

An Introduction to NOAA Electronic Navigational Charts (NOAA ENC®)

The Intent of This Document

NOAA electronic navigational charts (NOAA ENC®) are primarily designed for navigation purposes, but contained in each is a wide array of data that is useful to persons in a range of fields and disciplines. Local and regional planners, for example, may select portions of ENC data to use alongside their own datasets. Real estate agents, historians, scientists, engineers, graphic designers and many others may likewise find purposes for data that is stored within an ENC.

This document serves as an introduction to the ENC and as a guide to many of the related tools and resources that are available. It will benefit those who want to learn more about the ENC in order to navigate, as well as those who are ready to start accessing ENC data for their own purposes.

What exactly is a NOAA Electronic Navigation Chart (NOAA ENC®)?

NOAA ENCs are vector-based nautical charts. The term vector means that each feature is a point, line, or area that is encoded with tabular data. The attributes in this table control how the feature appears in the ENC. For example, a line representing shoreline that is attributed as “approximate” will result in a dashed line, while one that is attributed as “surveyed” will be solid. In short, the ENC is essentially a database.

Why does it matter?

Attribution allows you to query the data for more information than what basic symbols and text may communicate. For example, the date the feature was added to the chart can be determined, as can the source of the document that placed it at its current location, along with a variety of other information too difficult to show on a paper chart due to space constraints.

Additionally, layers can be turned off to make the chart less cluttered. Another advantage is that certain GPS-based navigation systems enable you to set an alarm as a way to inform when a vessel has entered charted water shallower than a specific, user-identified depth.

Perhaps most importantly, the Office of Coast Survey has identified ENCs as its premier navigation product. This means that when Coast Survey receives relevant nautical information, it is applied to the ENC *first* before all other products. As a result, for those who are navigating, as well as those who intend on leveraging the most recent data for alternate purposes, the ENC should be the primary resource!

More information about NOAA ENCs is available at the following link:

<https://nauticalcharts.noaa.gov/charts/noaa-enc.html>

How do I download ENC's?

The easiest way to find and download an individual ENC is through the chart locator available from <https://www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml>

You can search by a geographic name, chart number, or you can manually zoom in and pan around to find the desired area of ENC coverage. Searching by place name will provide a drop-down list of names that match what you typed. When you click on one of the items in the list and select "submit", the program automatically zooms into the area and highlights the boundary of the most detailed (largest scale) ENC coverage.

Clicking on the map manually in an area of interest will also zoom in and highlight the boundary of the most detailed ENC coverage.

The screenshot displays the NOAA Interactive Catalog interface. At the top is a blue navigation bar with links: HOME, CHARTS, PUBLICATIONS, DATA, LEARN, CUSTOMER SERVICE, and ABOUT US. Below this is a header section with tabs: Paper Charts (RNC & PDF), Electronic Charts (ENC), Coast Pilot, and Help. The 'Electronic Charts (ENC)' tab is active. A search bar labeled 'Place Name' contains the text 'Barnstable', with a 'Submit' button to its right. A dropdown menu is open below the search bar, listing several locations: Barnstable, Massachusetts, US; Barnstable Harbor, Massachusetts, US; Barnstable High School, Massachusetts; Barnstable Fire Department, Massachusetts; Barnstable Municipal Airport, Massachusetts; Barnstable Municipal Airport Aero Light; Barnstable County Court House, Massachusetts; Barnstable County Fairgrounds, Massachusetts; and Barnstable Police Department, Massachusetts. The map area shows a coastal region with labels for East Sandwich, Forestdale, West Barnstable, Barnstable, East Dennis, Harwich, South Yarmouth, Harwich Port, Dennis Port, Hyannis, Mashpee, Cotuit, and Osterville. A yellow rectangular box highlights the area around Barnstable Harbor. On the right side, there is a 'Available Product Information' section with text about NOAA ENC's (ENC) and a 'Map Selection Information' section showing details for Chart: US5MA33M, including Title: Barnstable Harbor, Scale: 1:20,000, Edition: 8.3, and Published: 8/6/2019. At the bottom right, there is an 'Available Products' section with a button labeled 'ENC'.

Searching by place name in the chart locator

With the area covered by the most detailed ENC highlighted, click on the “ENC” button under available products in order to download it. To see other, smaller scale, ENC cells covering the same area, you can continue clicking at the same place on the map. As you do so, the highlighted area of coverage will change to reflect the next smaller scale ENC coverage. The ENC cell name will simultaneously change in the panel at the right side of the screen.

If you would rather not use the chart locator application, you can also opt to download individual ENCs by selecting one or more from a [list of available ENCs](#).

Click [Here](#) to return to Chart Downloader for NOAA ENC®

[User's Agreement to Terms and Conditions](#).

Click [ENC Dates](#) for more information about the Update Application Date, Issue Date and various Cleared Dates.

Zip files of Individual ENCs:

#	ENC Name	XML	Edition	Update Application Date	Update	Issue Date	Zip File Date Time*	CGD	LNM Clear Date	NGA Clear Date	Chart
1	US1AK90M	View	17	9/12/2018	2	10/25/2018	10/30/2018 11:40:44	17	8/6/2019	11/4/2017	16003
2	US1BS01M	View	12	8/23/2018	5	8/7/2019	08/09/2019 11:34:12	17	10/23/2018	8/24/2019	513
3	US1BS02M	View	10	8/29/2018	0	8/29/2018	09/05/2018 16:44:24	17	8/6/2019	8/24/2019	513
4	US1BS03M	View	11	8/30/2018	3	8/2/2019	08/06/2019 14:05:35	17	8/6/2019	8/24/2019	514
5	US1BS04M	View	6	8/29/2018	0	8/29/2018	09/05/2018 20:04:51	17	8/6/2019	8/24/2019	514
6	US1EEZ1M	View	5	6/15/2018	1	4/16/2019	04/23/2019 14:06:09	14	9/17/2013	8/24/2019	526
7	US1EEZ2M	View	5	8/8/2018	0	8/8/2018	08/16/2018 12:36:53	14	8/20/2019	8/24/2019	526
8	US1EEZ3M	View	2	10/21/2013	3	2/26/2019	02/27/2019 17:06:56	14	8/20/2019	8/24/2019	526
9	US1GC09M	View	45	8/2/2019	1	8/20/2019	08/21/2019 17:00:39	5	7/30/2019	11/3/2018	411
-	US1GC09M	-	-	-	-	-	-	7	9/25/2018	-	-
-	US1GC09M	-	-	-	-	-	-	8	10/16/2018	-	-
10	US1HA01M	View	22	6/14/2018	1	8/7/2018	08/09/2018 11:27:05	14	8/20/2019	8/24/2019	540
11	US1HA02M	View	11	6/14/2018	7	6/21/2019	06/26/2019 14:21:09	14	6/18/2013	8/24/2019	19007
12	US1PO02M	View	21	3/6/2019	0	3/6/2019	03/06/2019 21:11:17	11	8/20/2019	8/24/2019	50
-	US1PO02M	-	-	-	-	-	-	13	8/13/2019	-	-
-	US1PO02M	-	-	-	-	-	-	14	1/29/2019	-	-
-	US1PO02M	-	-	-	-	-	-	17	8/6/2019	-	-
13	US1WC01M	View	45	6/15/2018	25	8/8/2019	08/15/2019 12:33:15	11	5/2/2017	11/10/2018	501
-	US1WC01M	-	-	-	-	-	-	13	10/13/2015	-	-
-	US1WC01M	-	-	-	-	-	-	17	8/6/2019	-	-
14	US1WC04M	View	14	9/11/2018	10	8/14/2019	08/16/2019 13:39:53	17	10/23/2018	8/24/2019	500
15	US1WC07M	View	20	8/7/2018	3	3/29/2019	04/02/2019 15:28:28	11	1/26/2016	3/30/2019	530
-	US1WC07M	-	-	-	-	-	-	13	8/13/2019	-	-
-	US1WC07M	-	-	-	-	-	-	14	8/20/2019	-	-
-	US1WC07M	-	-	-	-	-	-	17	8/14/2018	-	-
16	US2AK20M	View	10	8/31/2018	4	8/14/2019	08/16/2019 12:18:14	17	12/11/2018	8/24/2019	16013
17	US2AK30M	View	20	4/2/2019	2	8/14/2019	08/16/2019 12:34:58	17	8/6/2019	3/30/2019	16016
18	US2AK5FM	View	21	4/23/2019	4	7/17/2019	07/22/2019 14:54:25	17	10/23/2018	8/24/2019	16011
19	US2AK70M	View	13	8/22/2018	1	3/25/2019	03/28/2019 12:12:05	17	8/6/2019	8/24/2019	16012
20	US2AK7XM	View	9	8/6/2018	1	2/27/2019	03/01/2019 17:38:22	17	8/6/2019	8/24/2019	16012
21	US2AK91M	View	13	7/11/2018	2	9/19/2018	09/24/2018 11:43:27	17	8/6/2019	8/24/2019	16004
22	US2AK92M	View	15	7/11/2018	5	10/25/2018	10/30/2018 11:41:26	17	8/6/2019	11/4/2017	16005
23	US2AK95M	View	9	8/20/2018	11	8/2/2019	08/06/2019 14:04:36	17	10/2/2018	8/24/2019	16006

List of individual ENC cells for download

You can also download a bulk selection of ENC's by region, state, Coast Guard District, or download the entire portfolio of NOAA ENC's in a few short clicks.

Chart Download for NOAA ENC's

The Electronic Navigational Charts are available in S-57 format.

User's Agreement to Terms and Conditions

There are several options for downloading:

1. Select a zip file of an individual ENC from a list sorted by name.
2. Select a zip file of an individual ENC from a list sorted by date.
3. Write an application or script that uses the data in the ENC Product Catalog, an XML file that contains the status of the ENC's available for download.
4. Select one of the pre-packaged zip files below.

All ENC's:

Name	XML Size	Zip File Date Time*
100	100 MB	07/03/2019 15:26:50
101	101 MB	07/03/2019 15:26:50
102	102 MB	07/03/2019 15:26:50
103	103 MB	07/03/2019 15:26:50
104	104 MB	07/03/2019 15:26:50
105	105 MB	07/03/2019 15:26:50
106	106 MB	07/03/2019 15:26:50
107	107 MB	07/03/2019 15:26:50
108	108 MB	07/03/2019 15:26:50
109	109 MB	07/03/2019 15:26:50
110	110 MB	07/03/2019 15:26:50

ENC's by Coast Guard Districts (map):

Name	XML Size	Zip File Date Time*	Name	XML Size	Zip File Date Time*
101	101 MB	07/03/2019 15:26:50	101	101 MB	07/03/2019 15:26:50
102	102 MB	07/03/2019 15:26:50	102	102 MB	07/03/2019 15:26:50
103	103 MB	07/03/2019 15:26:50	103	103 MB	07/03/2019 15:26:50
104	104 MB	07/03/2019 15:26:50	104	104 MB	07/03/2019 15:26:50
105	105 MB	07/03/2019 15:26:50	105	105 MB	07/03/2019 15:26:50
106	106 MB	07/03/2019 15:26:50	106	106 MB	07/03/2019 15:26:50
107	107 MB	07/03/2019 15:26:50	107	107 MB	07/03/2019 15:26:50
108	108 MB	07/03/2019 15:26:50	108	108 MB	07/03/2019 15:26:50
109	109 MB	07/03/2019 15:26:50	109	109 MB	07/03/2019 15:26:50
110	110 MB	07/03/2019 15:26:50	110	110 MB	07/03/2019 15:26:50

ENC's by State:

Name	XML Size	Zip File Date Time*	Name	XML Size	Zip File Date Time*
101	101 MB	07/03/2019 15:26:50	101	101 MB	07/03/2019 15:26:50
102	102 MB	07/03/2019 15:26:50	102	102 MB	07/03/2019 15:26:50
103	103 MB	07/03/2019 15:26:50	103	103 MB	07/03/2019 15:26:50
104	104 MB	07/03/2019 15:26:50	104	104 MB	07/03/2019 15:26:50
105	105 MB	07/03/2019 15:26:50	105	105 MB	07/03/2019 15:26:50
106	106 MB	07/03/2019 15:26:50	106	106 MB	07/03/2019 15:26:50
107	107 MB	07/03/2019 15:26:50	107	107 MB	07/03/2019 15:26:50
108	108 MB	07/03/2019 15:26:50	108	108 MB	07/03/2019 15:26:50
109	109 MB	07/03/2019 15:26:50	109	109 MB	07/03/2019 15:26:50
110	110 MB	07/03/2019 15:26:50	110	110 MB	07/03/2019 15:26:50

ENC's by Region (list):

Name	XML Size	Zip File Date Time*	Name	XML Size	Zip File Date Time*
101	101 MB	07/03/2019 15:26:50	101	101 MB	07/03/2019 15:26:50
102	102 MB	07/03/2019 15:26:50	102	102 MB	07/03/2019 15:26:50
103	103 MB	07/03/2019 15:26:50	103	103 MB	07/03/2019 15:26:50
104	104 MB	07/03/2019 15:26:50	104	104 MB	07/03/2019 15:26:50
105	105 MB	07/03/2019 15:26:50	105	105 MB	07/03/2019 15:26:50
106	106 MB	07/03/2019 15:26:50	106	106 MB	07/03/2019 15:26:50
107	107 MB	07/03/2019 15:26:50	107	107 MB	07/03/2019 15:26:50
108	108 MB	07/03/2019 15:26:50	108	108 MB	07/03/2019 15:26:50
109	109 MB	07/03/2019 15:26:50	109	109 MB	07/03/2019 15:26:50
110	110 MB	07/03/2019 15:26:50	110	110 MB	07/03/2019 15:26:50

* Zip File Date Time indicates when the zip file was created in Coordinated Universal Time.

Resources:

- Click ENC Dates for more information about the Update Application Date, Issue Date and various Cleared Dates.
- Click Coast Survey's Inquiry page if you have comments or suggestions.

Bulk ENC Download Options

Each ENC comes in a format known as S-57. The format, in which files appears with an extension “.000”, is a worldwide standardized format for transferring digital navigation data.

If you download multiple ENC's, you will get a zip file that contains a folder called “ENC_ROOT” with subfolders containing all the files associated with each ENC in that group. Each actual ENC folder will contain the base .000 file as well as several text files consisting of notes that can be retrieved from the cell for display purposes. The folders may also contain intermediate updates or “patches” with revisions to the base .000 file. The patches show up in numerical order, “.001”, “.002”, et cetera. Navigation programs that use ENC's typically apply these updates for you automatically when you load the ENC, but some programs may require you to load them through a series of steps available in the particular program's menu.

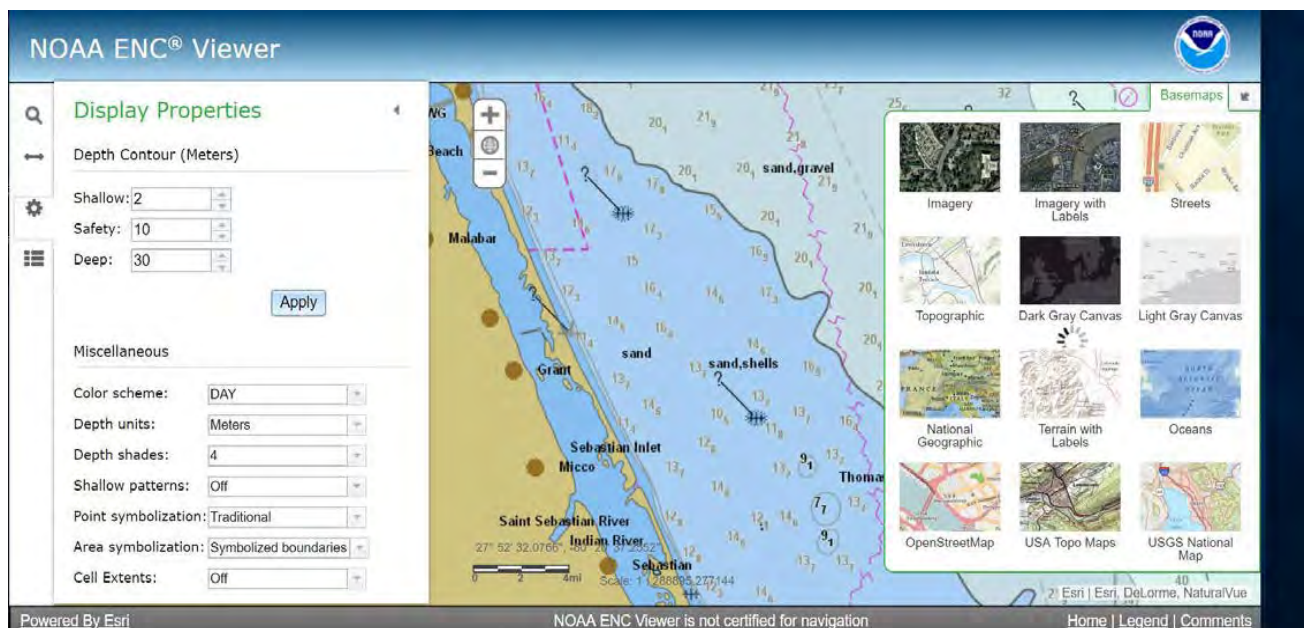
Periodically, NOAA will take all the patches and combine them to release a new edition of the ENC cell.

How do I view ENC data once I have downloaded it?

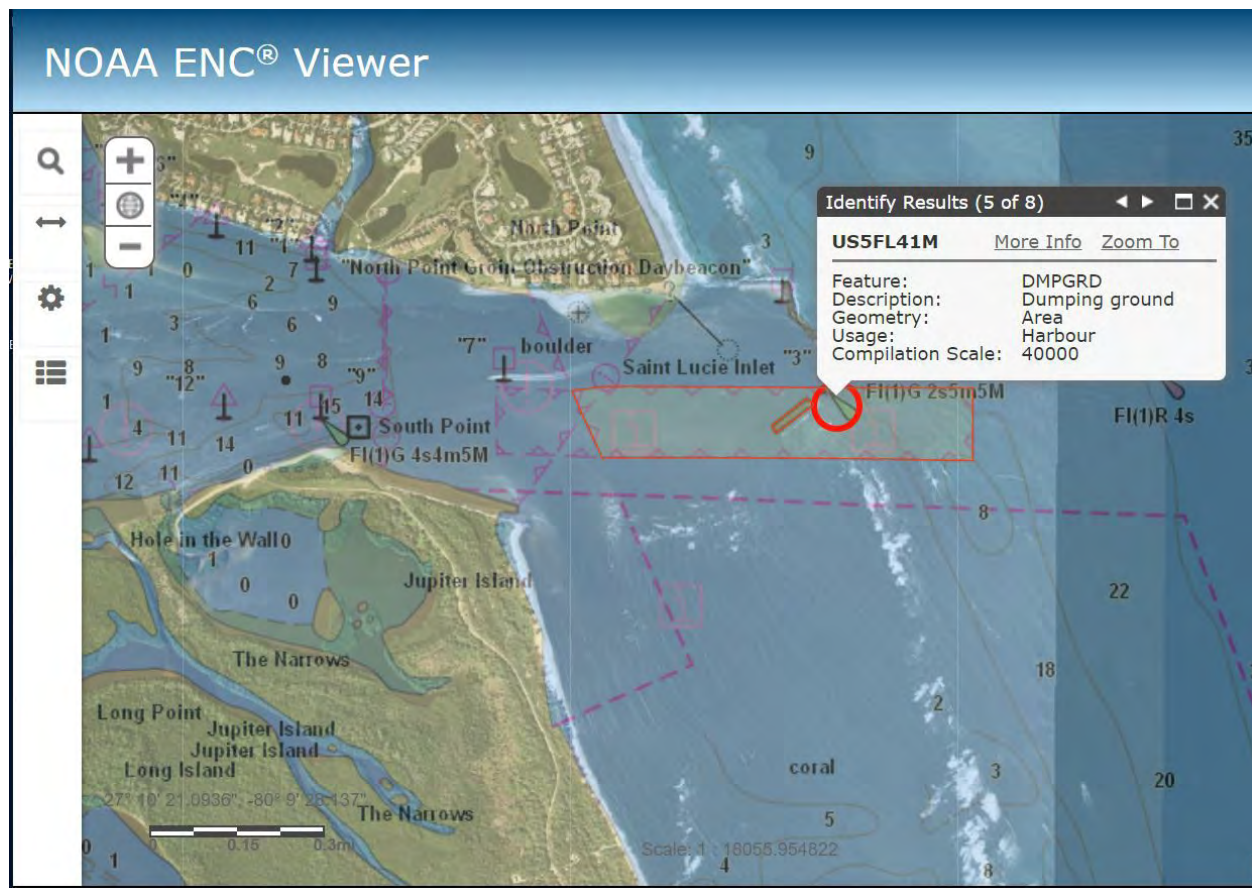
You can load ENC data into your navigation software packages, bearing in mind that loading instructions will vary depending on the software. If you are purchasing navigation software for viewing and navigating with NOAA ENC data, verify that the software can accommodate ENC data; a number of navigation software packages exist which accommodate NOAA raster nautical charts (NOAA RNCs®), but not ENC data.

You can download an individual ENC and view it in a free viewer like [Caris Easy View](#) or use the online [ENC viewer](#) hosted on NOAA's Office of Coast Survey website. The ENC Viewer is an especially useful tool in that it allows you to query features by clicking on them. Additionally, various underlying base maps can be imported and viewed simultaneously with the ENC by adjusting the transparency settings on the Viewer. You can measure distances, and specify sounding units as well.

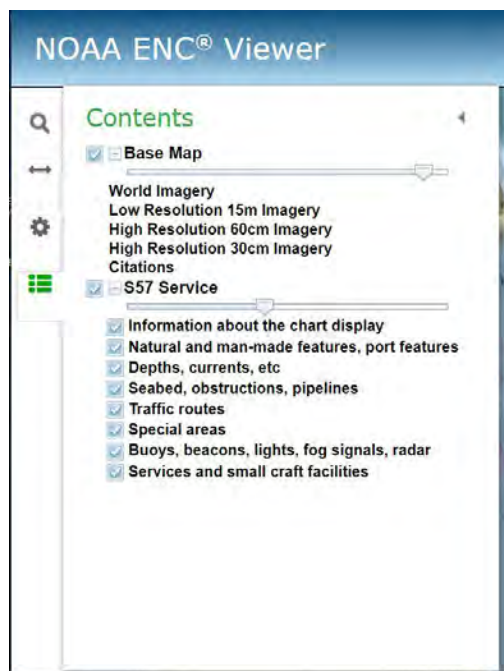
It is important to note that the data available in the ENC Viewer may be as much as 1 day older than the latest ENC data posted by NOAA.



Some of the options available within the ENC viewer



Getting information about a feature by clicking on it in the ENC Viewer



Controlling transparency with the selected base map

Am I required to use these for navigation?

The United States Coast Guard (USCG) maintains a list of the charts, publications, and navigation systems that must be carried aboard vessels. These items are collectively known as “Carriage Requirements”. The requirements vary a great deal depending on vessel size and purpose. For details, please refer to the USCG’s [Navigation and Vessel Inspection Circular No. 01-16](#).

Can I use ENC data for other purposes besides navigation?

As alluded to above, people are often interested in using the various types of chart data in their Geographic Information System (GIS) projects. Because ENC data is broken down into classes of information, it is possible to isolate specific features like shoreline, rocks, wrecks, aids to navigation, and so on.

If you want to obtain specific feature types from ENC data for your own GIS project, you can use the [Office of Coast Survey’s ENC Direct to GIS interface](#) to do just that. The program allows you to extract data using a predefined boundary and then output data in a variety of formats.

Alternatively, you can bring NOAA ENC data directly into Esri ArcMap using the [Esri S-57 Viewer add-on](#).

Data obtained from the ENC Direct Tool is in shapefile format and can be viewed using a number of GIS packages like Esri’s ArcMap. If you are not familiar with ArcMap, or do not wish to purchase a licensed copy of the software, you may consider establishing an [Esri ArcGIS Online account](#) that will enable you to use the shapefiles to create and share maps for free.

Although you can view one or more features extracted from ENC Direct, it is important to remember to view the *entire* ENC during planning, navigation and dredging operations. If you extract certain features from their context, that is to say from the ENC in its entirety, then you are not viewing related features that you did not extract. Also, be advised that the ENC Direct data is refreshed Saturday evenings, while the actual ENC cells are updated and posted each Thursday on the Office of Coast Survey website. As such, the ENC Direct data may lag behind the latest available data by as much as 3 days.

Troubleshooting

If you experience issues with the use of an ENC within a designated navigation software system, please contact the software vendor.

For issues with the data itself (noted discrepancies), please report your issue to the Office of Coast Survey using the [ASSIST interface](#).