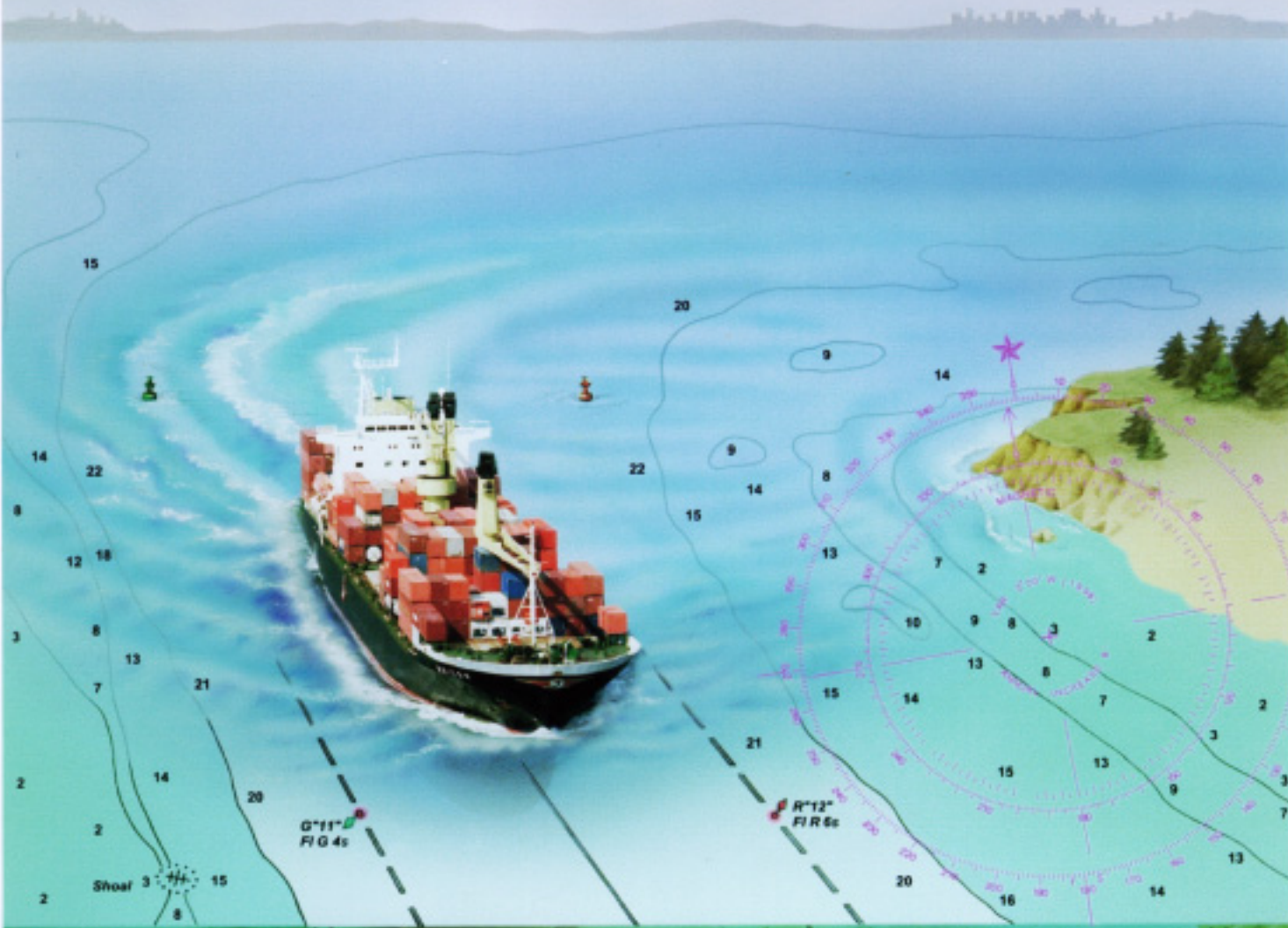


The Nautical Charting Plan



Nautical Charts play a key role
in providing safe passage...



U.S. Department of Commerce
National Oceanic and Atmospheric Administration



Fourth Edition
August 1999

Introduction to the Fourth Edition

The Fourth Edition of The Nautical Charting Plan has been revised to reflect the ranking of the port areas based on 1997 tonnage data. Information regarding quality of charting data within United States waters that are considered to be "critical" in terms of need for new surveys to collect depth information have been revised.

This edition has been expanded to include information concerning the Electronic Navigational Chart Program, including the western river systems.

Please address comments on this nautical charting plan to:

Chief, Marine Chart Division, N/CS28
National Ocean Service, NOAA
1315 East-West Highway
Silver Spring, Maryland 20910-3282

FAX: 301-713-4516

SAMPLE

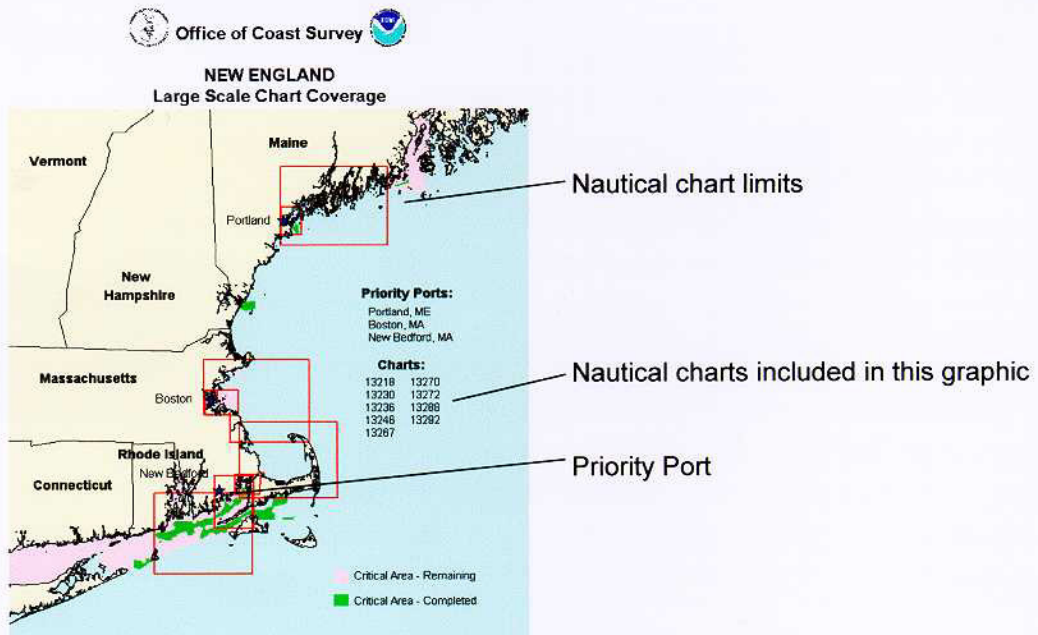


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**Office of Coast Survey
Nautical Charting Plan
Fourth Edition: AUGUST 1999**

In 1995, NOAA's Office of Coast Survey developed a nautical chart maintenance plan to provide priority support to marine commerce. The Coast Survey has placed the nautical charts covering the major U.S. ports on an accelerated updating and publication schedule to provide mariners with the most current information.

The Coast Survey has operated under severe resource constraints in the past. With reduced resources, the Coast Survey is compelled to prioritize every element of its budget, including the scheduling and printing of new editions of nautical charts and hydrographic surveying. To maintain the suite of nautical charts in a state of currency requires the annual publication of approximately 400 new editions. Resource levels for Fiscal Year 1999 will sustain the compilation, printing, and distribution cost for approximately 141 new nautical chart editions, approximately 35 percent of what is required to properly maintain the entire chart suite. New nautical chart editions for Fiscal Year 2000 are scheduled to be 300.

The Coast Survey has designed a priority scheme to support the marine transportation infrastructure as well as possible with the available resources. The charts that support the busiest commercial ports and trade routes are being published more frequently in order to reflect changing conditions. This chart publication schedule has been developed to ensure data currency and to prevent an excessive accumulation of Notice to Mariners corrections to be applied by the mariner. Charts of lower priority areas will be published less frequently.

The number of new editions of nautical charts and hydrographic surveys required to support all U.S. ports exceeds the annual capability of the Coast Survey at the chart publication frequency required. Therefore, a production model was developed that allocates the Coast Survey chart production and hydrographic surveying resources to the highest ranked ports. The charts that support the largest commercial ports and trade routes were chosen by analyzing data that rank U.S. ports by tonnage of goods moving through them. While this model does not support all ports, it does:

- Include 62% of the ports ranked by tonnage of goods and accounts for 93% of the total tonnage handled in the ranked U.S. ports and harbors.
- Include approximately 63% of the ports ranked by value of goods and accounts for 99% of the total value of goods handled in ranked U.S. ports and harbors.
- Support major ports of call that are visited by the cruise line industry.
- Support the Coast Survey priority scheme for hydrographic surveying and coincides with the most current and planned hydrographic survey activity.
- Include those areas where the most frequent and critical changes occur.

Some additional areas of charting importance are not directly associated with a particular port. Examples of these types of areas are coastal sea routes and cruise ship operating areas. Some of these areas, formerly considered remote, have never been adequately surveyed and are now being comprehensively surveyed for the first time. As these new surveys are completed, the affected charts are being updated on a priority basis.

A new edition of a nautical chart is constructed by revising the current edition of the chart with new

information received since it was last published. The new information typically comes from many sources and is used to revise various charted features. A new edition does not imply that all the data on the chart is newly collected, only that information significant enough to justify publication of a revised chart has been received. This is especially true of the depth information on a nautical chart, the information that results from hydrographic surveys.

Hydrographic Surveying

Until the 1940's, surveys were conducted with lead lines for measuring depths and sextants for determining positions. Approximately 50 percent of the soundings on Coast Survey nautical charts are from survey data collected before 1940 using lead lines. This methodology could miss large and potentially hazardous features rising from the sea floor. Since then the application of electronics to surveying equipment has resulted in recording fathometers which replaced the lead line and electronic positioning systems that replaced the sextant. The recording fathometers and electronic positioning systems have evolved into modern multi-beam surveying equipment that can "see" the bottom and the Differential Global Positioning System. Even with advances in technology, however, conducting surveys to collect depth information and locate dangers to navigation is costly and time consuming.

The Coast Survey is responsible for surveying and charting more than 3 million square nautical miles of ocean. To prioritize its surveying operations, Coast Survey has developed criteria for determining which coastal areas are in critical need of updated depth information. These criteria include depth of the area, quality of existing depth information, passenger traffic, volume and type of cargo traffic, and the area's proximity to fisheries and marine resources.

There were 43,000 square miles of coastal area identified in 1994 that met the criteria to be designated as critical areas. These critical areas are primarily coastal shipping lanes and major U.S. ports and their approaches. Since 1994 approximately 5,000 square nautical miles of critical area have been surveyed using modern methods and equipment. Approximately 21,000 square nautical miles in the continental U.S. and Hawaii and 17,000 square nautical miles in Alaska still require surveying with modern means.

Many areas not included in the designated critical area category have never been adequately surveyed. In other areas changes such as shifting shoals and recently reported wrecks and obstructions add to the requirements for surveys. Although the U.S. Coast Guard, U.S. Army Corps of Engineers, local port authorities, and mariners report these hazards, it is NOAA's responsibility to locate and determine the depth over them. With limited resources, prioritizing the scheduling of these surveys is Coast Survey's challenge.

PORTS

Another important source of navigation information is the Physical Oceanographic Real-Time Systems (PORTS). PORTS allows ships to access real-time data from instruments that measure currents, water levels (tides), winds, waves, temperatures, and salinity. PORTS, by providing the accurate water level and current information that pilots need to avoid ship groundings and collisions, also allows shippers to recognize conditions suitable for additional loading of goods. PORTS is operational in New York Harbor, Chesapeake Bay, Tampa Bay, Galveston Bay, and San Francisco Bay.

Electronic Navigational Chart Program

Information concerning the Electronic Navigational Chart program developed by Coast Survey has been incorporated into this edition of the Nautical Charting Plan. The purpose of this program is to deliver to the mariner the most current and accurate nautical chart information available in the form of an electronic chart. The electronic navigational chart database is being built from data acquired from many sources,

such as the U.S. Army Corps of Engineers, U.S. Coast Guard, etc. Data sets are then converted into an internationally accepted format, S-57, established by the International Hydrographic Organization, as attributed vector data.

The Coast Survey, cognizant of the large volume of commerce borne on the western inland waterways, the availability of Differential Global Positioning System, commercially available navigation systems, and the commercial marine navigation community's need for a government-certified navigation database, has made the decision to expanded its electronic navigational chart program to investigate the creation of a rivers chart database for the navigable portion of the Mississippi River and its tributaries. These waterways extend for approximately 5,284 miles, with major ports along these waterways accounting for approximately 846,286,000 tons of commodities in 1997. The Mississippi River alone carries 60% of this total tonnage.

The first electronic navigational charts for the lower Mississippi River extend from the Gulf of Mexico to Mile 320 (approximately 100 miles north of Baton Rouge, LA). These electronic navigational charts are undergoing evaluation to test the data compilation and formatting processes and the near-real-time application of updates as well as gather feedback from users. In addition, the U.S. Coast Guard is using these electronic navigational charts for the evaluation of the Automated Identification System. The U.S. Army Corps of Engineers, U.S. Coast Guard, pilots, barge lines, and many other organizations have been very cooperative in sharing information to help make this possible.

Graphics

The following pages graphically portray the nautical charts necessary for minimal navigational support of major commercial ports that have been placed on the accelerated publication schedule. Also portrayed are those areas identified as in critical need of modern hydrographic surveys. Future electronic navigational chart areas are also included.

The fourth edition of this charting plan includes the following changes:

- Additional information on critical areas that require hydrographic surveying.
- The addition of charts 11543, 11545, 11547, and 18587.
- Deletion of chart 11522.
- Planned Electronic Navigational Chart coverage

MAJOR U.S. PORT CITIES and SATELLITE PORTS
(grouped by location; ranked by total cargo tonnage)

RANK	PORT AREAS	RANK	PORT AREAS	RANK	PORT AREAS
1	Port of South LA, LA New Orleans, LA Baton Rouge, LA Port of Plaquemines, LA Morgan City, LA Avondale, LA	11	Duluth/Superior, MN/WI Two Harbors, MN Silver Bay, MN Drummond Island, MI Sault Ste Marie, MI	25	Jacksonville, FL
2	Houston, TX Texas City, TX Freeport, TX Galveston, TX	12	Seattle, WA Tacoma, WA Anacortes, WA	26	Detroit, MI
3	Lake Charles, LA Beaumont, TX Port Arthur, TX Orange, TX	13	Tampa, FL St. Petersburg, FL Manatee, FL	27	Cleveland, OH
4	Port of NY/NJ	14	Pittsburgh, PA	28	Memphis, TN
5	Philadelphia, PA Paulsboro, NJ Marcus Hook, PA New Castle, DE Camden-Gloucester City, NJ Wilmington, DE Trenton, NJ Chester, PA Morrisville, PA Burlington, NJ	15	Portland, OR Kalama, WA Vancouver, WA Longview, WA Astoria, OR	29	Savannah, GA
6	Corpus Christi, TX Matagorda, TX Victoria, TX Brownsville, TX Port Lavaca, TX	16	Richmond, CA Oakland, CA San Francisco, CA Carquinez Strait, CA San Pablo Bay, CA Martinez, CA Selby, CA Alameda, CA	30	Charleston, SC
7	Long Beach, CA Los Angeles, CA	17	Mobile, AL	31	Toledo, OH Monroe, MI
8	Valdez, AK	18	Baltimore, MD	32	Portland, ME
9	Chicago, IL Indiana Harbor, IN Burns Int'l Hbr, IN Gary, IN Port Inland, MI Buffington, IN East Chicago, IN	19	Pascagoula, MS Biloxi, MS Gulfport, MS	33	Lorain, OH
10	Norfolk, VA Newport News, VA	20	St. Louis, MO & IL	34	San Juan, PR
		21	Port Everglades, FL Miami, FL Palm Beach, FL Ft. Lauderdale, FL	35	Cincinnati, OH
		22	Huntington, WV	36	St. Clair, MI Marine City, MI Marysville, MI Port Huron, MI
		23	Boston, MA New Bedford, MA	37	Nikiski, AK Anchorage, AK
		24	Honolulu, HI Barbers Pt., HI	38	Louisville, KY
				39	Wilmington, NC
				40	St. Paul, MN Minneapolis, MN
				41	Mount Vernon, IN
				42	Vicksburg, MS
				43	Morehead City, NC
				44	Nashville, TN
				45	Kansas City, MO
				46	Coos Bay, OR
				47	Chattanooga, TN
				48	Greenville, MS

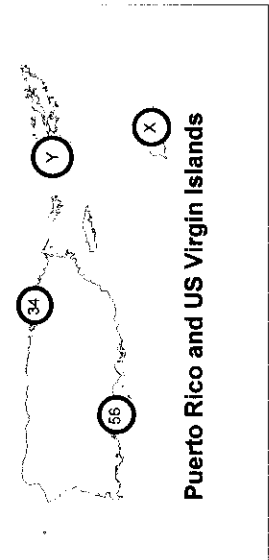
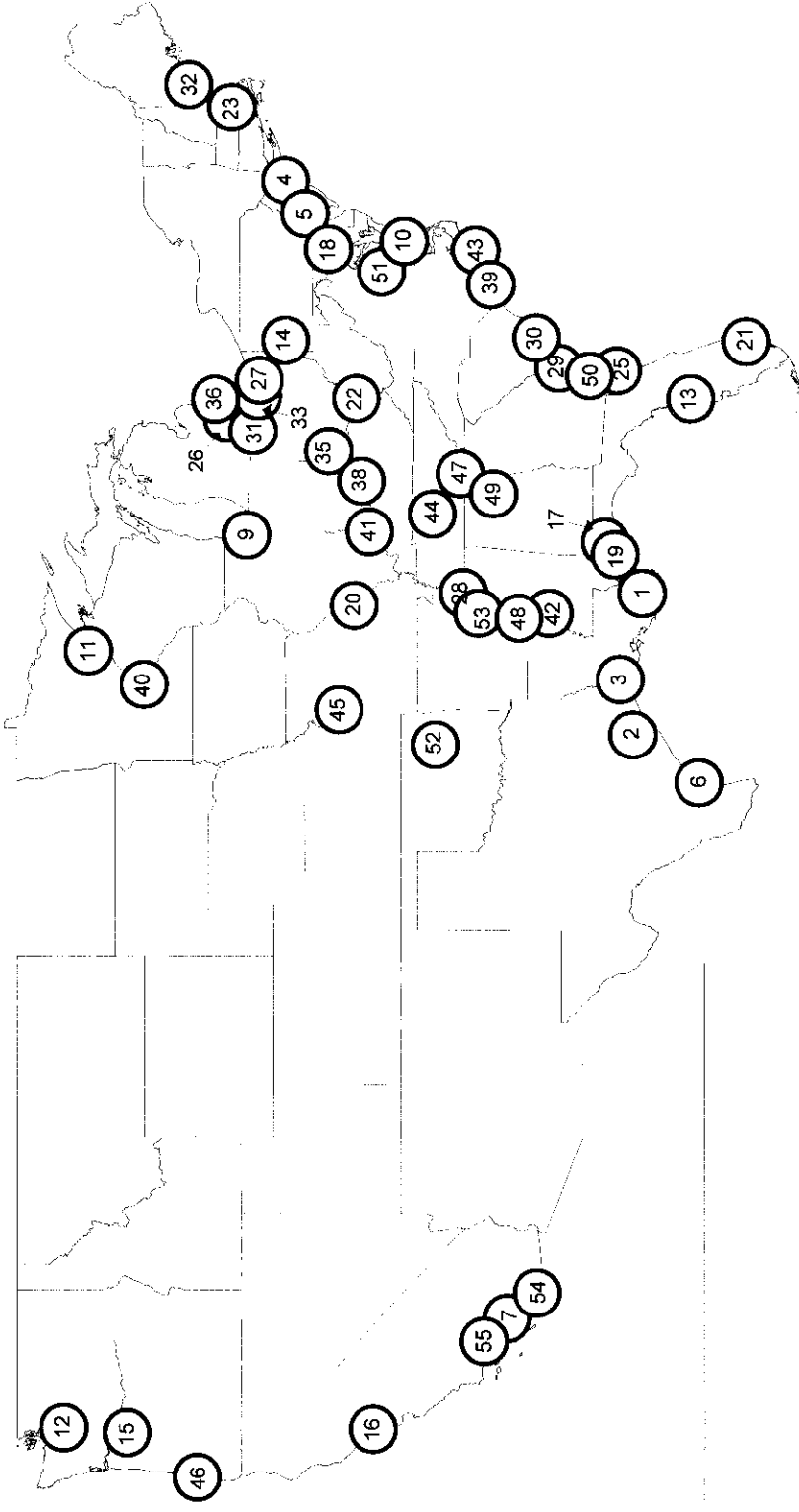
- 49 **Guntersville, AL**
- 50 **Brunswick, GA**
- 51 **Richmond, VA**
Hopewell, VA
- 52 **Tulsa, Port of**
Chatoosa, OK
- 53 **Helena, AR**
- 54 **San Diego, CA**
- 55 **Port Hueneme, CA**
Ventura, CA
- 56 **Ponce, PR**
- X **Christiansted,**
St. Croix, VI
- Y **Charlotte Amalie,**
St. Thomas, VI



Office of Coast Survey

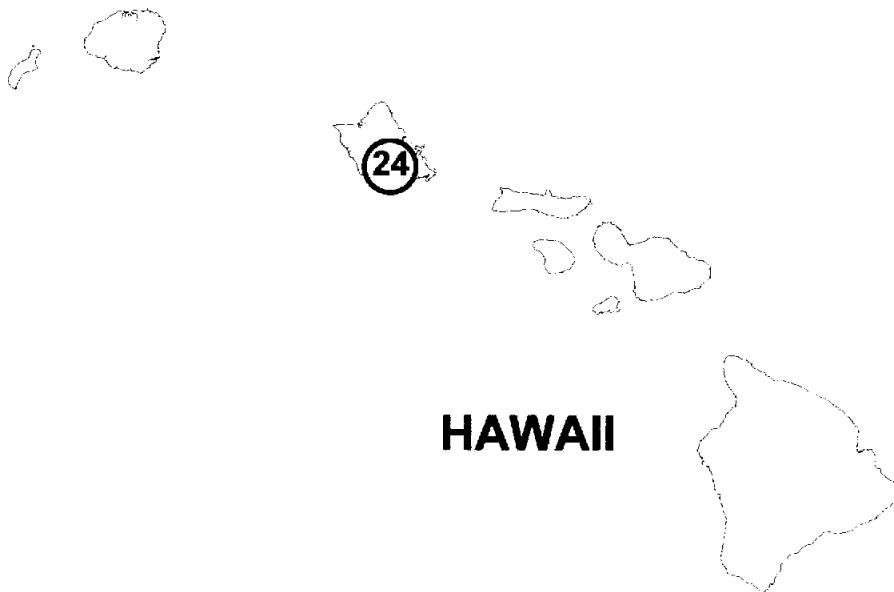
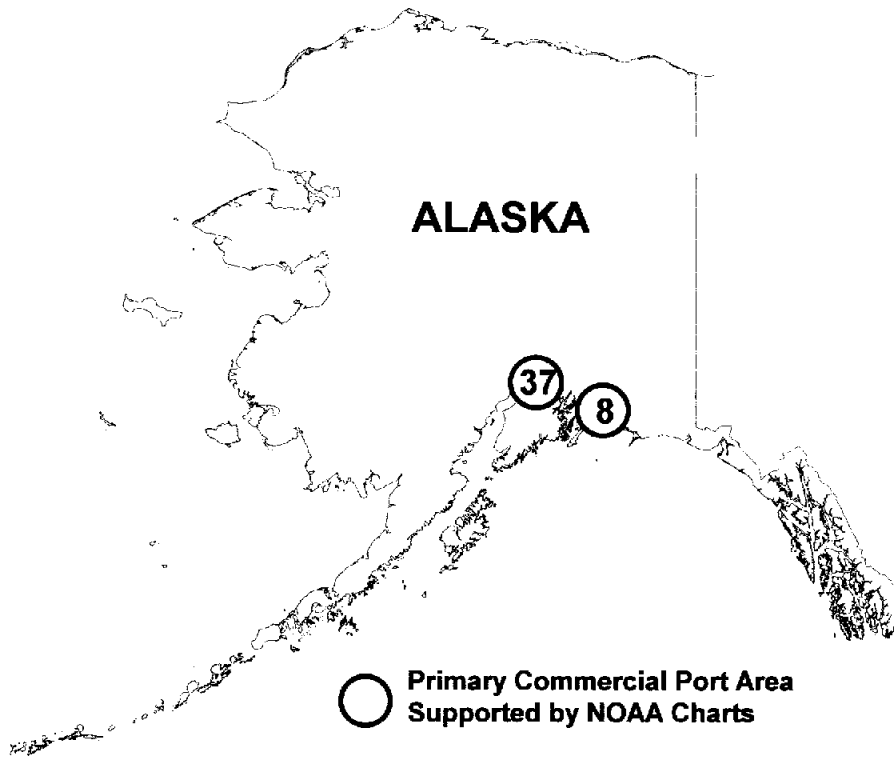


○ Primary Commercial Port Area
Supported by NOAA Charts



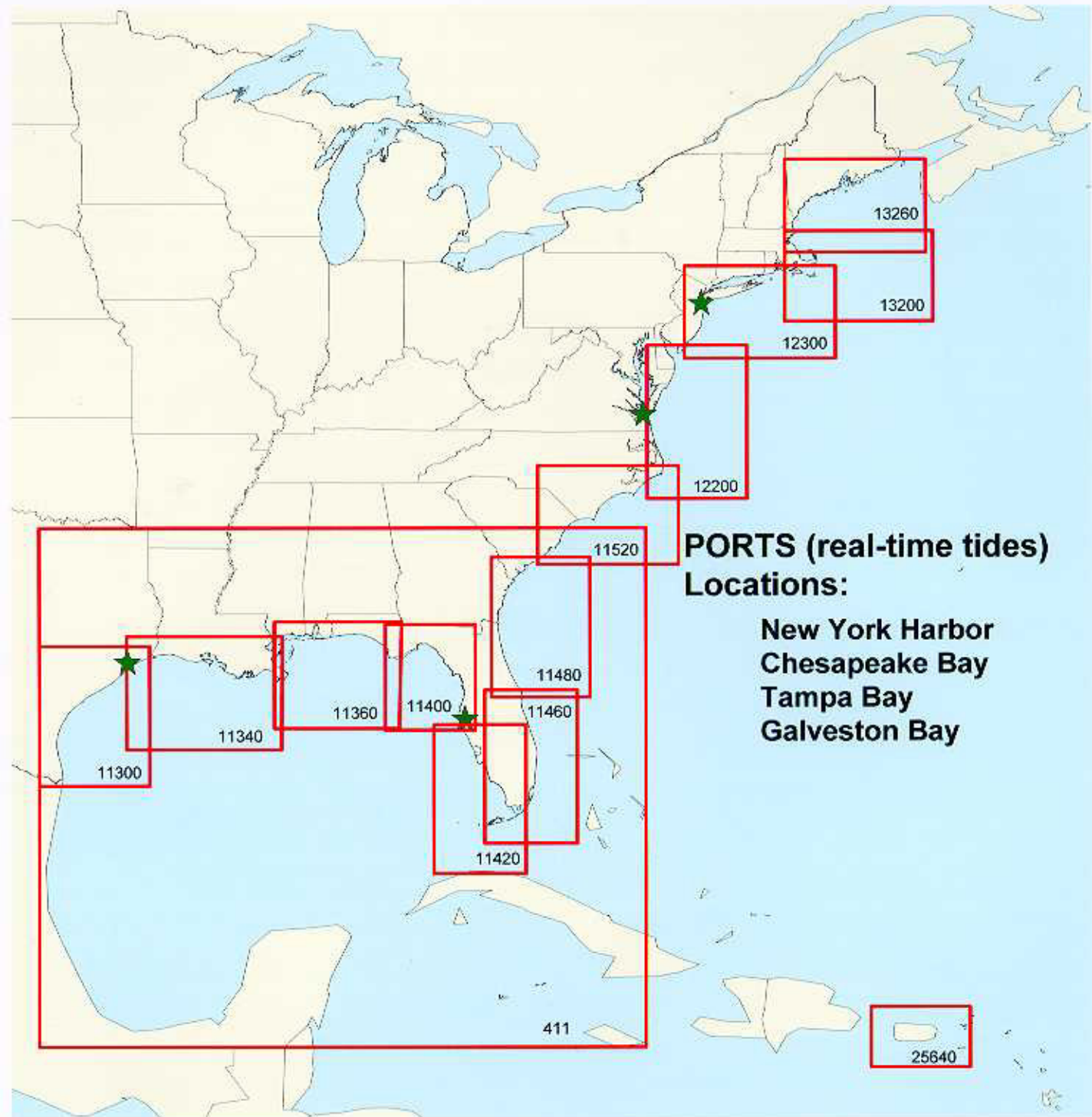


Office of Coast Survey





EAST AND GULF COAST STATES Small Scale Chart Coverage

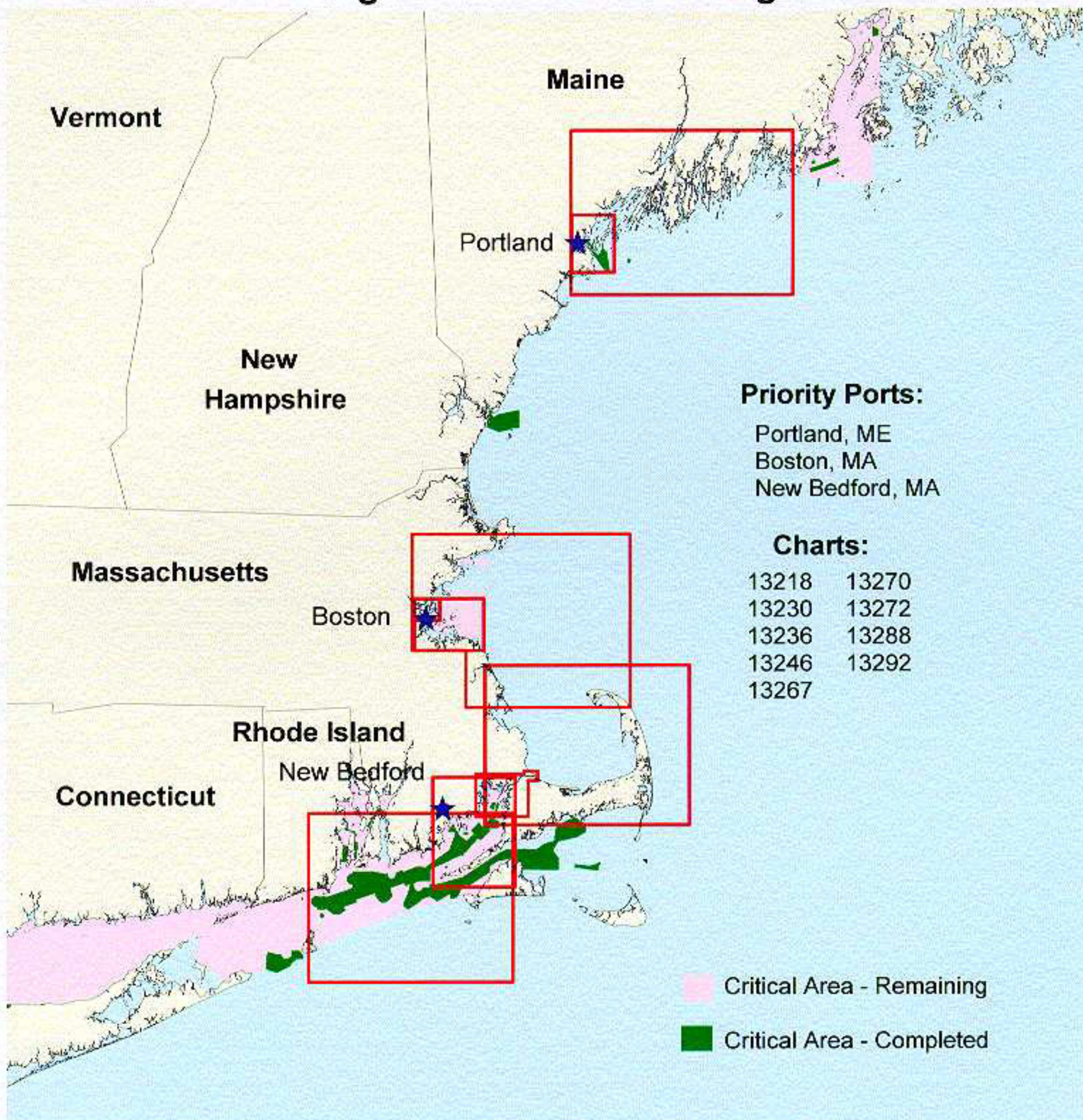


**PORTS (real-time tides)
Locations:**

- New York Harbor
- Chesapeake Bay
- Tampa Bay
- Galveston Bay

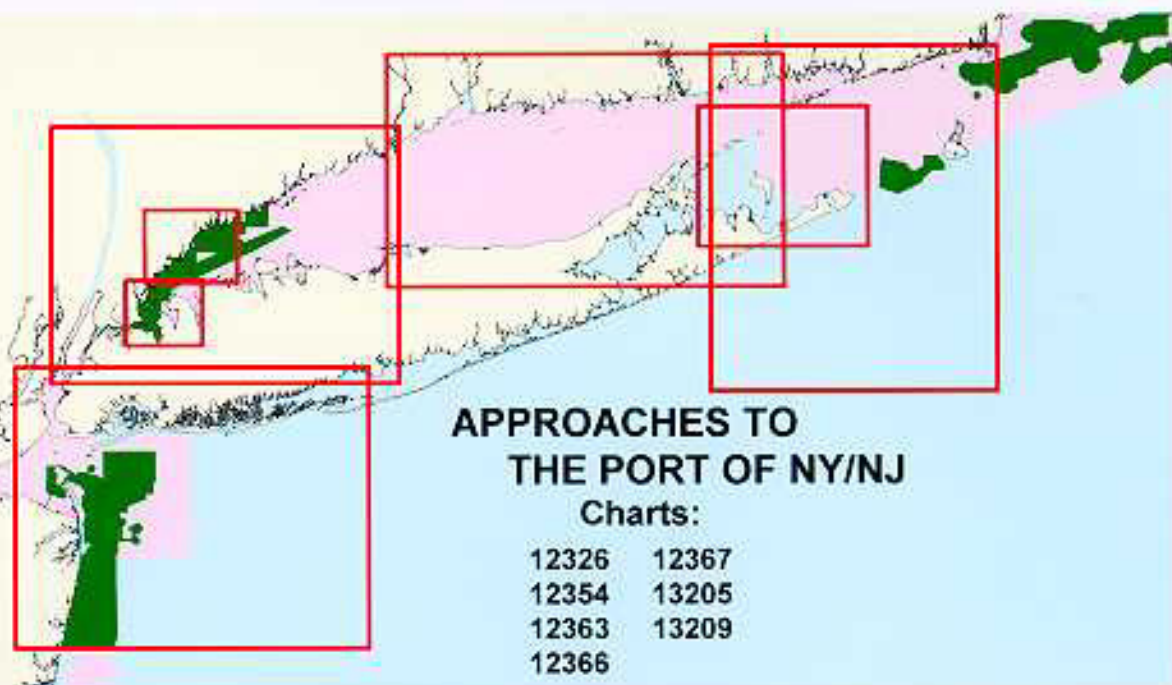


NEW ENGLAND Large Scale Chart Coverage






NEW YORK/NEW JERSEY Small and Large Scale Chart Coverage




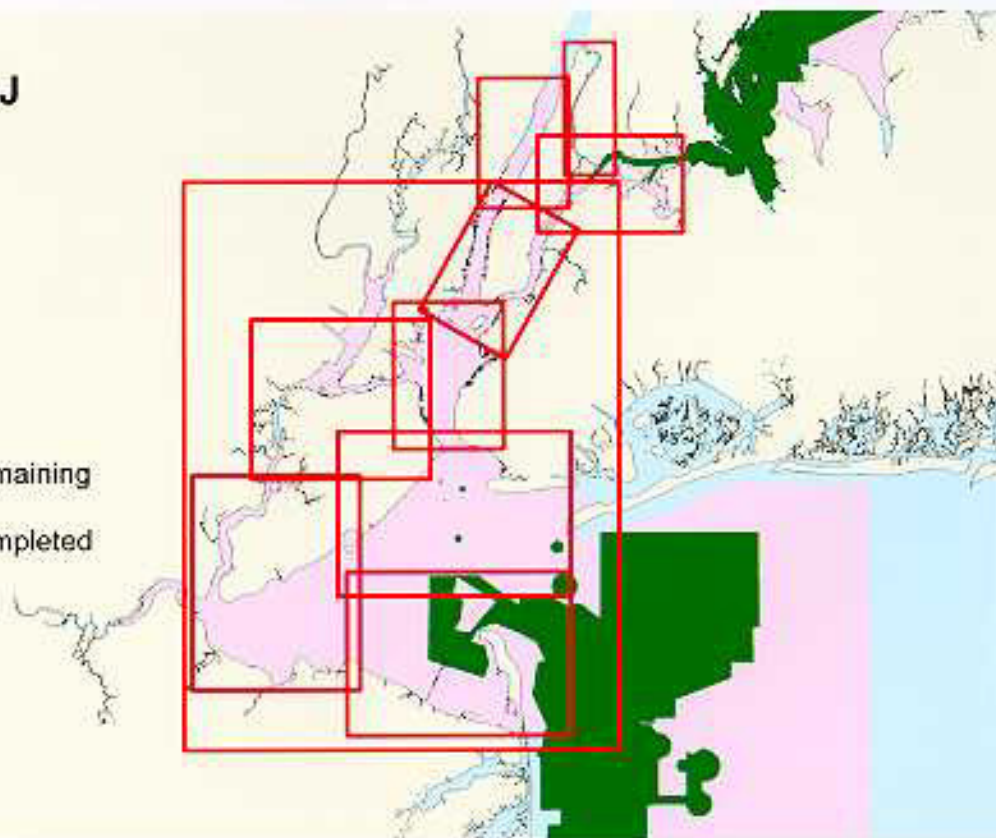
PORT OF NY/NJ (Enlarged)

Charts:

12327	12339
12331	12341
12333	12342
12334	12401
12335	12402

 Critical Area - Remaining

 Critical Area - Completed





MID-ATLANTIC Large Scale Chart Coverage

Priority Ports:

- Trenton, NJ
- Morrisville, PA
- Burlington, NJ
- Philadelphia, PA
- Chester, PA
- Marcus Hook, PA
- Camden, NJ
- Paulsboro, NJ
- Wilmington, DE
- New Castle, DE
- Baltimore, MD
- Norfolk, VA
- Newport News, VA
- Hopewell, VA
- Richmond, VA

Baltimore

Philadelphia

Trenton

Richmond

Norfolk

Charts:

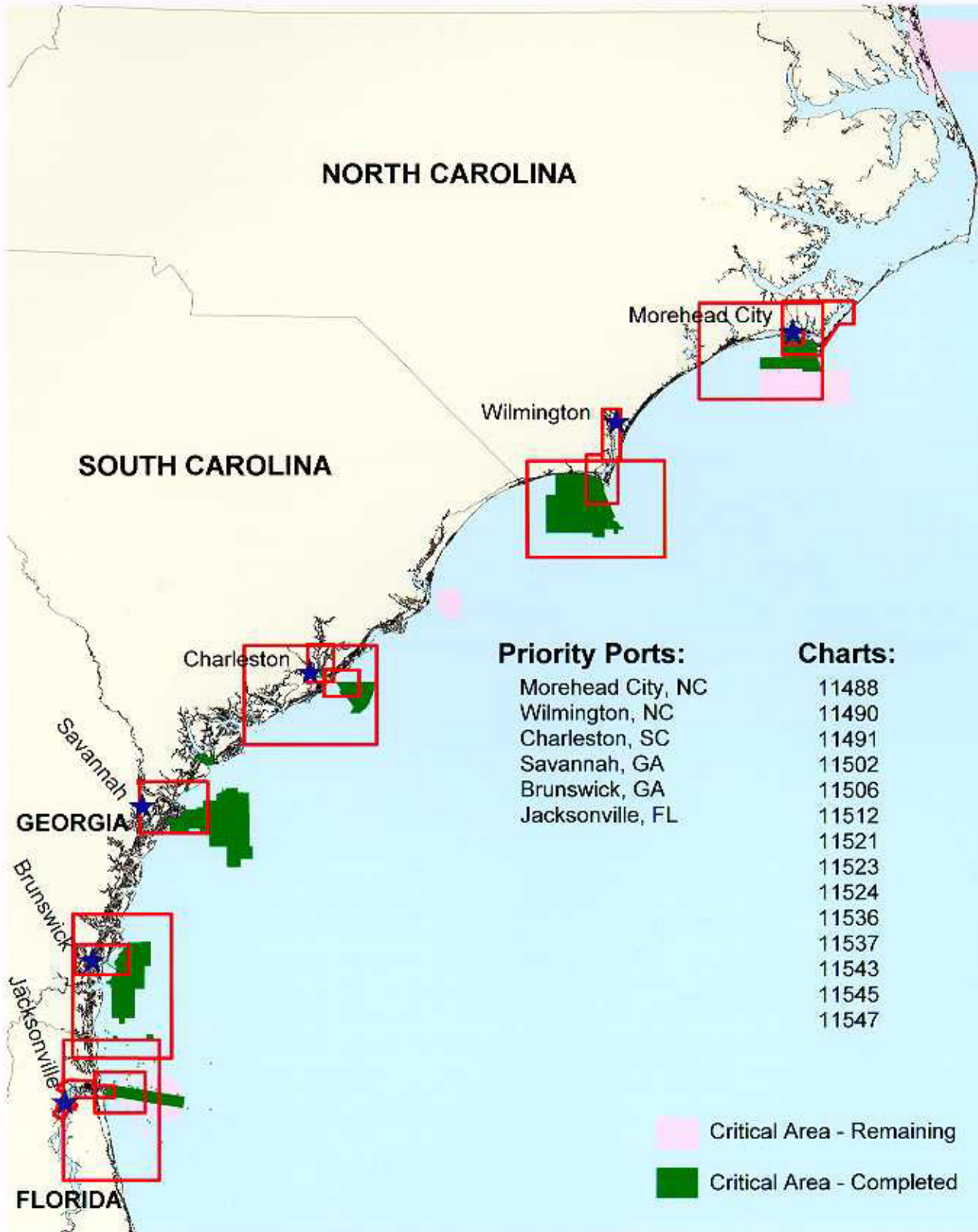
12214	12251	12281
12221	12254	12304
12225	12263	12311
12230	12274	12312
12245	12277	12313
12248	12278	12314

Critical Area - Remaining

Critical Area - Completed



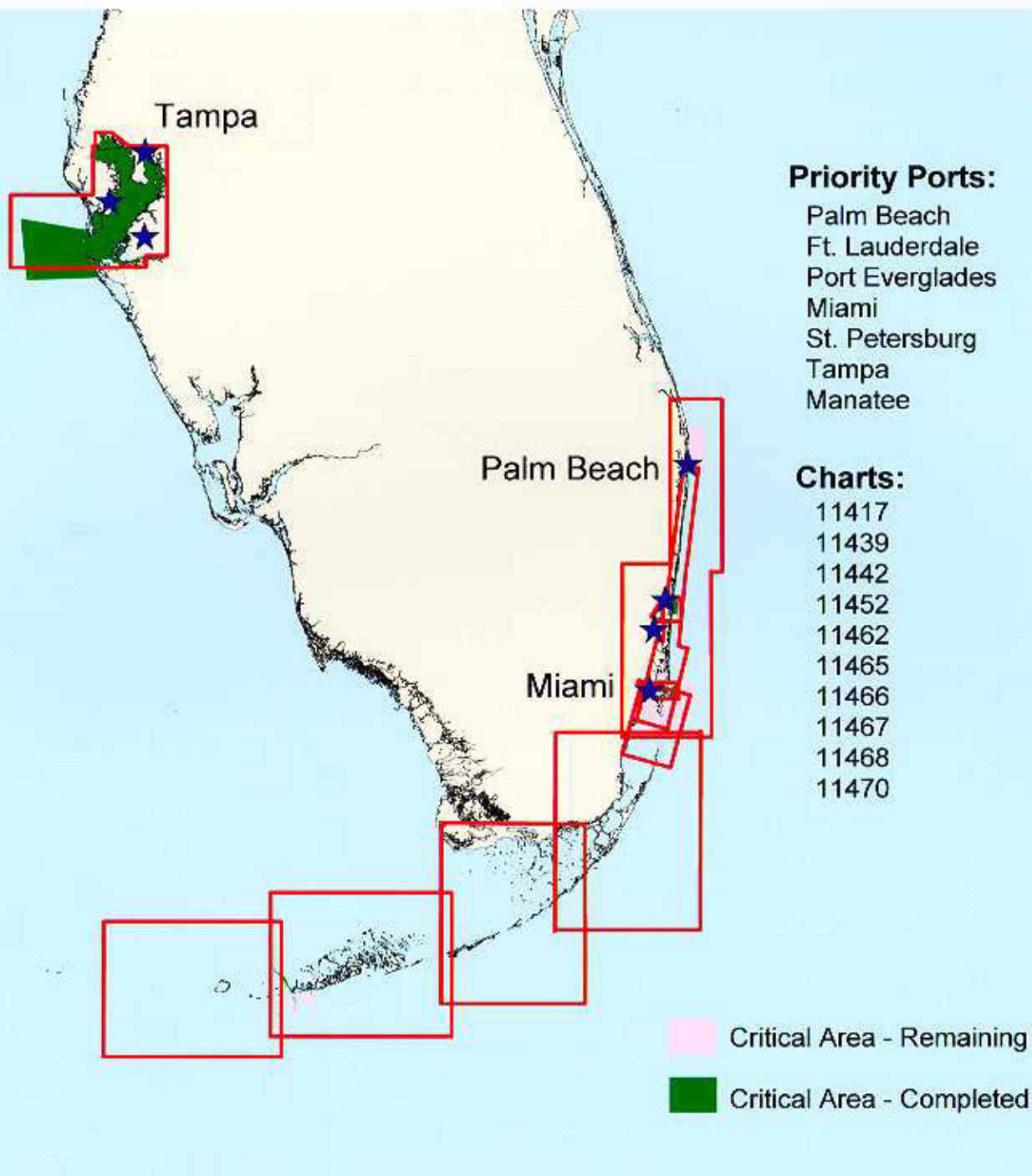
SOUTHEAST ATLANTIC Large Scale Chart Coverage





FLORIDA

Large Scale Chart Coverage





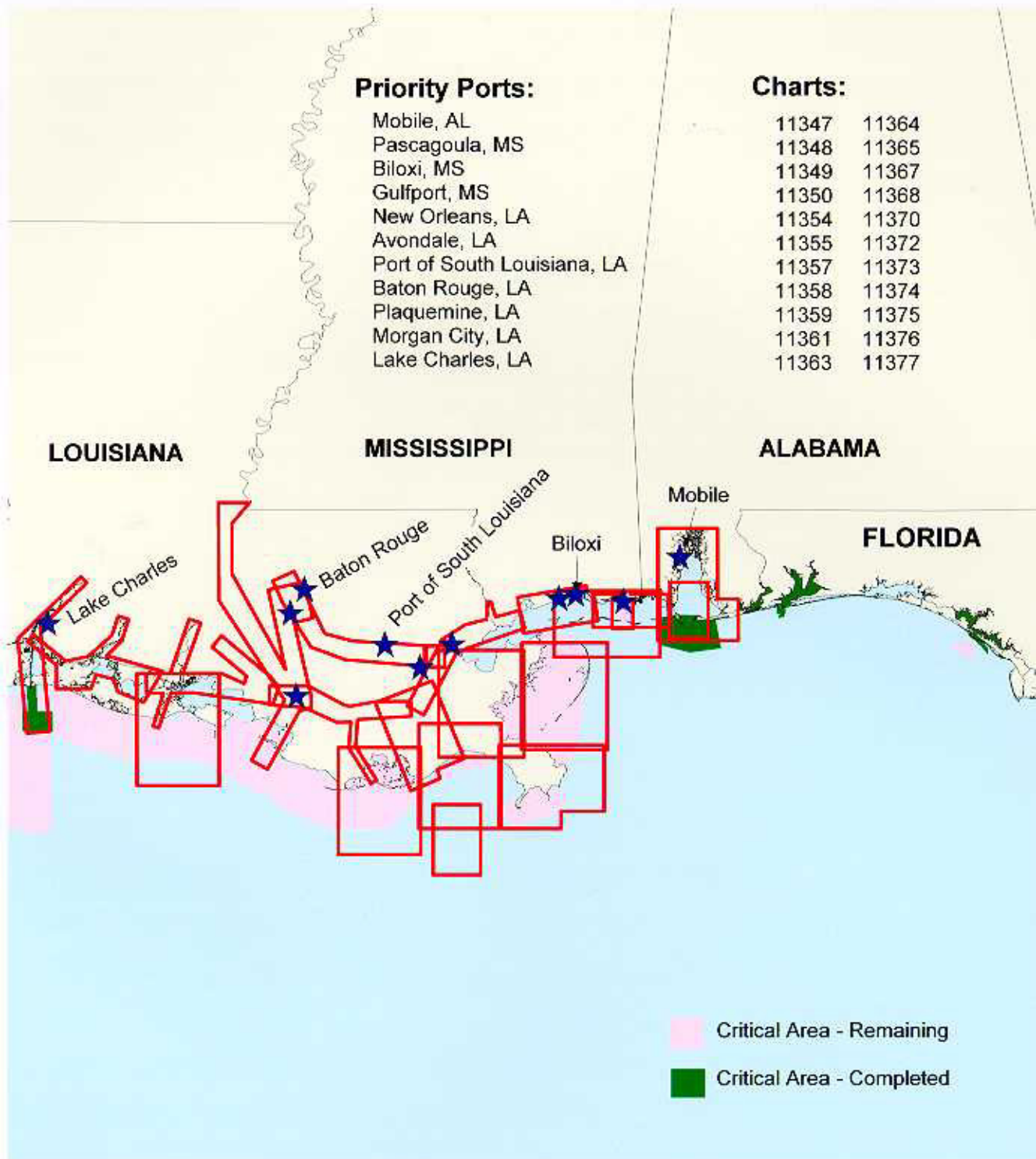
CENTRAL GULF COAST Large Scale Chart Coverage

Priority Ports:

- Mobile, AL
- Pascagoula, MS
- Biloxi, MS
- Gulfport, MS
- New Orleans, LA
- Avondale, LA
- Port of South Louisiana, LA
- Baton Rouge, LA
- Plaquemine, LA
- Morgan City, LA
- Lake Charles, LA

Charts:

11347	11364
11348	11365
11349	11367
11350	11368
11354	11370
11355	11372
11357	11373
11358	11374
11359	11375
11361	11376
11363	11377





TEXAS Large Scale Chart Coverage

TEXAS



Priority Ports:

- Brownsville
- Corpus Christi
- Victoria
- Port Lavaca
- Matagorda
- Freeport
- Galveston
- Texas City
- Houston
- Port Arthur
- Beaumont
- Orange

Charts:

11301	11321
11302	11322
11303	11323
11306	11324
11307	11326
11308	11327
11309	11328
11311	11329
11312	11331
11314	11332
11315	11342
11317	11343
11319	

- Critical Area - Remaining
- Critical Area - Completed



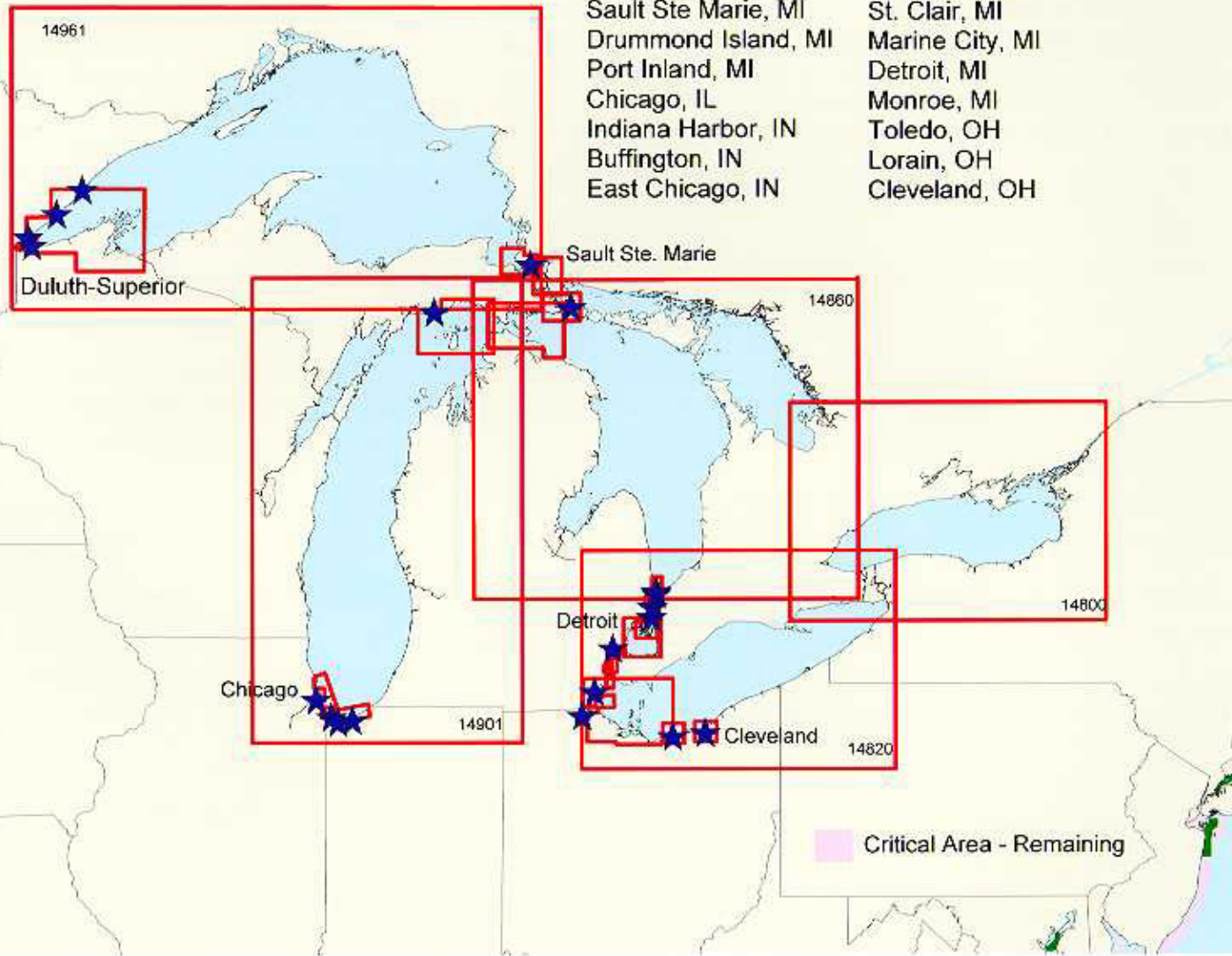
GREAT LAKES Small and Large Scale Chart Coverage

Charts:

14830	14854	14911
14839	14865	14926
14841	14881	14928
14847	14882	14929
14848	14883	14966
14850	14884	14975
14852		

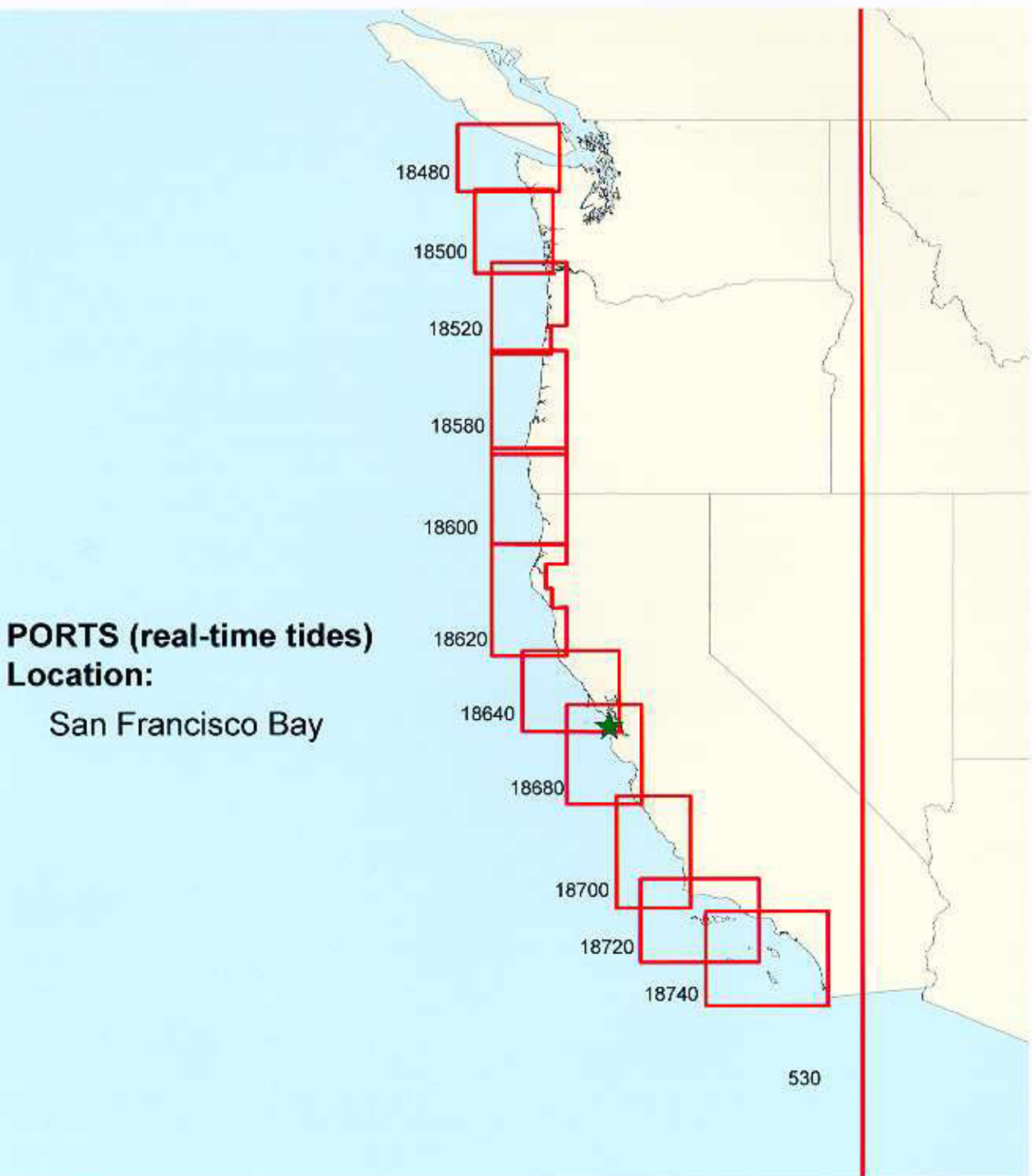
Priority Ports:

- | | |
|---------------------|--------------------------------|
| Silver Bay, MN | Gary, IN |
| Two Harbors, MN | Burns International Harbor, IN |
| Duluth, MN | Port Huron, MI |
| Superior, WI | Marysville, MI |
| Sault Ste Marie, MI | St. Clair, MI |
| Drummond Island, MI | Marine City, MI |
| Port Inland, MI | Detroit, MI |
| Chicago, IL | Monroe, MI |
| Indiana Harbor, IN | Toledo, OH |
| Buffington, IN | Lorain, OH |
| East Chicago, IN | Cleveland, OH |





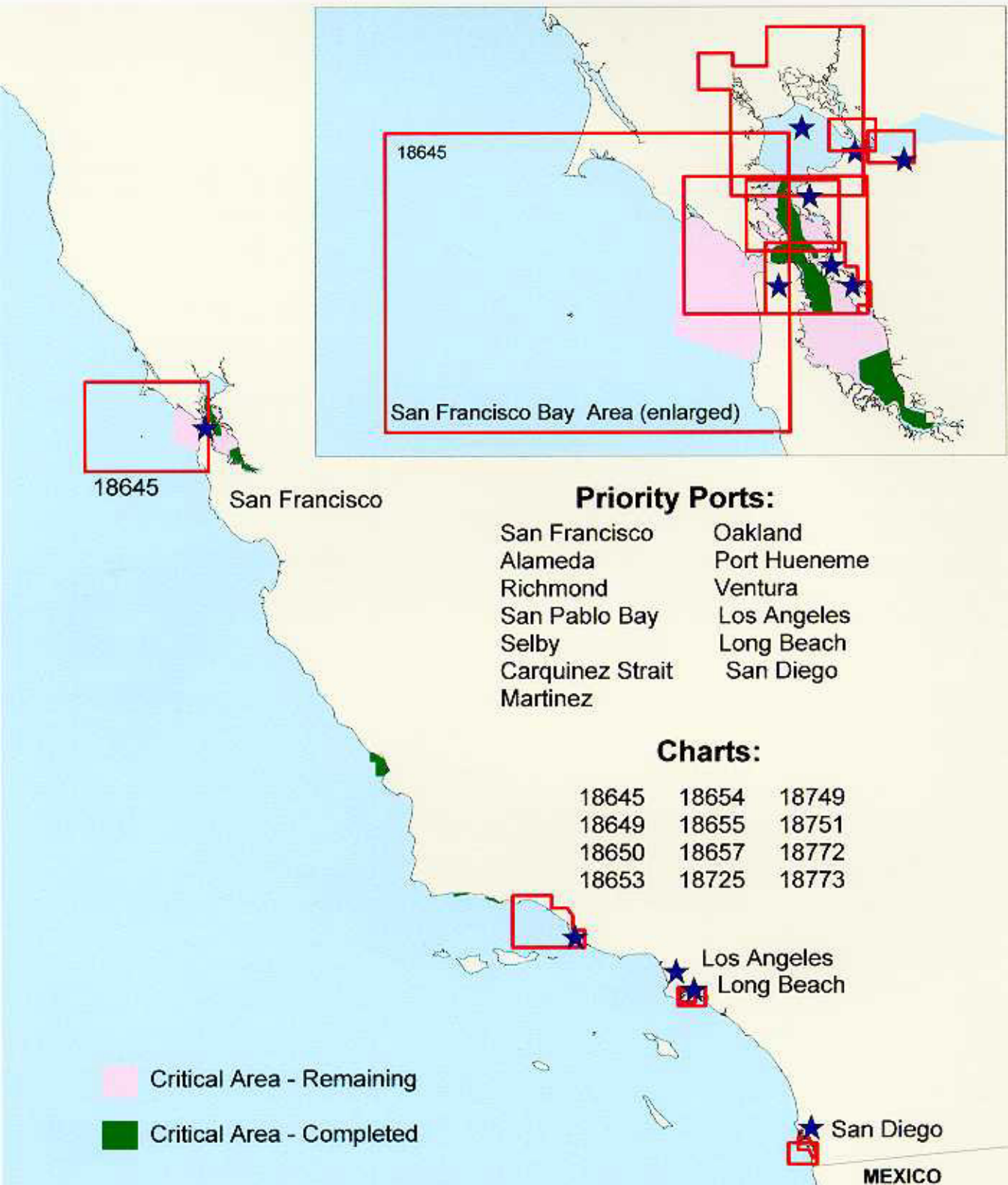
PACIFIC COAST Small Scale Chart Coverage



PORTS (real-time tides)
Location:
San Francisco Bay



CALIFORNIA Large Scale Chart Coverage



18645

San Francisco Bay Area (enlarged)

18645

San Francisco

Priority Ports:

- | | |
|------------------|--------------|
| San Francisco | Oakland |
| Alameda | Port Hueneme |
| Richmond | Ventura |
| San Pablo Bay | Los Angeles |
| Selby | Long Beach |
| Carquinez Strait | San Diego |
| Martinez | |

Charts:

- | | | |
|-------|-------|-------|
| 18645 | 18654 | 18749 |
| 18649 | 18655 | 18751 |
| 18650 | 18657 | 18772 |
| 18653 | 18725 | 18773 |

Los Angeles
Long Beach

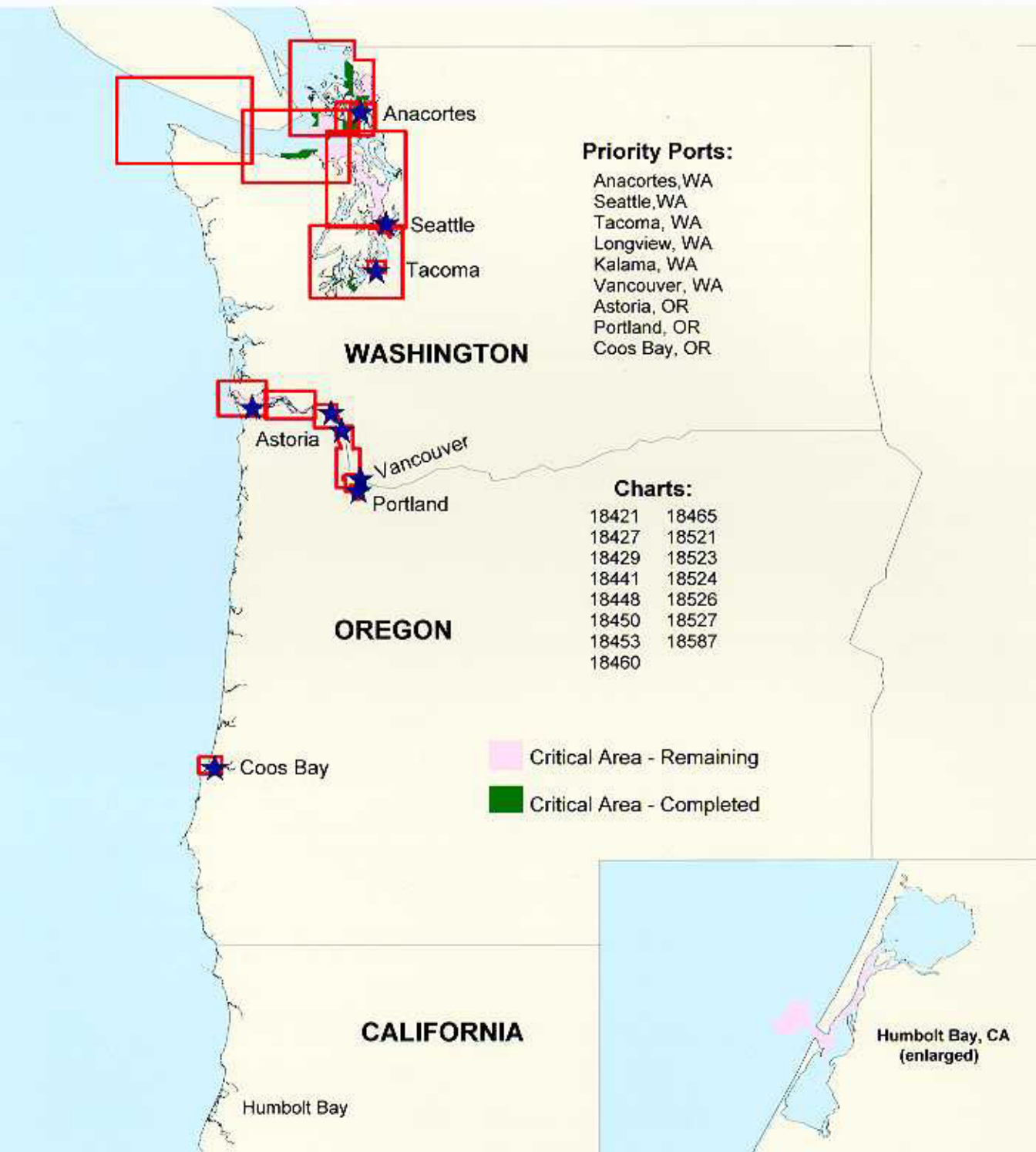
San Diego

MEXICO

- Critical Area - Remaining
- Critical Area - Completed

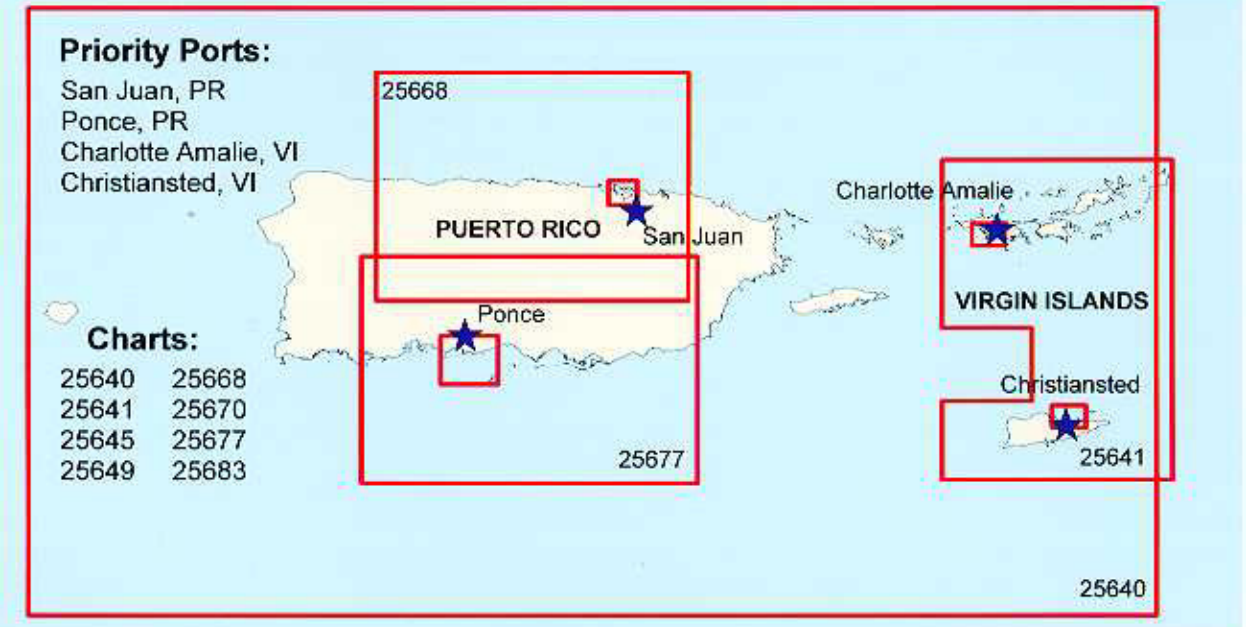
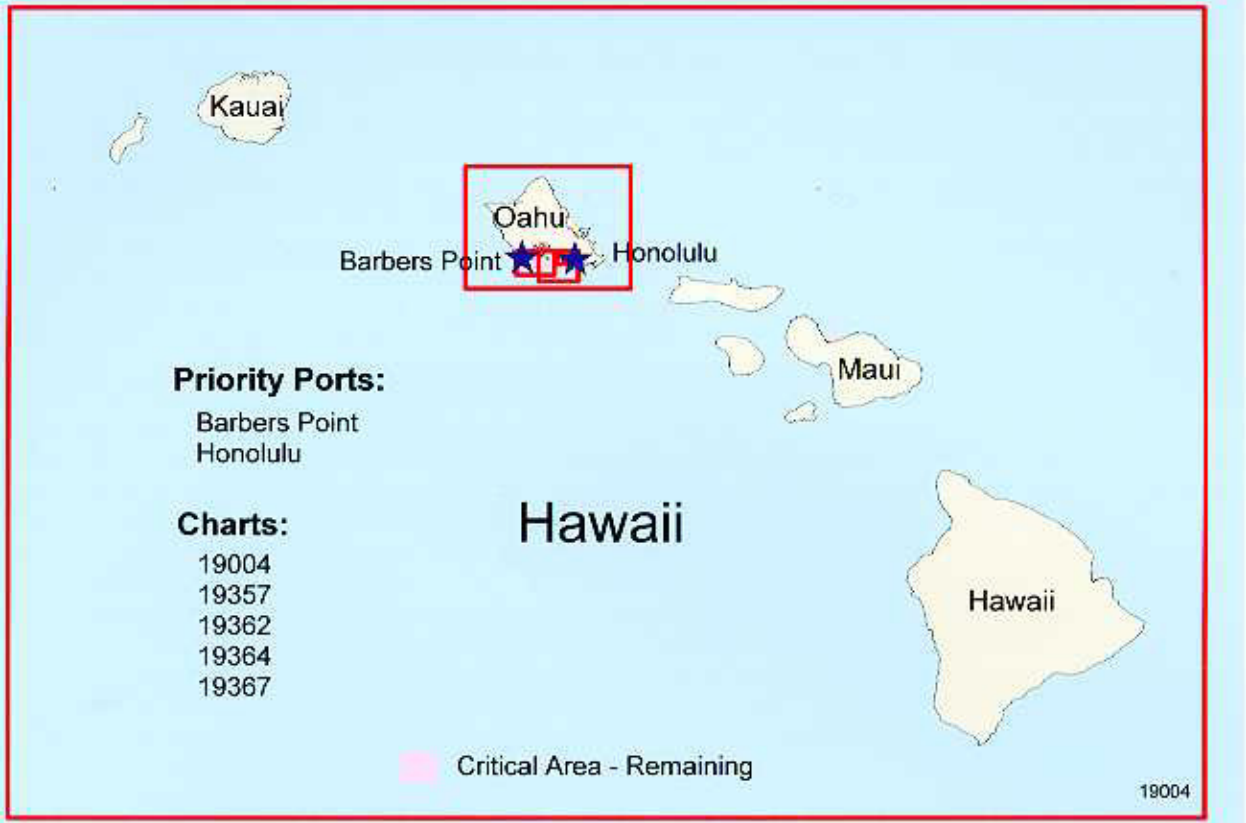


PACIFIC NORTHWEST Large Scale Chart Coverage





HAWAII, PUERTO RICO, AND U.S. VIRGIN ISLANDS Small and Large Scale Chart Coverage





Office of Coast Survey



ALASKA, HAWAII, & PACIFIC COAST Small Scale Chart Coverage



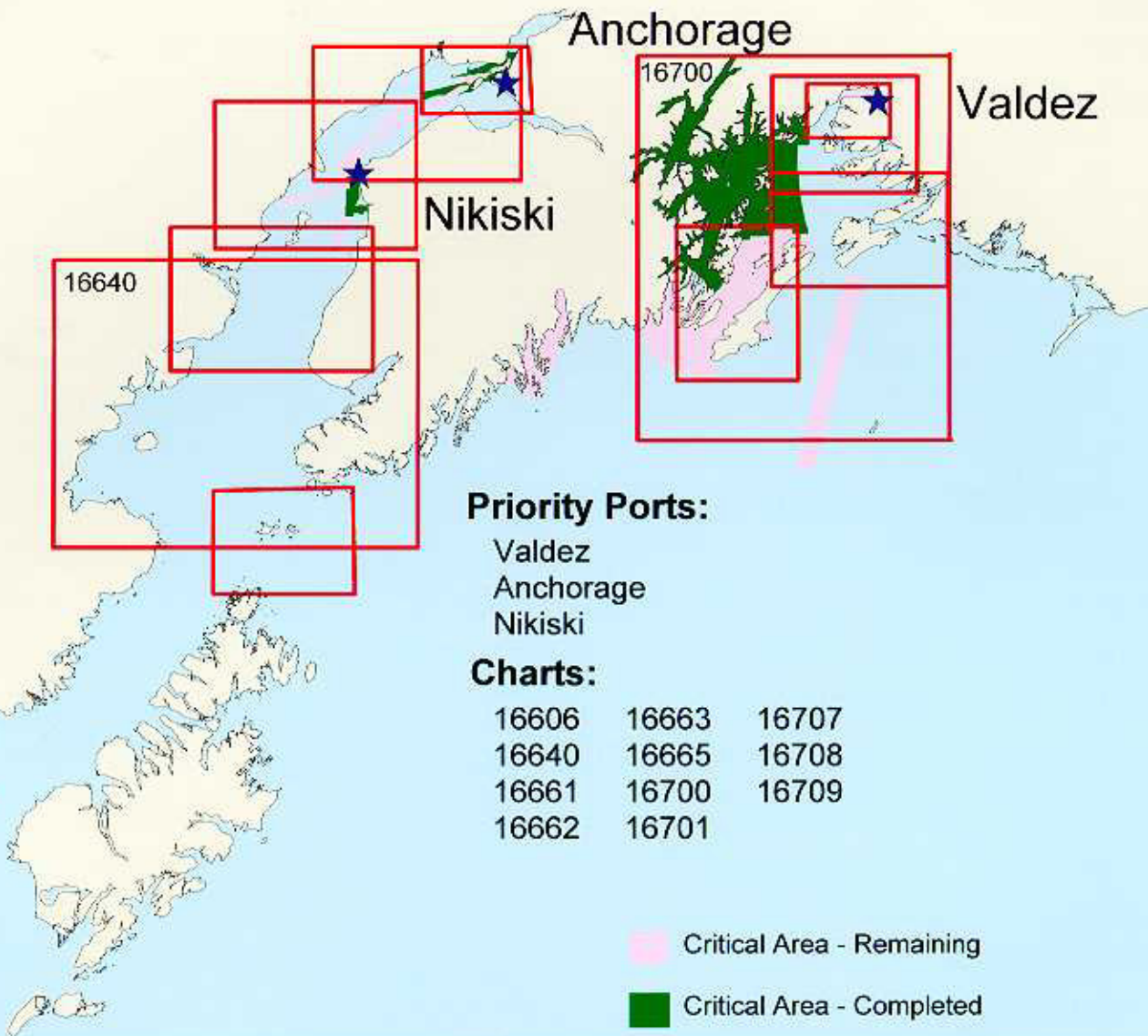


WESTERN ALASKA





SOUTH CENTRAL ALASKA Small and Large Scale Chart Coverage





SOUTHEAST ALASKA

CANADA



Coast Survey



The art and science of navigation and piloting has not been immune to the effects of technology. The ever-increasing pace of technological change has started to dramatically affect the way in which the mariner navigates. The most obvious new technology in navigation is Differential Global Positioning System (DGPS). Navigation systems using DGPS for locating a vessel's position on the earth have put mariners in a unique predicament. In many cases, the DGPS position is more accurate than the surveying technology that was used to put the soundings and features on the nautical chart in the first place.

This discrepancy is even more pronounced when chart scale is taken into consideration. The width of a line or symbol on a paper chart is typically 1 to 2 millimeters. A feature's actual position can fall anywhere within that line or symbol. Thus, on a typical 1:40,000 scale chart, a feature could have a potential error of 40 to 80 meters (about 130-160 feet) due to scale alone. This is often the cause of the "ship on the pier" situation, where the vessel tied up at the pier appears on the navigation system to be on the pier rather than alongside. Another source of this type of apparent discrepancy is that symbols on a chart of a given scale may be a representation for multiple real features that are too close together to be shown at chart scale. Similarly, symbols may be displaced from their original location for legibility and presentation. This also applies to products derived from paper charts, such as raster charts and vector charts created by digitizing the paper chart.

The Challenge

The "ship on the pier" situation is causing mariners to realize that DGPS has leaptfrogged them ahead of the accuracy of the paper charts.

The Office of Coast Survey in the National Oceanic and Atmospheric Administration has recognized that this situation is of particular importance to commercial shipping. Shippers are tending towards using larger, faster ships that are being brought into port closer to the bottom than ever before. Just a few more inches of draft can mean additional thousands to millions of dollars of cargo carried.

The Solution

The potential solution to the situation lies in another technology that has been in the wings for several years, the Electronic Chart Display and Information System, commonly known as ECDIS. ECDIS uses Electronic Navigational Charts, ENC, to draw a chart-like display on a computer screen using vector chart data. Vector data is essentially a database of chart features that intelligently processes the information and draws the display. This display is combined with the ship's characteristics and positional information as well as other information such as RADAR overlays and targets. This information allows ECDIS to warn the mariner of hazards to navigation and situations where the vessel's current track will take it into danger. The potential for ECDIS to solve the accuracy problem lies in how the ENC data are created.

As mentioned before, products, including ENC, which are derived from paper charts are no more accurate than the chart that they are derived from.



Figure 1, Tampa Bay ENC

Coast Survey has developed its ENC program by creating the ENC database from the source materials that were used to create the chart in the first place. This involves researching where each feature originated and trying to locate the corresponding document in the source archives. In some cases, the original source is no longer available or provides no additional accuracy (e.g.,

The U.S. Electronic Navigational Chart Program

the position was determined by LORAN). In these cases the largest scale chart was used as the only source. In many cases, particularly with aids to navigation and maintained channels, more accurate positions are available. Maintained channels for example are typically created from the U.S. Army Corps of Engineers blueprints that have scales on the order of 1:2400. The goal is to use source material wherever possible so that the ENC is created from the largest scale, most accurate information currently available to Coast Survey.



Figure 2, Tampa Bay ENC, all features displayed

Coast Survey is also working to obtain more accurate information so that it can be included in the ENC. This new data will be used to replace less accurate information as soon as it is available. Changes to the ENC, including weekly Notices to Mariners, will be available to the mariner on a weekly basis. This will minimize any delay between when new information arrives at Coast Survey and when it is available for use by the public.

The fact that the ENC is vector data generated from a database also allows for the gradual enhancement of the ENC. As new features and areas are included in the database, they can be immediately distributed. Features unique to specific ports can be included in the ENC. Mariners with systems capable of using ENC data will have access to the same data sets in a non-proprietary format.

Current Status

Work began on creating the database in January 1997. The schedule calls for completion of the initial collection of features in all 40 major U.S. commercial ports by the end of calendar year 1998. As of October 1998, data collection has been completed ahead of schedule. The ENC database is now being loaded into the production



Figure 3, St. Marys River ENC

system for release of the first publicly available data scheduled for early 1999. Coast Survey is also working to expand the coverage to include the Mississippi River System. This project is being closely coordinated with the U.S. Army Corps of Engineers. This would allow mariners to use official U.S. ENC data in both coastal and inland waters.

Three test data sets have been released to date. The first data set covers the St. Marys River from DeTour Passage to Sault Ste. Marie, Michigan, in the Great Lakes. The second data set covers the lower Mississippi River from Baton Rouge, Louisiana, to Southwest Pass. This set was provided to the U.S. Coast Guard in June 1998 for use in developing its Automated Identification System (AIS). The last data set covers Tampa, Florida, and was also created for AIS development.

For more information, contact:

Michael Brown

ENC Product Manager

mike.brown@noaa.gov

NOAA, N/CS2x2

1315 East West Highway

Silver Spring, MD 20910 USA

Visit our web site: chartmaker.ncd.noaa.gov



WESTERN RIVERS



Proposed Electronic Navigational Chart Coverage





EAST COAST & GREAT LAKES Planned Electronic Navigational Chart Coverage



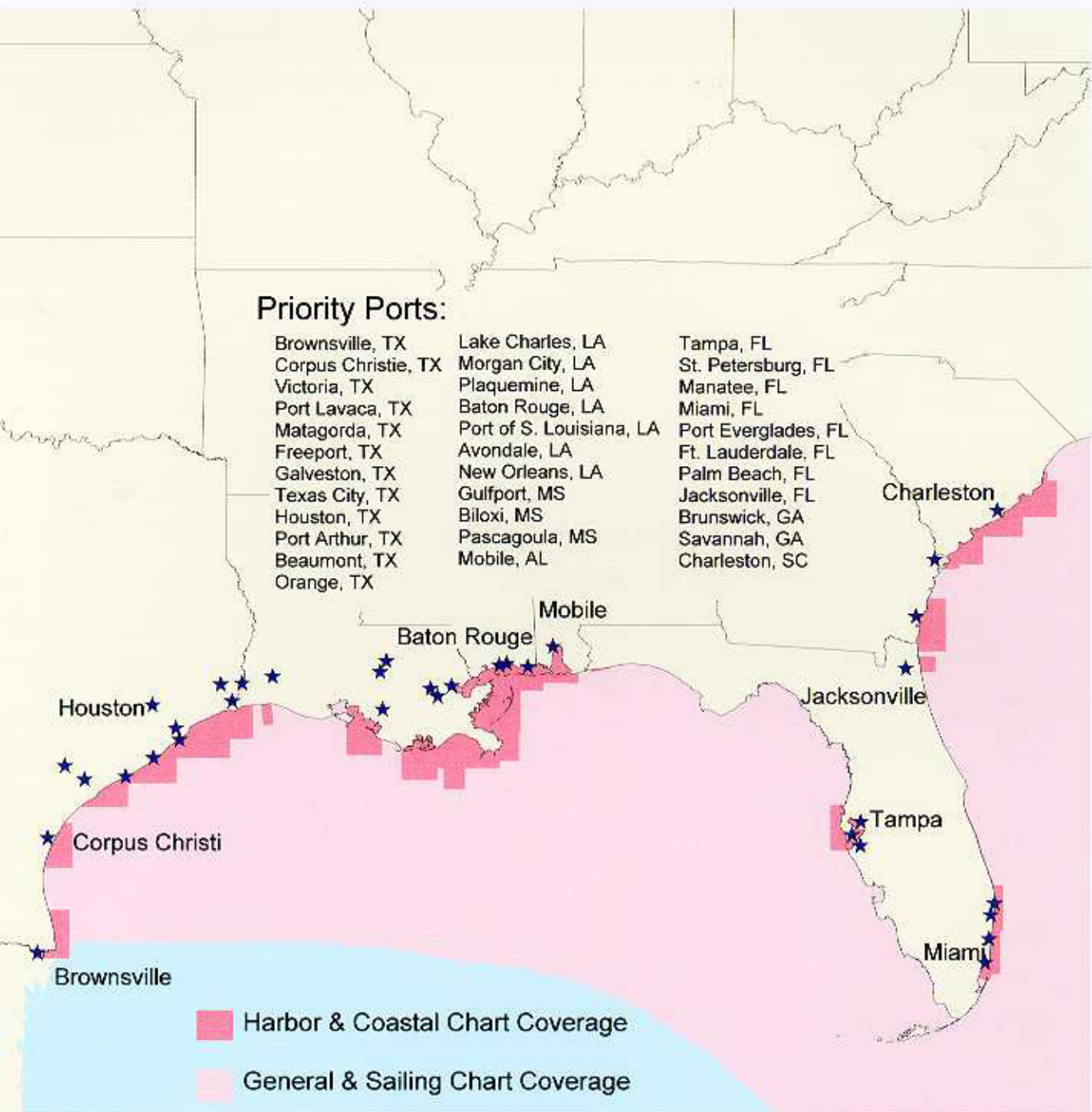
 Harbor & Coastal Chart Coverage
 General & Sailing Chart Coverage



GULF COAST AND SOUTHEAST ATLANTIC Planned Electronic Navigational Chart Coverage

Priority Ports:

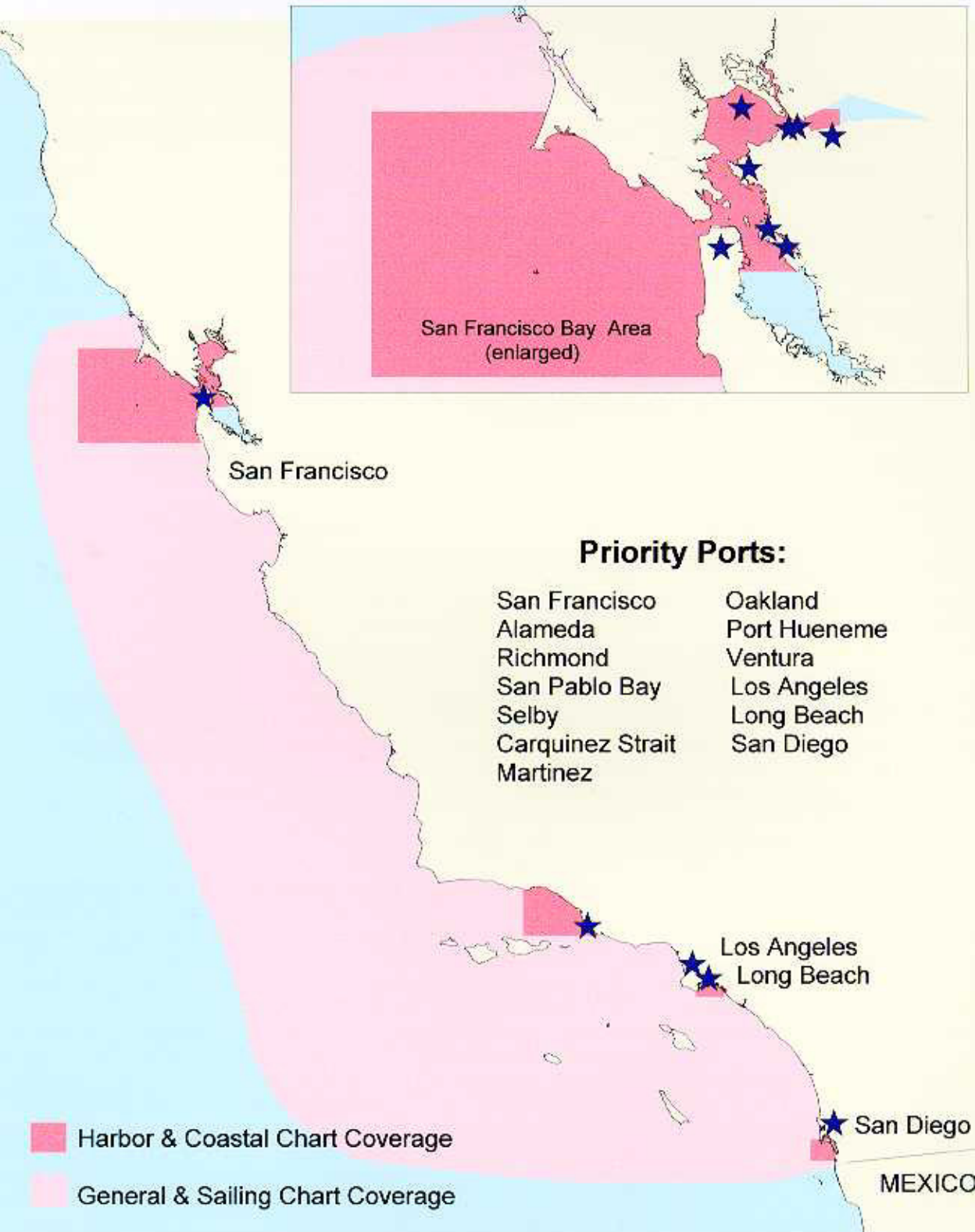
- | | | |
|---------------------|--------------------------|---------------------|
| Brownsville, TX | Lake Charles, LA | Tampa, FL |
| Corpus Christie, TX | Morgan City, LA | St. Petersburg, FL |
| Victoria, TX | Plaquemine, LA | Manatee, FL |
| Port Lavaca, TX | Baton Rouge, LA | Miami, FL |
| Matagorda, TX | Port of S. Louisiana, LA | Port Everglades, FL |
| Freeport, TX | Avondale, LA | Ft. Lauderdale, FL |
| Galveston, TX | New Orleans, LA | Palm Beach, FL |
| Texas City, TX | Gulfport, MS | Jacksonville, FL |
| Houston, TX | Biloxi, MS | Brunswick, GA |
| Port Arthur, TX | Pascagoula, MS | Savannah, GA |
| Beaumont, TX | Mobile, AL | Charleston, SC |
| Orange, TX | | |





CALIFORNIA

Planned Electronic Navigational Chart Coverage





PACIFIC NORTHWEST

Planned Electronic Navigational Chart Coverage





ALASKA, HAWAII, PUERTO RICO & VIRGIN ISLANDS Planned Electronic Navigational Chart Coverage

Alaska

Priority Ports:
Anchorage
Nikiski
Valdez



Priority Ports:
Barbers Point
Honolulu

Hawaii



Priority Ports:
San Juan, PR
Ponce, PR
Charlotte Amalie, VI
Christiansted, VI



 Harbor & Coastal Chart Coverage