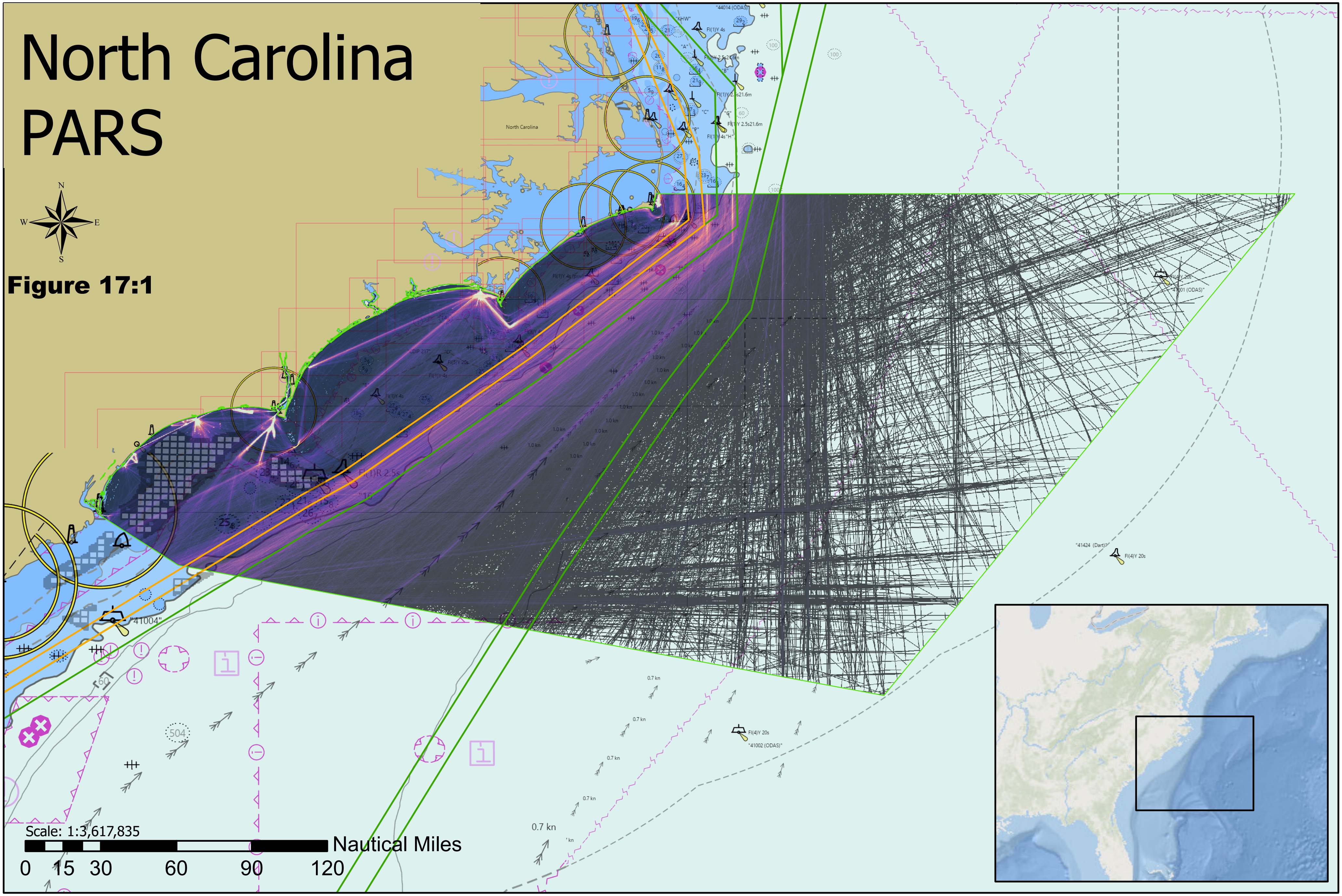
Histogram of Vessel Lengths (Feet)
by Unique Other Vessels 2017−2020
Unique Vessel Count
Vessel Length
median: 164
0
20
40
60
80
100
0
200
400
600
800
1000
1200
103
96
37
59
54
44
10
11
11
21
9
8
3
13
4
6
3
3
2
1
1
2


Histogram of Vessel Lengths (Feet)
by Unique Tug/Tow Vessels 2017−2020
Unique Vessel Count
Vessel Length
0
50
100
150
200
0
200
400
600
800
1000
1200
19
205
181
16
6
3
0
1
1
3
8
4
3
5
2
median: 102



Histogram of Vessel Lengths (Feet)
by Unique Passenger Vessels 2017−2020
72
median: 151
42
27
26
11
8
7
7
7
6
6
4
4
4
3
3
3
3
3
3
2
2
2
0
0
20
40
60
Unique Vessel Count
0
200
400
600
800
1000
1200
Vessel Length

Attachment 3 – Vessel Traffic Densities



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:34 PM

Wind Energy Areas

ACPARS Fairways

Offshore Lane

Near Shore Lane

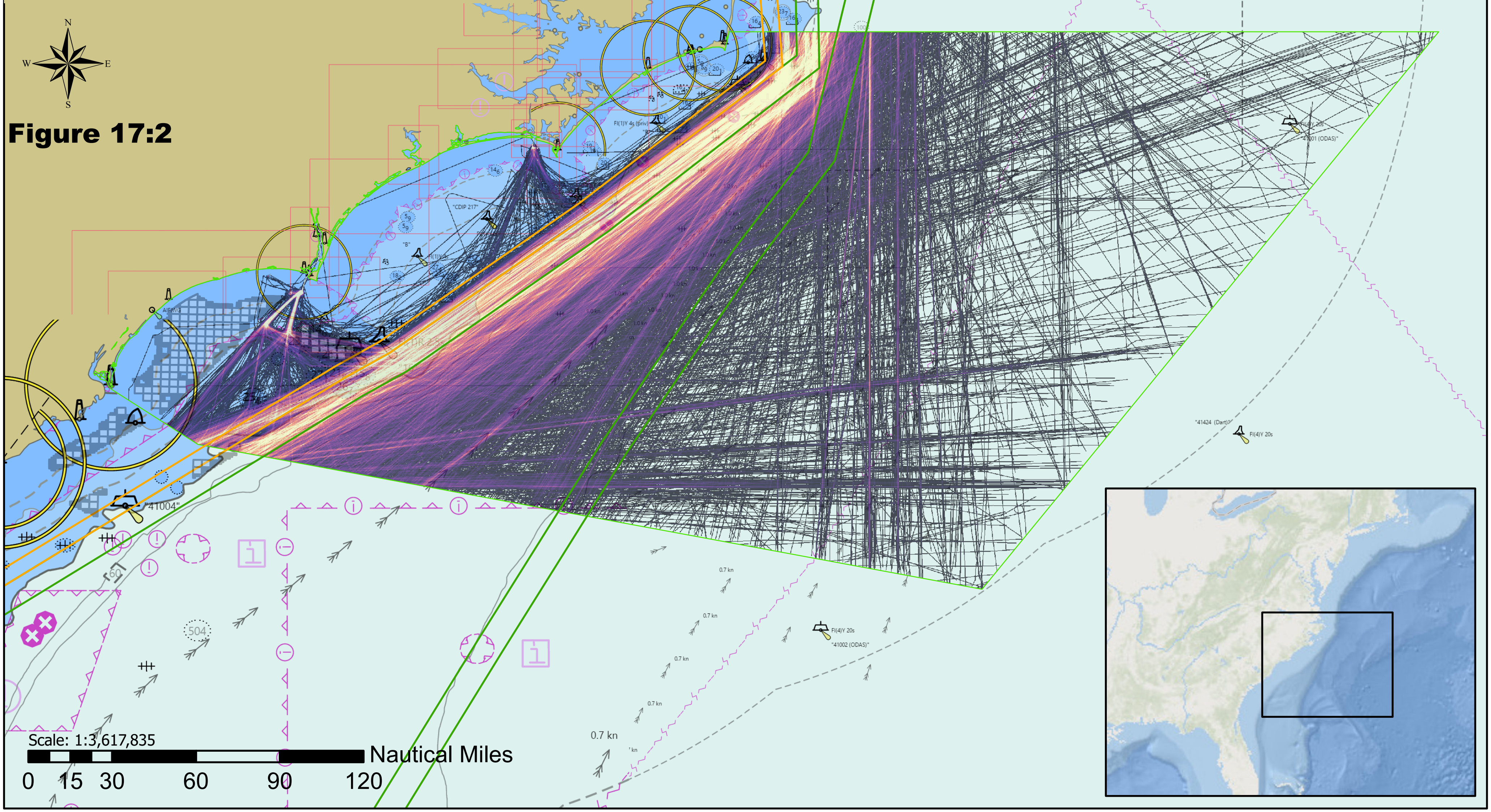
All Vessels 2017

High Traffic Density

Low Traffic Density

North Carolina PARS

Figure 17:2



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

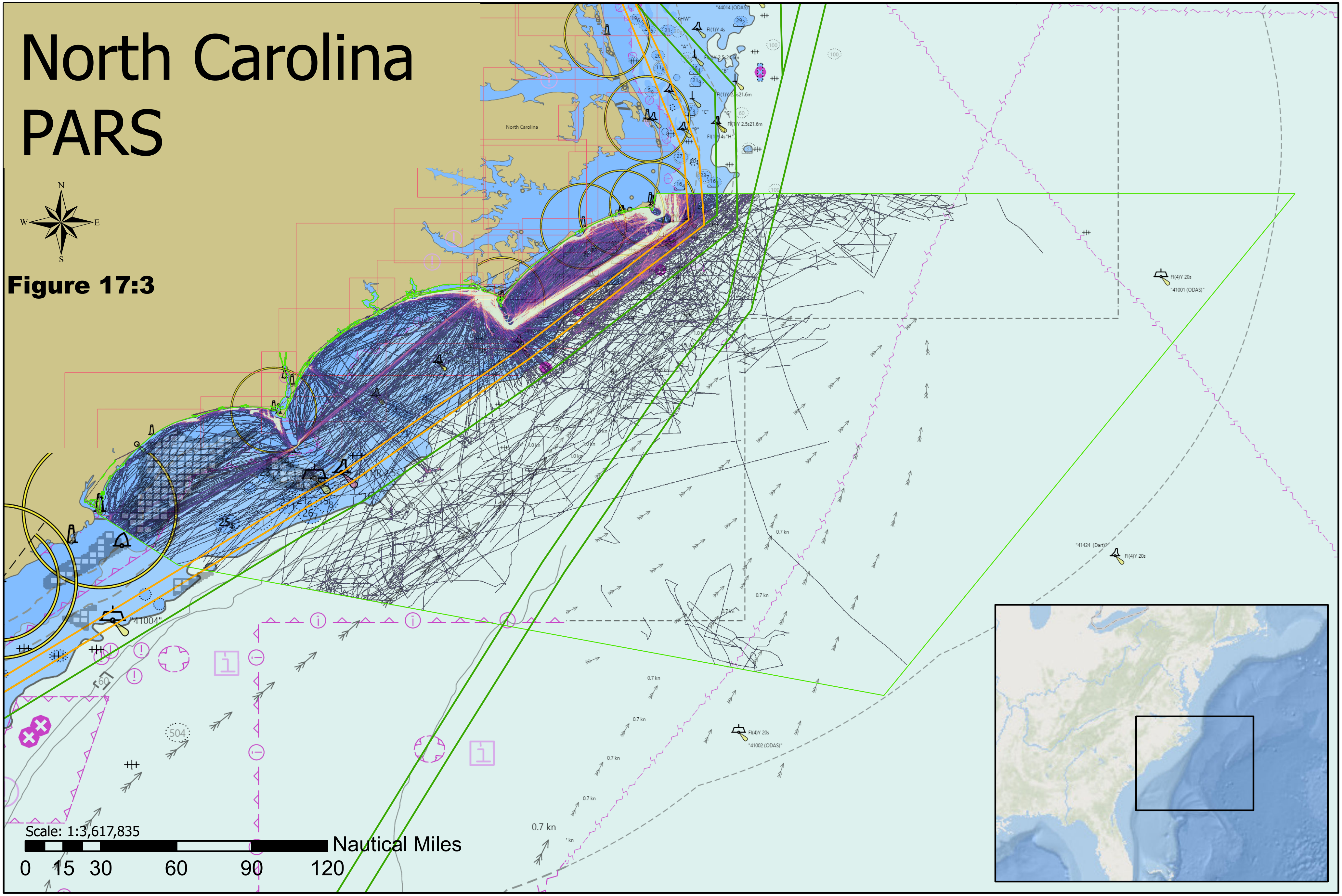
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Cargo 2017
High Traffic Density
Low Traffic Density

Last Update: 8/2/2021 5:11 PM



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017), BOEM (June 2021)

Last Update: 8/2/2021 1:21 PM

Wind Energy Areas

ACPARS Fairways

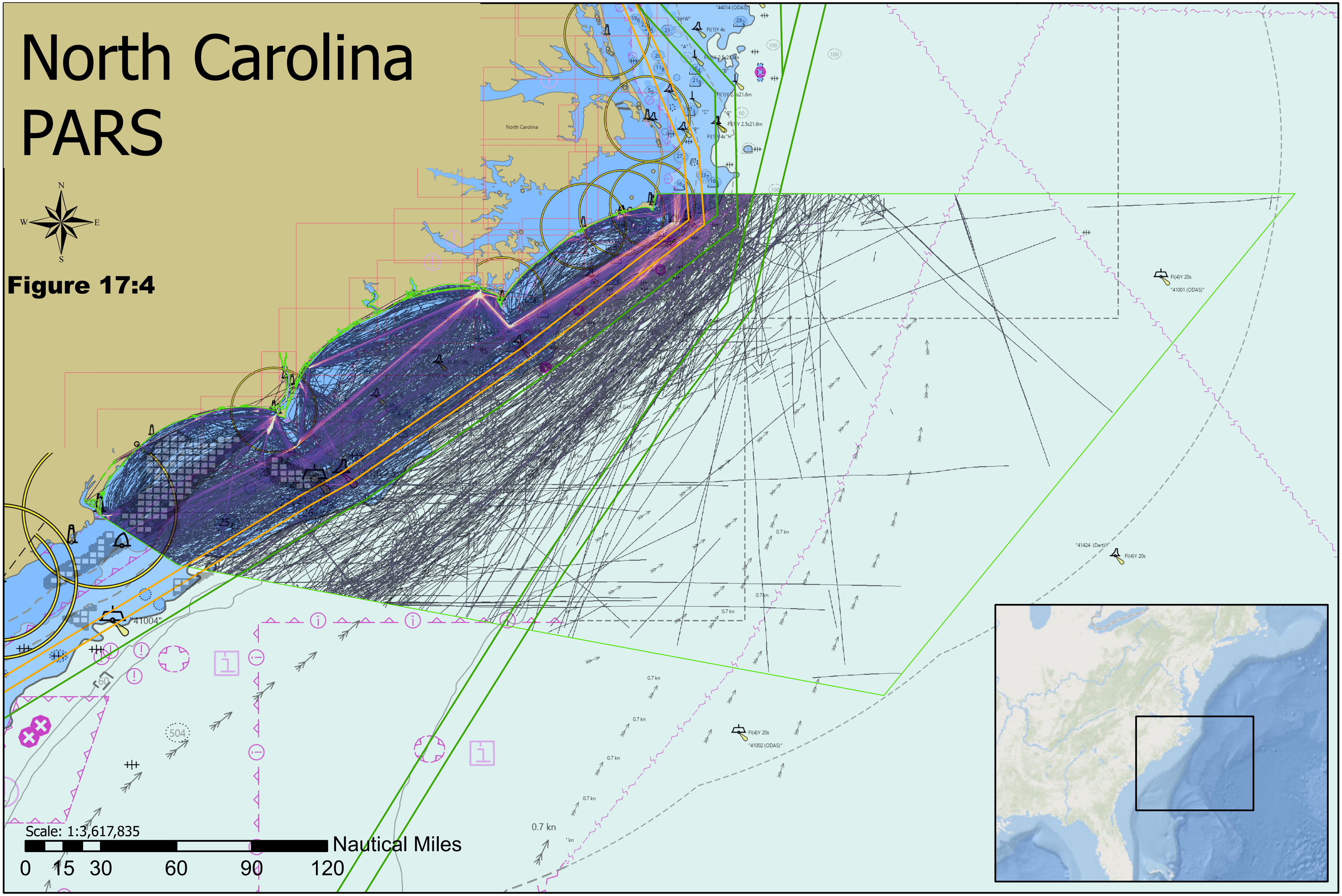
Offshore Lane

Near Shore Lane

Fishing 2017

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017), BOEM (June 2021)

Last Update: 8/2/2021 1:38 PM

Wind Energy Areas

ACPARS Fairways

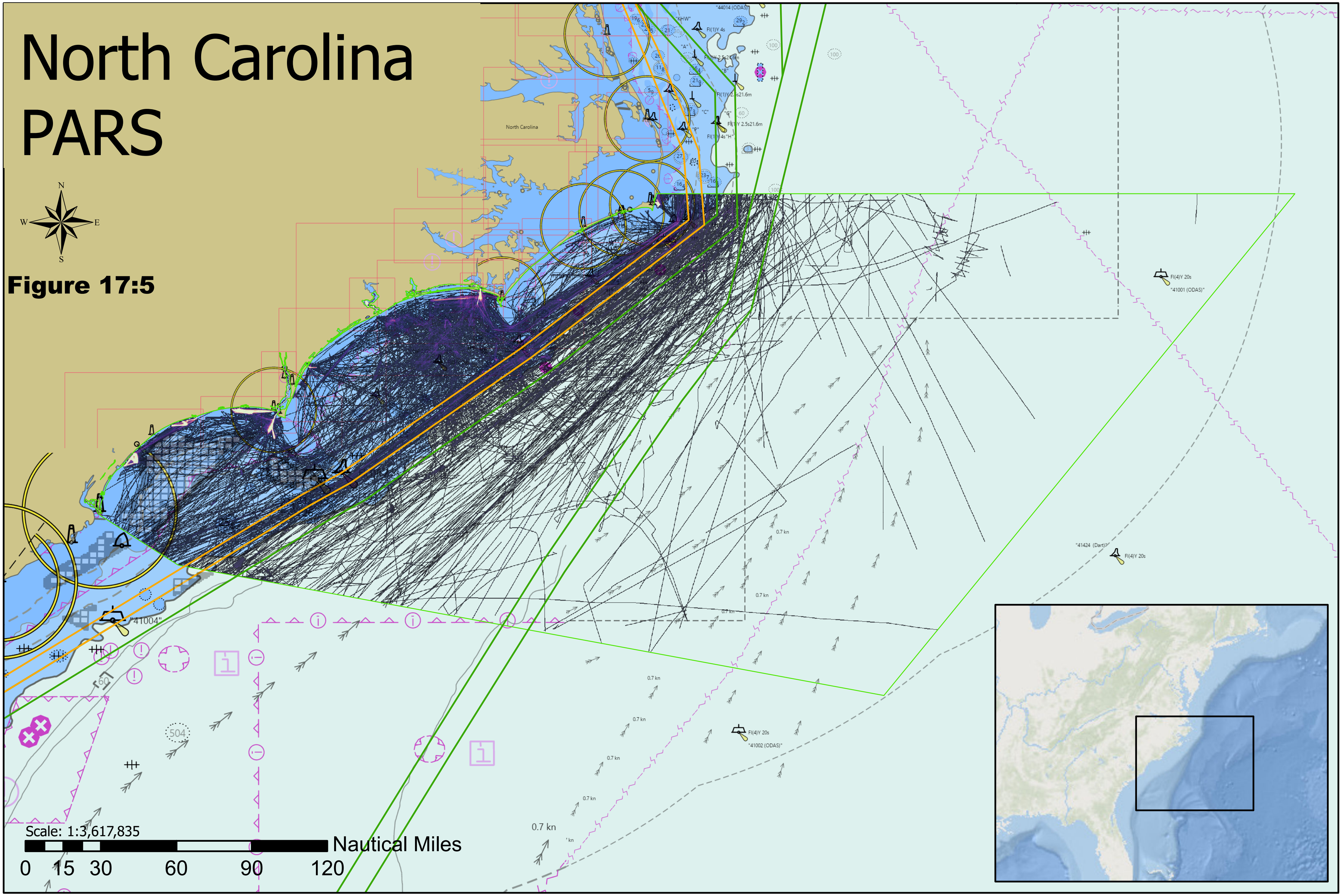
Offshore Lane

Near Shore Lane

Not Available 2017

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:26 PM

Wind Energy Areas

ACPARS Fairways

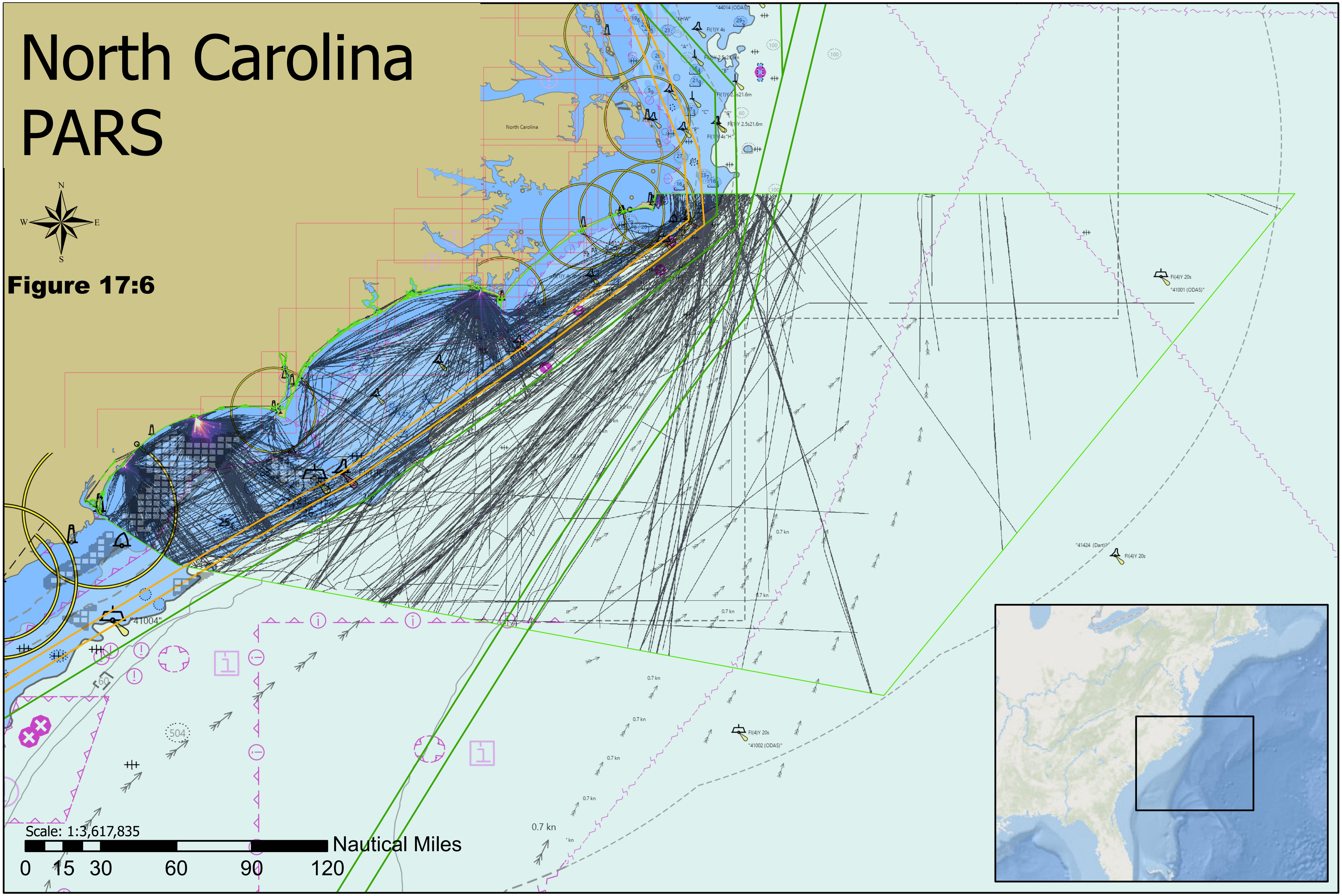
Offshore Lane

Near Shore Lane

Other 2017

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS (2017), BOEM (June 2021)

Last Update: 8/2/2021 1:50 PM

Wind Energy Areas

ACPARS Fairways

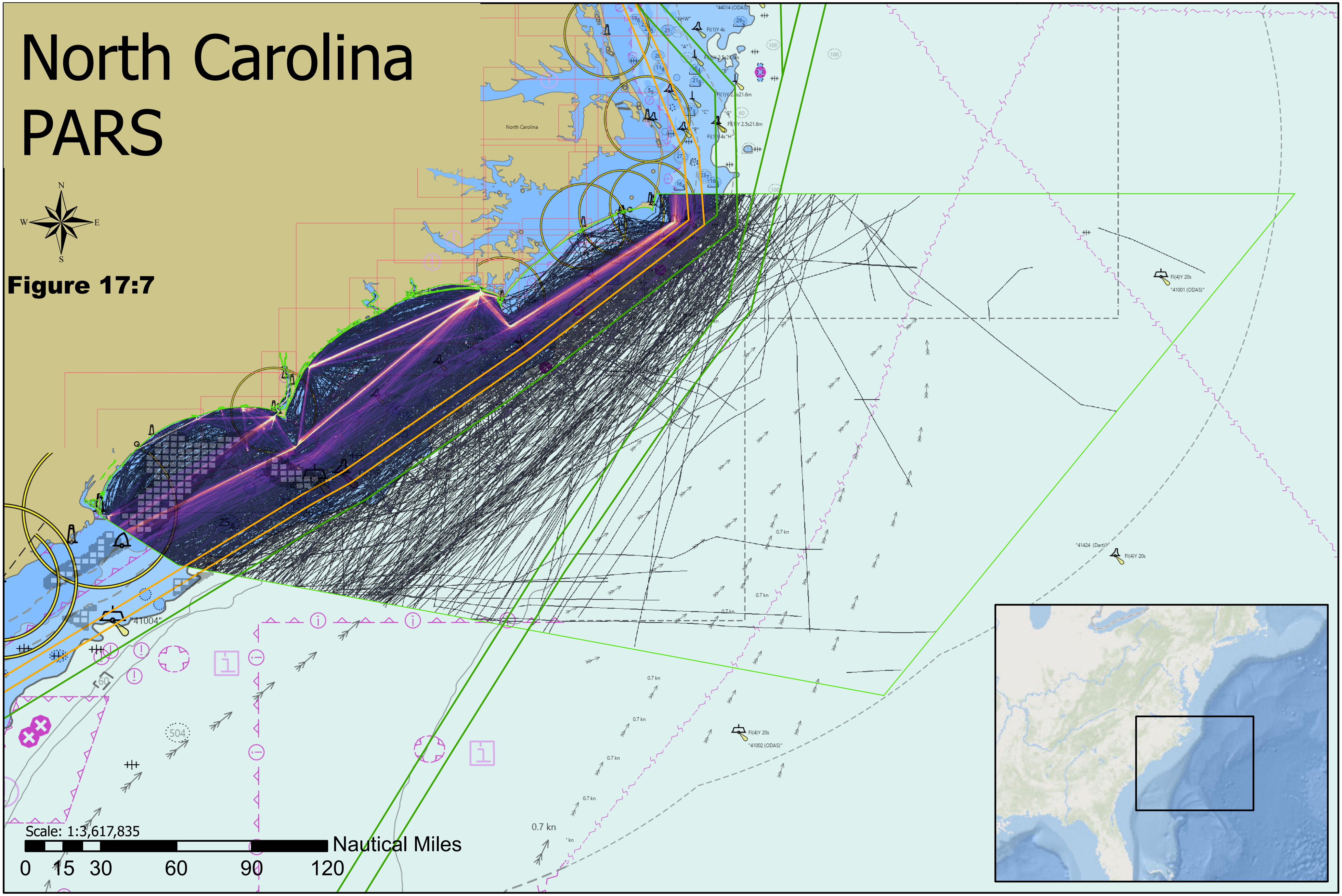
Offshore Lane

Near Shore Lane

Passenger 2017

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:17 PM

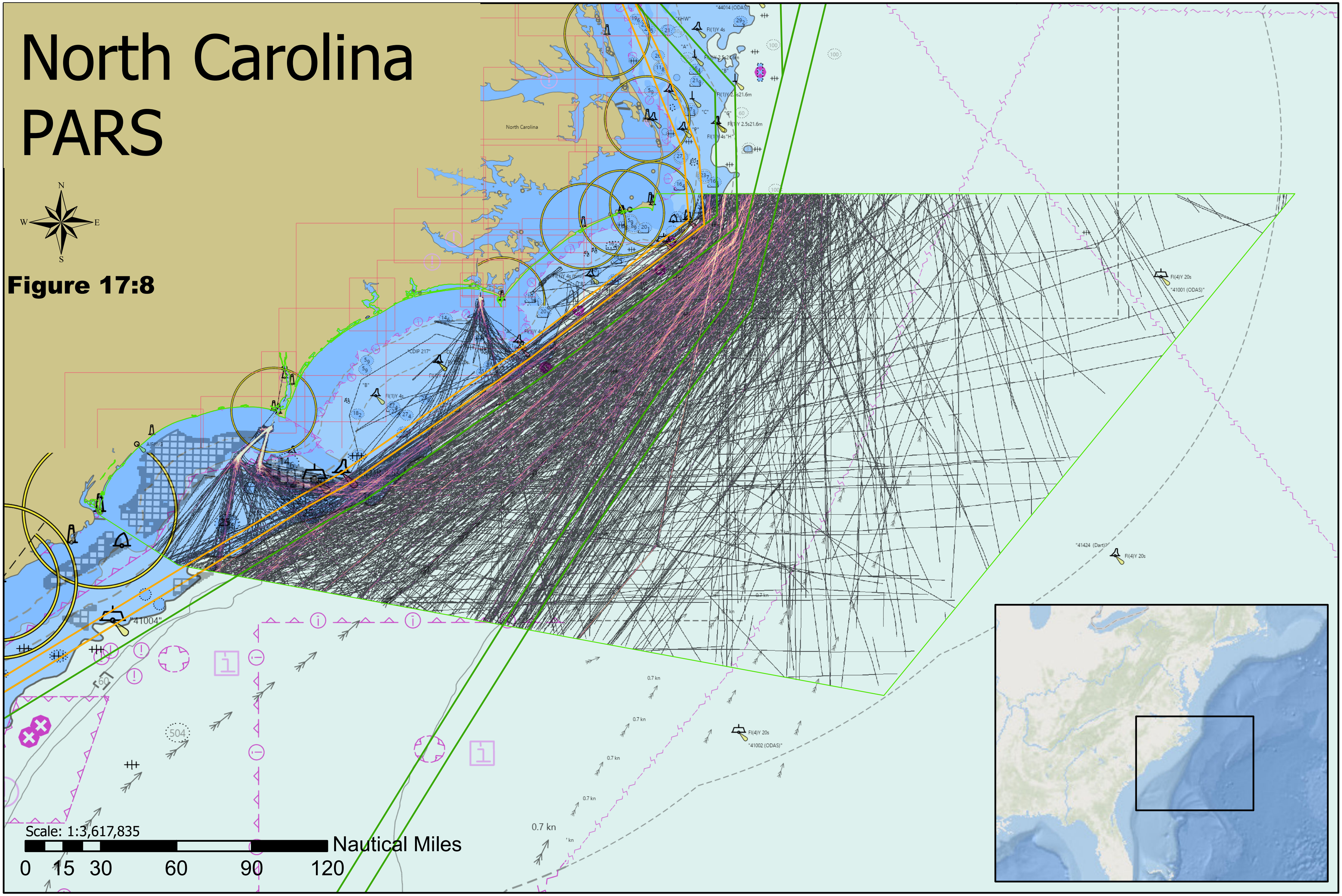
Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Pleasure Craft 2017
High Traffic Density
Low Traffic Density

North Carolina PARS

Figure 17:8



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

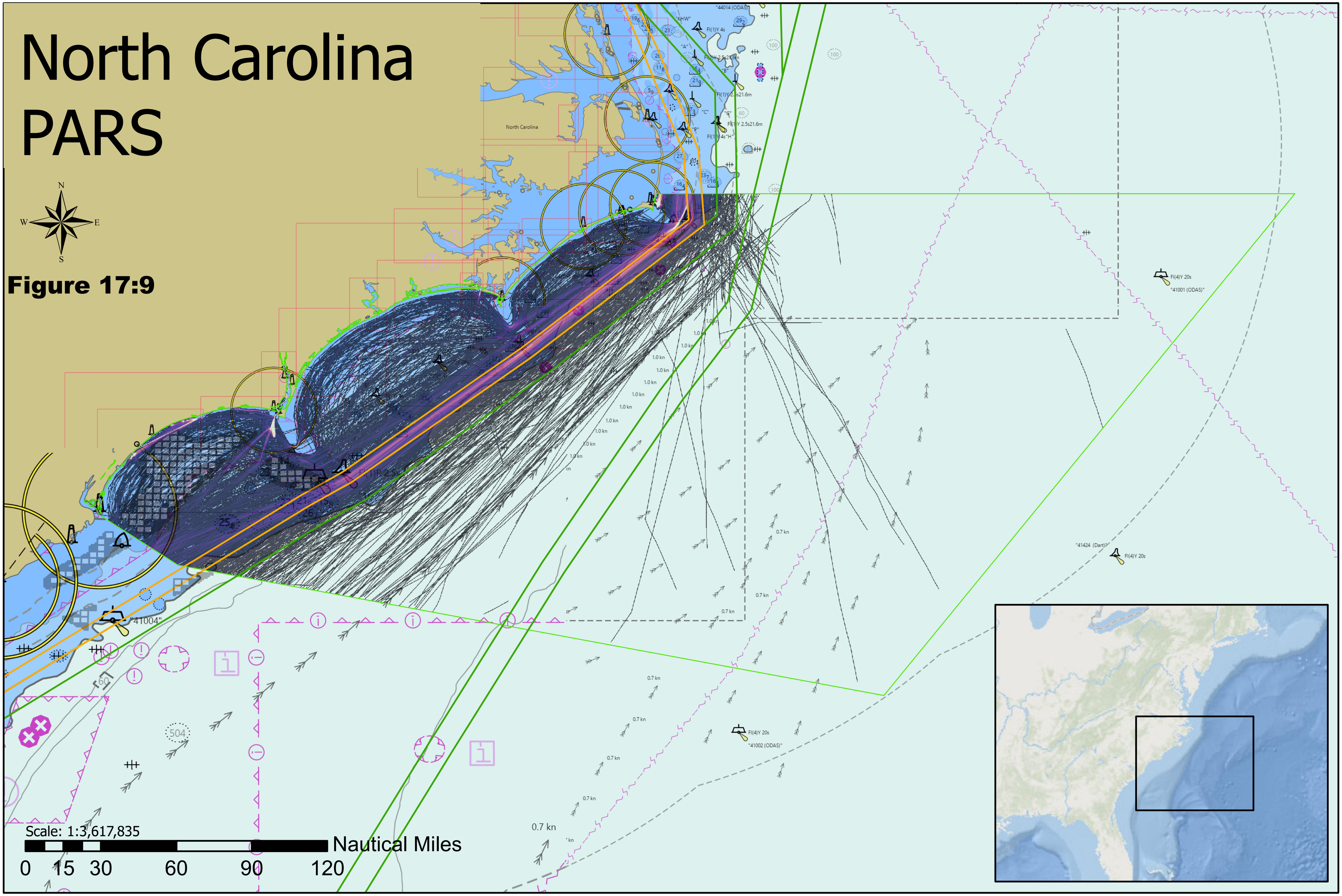
Prepared by the USCG Navigation Center
Data Sources: NAIS (2017), BOEM (June 2021)

Last Update: 8/2/2021 2:08 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Tanker 2017
High Traffic Density
Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:06 PM

Wind Energy Areas

ACPARS Fairways

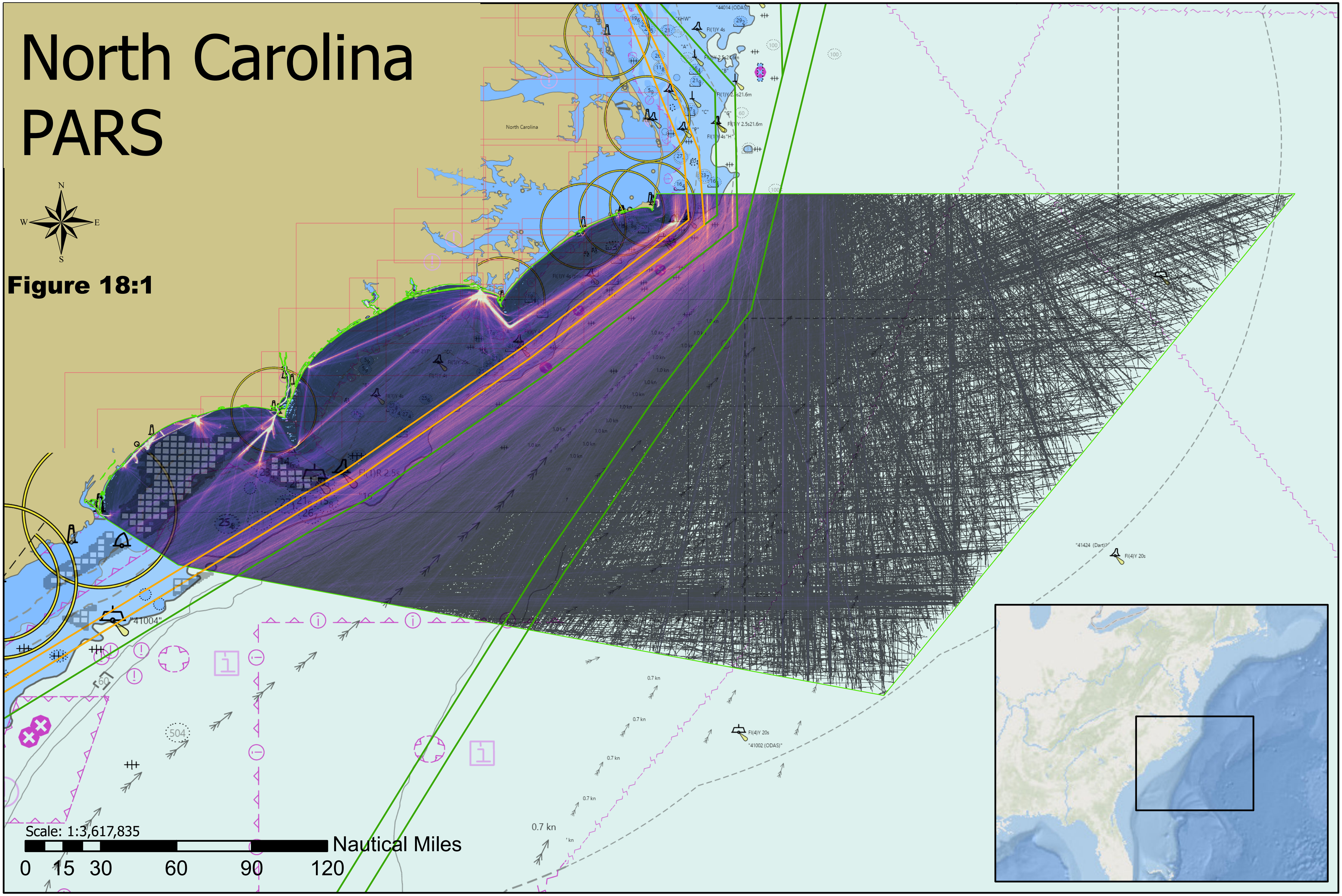
Offshore Lane

Near Shore Lane

Tug Tow 2017

High Traffic Density

Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:41 PM

Wind Energy Areas

ACPARS Fairways

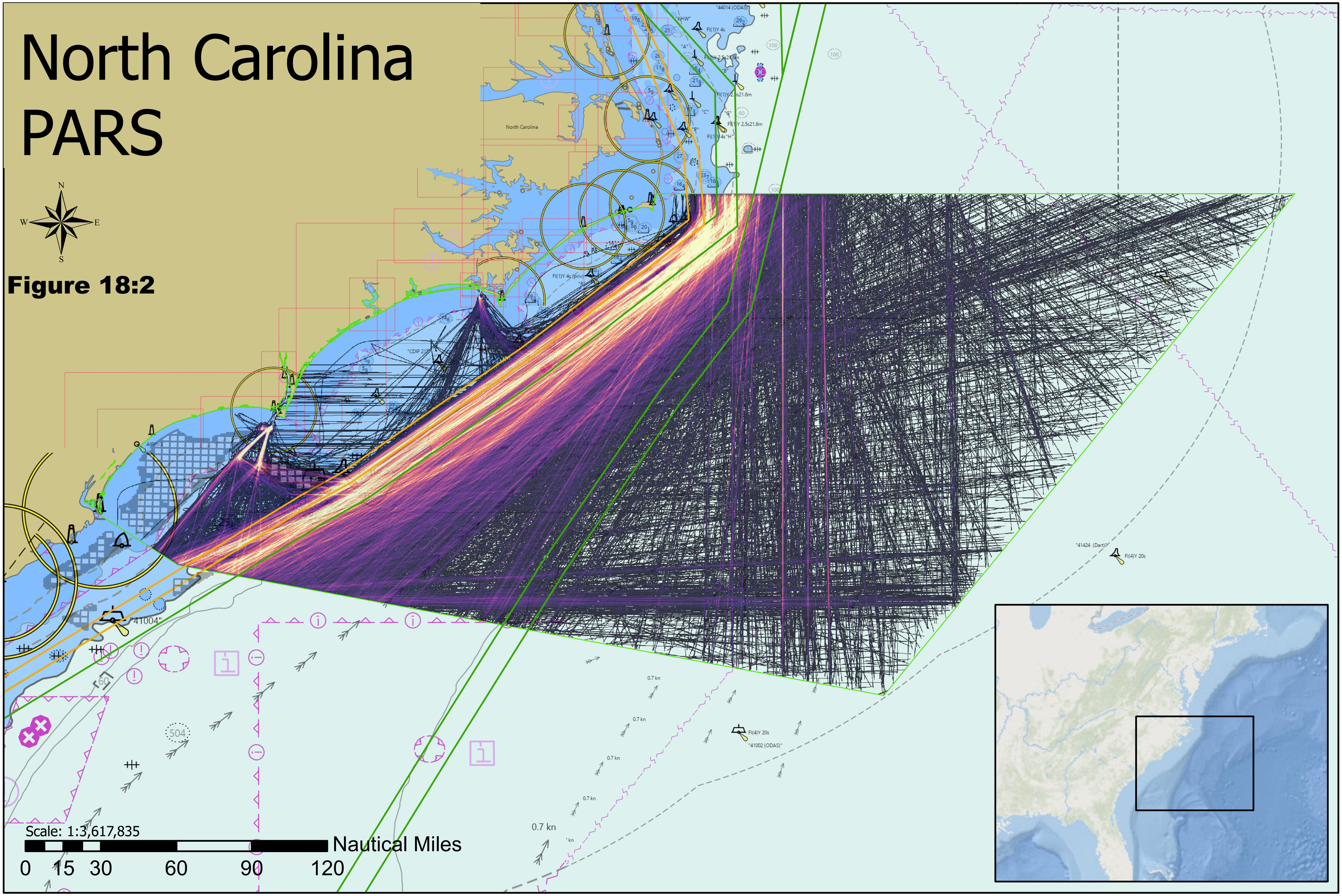
Offshore Lane

Near Shore Lane

All Vessels 2018

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:52 PM

Wind Energy Areas

ACPARS Fairways

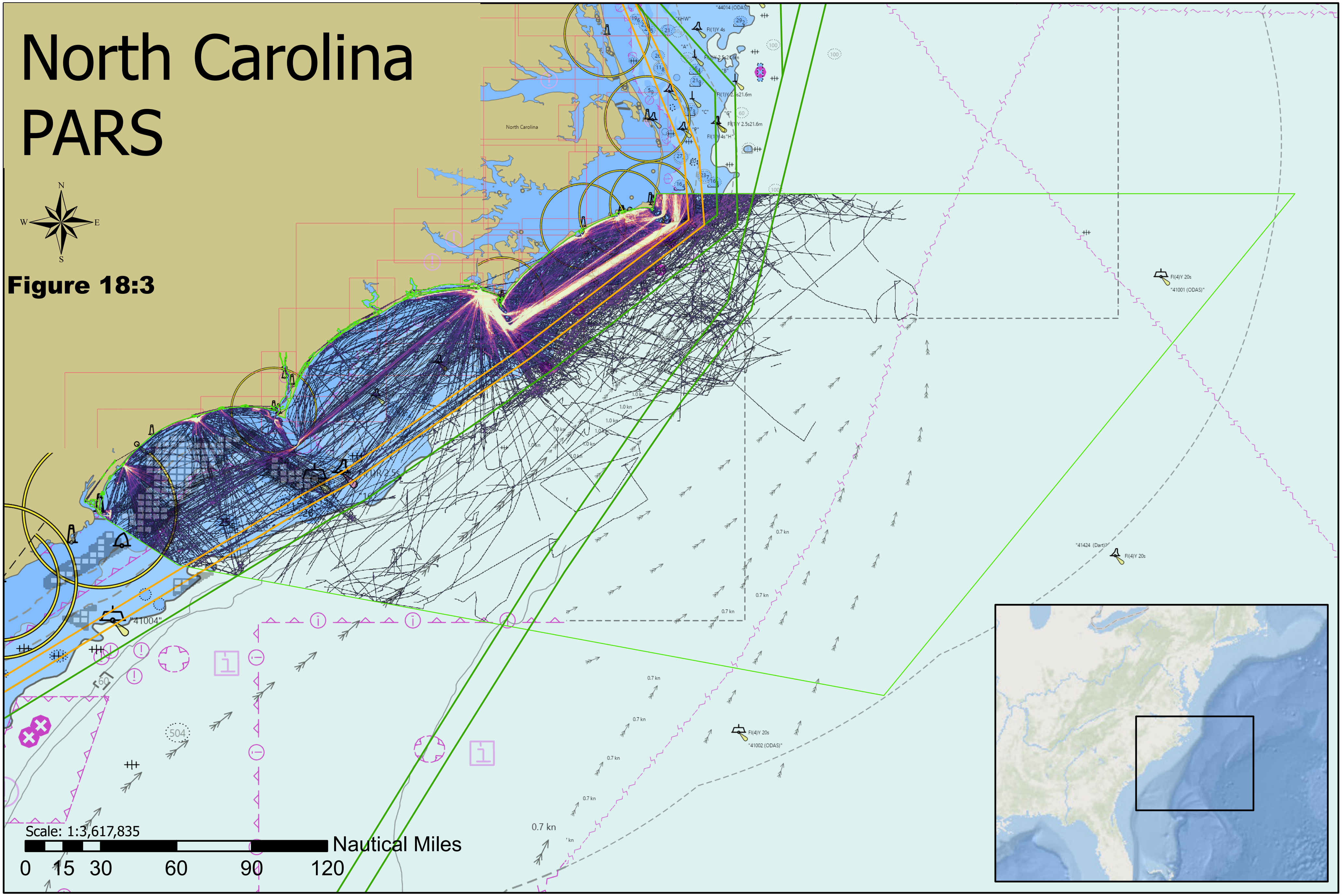
Offshore Lane

Near Shore Lane

Cargo 2018

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

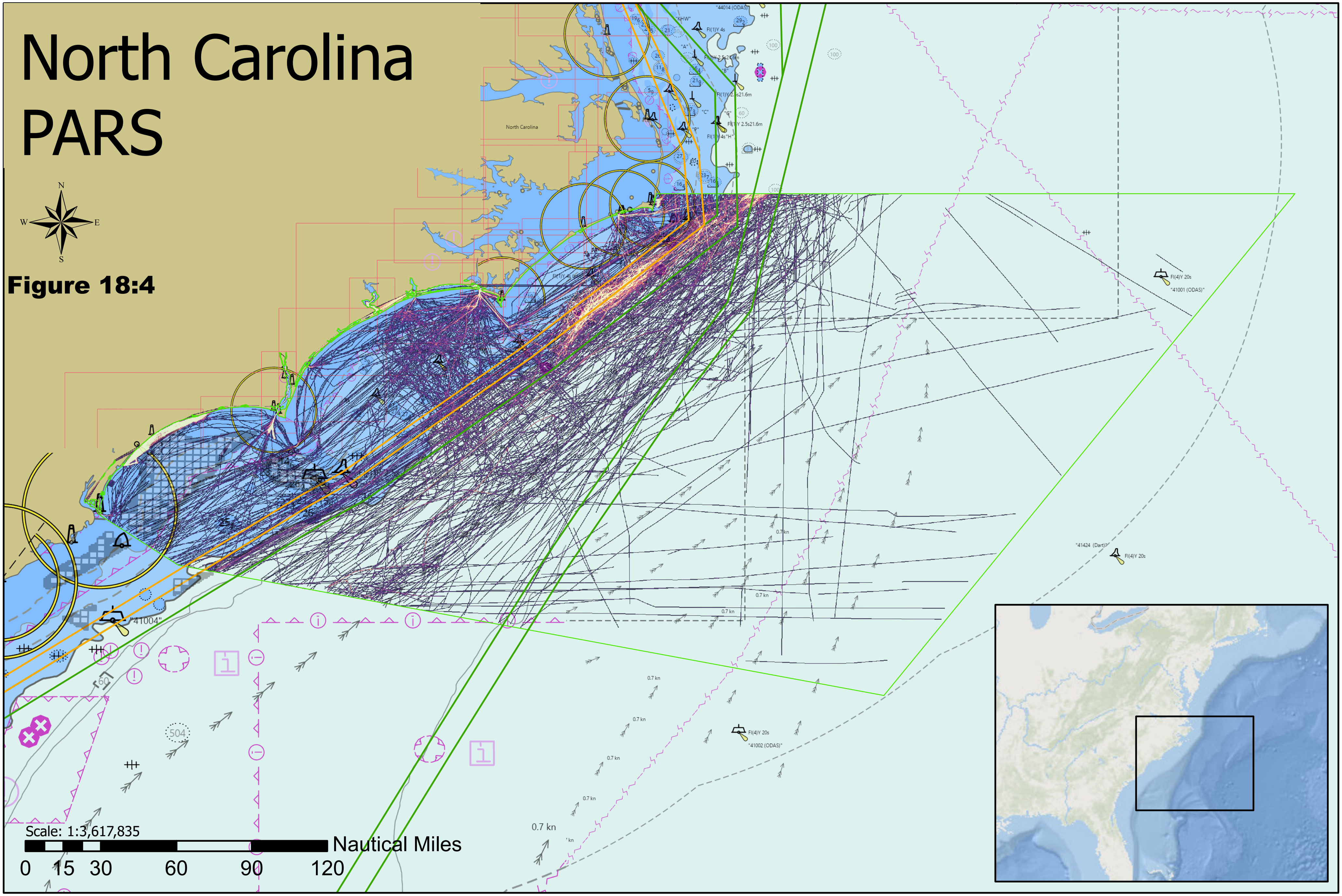
Prepared by the USCG Navigation Center
Data Sources: NAIS (2018), BOEM (June 2021)

Last Update: 8/2/2021 2:34 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Fishing 2018
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

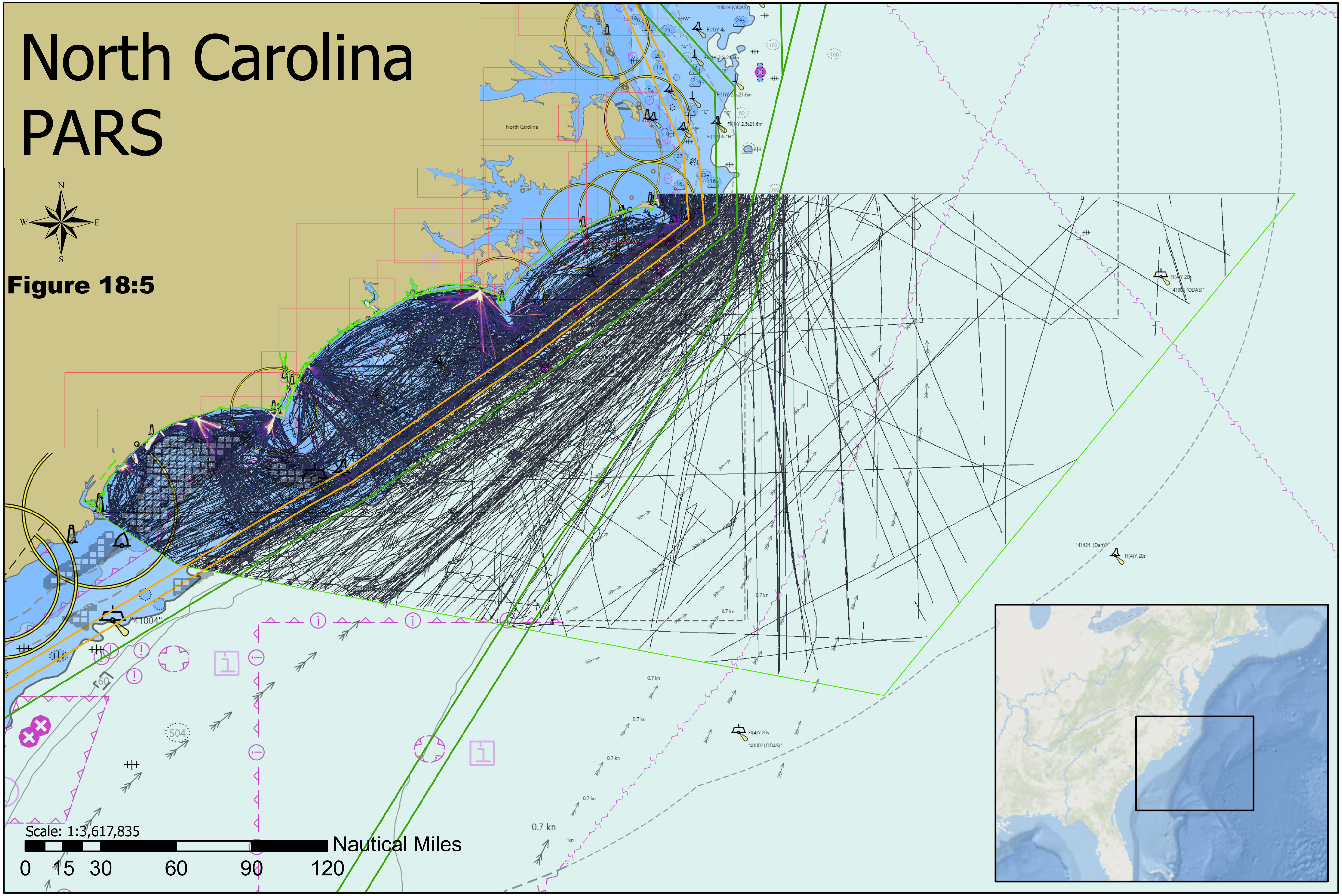
Prepared by the USCG Navigation Center
Data Sources: NAIS (2018), BOEM (June 2021)

Last Update: 8/2/2021 2:39 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Not Available 2018
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

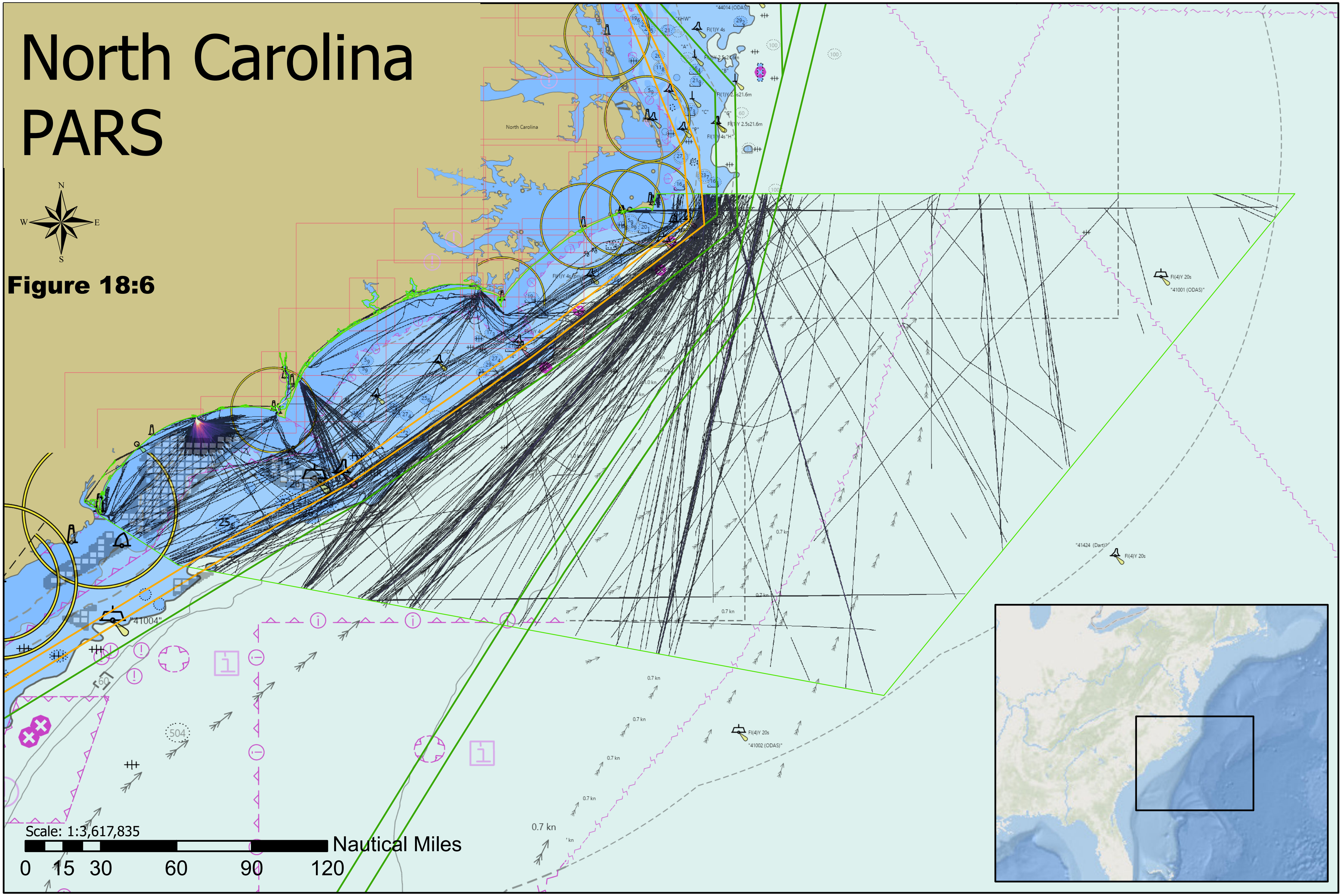
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:10 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Other 2018
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:17 PM

Wind Energy Areas

ACPARS Fairways

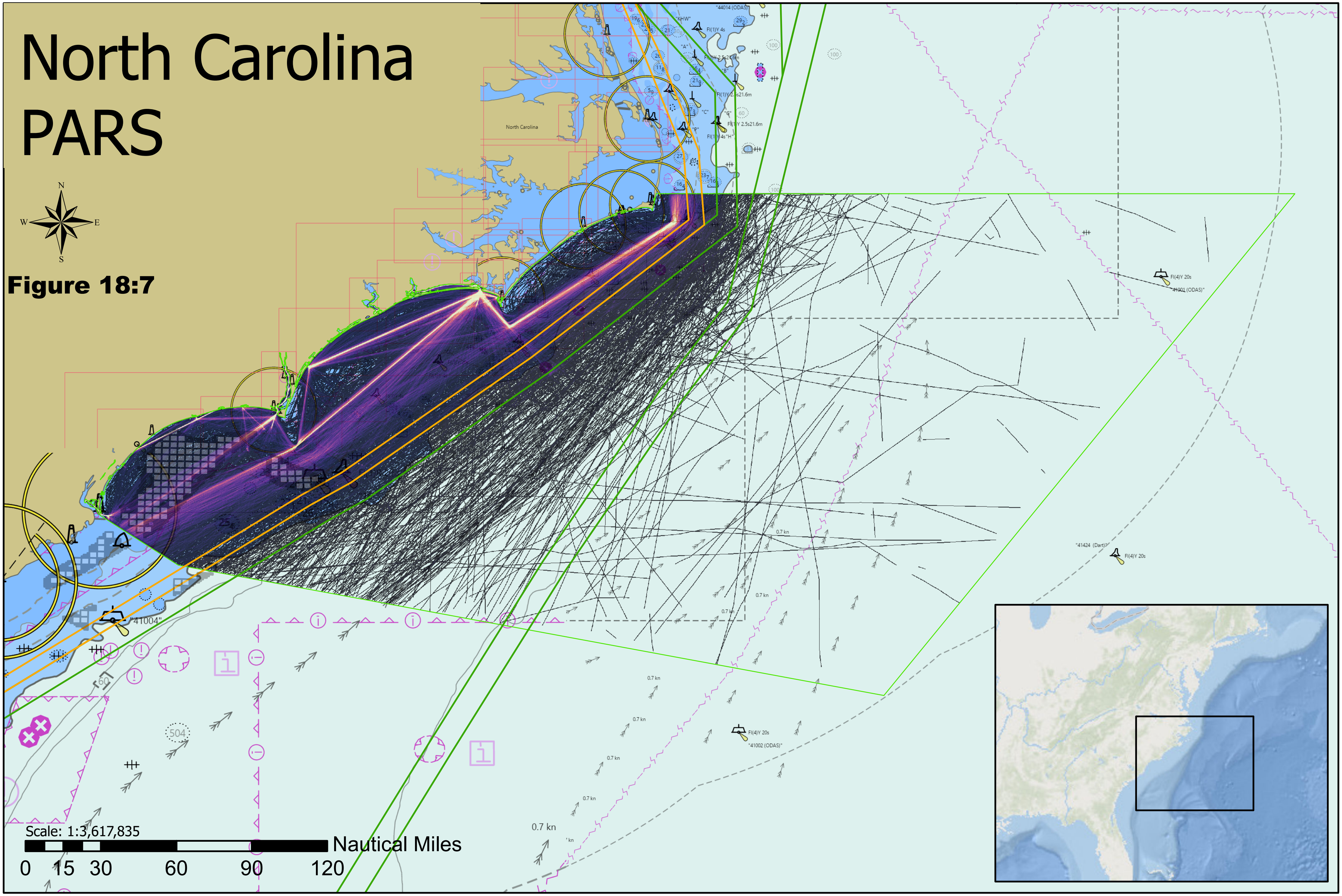
Offshore Lane

Near Shore Lane

Passenger 2018

High Traffic Density

Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

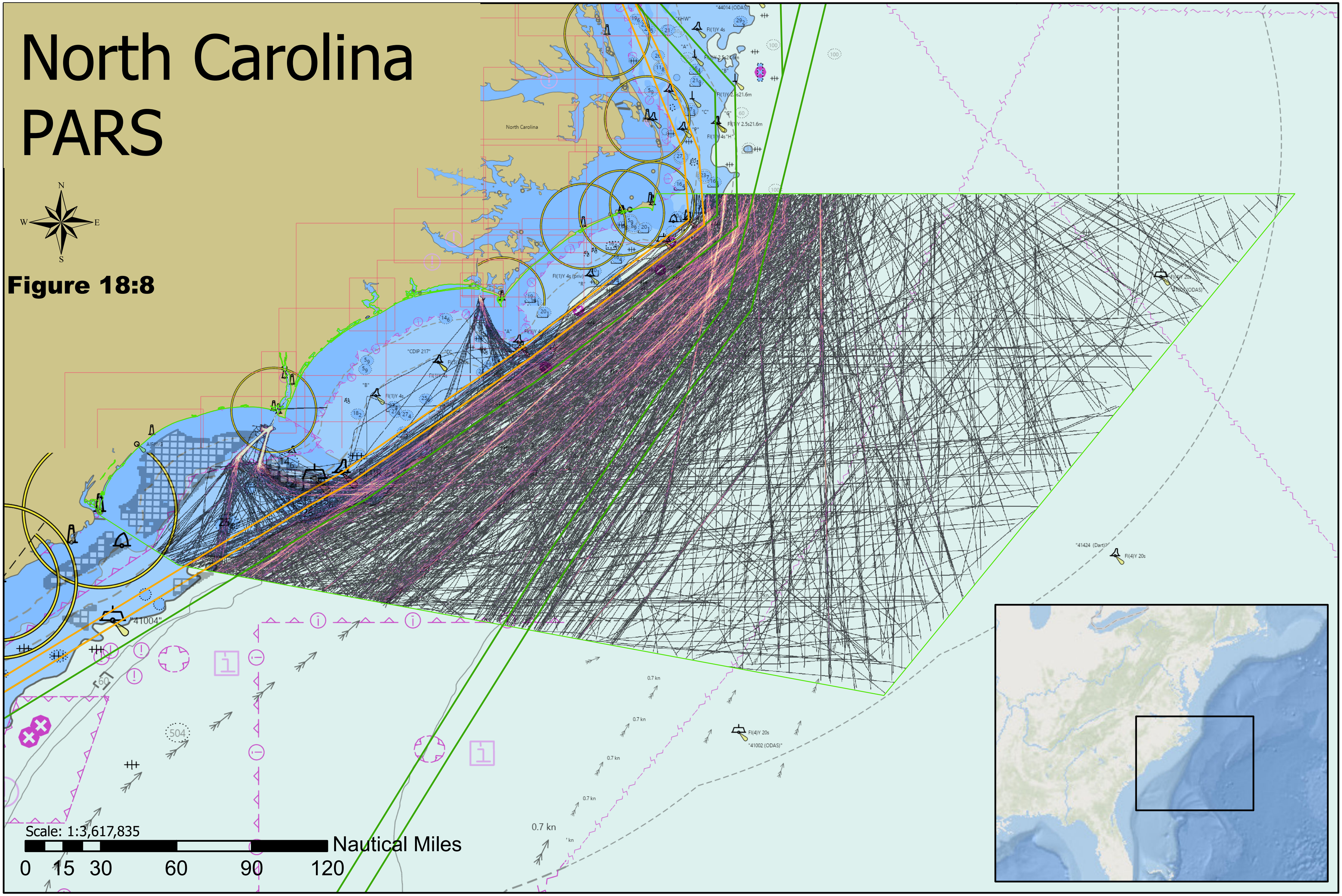
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/3/2021 7:33 AM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Pleasure Craft 2018
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:28 PM

Wind Energy Areas

ACPARS Fairways

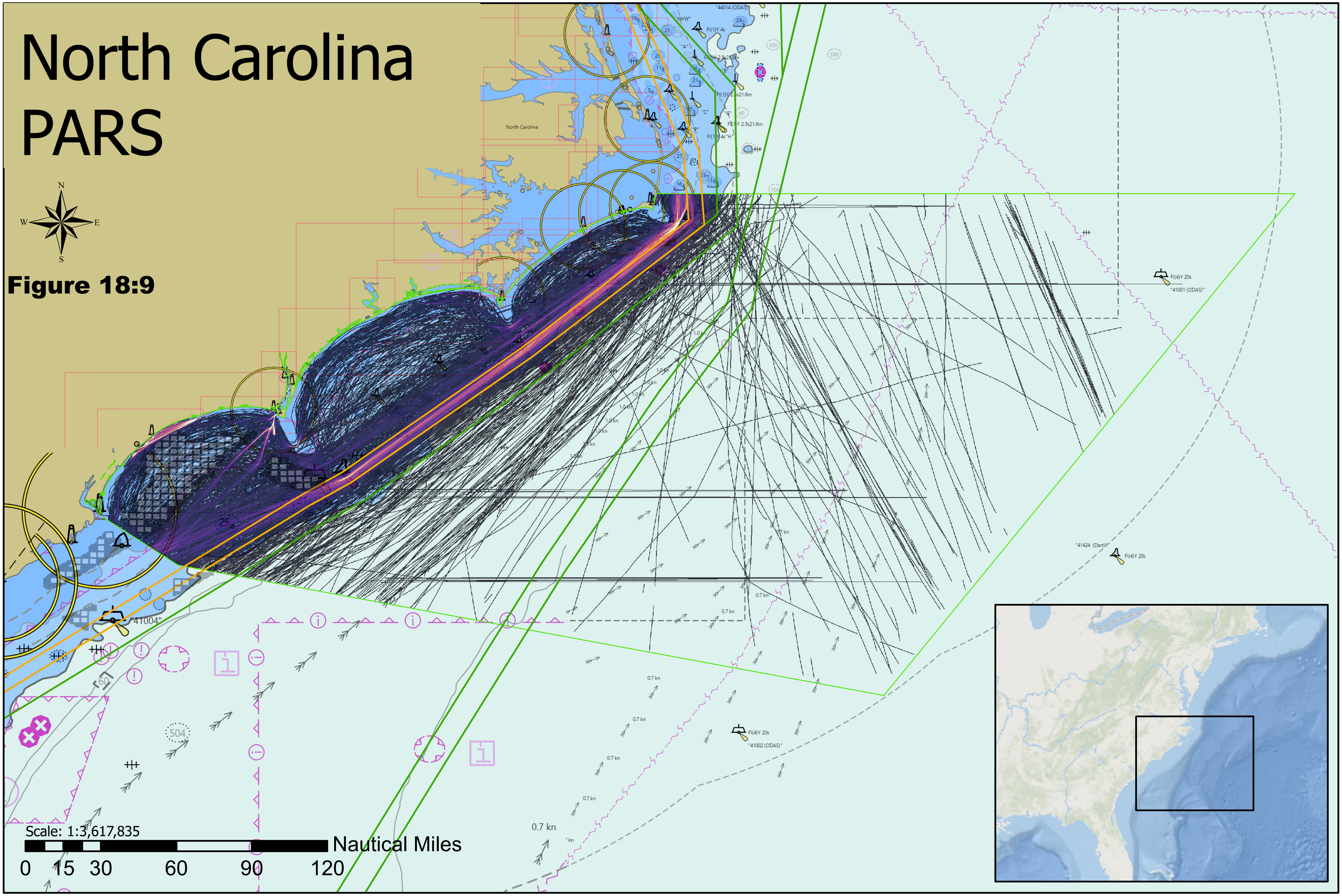
Offshore Lane

Near Shore Lane

Tanker 2018

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 5:46 PM

Wind Energy Areas

ACPARS Fairways

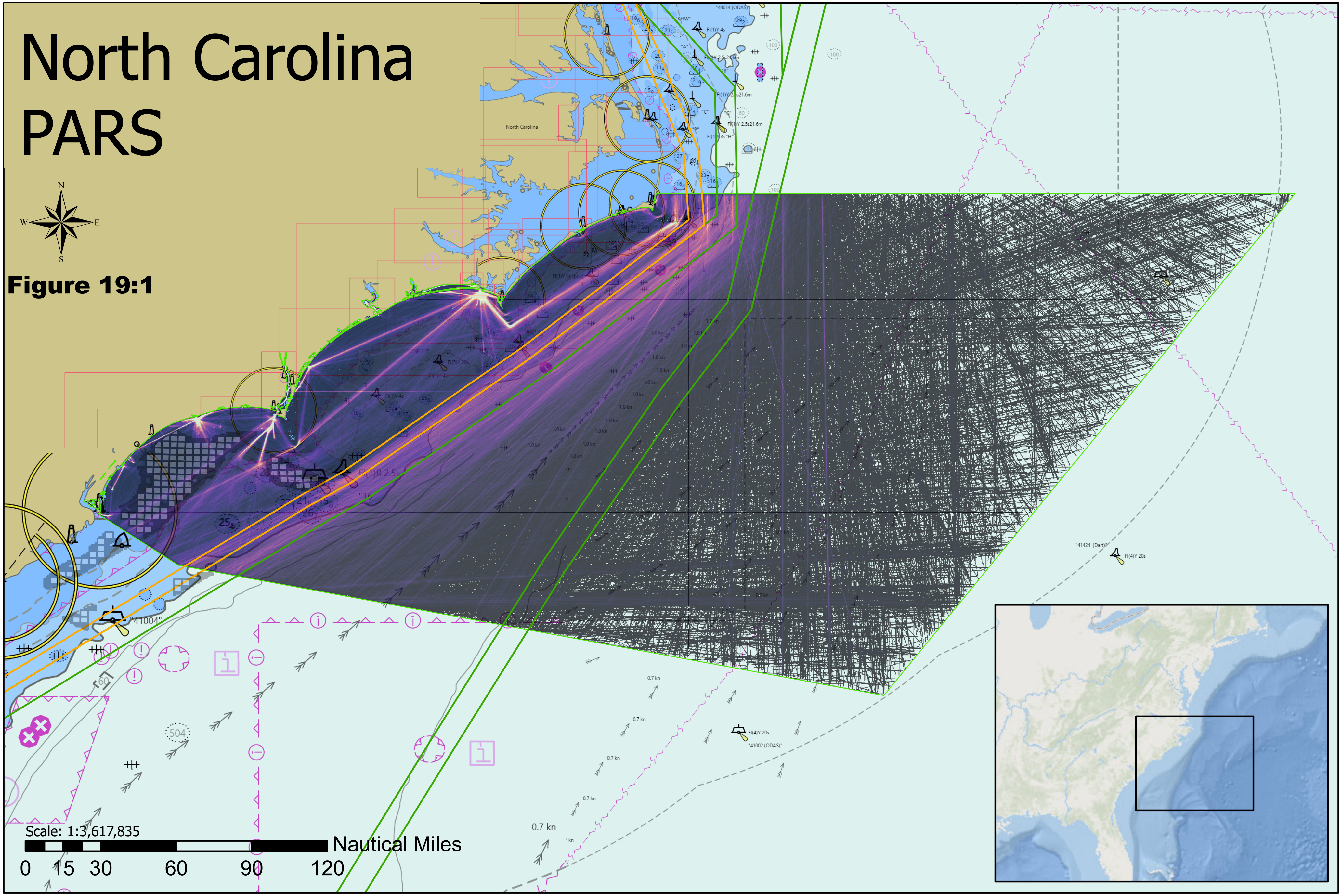
Offshore Lane

Near Shore Lane

Tug Tow 2018

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

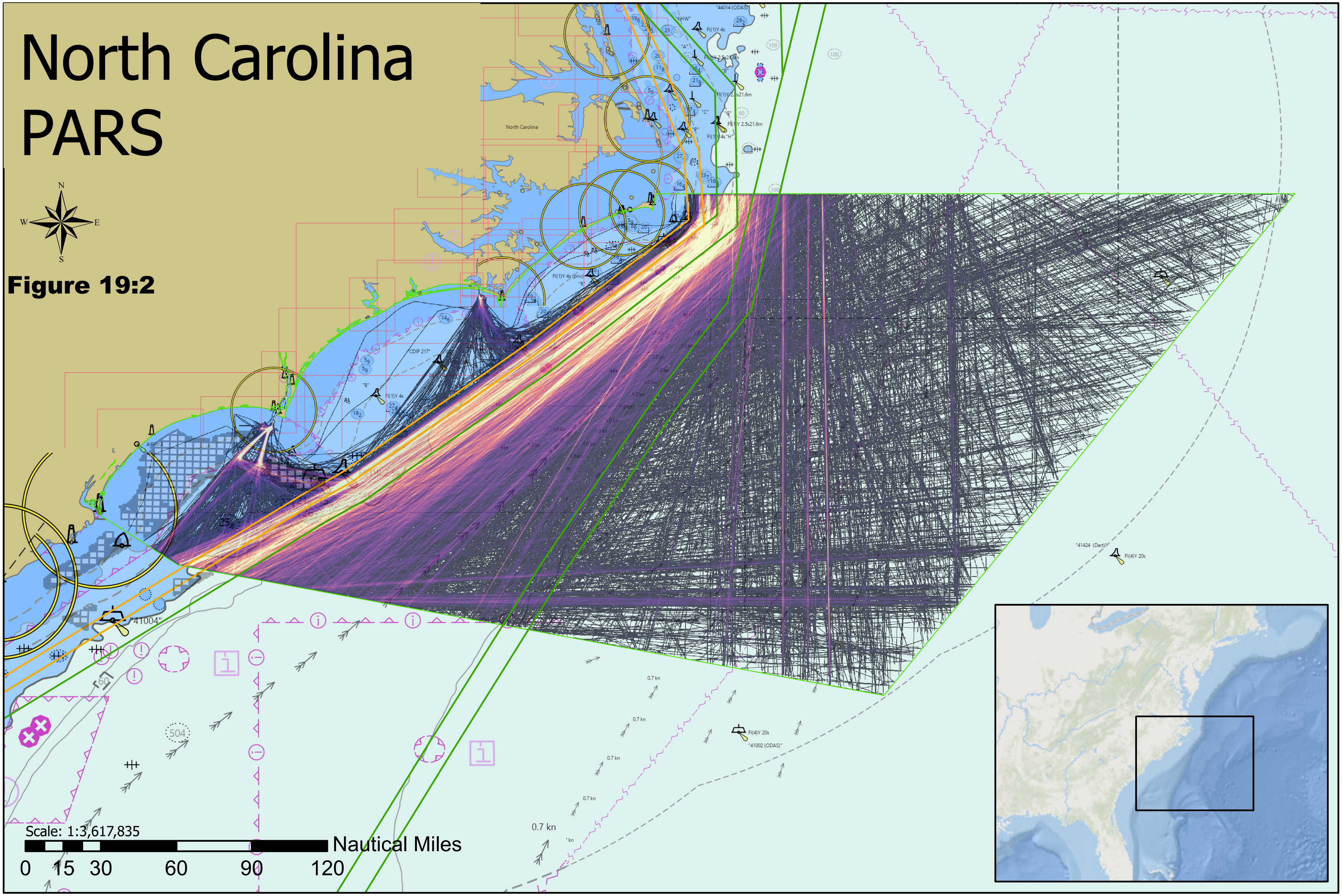
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:43 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

All Vessels 2019
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:48 PM

Wind Energy Areas

ACPARS Fairways

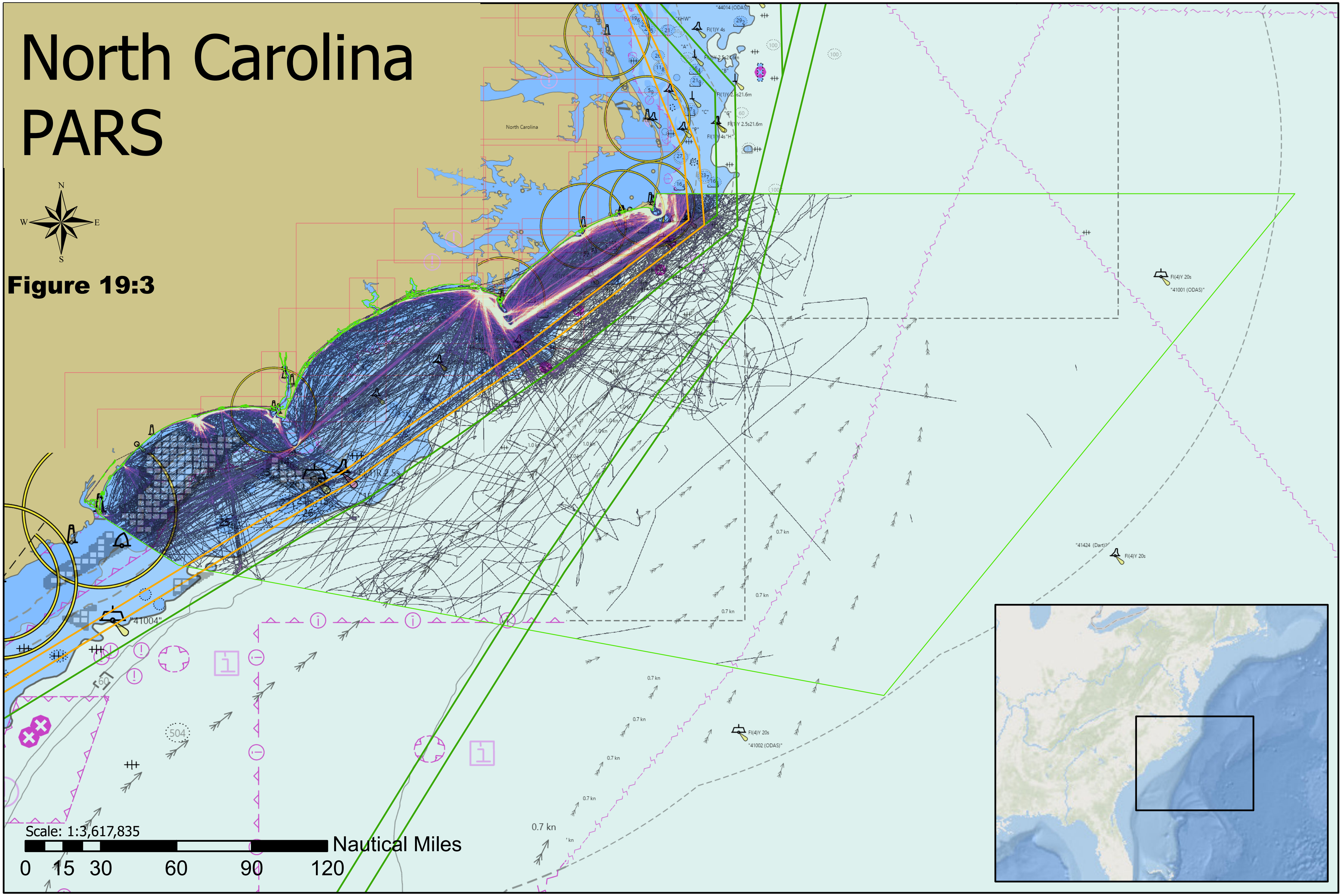
Offshore Lane

Near Shore Lane

Cargo 2019

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

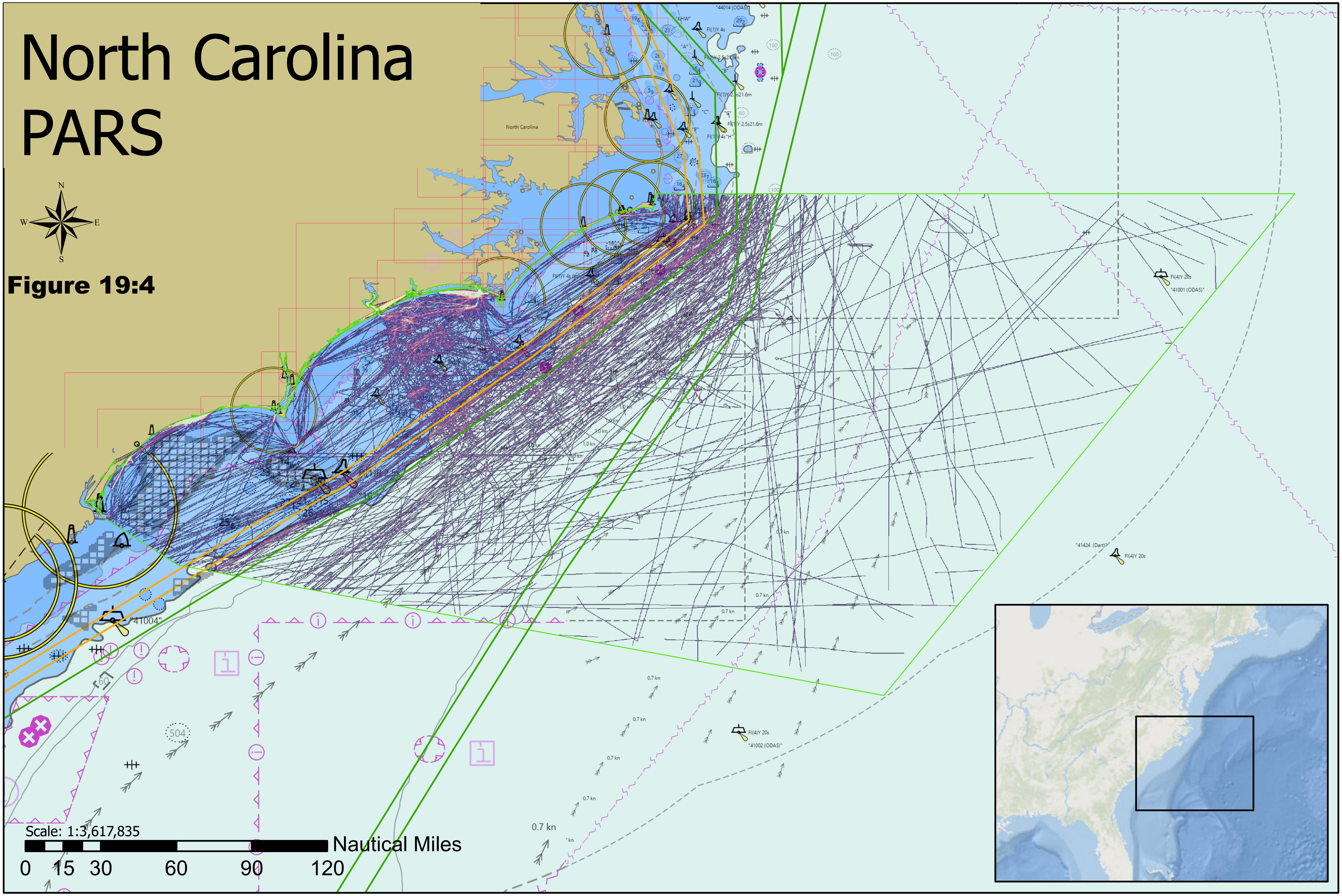
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:35 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Fishing 2019
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:48 PM

Wind Energy Areas

ACPARS Fairways

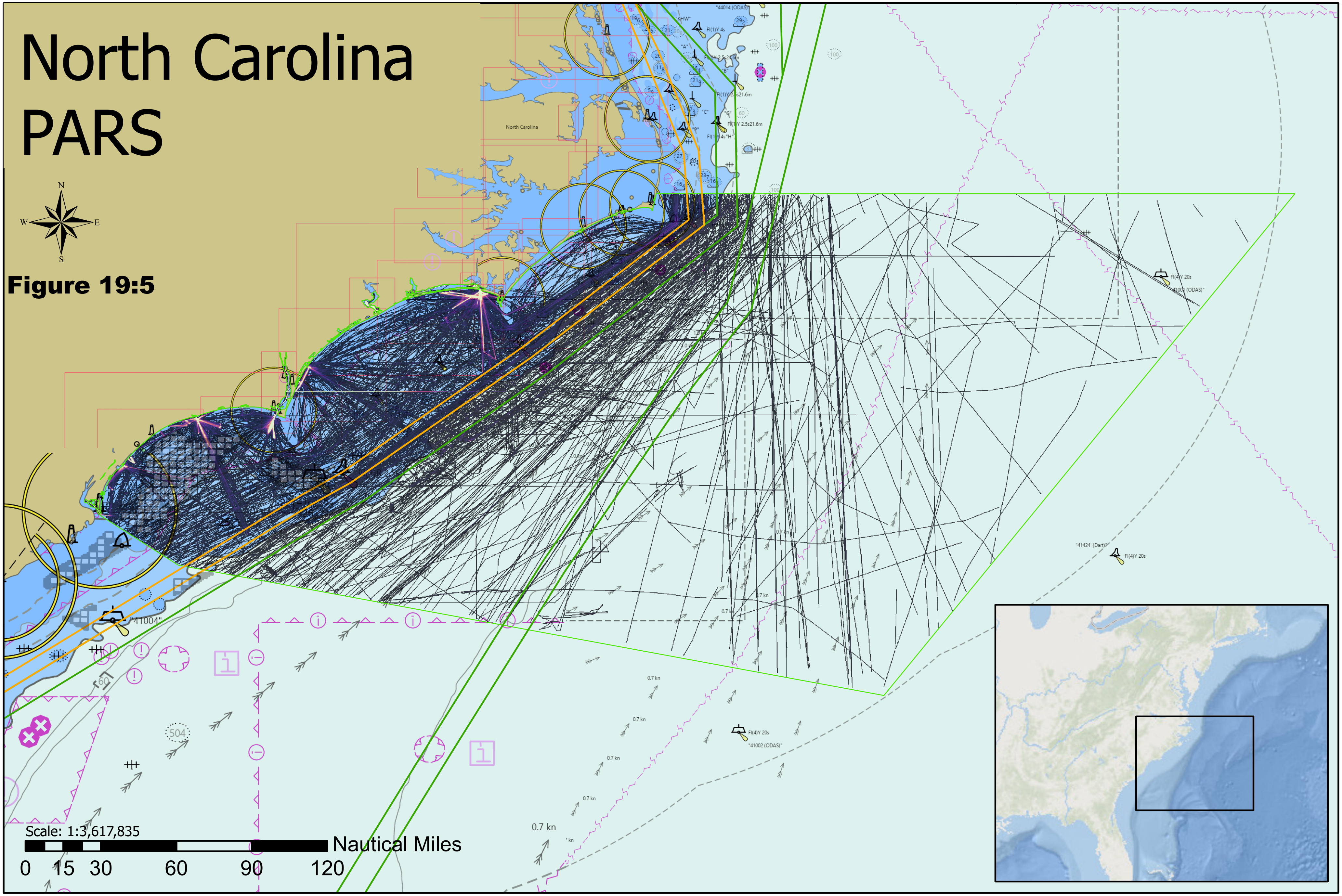
Offshore Lane

Near Shore Lane

Not Available 2019

High Traffic Density

Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 6:54 PM

Wind Energy Areas

ACPARS Fairways

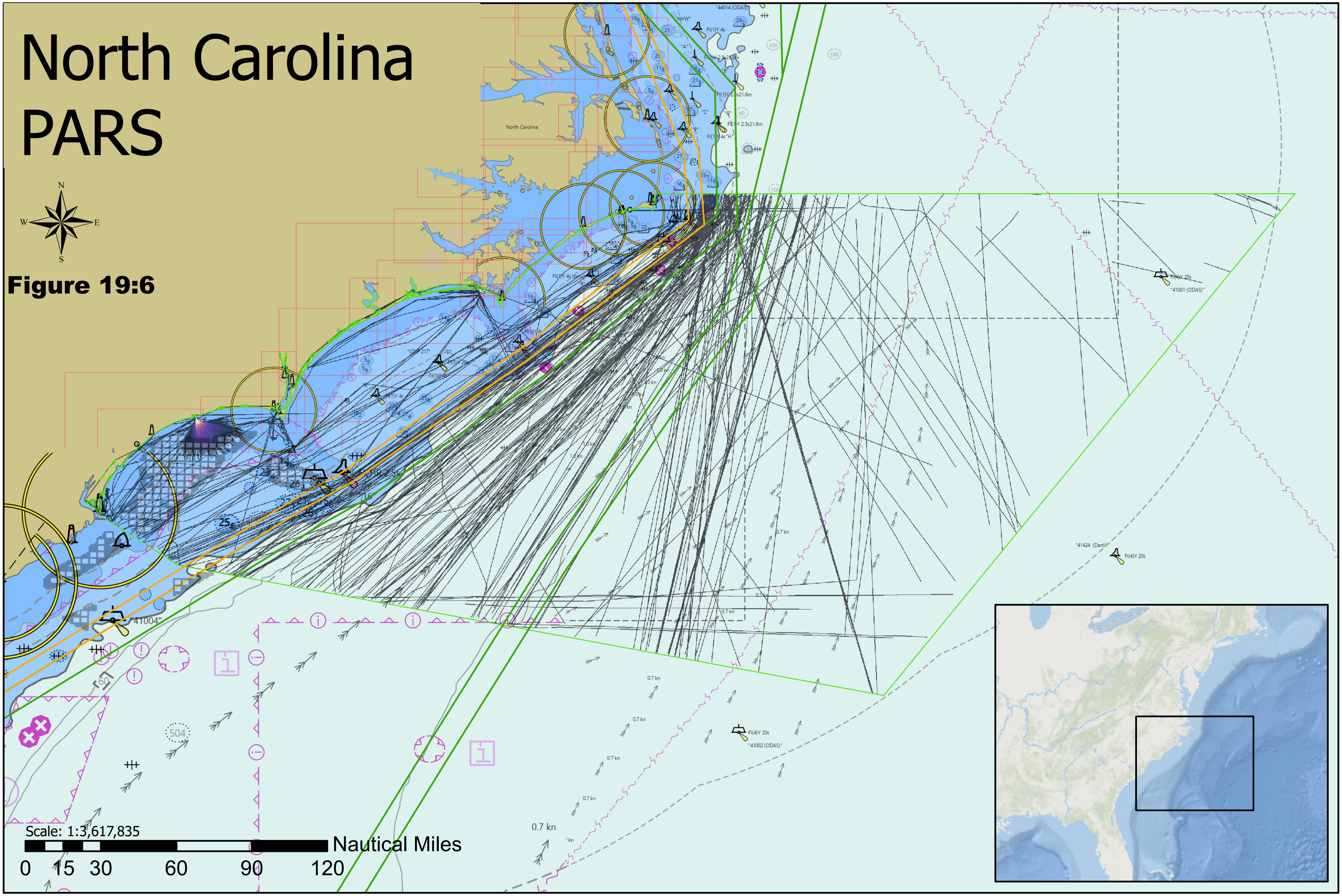
Offshore Lane

Near Shore Lane

Other 2019

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:22 PM

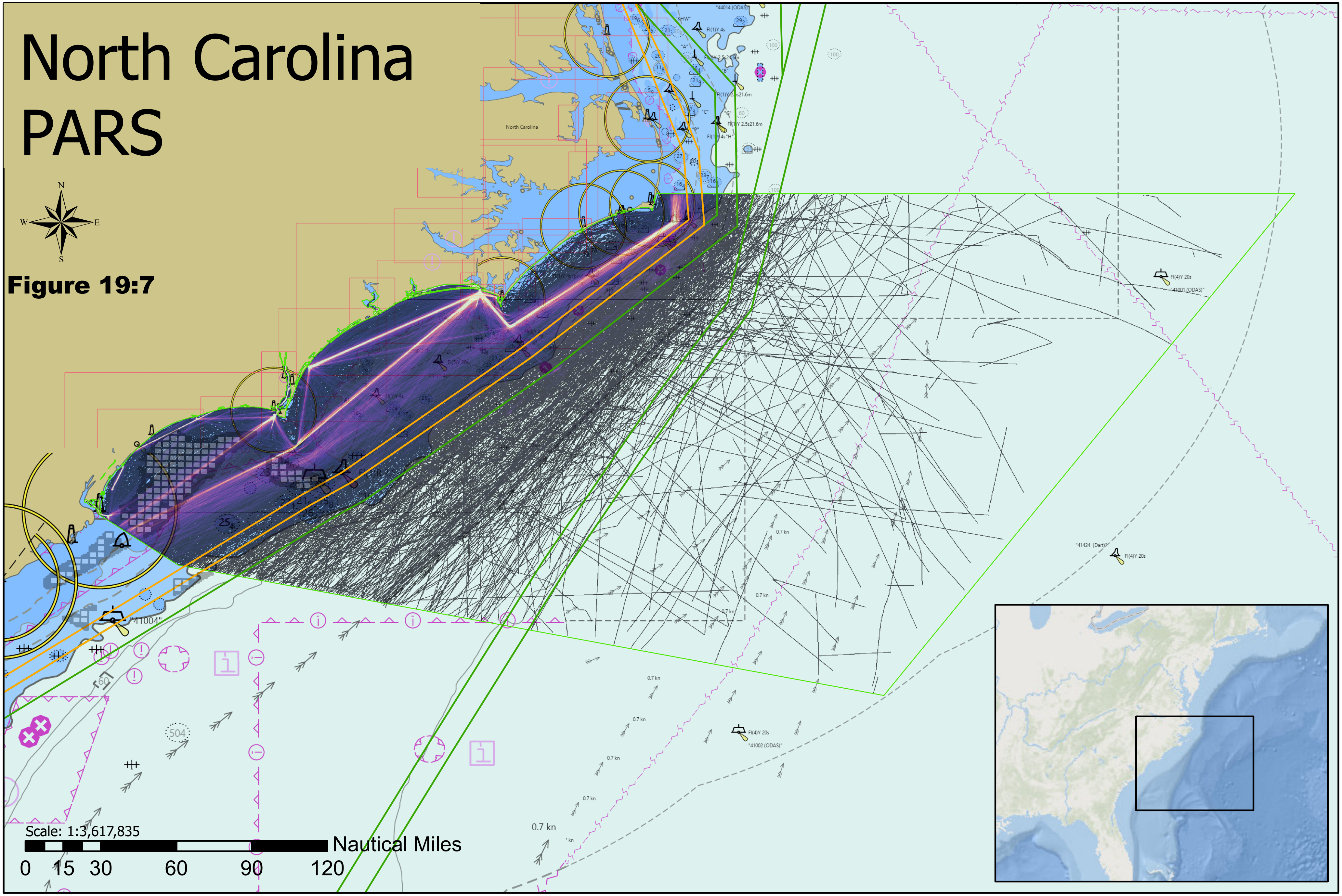
Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Passenger 2019
High Traffic Density
Low Traffic Density

North Carolina PARS

Figure 19:7



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

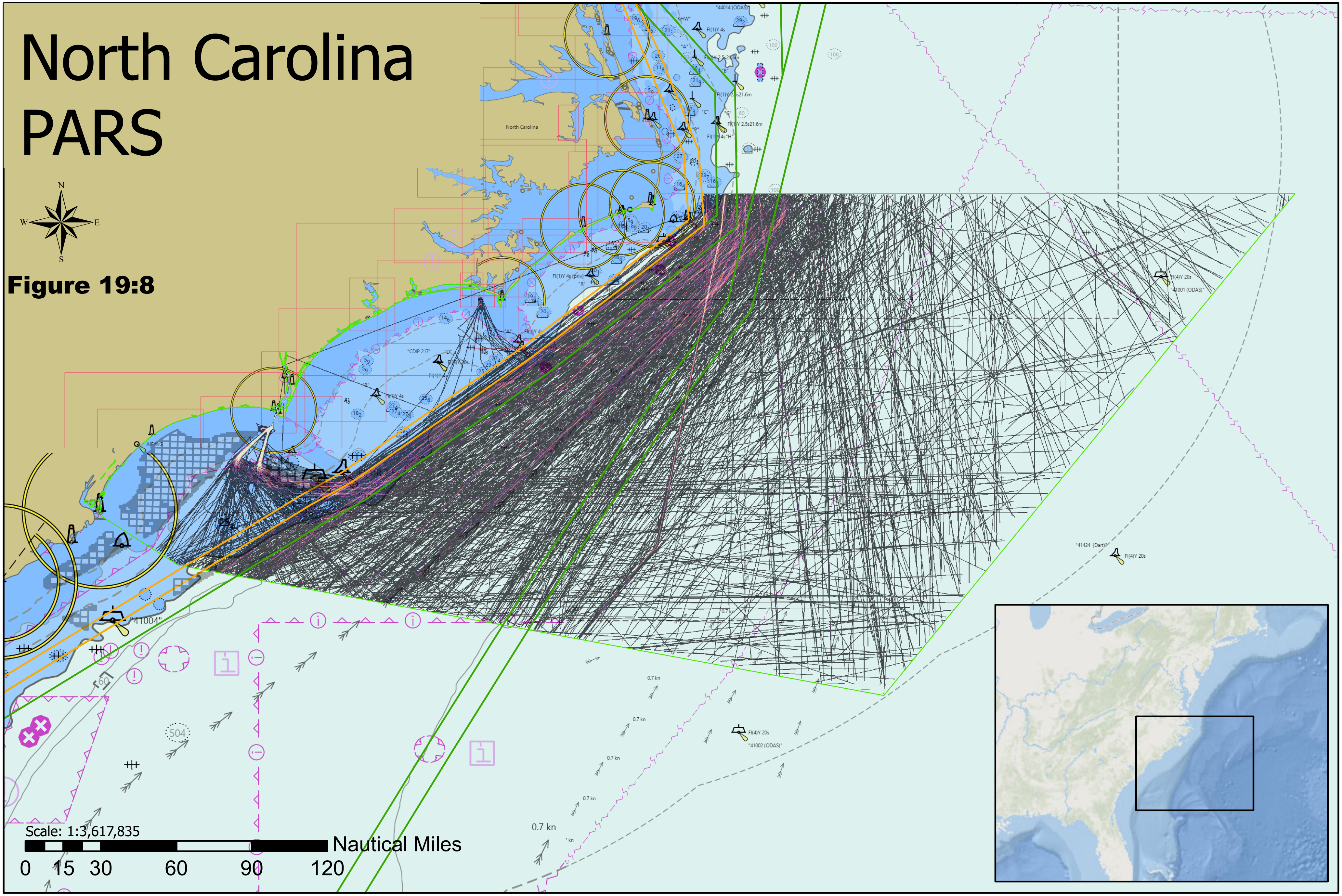
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:01 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Pleasure Craft 2019
High Traffic Density
Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

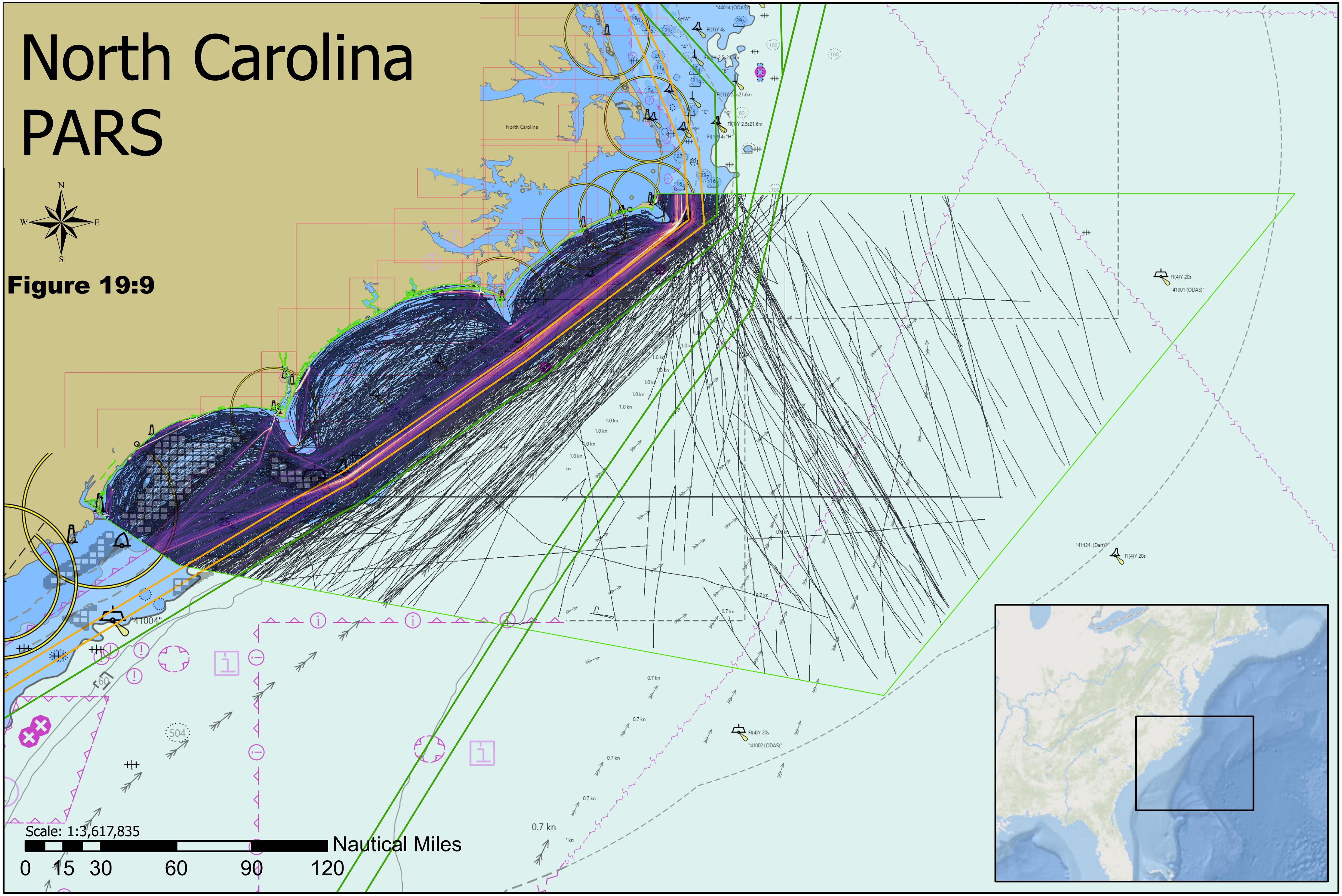
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:14 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Tanker 2019
High Traffic Density
Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 7:07 PM

Wind Energy Areas

ACPARS Fairways

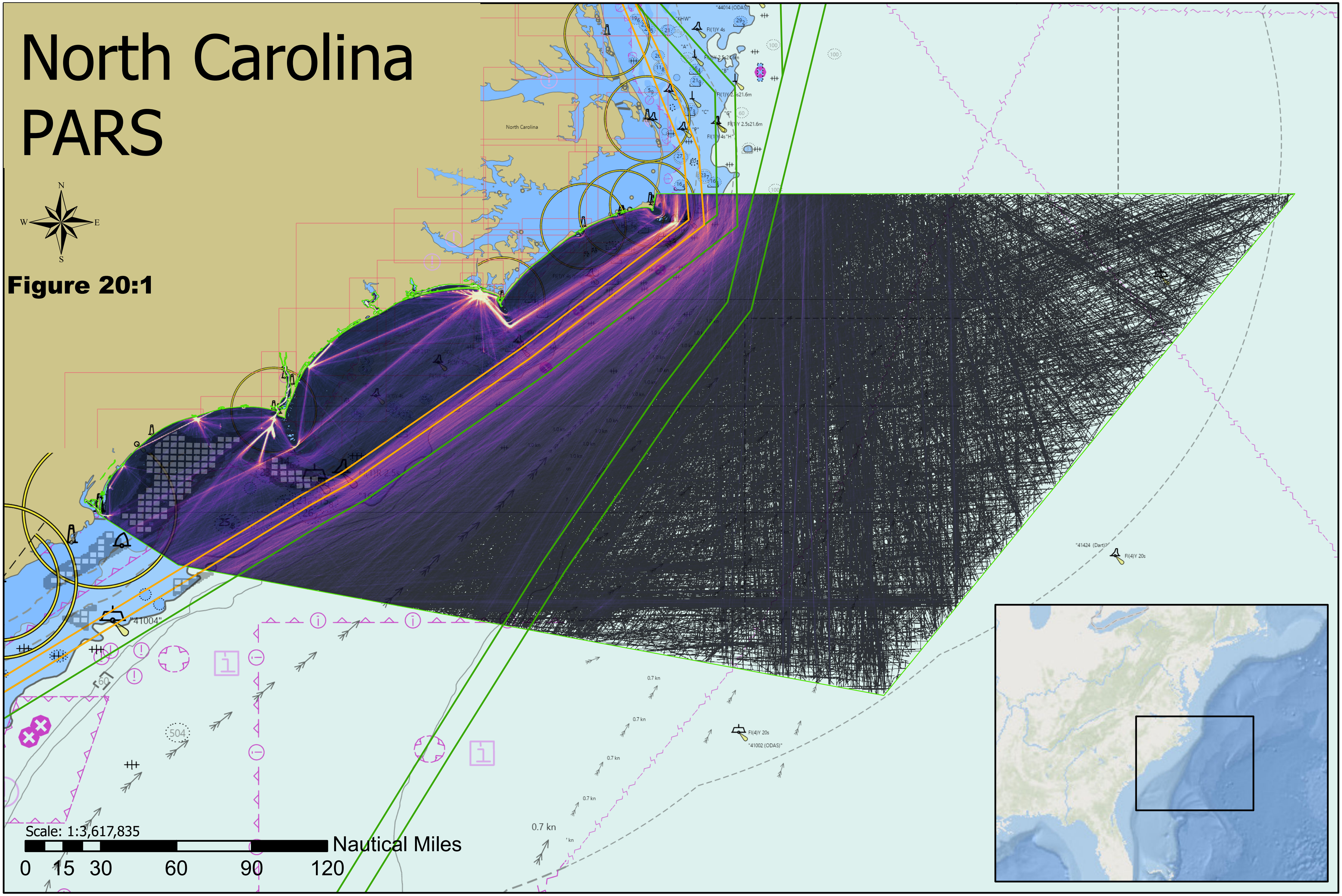
Offshore Lane

Near Shore Lane

Tug Tow 2019

High Traffic Density

Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 8:00 PM

Wind Energy Areas

ACPARS Fairways

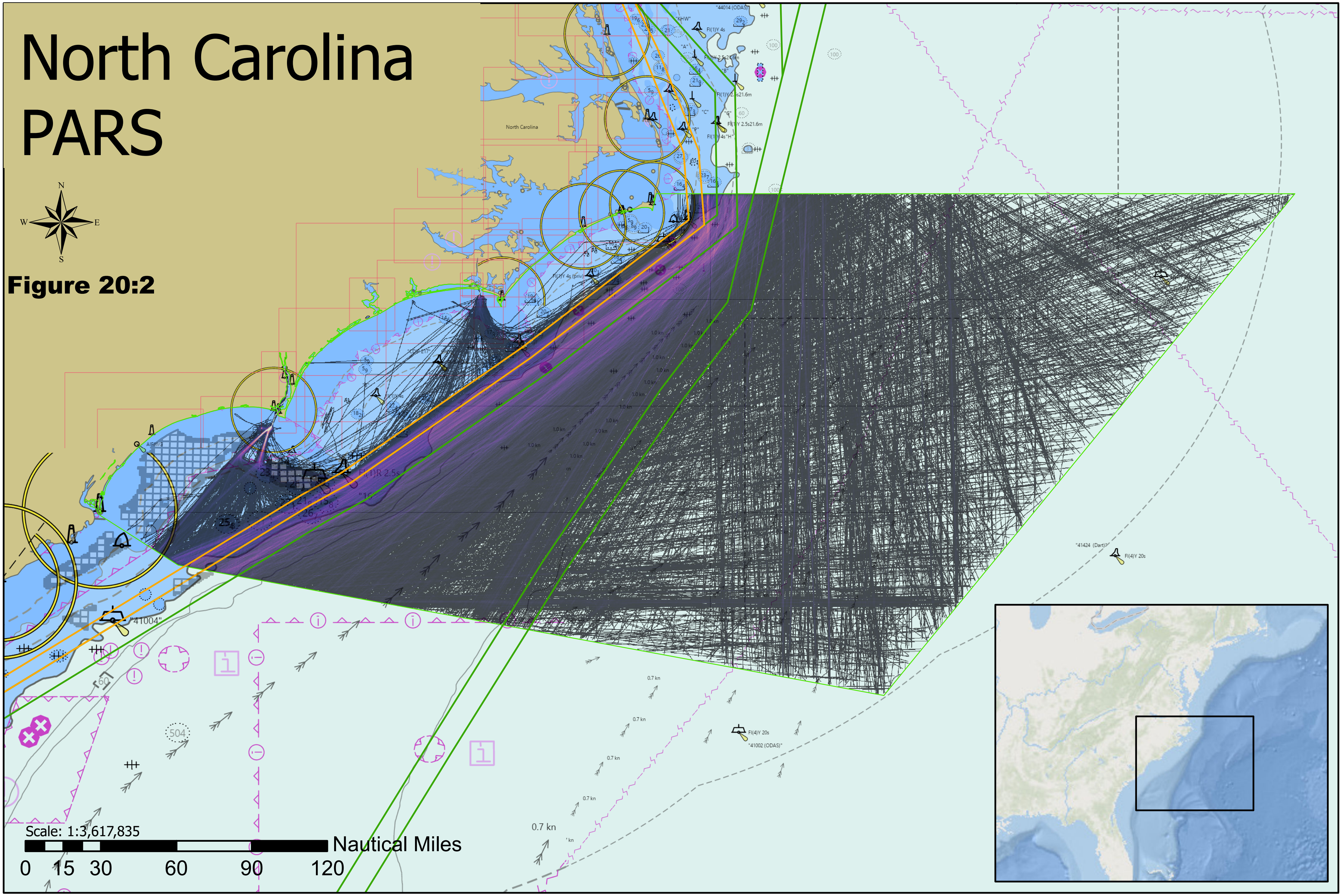
Offshore Lane

Near Shore Lane

All Vessels 2020

High Traffic Density

Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

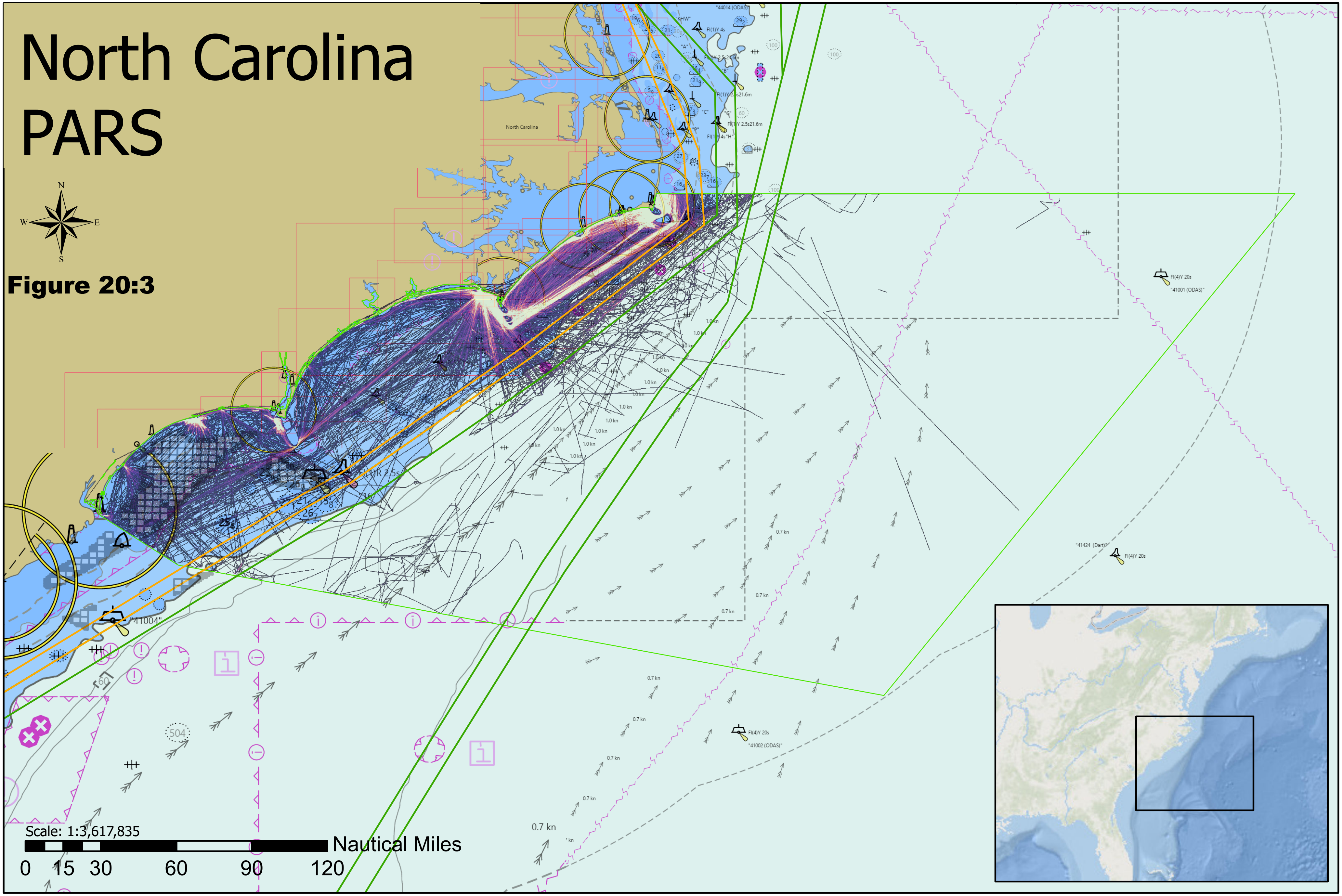
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 8:12 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Cargo 2020
High Traffic Density
Low Traffic Density



Spatial Reference
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GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 8:50 PM

Wind Energy Areas

ACPARS Fairways

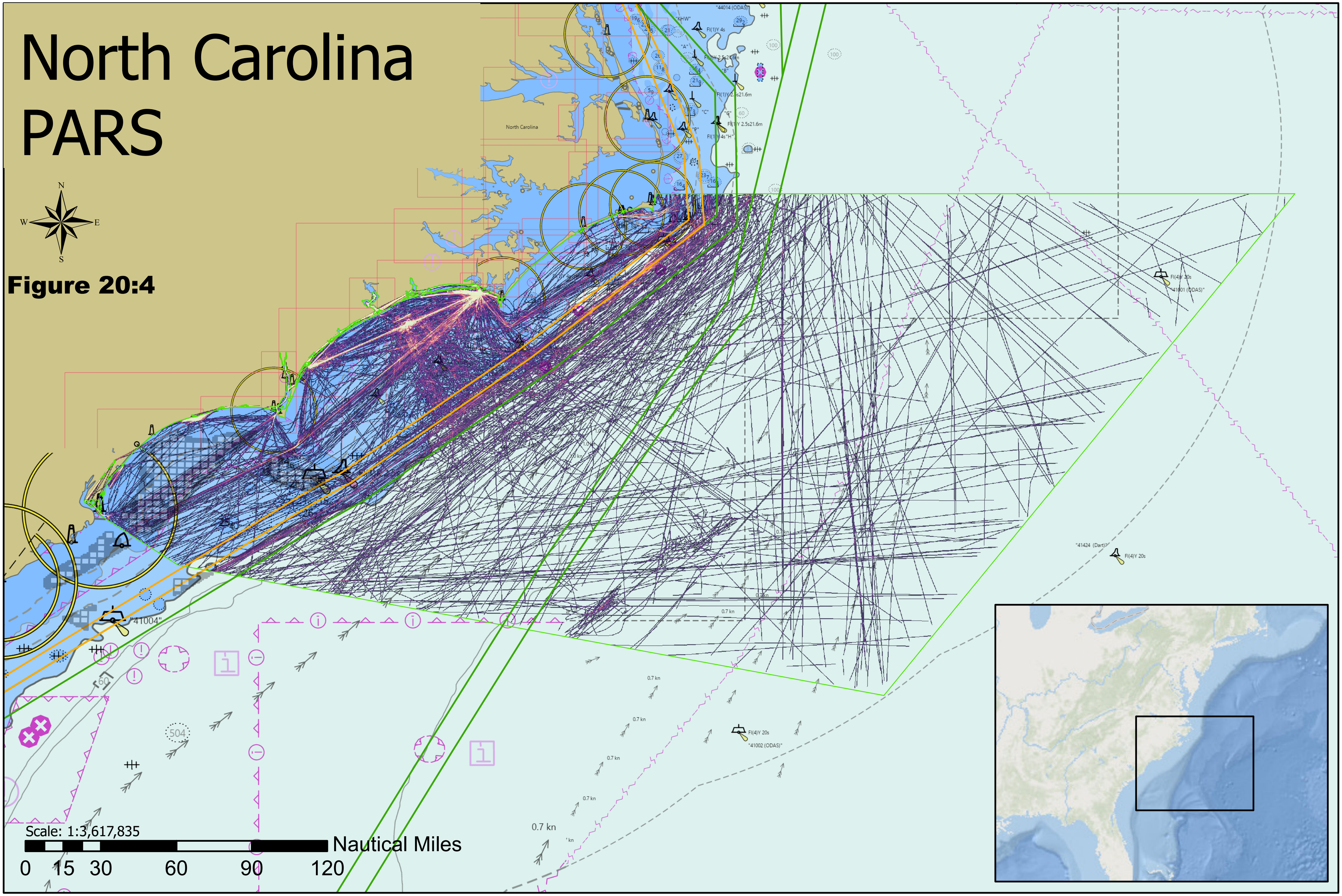
Offshore Lane

Near Shore Lane

Fishing 2020

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Wind Energy Areas

ACPARS Fairways

Offshore Lane

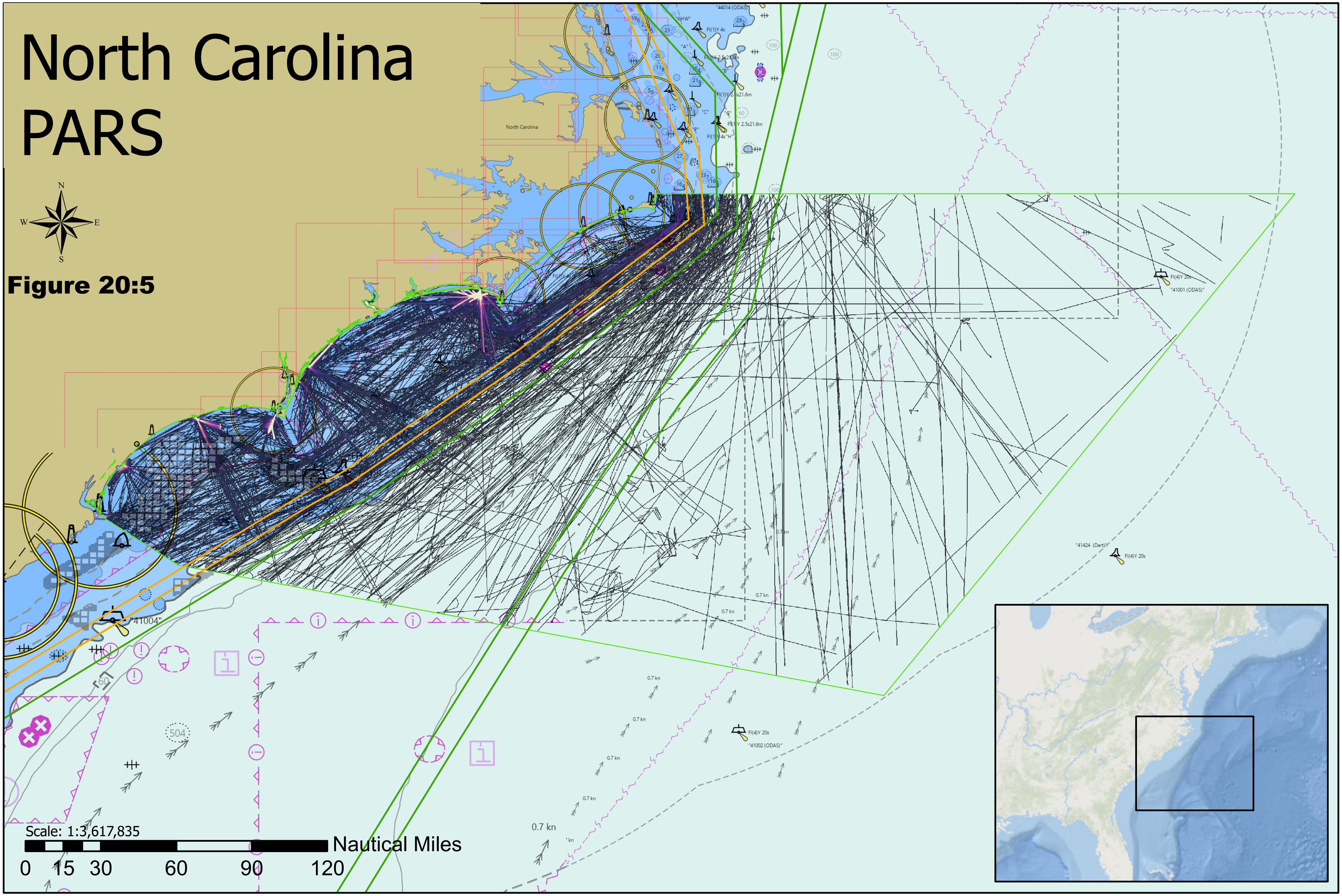
Near Shore Lane

Not Available 2020

High Traffic Density

Low Traffic Density

Last Update: 8/2/2021 9:02 PM



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

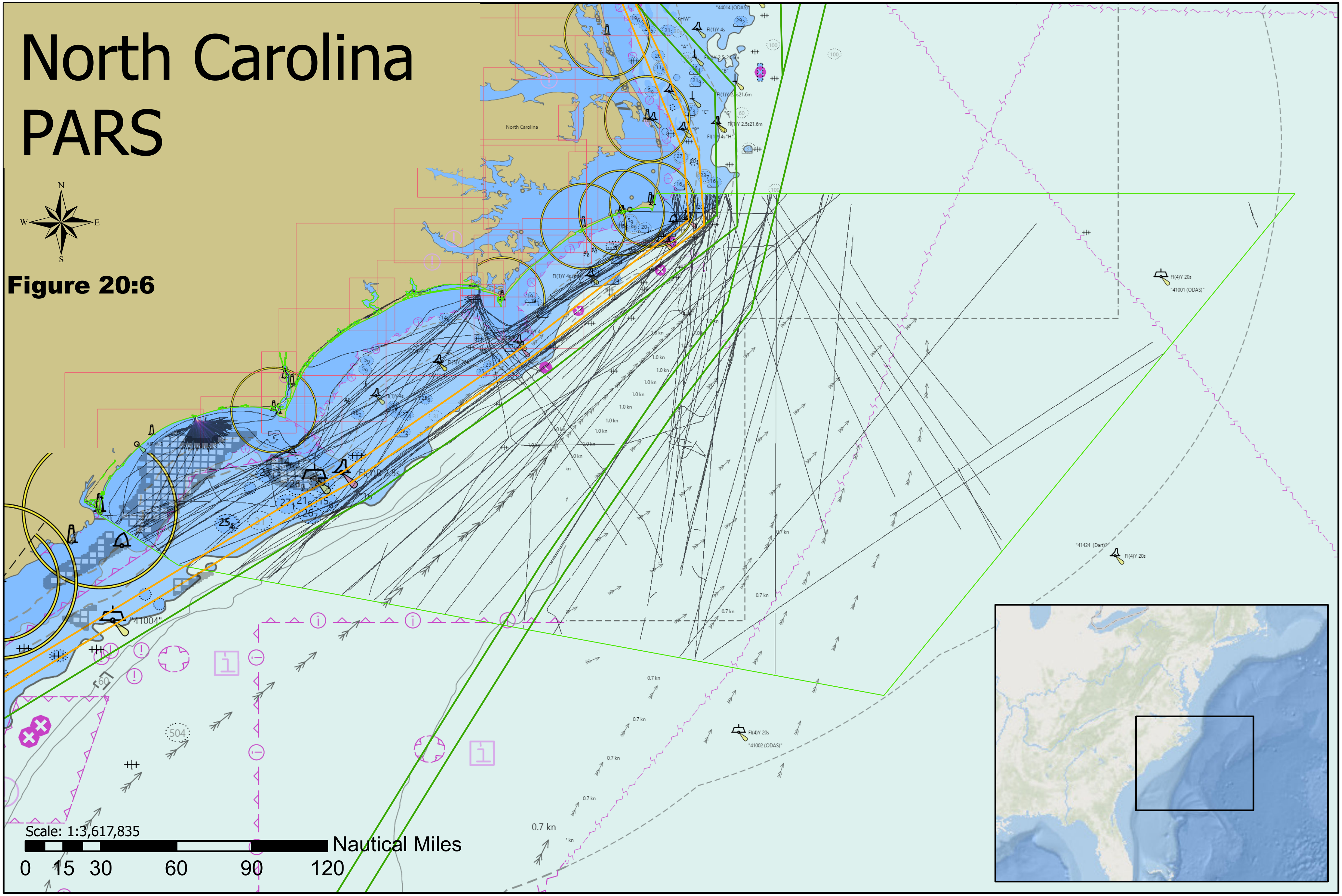
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 8:39 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Other 2020
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 9:13 PM

Wind Energy Areas

ACPARS Fairways

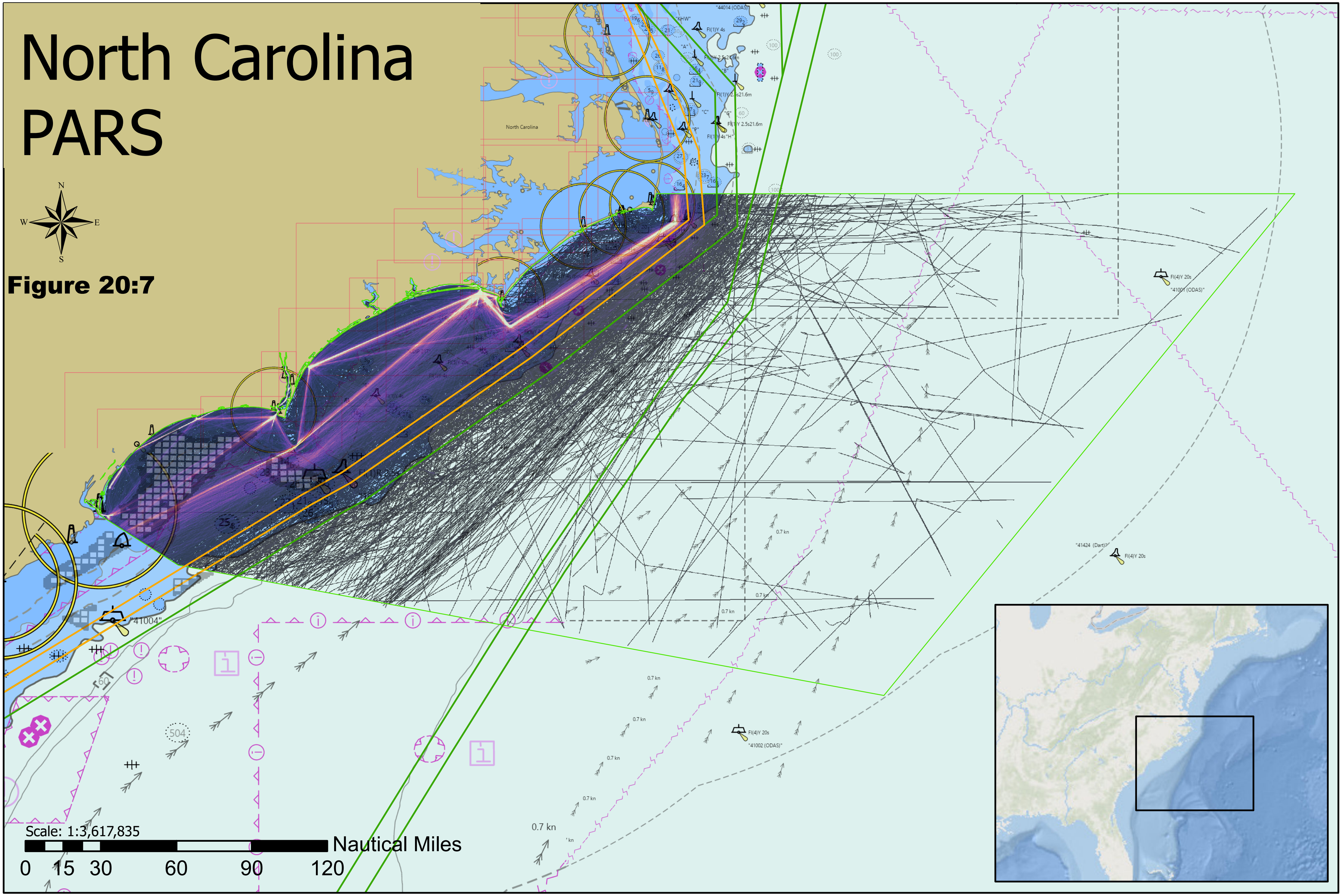
Offshore Lane

Near Shore Lane

Passenger 2020

High Traffic Density

Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

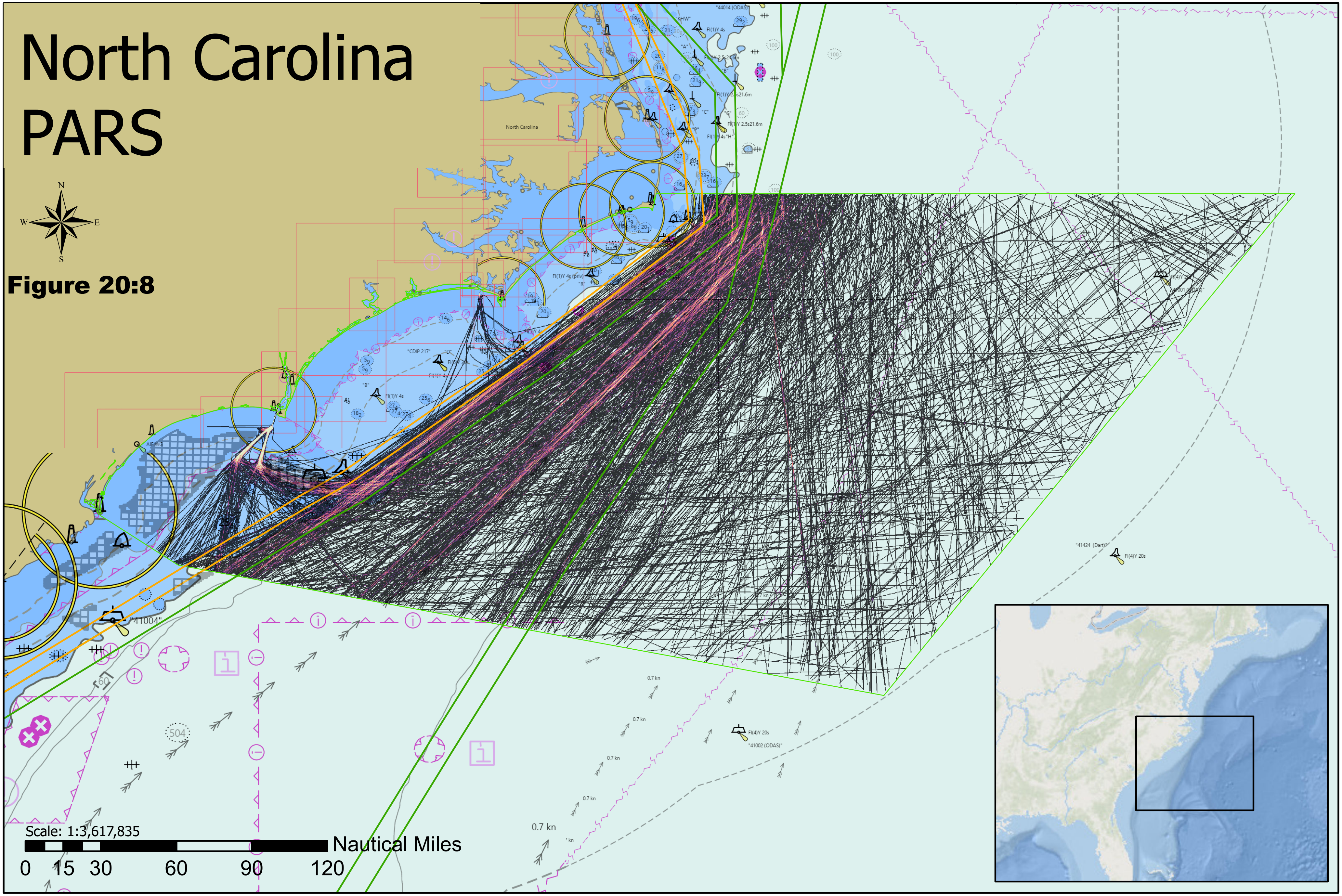
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 9:19 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Pleasure Craft 2020
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

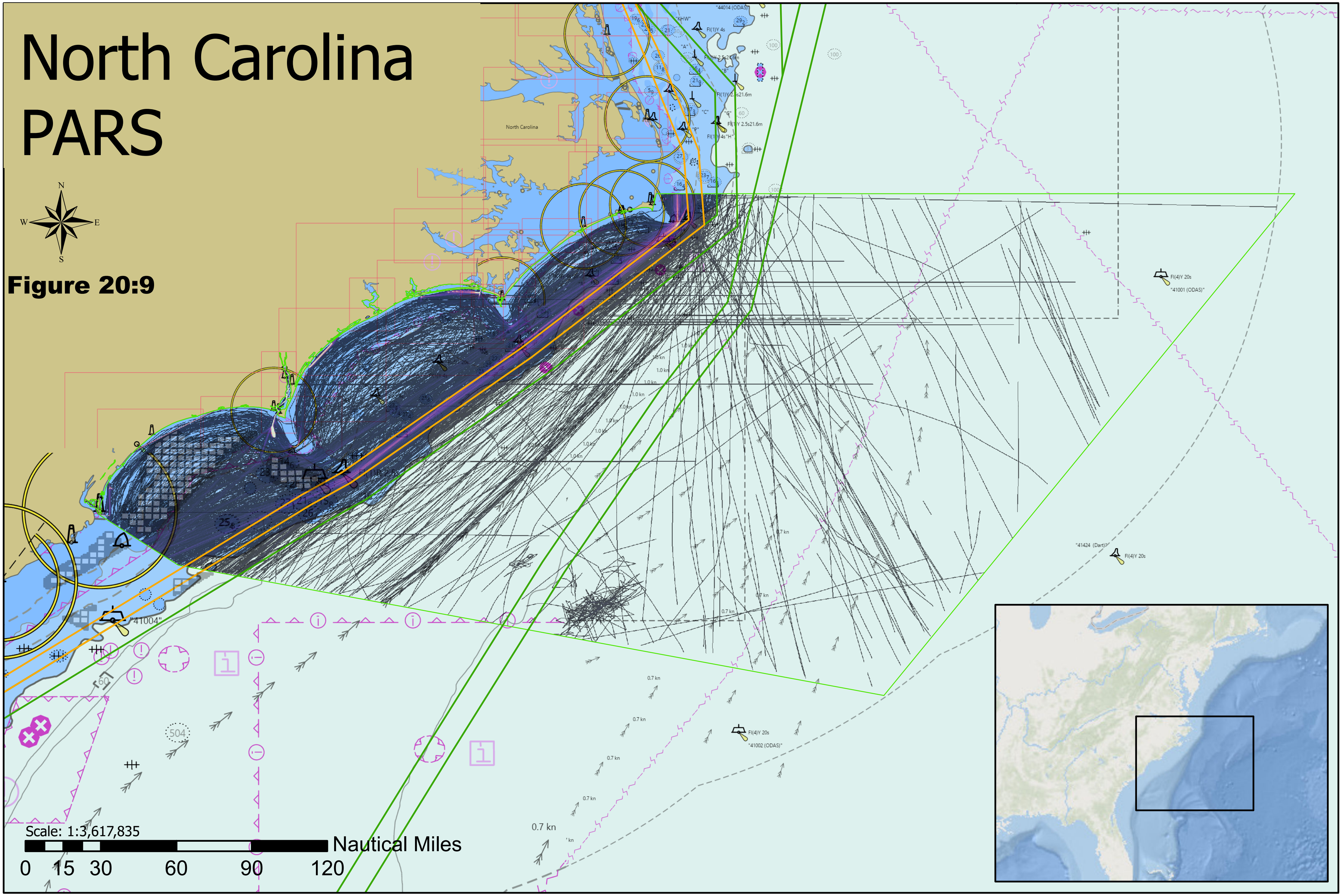
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

Last Update: 8/2/2021 9:26 PM

Wind Energy Areas

ACPARS Fairways
Offshore Lane
Near Shore Lane

Tanker 2020
High Traffic Density
Low Traffic Density



Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree

Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)

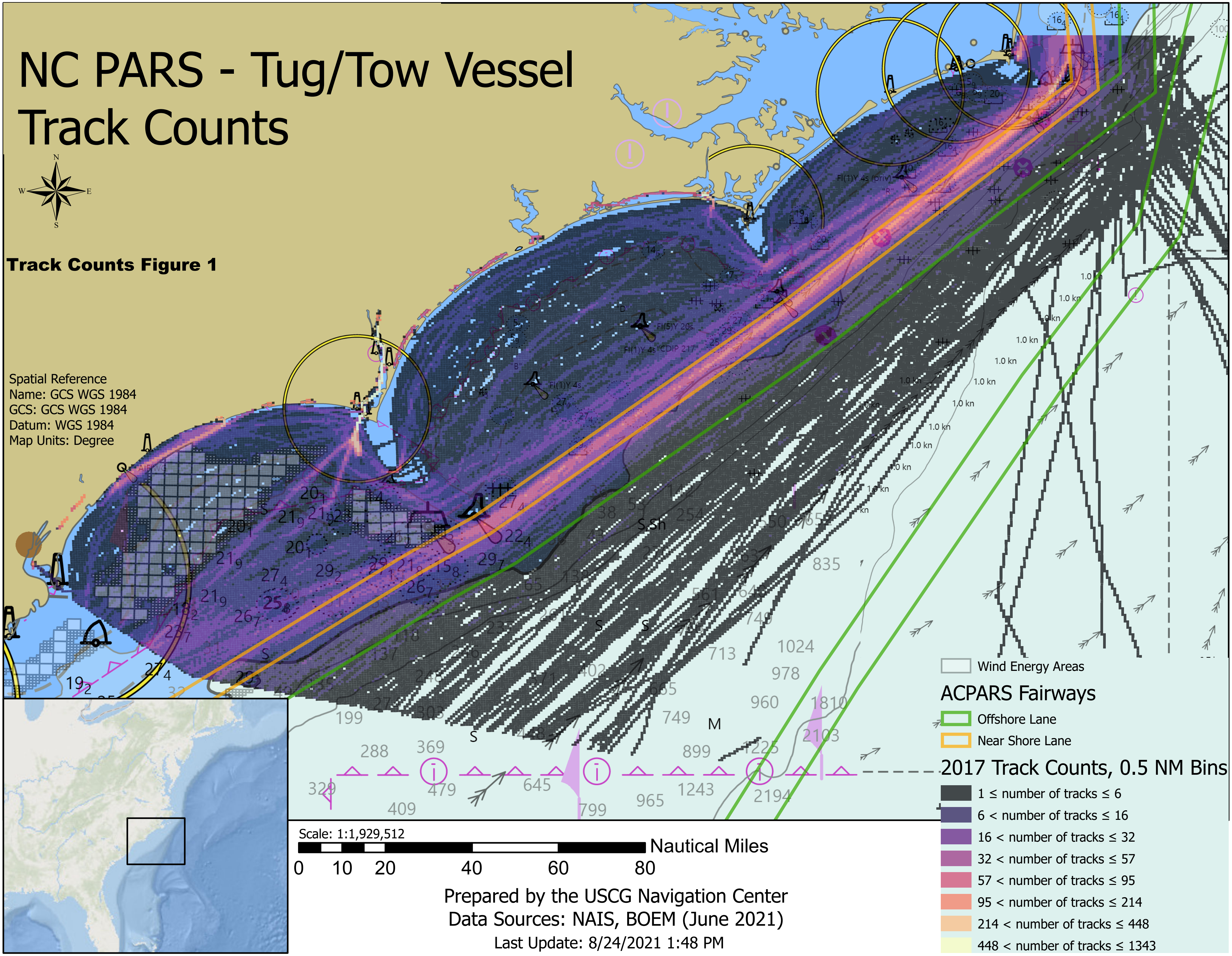
Last Update: 8/2/2021 8:24 PM

Wind Energy Areas

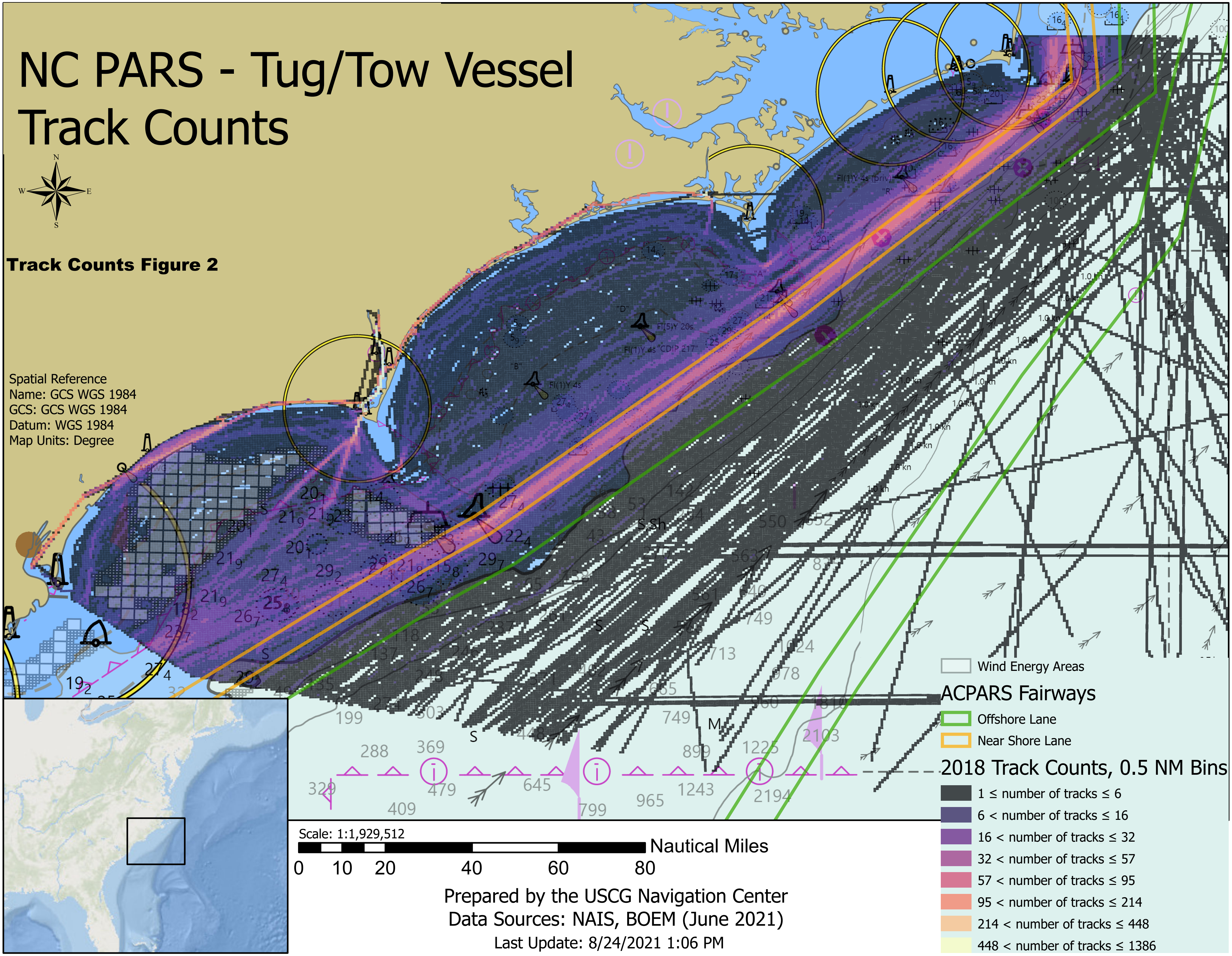
ACPARS Fairways
Offshore Lane
Near Shore Lane

Tug Tow 2020
High Traffic Density
Low Traffic Density

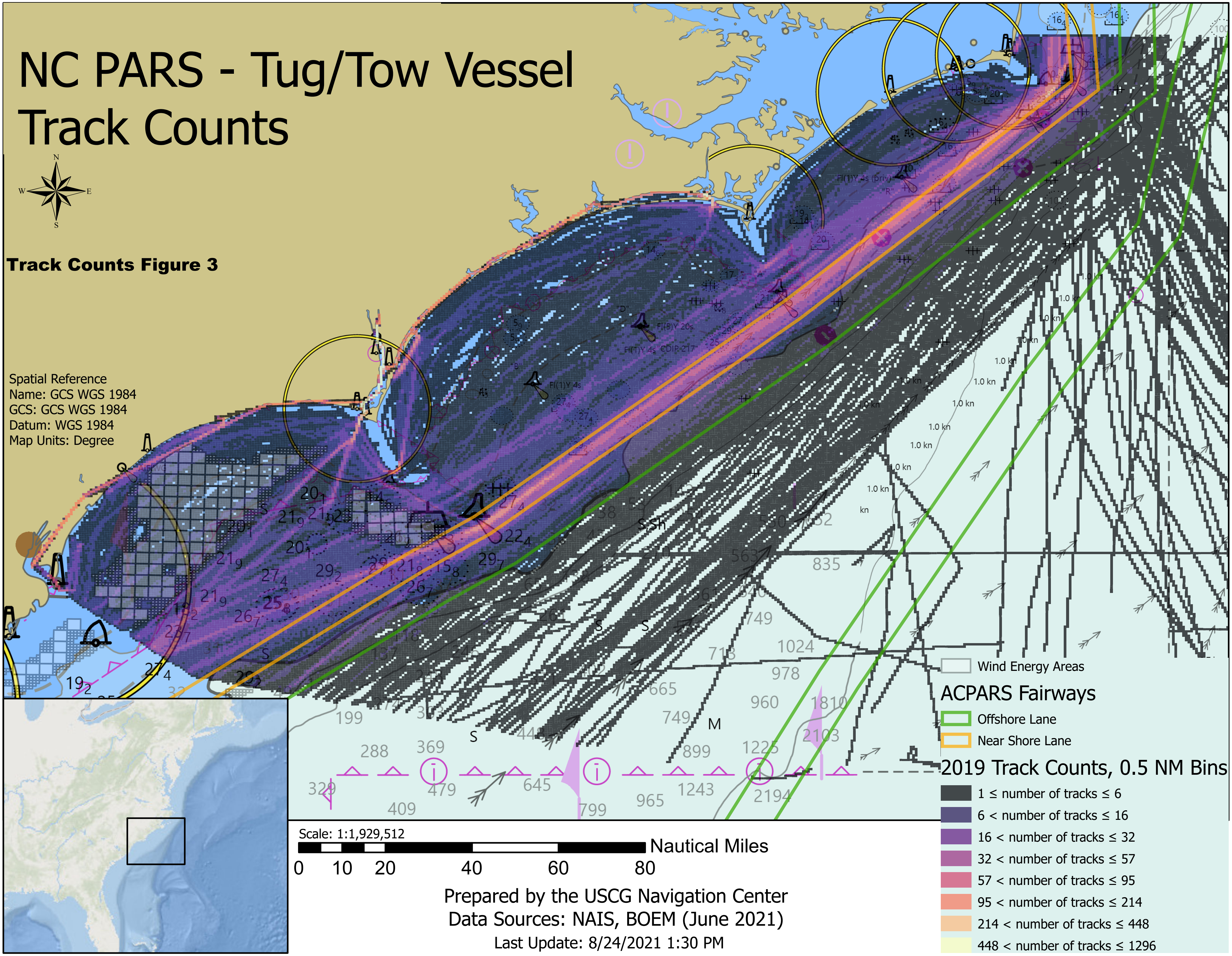
Attachment 4 – Tug-Tow Traffic Graphics



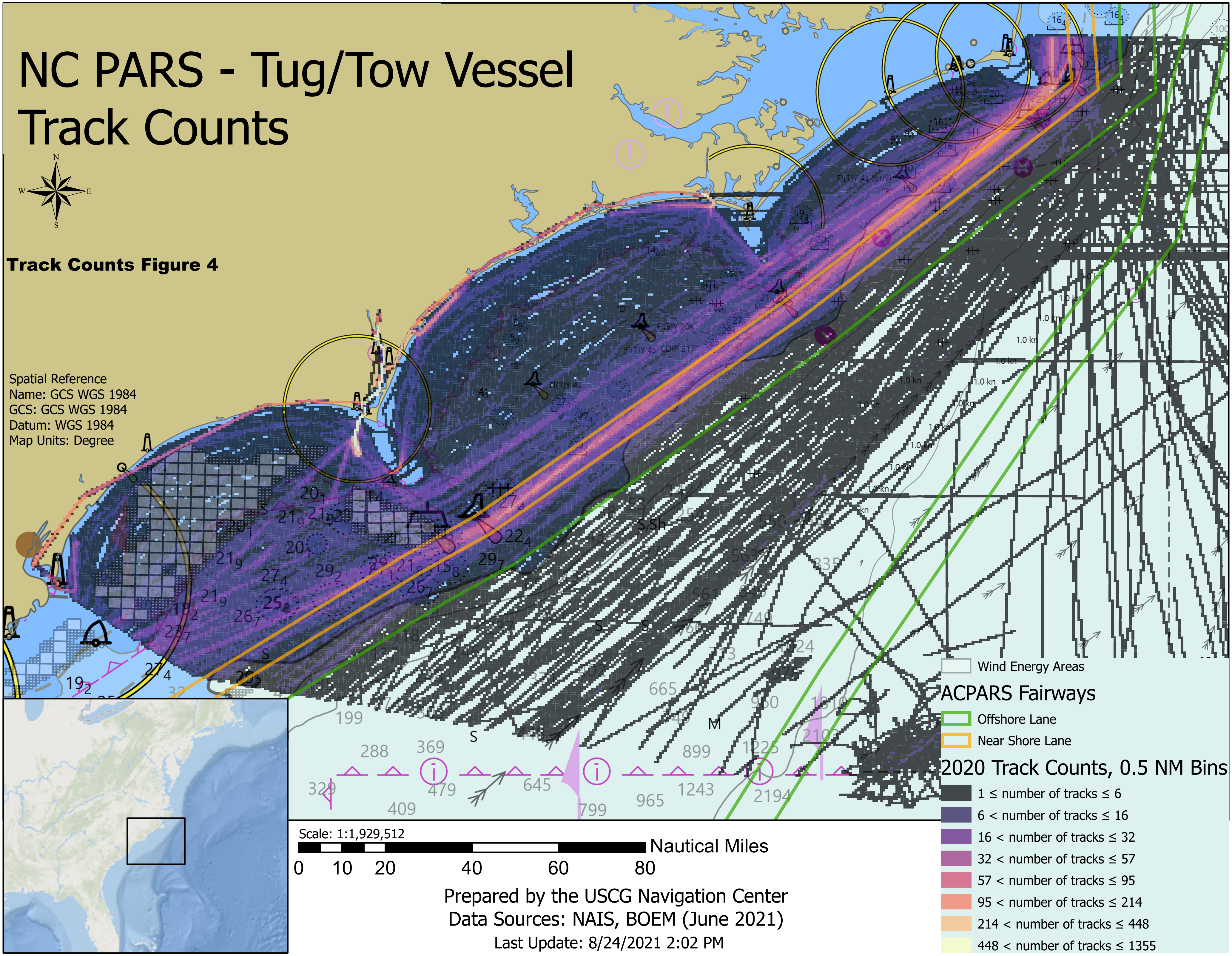
NC PARS - Tug/Tow Vessel Track Counts
Track Counts Figure 1
Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree
Wind Energy Areas
ACPARS Fairways
Offshore Lane
Near Shore Lane
2017 Track Counts, 0.5 NM Bins
1 ≤ number of tracks ≤ 6
6 < number of tracks ≤ 16
16 < number of tracks ≤ 32
32 < number of tracks ≤ 57
57 < number of tracks ≤ 95
95 < number of tracks ≤ 214
214 < number of tracks ≤ 448
448 < number of tracks ≤ 1343
Scale: 1:1,929,512
Nautical Miles
0 10 20 40 60 80
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)
Last Update: 8/24/2021 1:48 PM



NC PARS - Tug/Tow Vessel Track Counts
Track Counts Figure 2
Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree
Wind Energy Areas
ACPARS Fairways
Offshore Lane
Near Shore Lane
2018 Track Counts, 0.5 NM Bins
1 ≤ number of tracks ≤ 6
6 < number of tracks ≤ 16
16 < number of tracks ≤ 32
32 < number of tracks ≤ 57
57 < number of tracks ≤ 95
95 < number of tracks ≤ 214
214 < number of tracks ≤ 448
448 < number of tracks ≤ 1386
Scale: 1:1,929,512
Nautical Miles
0 10 20 40 60 80
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)
Last Update: 8/24/2021 1:06 PM


NC PARS - Tug/Tow Vessel
Track Counts
Track Counts Figure 3
N
S
E
W
Spatial Reference
Name: GCS WGS 1984
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree
Wind Energy Areas
ACPARS Fairways
Offshore Lane
Near Shore Lane
2019 Track Counts, 0.5 NM Bins
1 ≤ number of tracks ≤ 6
6 < number of tracks ≤ 16
16 < number of tracks ≤ 32
32 < number of tracks ≤ 57
57 < number of tracks ≤ 95
95 < number of tracks ≤ 214
214 < number of tracks ≤ 448
448 < number of tracks ≤ 1296
Scale: 1:1,929,512
Nautical Miles
0 10 20 40 60 80
Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)
Last Update: 8/24/2021 1:30 PM

NC PARS - Tug/Tow Vessel Track Counts



Prepared by the USCG Navigation Center
Data Sources: NAIS, BOEM (June 2021)
Last Update: 8/24/2021 2:02 PM