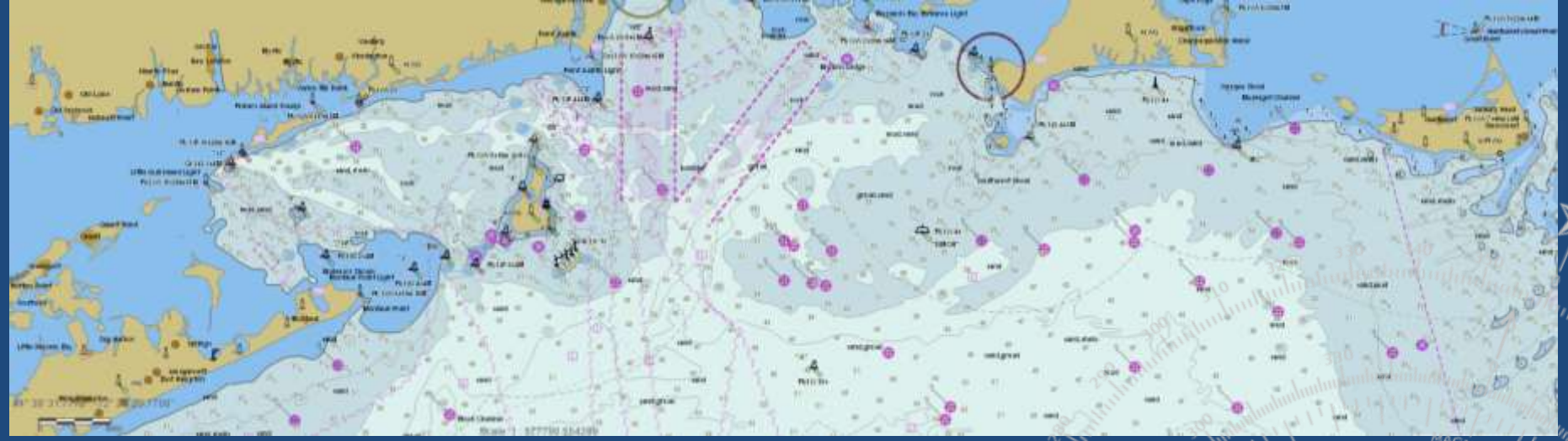


# NOAA's Role Supporting Safe Navigation

Laura Pagano
Navigation Manager
COBALT
2026

National Ocean Service (NOS)

National Environmental Satellite, Data, and Information Service (NESDIS)

Office of Marine & Aviation Operations (OMAO)

National Weather Service (NWS)

National Marine Fisheries Service (NMFS)

Office of Oceanic & Atmospheric Research (OAR)

# National Ocean Service

**Assistant Administrator**
*Nicole LeBoeuf*

**NAVIGATION SERVICES**

***Charts***
**Office of Coast Survey**

***Tides & currents***
**Center for Operational Oceanographic Products & Services**

***Geodesy***
**National Geodetic Survey**

**Office for Coastal Management**

**National Marine Sanctuaries**

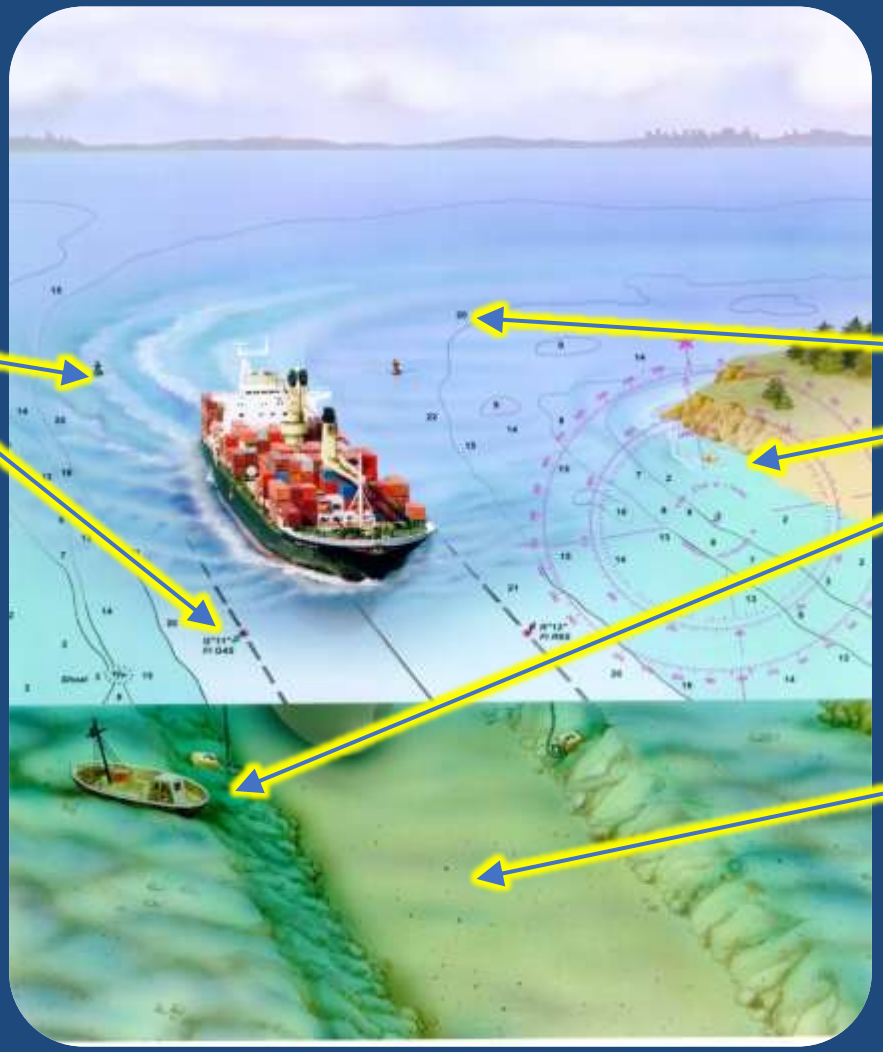
**Office of Response & Restoration**

**U.S. Integrated Ocean Observing System Program**

**National Centers for Coastal Ocean Science**

# Federal Charting Responsibilities

Aids to Navigation
Local Notice to Mariners

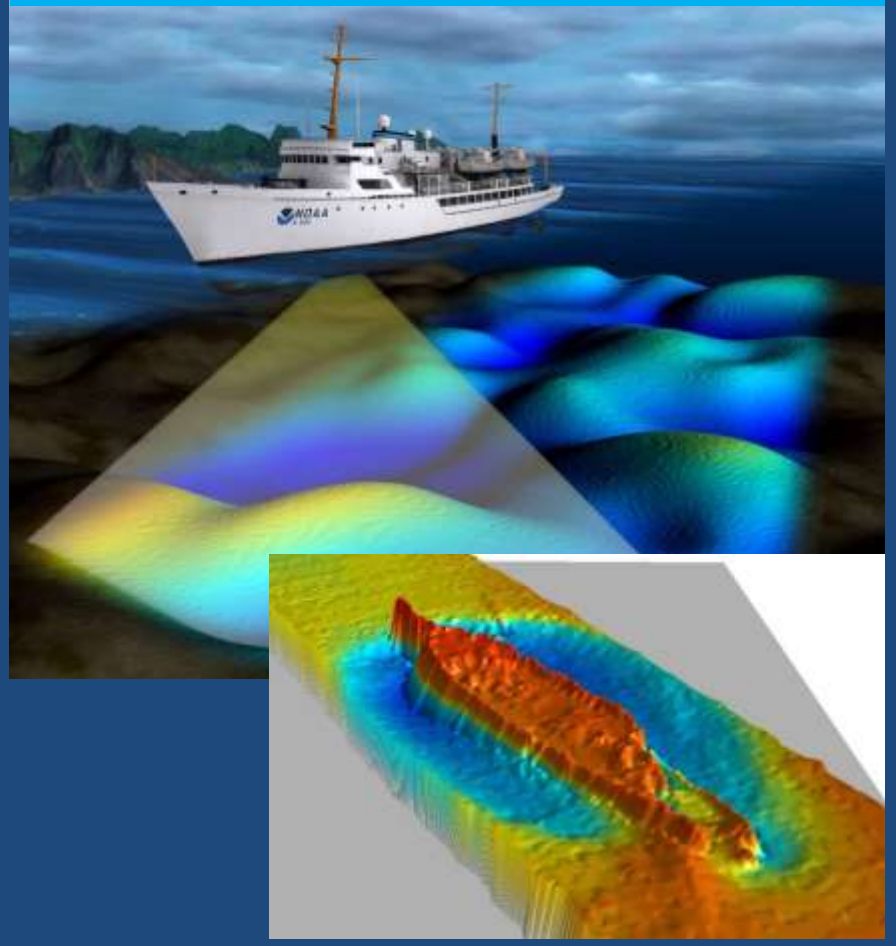


Shoreline, Hazards
Soundings, Contours

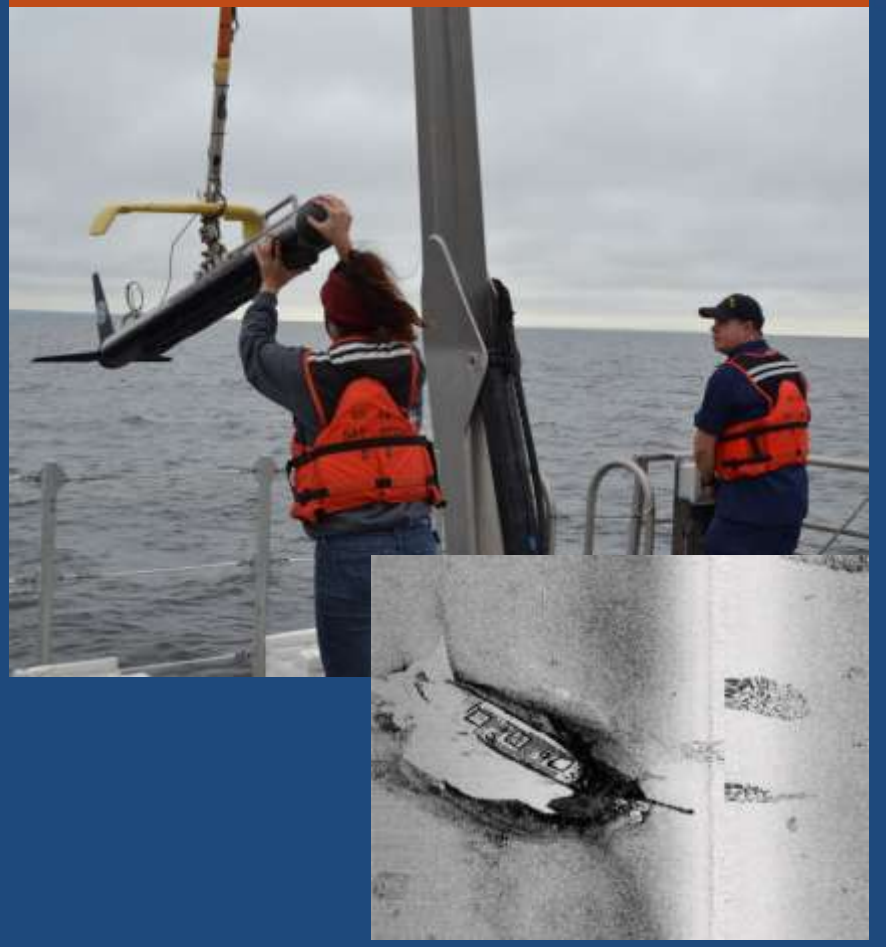
Federally Maintained
Channels

# Data acquisition – Hydrographic Surveys

## Multibeam echo sounder



## Side scan sonar



# Data Acquisition Platforms - Pacific

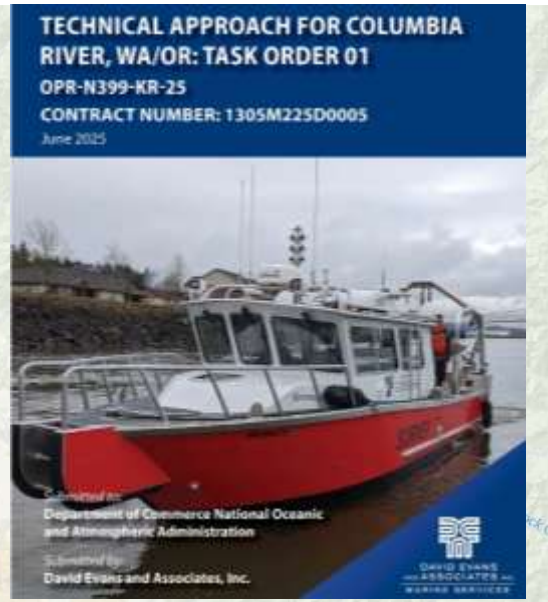
*Fairweather* - Ketchikan, AK
*Rainier* - Newport, OR

*Navigation Response Team (NRT) - Seattle*

*Contracting Program –*
*Currently 7 firms under contract*

# 2025/2026 Hydrographic Surveys: Columbia River

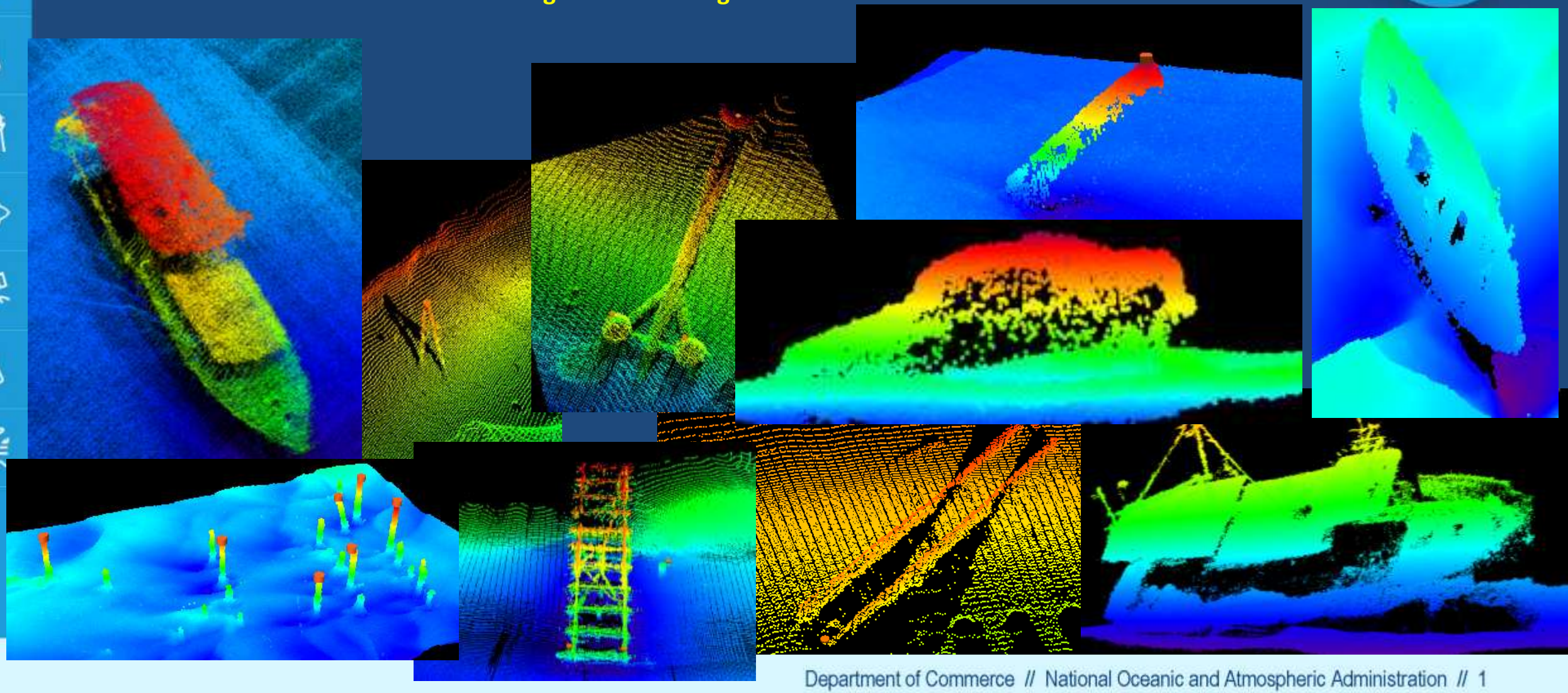
*David Evans and Associates: Mouth of the Columbia to the Bonneville Dam*



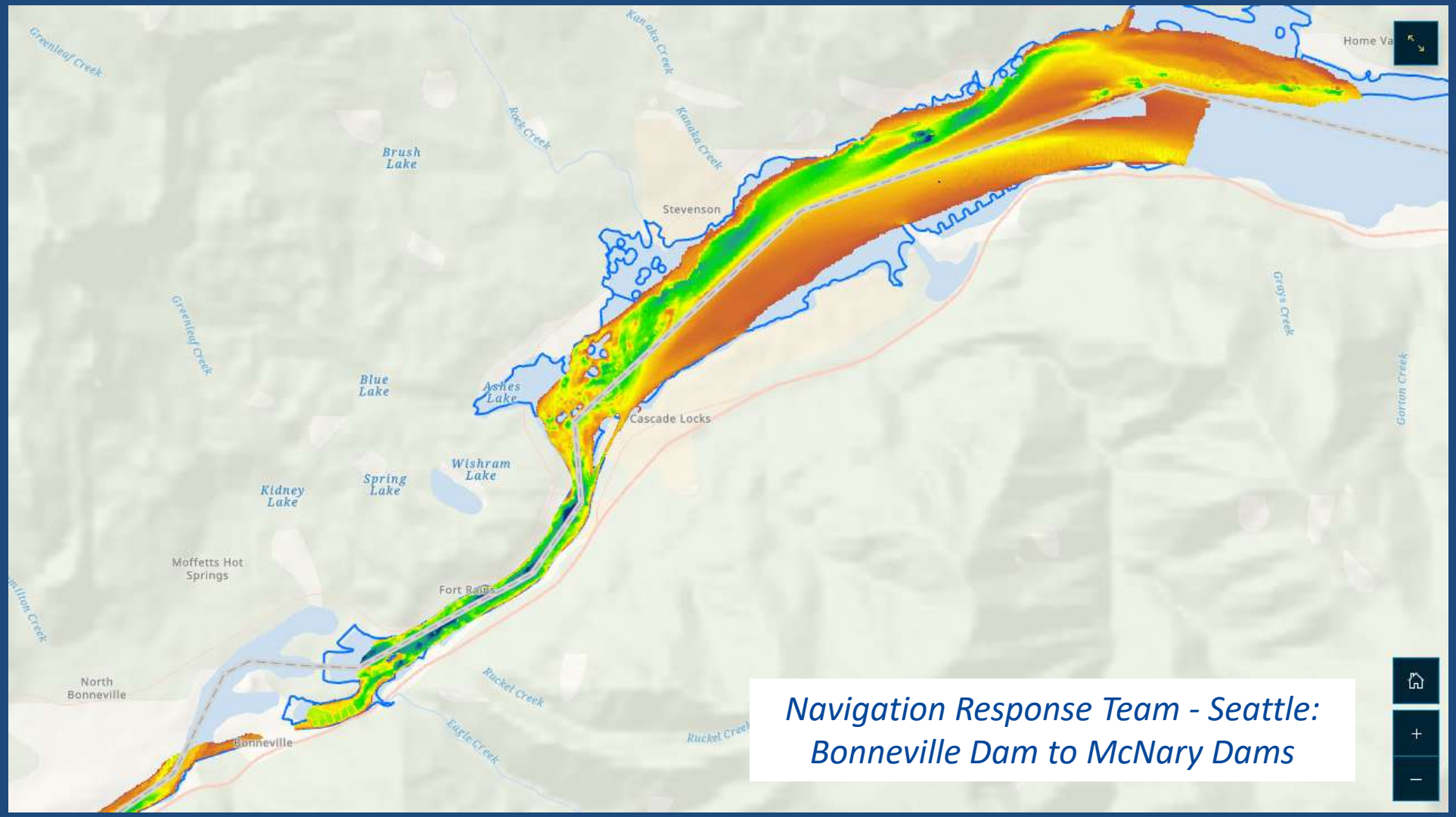
# 2025/2026 Hydrographic Surveys: Columbia River

**Findings:**

- 29 DtoNs added to the Chart
- ~ 6400 Features with Designated Soundings



# 2025/2026 Hydrographic Surveys: Columbia River




*Navigation Response Team - Seattle: Bonneville Dam to McNary Dams*

# NCEI - Bathymetric Data Viewer

National Centers for Environmental Information
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Bathymetric Data Viewer

MORE INFORMATION

NCEI Home › Maps and Geospatial Products › Seafloor Mapping

## Layers

Min Date added to Database

Max Date added to Database

Only show surveys with sidescan products:

Only show surveys with backscatter products:

Only show surveys with digital data:

SELECT NOS SURVEYS

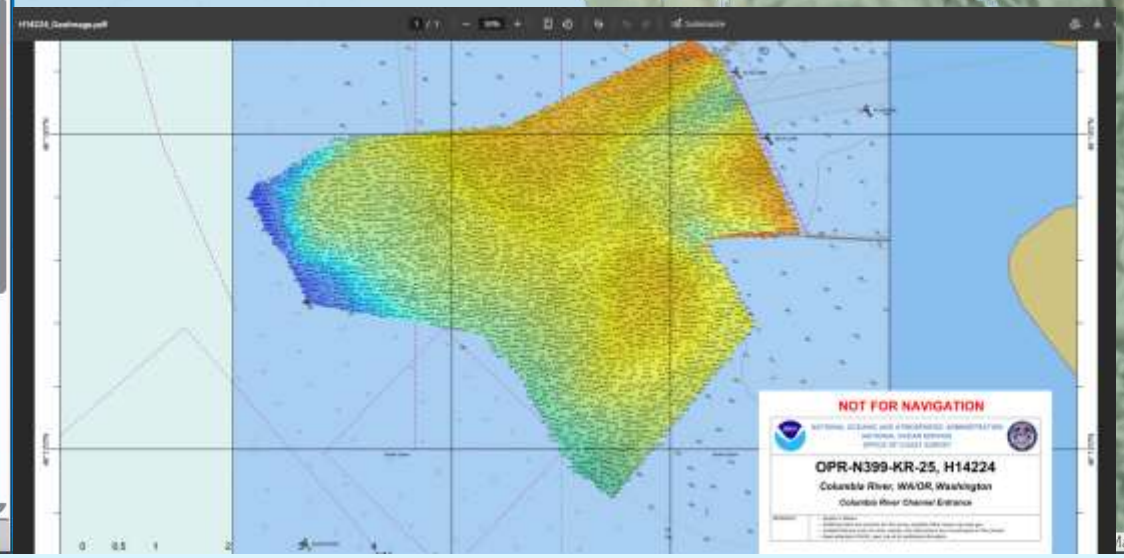
ZOOM TO NOS SURVEYS

CLEAR NOS SELECTION

CLEAR NOS FILTERS

- BAG Color Shaded Relief
- U.S. Bathymetry Coverage and Gap Analysis
- BlueTopo
- Single-Beam Surveys
- Filter Single-Beam Surveys
- Single-Beam Sounding

Grid Extract



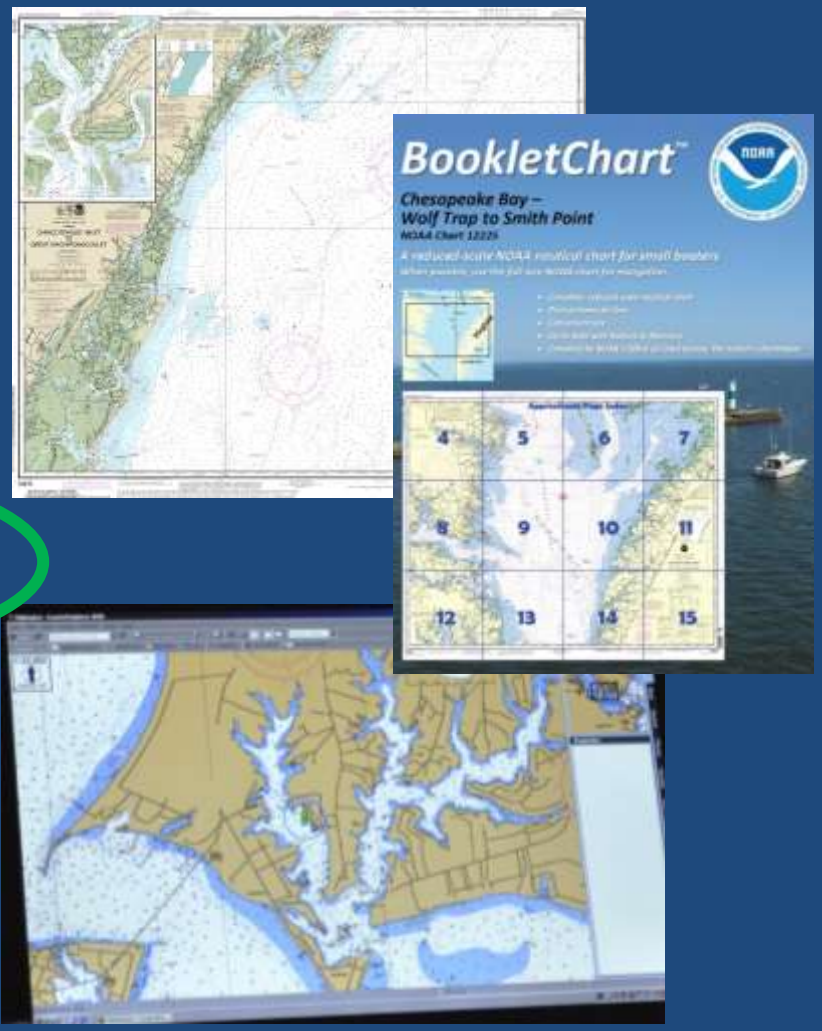

Astoria Canyon

MERCATOR
ARCTIC
ANTARCTIC

Management | EPA | NPS | USFWS | General Bathymetric Chart of the Oceans (GEBCO); NOAA National Centers f... Powered by Esri

# Modernization of Navigational Charts – In the midst of change

- Paper nautical charts
  - Sold commercially
- PDF charts
  - Free download
- Raster navigational charts
  - NOAA RNC®
- Electronic navigational charts
  - NOAA ENC®
- NOAA BookletChart™
  - Free download
- Raster Tile Service
  - App developers

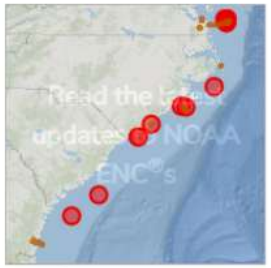


# Office of Coast Survey: NAUTICALCHARTS.NOAA.GOV

ENC®

Chart Locator

NOAA Custom Chart



NOAA Navigation Updates

Precision Marine Navigation

## Additional Regulated Products & References

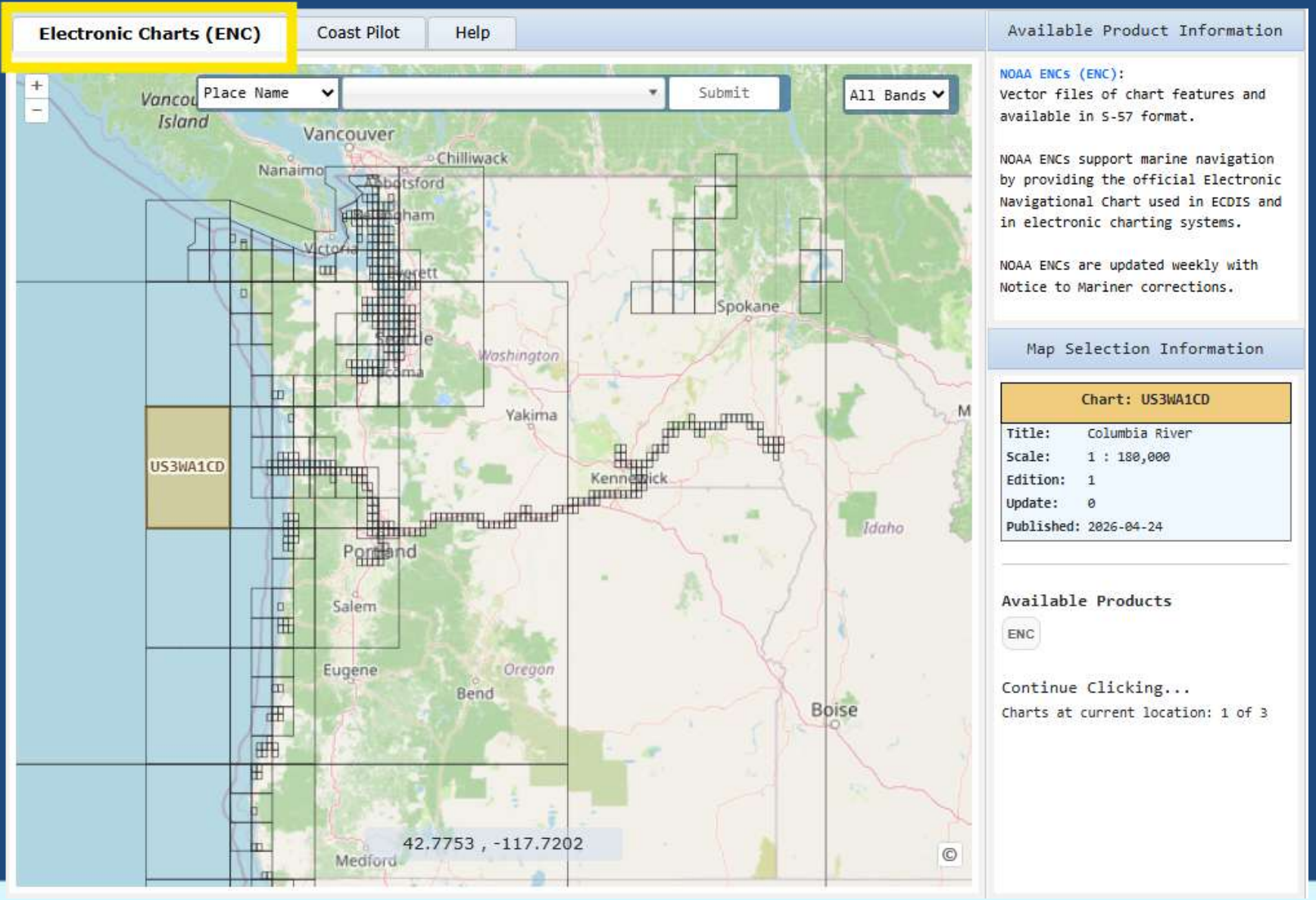
United States Coast Pilot®

Historical Charts

U.S. Chart No. 1

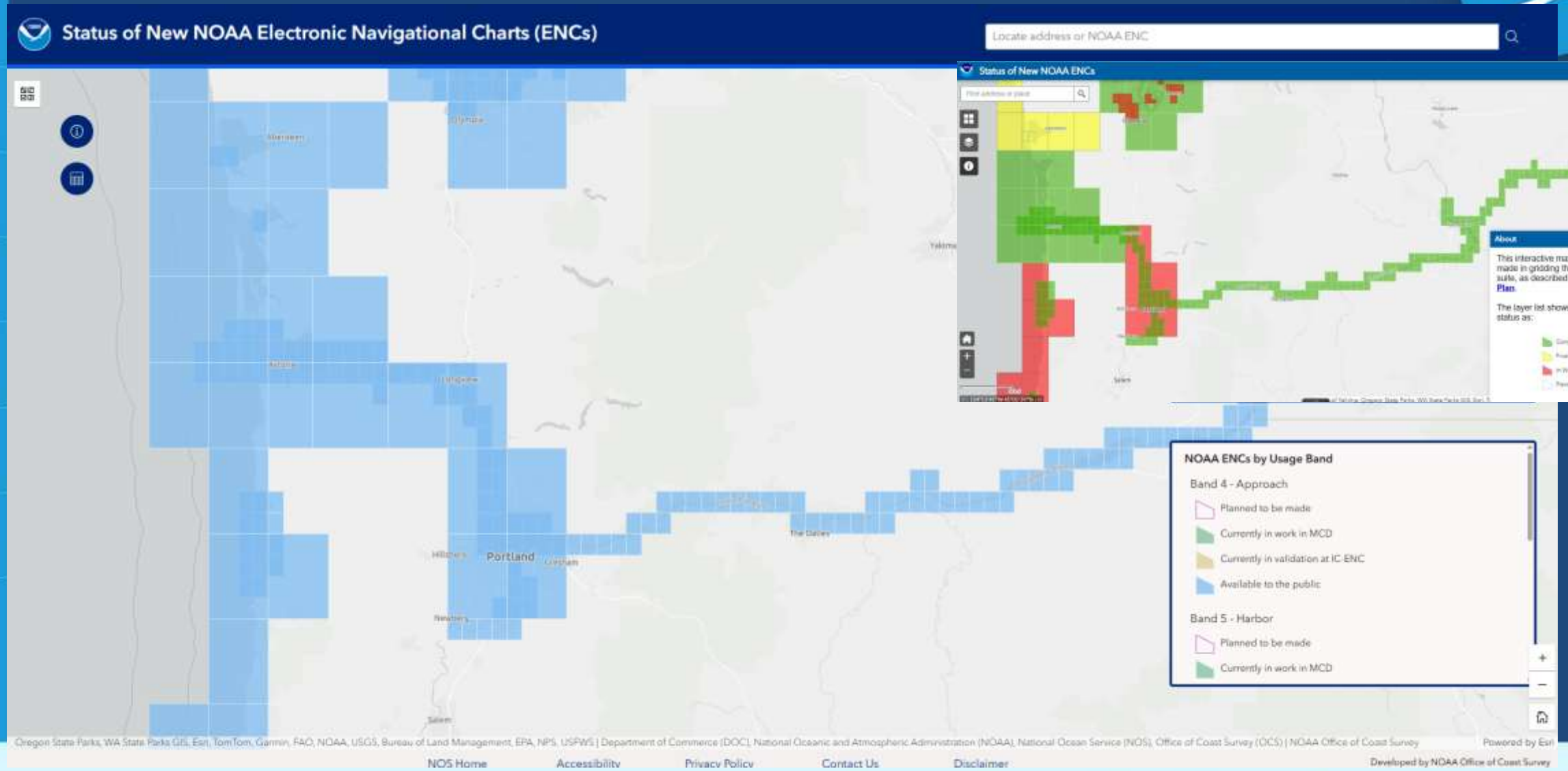
Printing Charts

# Chart Locator - Electronic Charts (ENC)

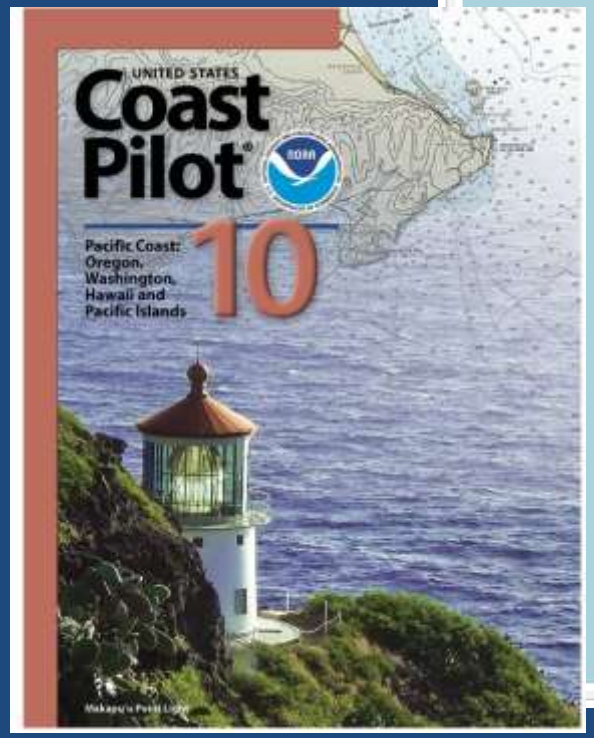


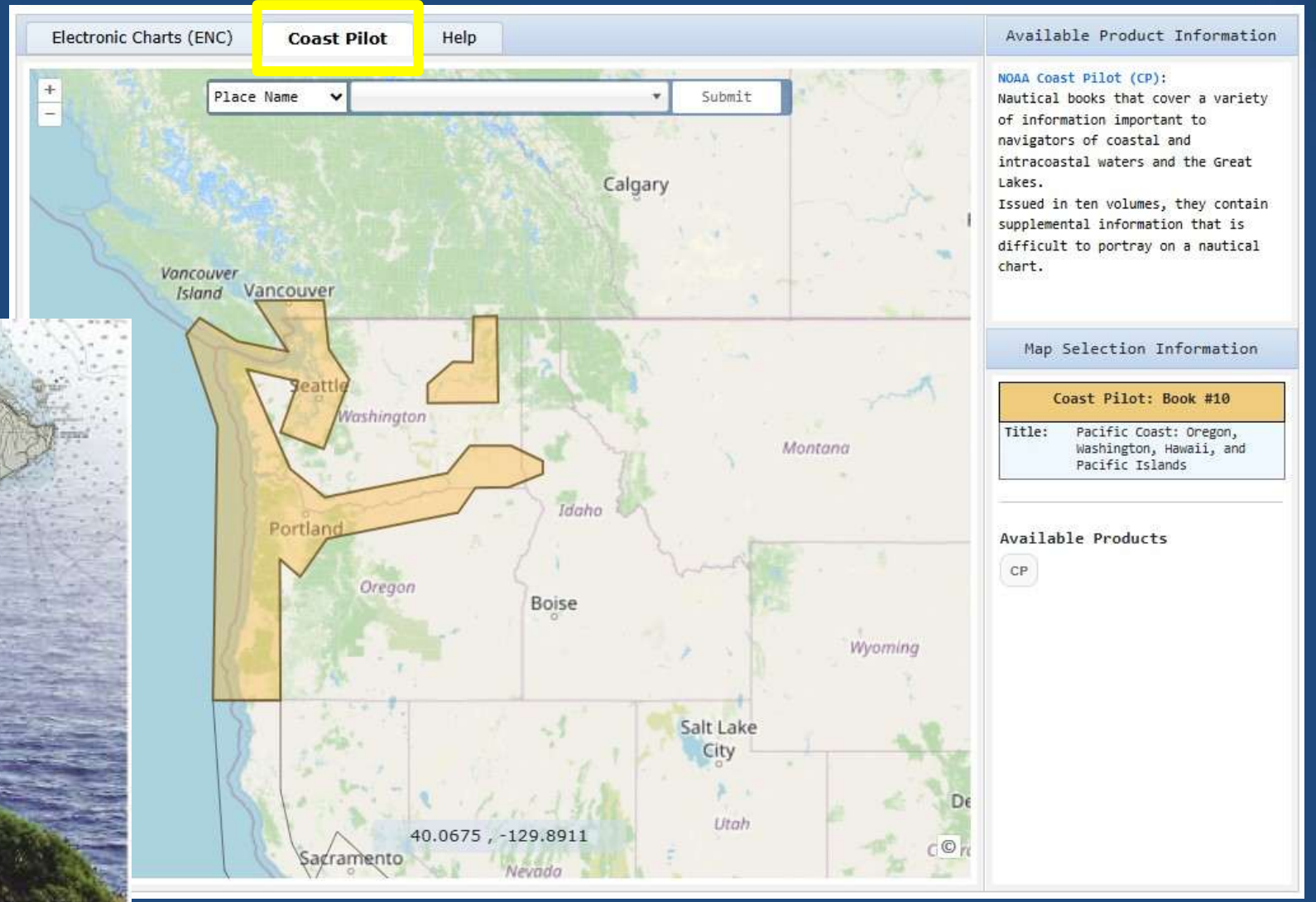
# ENC Re-gridding: New ENC Layout

distribution.charts.noaa.gov/ENC/rescheme/



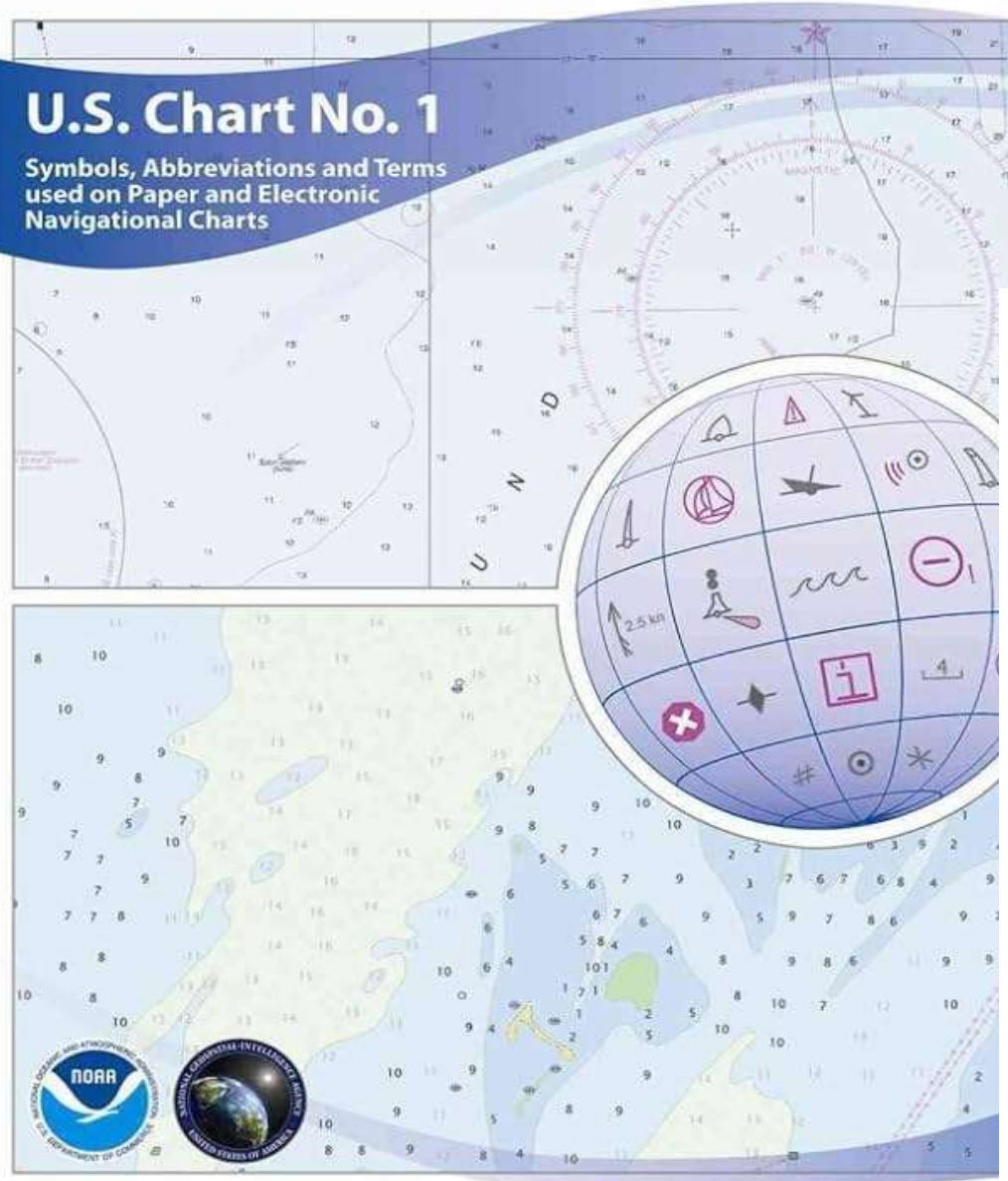
# NOAA Coast Pilot Book #10: Pacific Coast



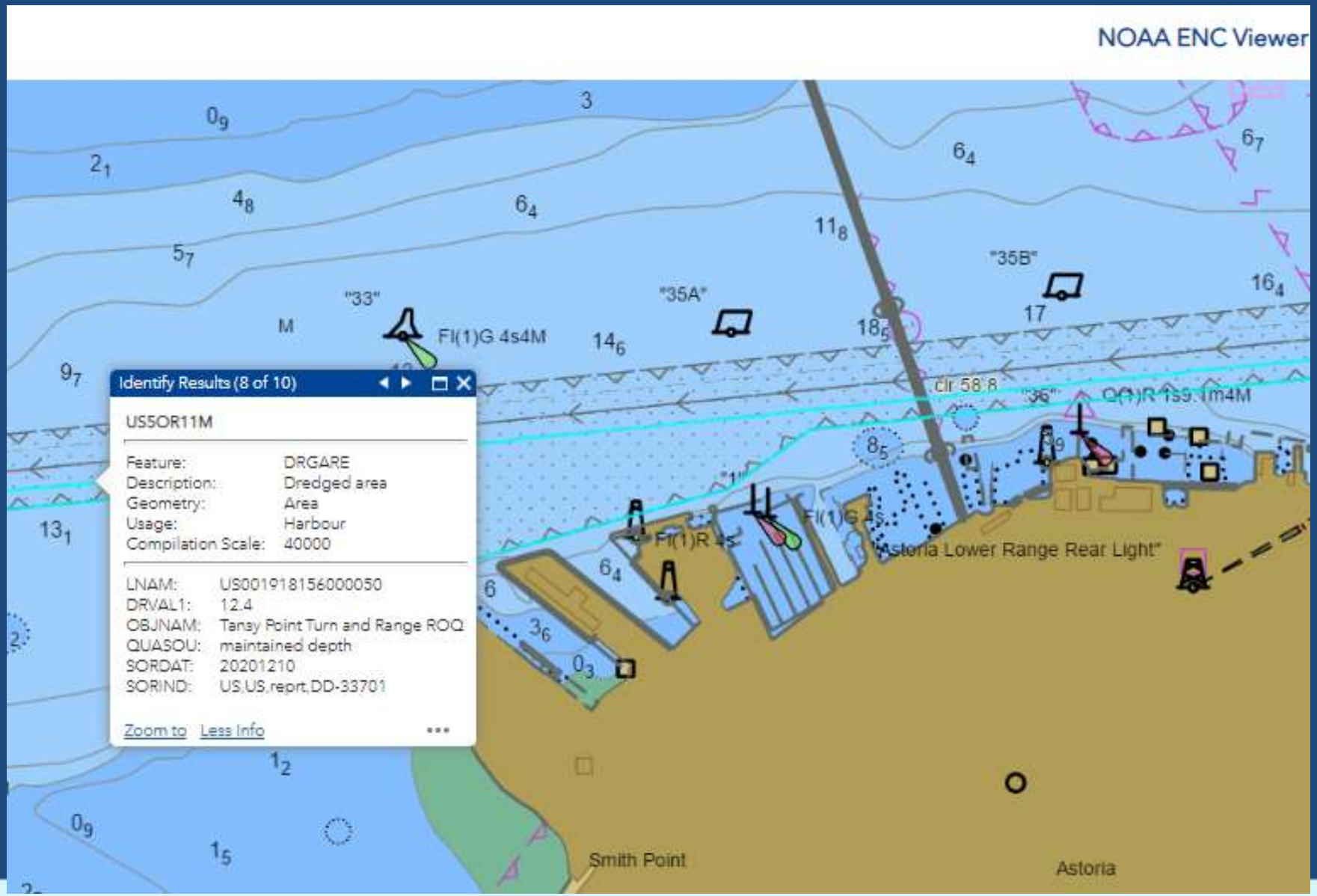
# U.S. Chart No. 1

## Symbols, Abbreviations and Terms used on Paper and Electronic Navigational Charts

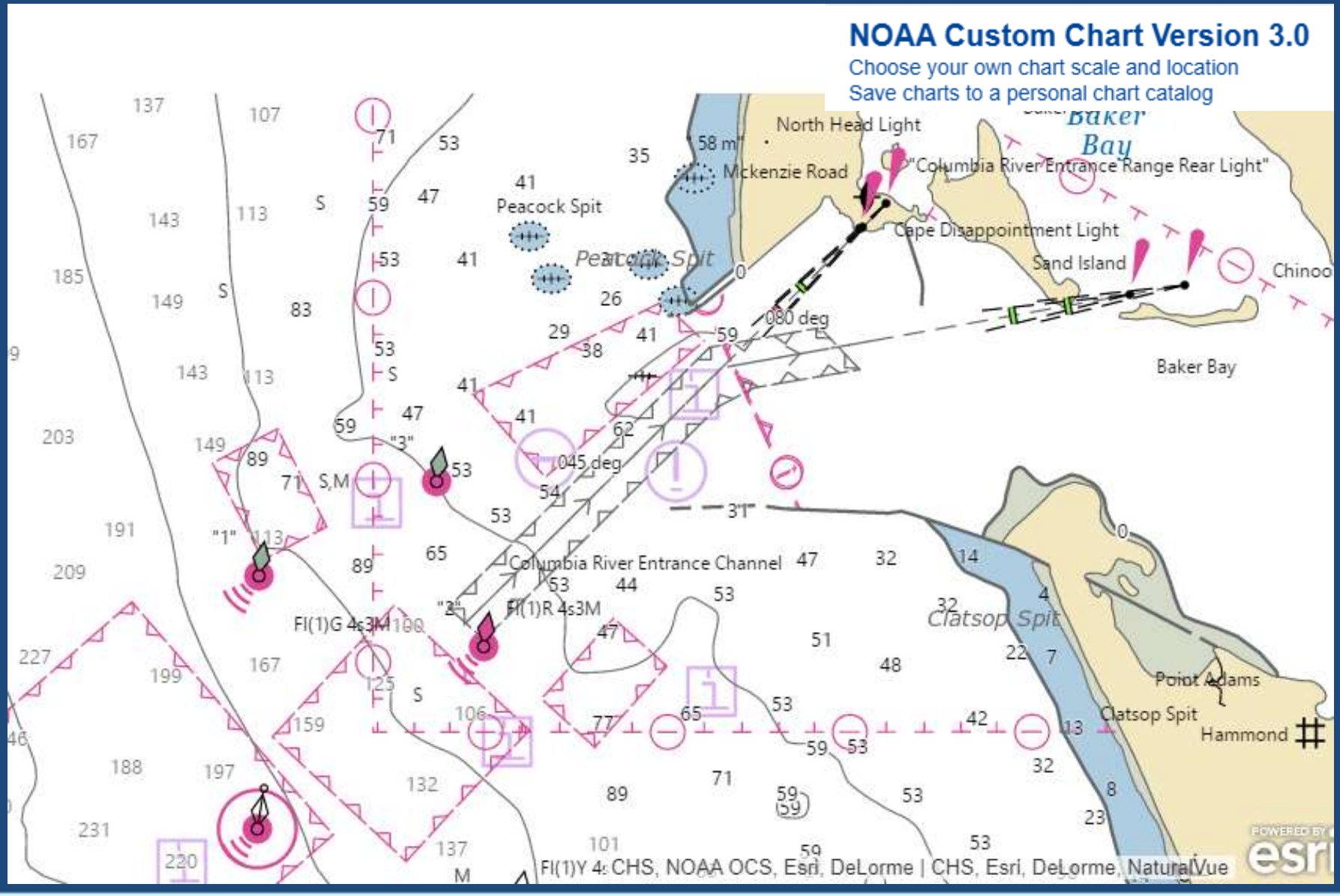


| No. | INT | Description | NOAA | NGA | Other NGA | ECDIS | |
|---|---|---|---|---|---|---|---|
| General | | | | | | | |
| 1 | *ED* | Existence doubtful | | | | 25 | Sounding of low accuracy |
| 2 | *SD* | Sounding of doubtful depth | | | | 25<br>212<br>⊗ | Sounding of low accuracy<br>Underwater hazard with depth greater than 20 meters<br>Isolated danger of depth less than the safety contour |
| 3.1 | *Rep* | Reported, but not confirmed | | | | 25<br>?<br>▫ ▫ ▫ ▫ ▫<br>▫ ▫ ▫ ▫ ▫ | Sounding of low accuracy<br>Point feature or area of low accuracy<br>Low accuracy line demarking area wreck or obstruction<br>Low accuracy line demarking foul area |
| 3.2 | *Rep (2011)* | Reported (with year of report), but not confirmed | | | | | |
| 4 | (184) (212) | Reported, but not confirmed sounding or danger (on small scale charts only) | | | | ○<br>25<br>5<br>212<br>⊗<br>? | Obstruction, depth not stated<br>Sounding of low accuracy<br>Underwater hazard with depth of 20 meters or less<br>Underwater hazard with depth greater than 20 meters<br>Isolated danger of depth less than the safety contour<br>Point feature or area of low accuracy |

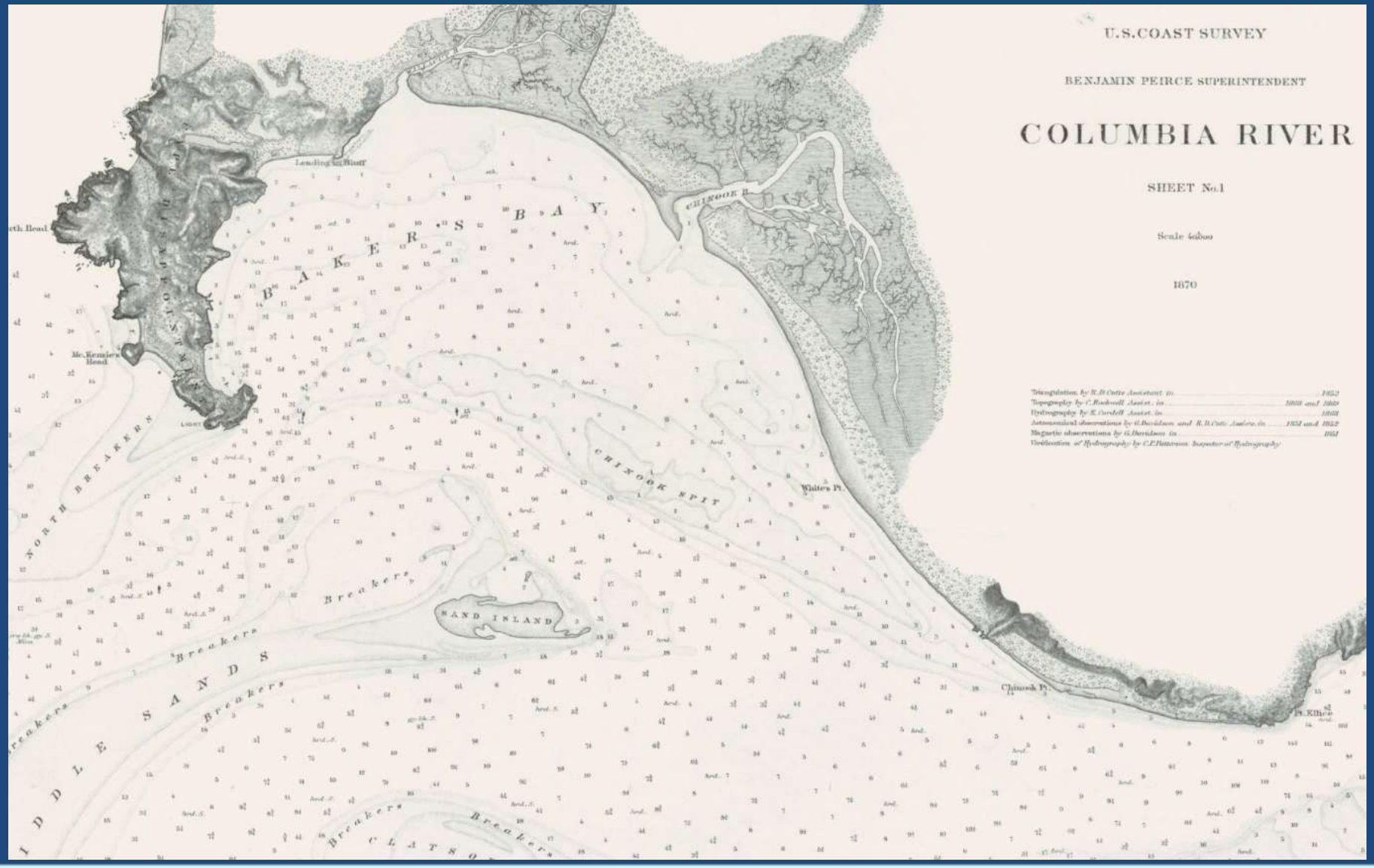
# NOAA ENC Viewer - NAUTICALCHARTS.NOAA.GOV



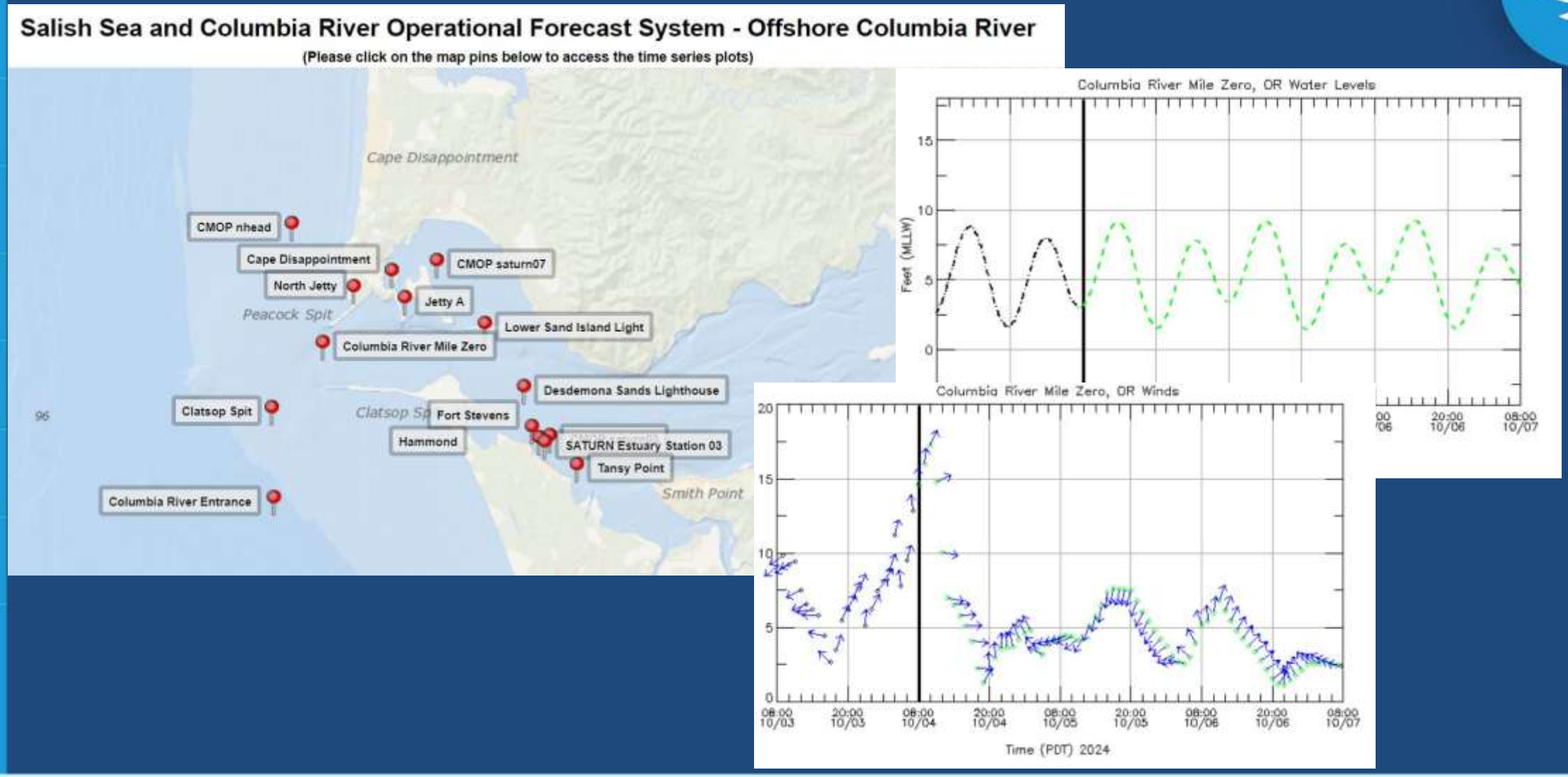
# NOAA Custom Chart Tool: DEVGIS.CHARTTOOLS.NOAA.GOV/POD/



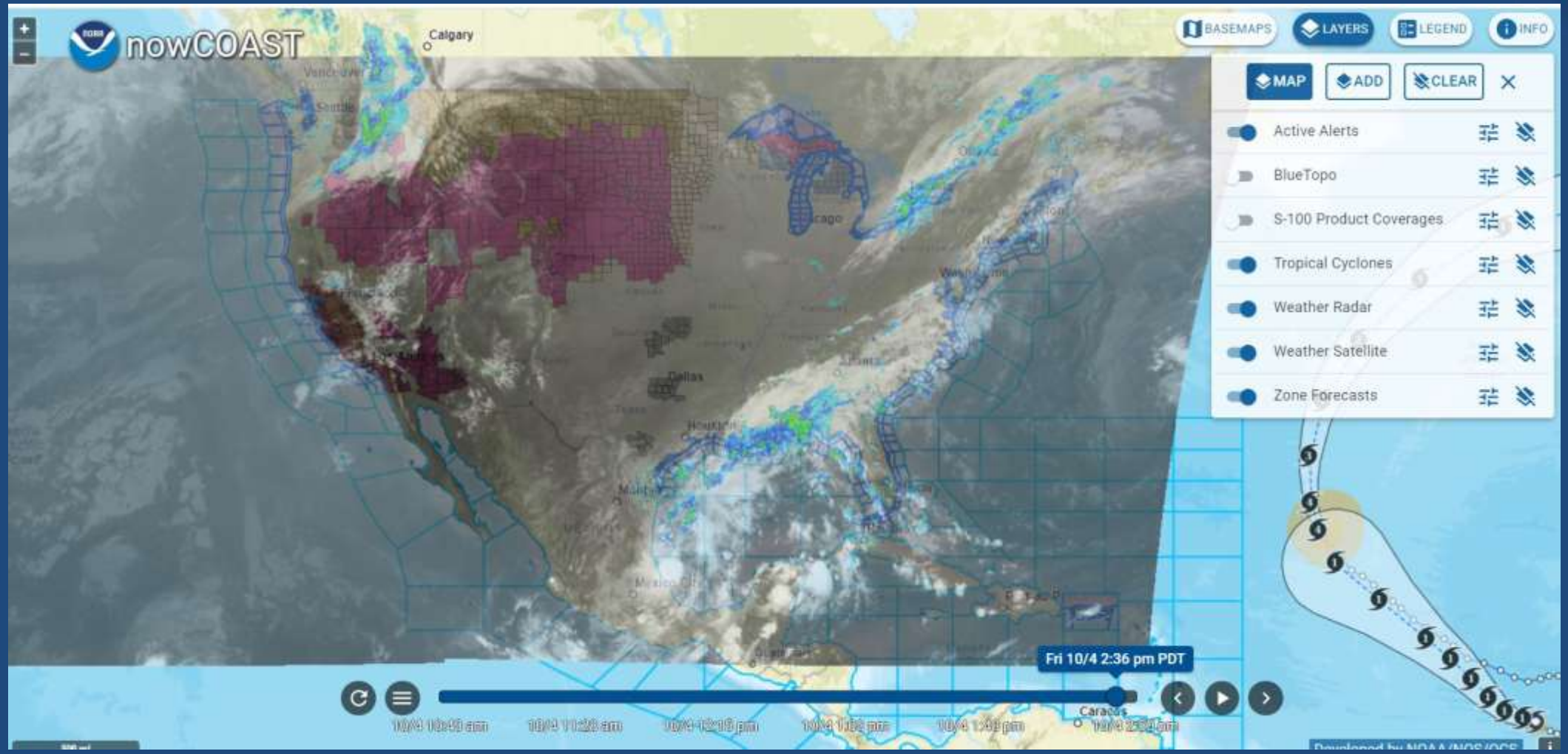
# HISTORICALCHARTS.NOAA.GOV



# Salish Sea and Columbia River Operational Forecast System (SSCOFS)

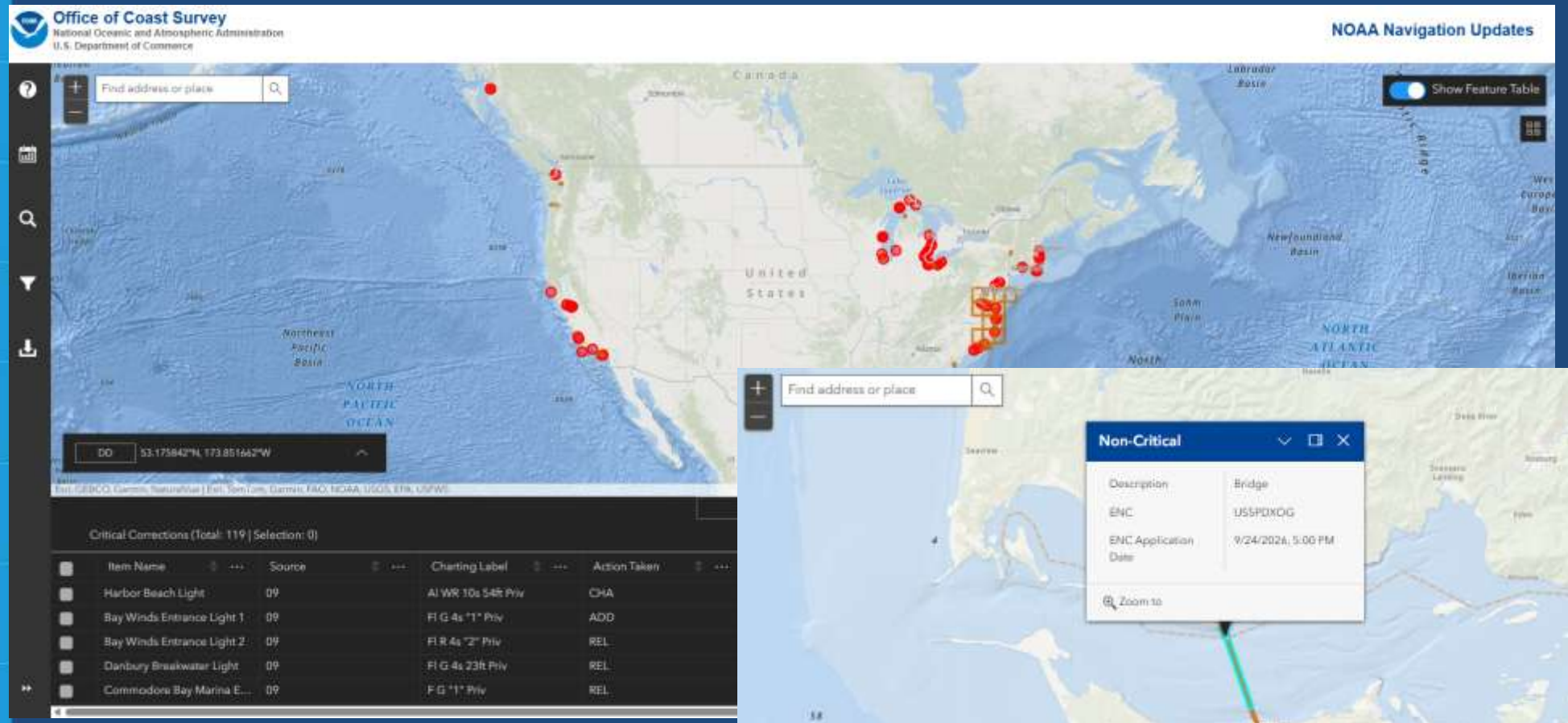


# NOWCOAST.NOAA.GOV



# NOAA Navigation Updates

https://distribution.charts.noaa.gov/navigation-updates/



# Navigation Systems:

Where does your chart data comes from?

- How is it updated?
  - Connected to internet and automatic?
  - Sneaker net, from the office to boat?
  - Vendor chip or subscription?
  - Has the App transitioned from Raster (RNC) to ENC?

NOAA ENCs updated weekly with new source and USCG Local Notice to Mariner information

# The Future of Charting…

## What is Precision Marine Navigation?

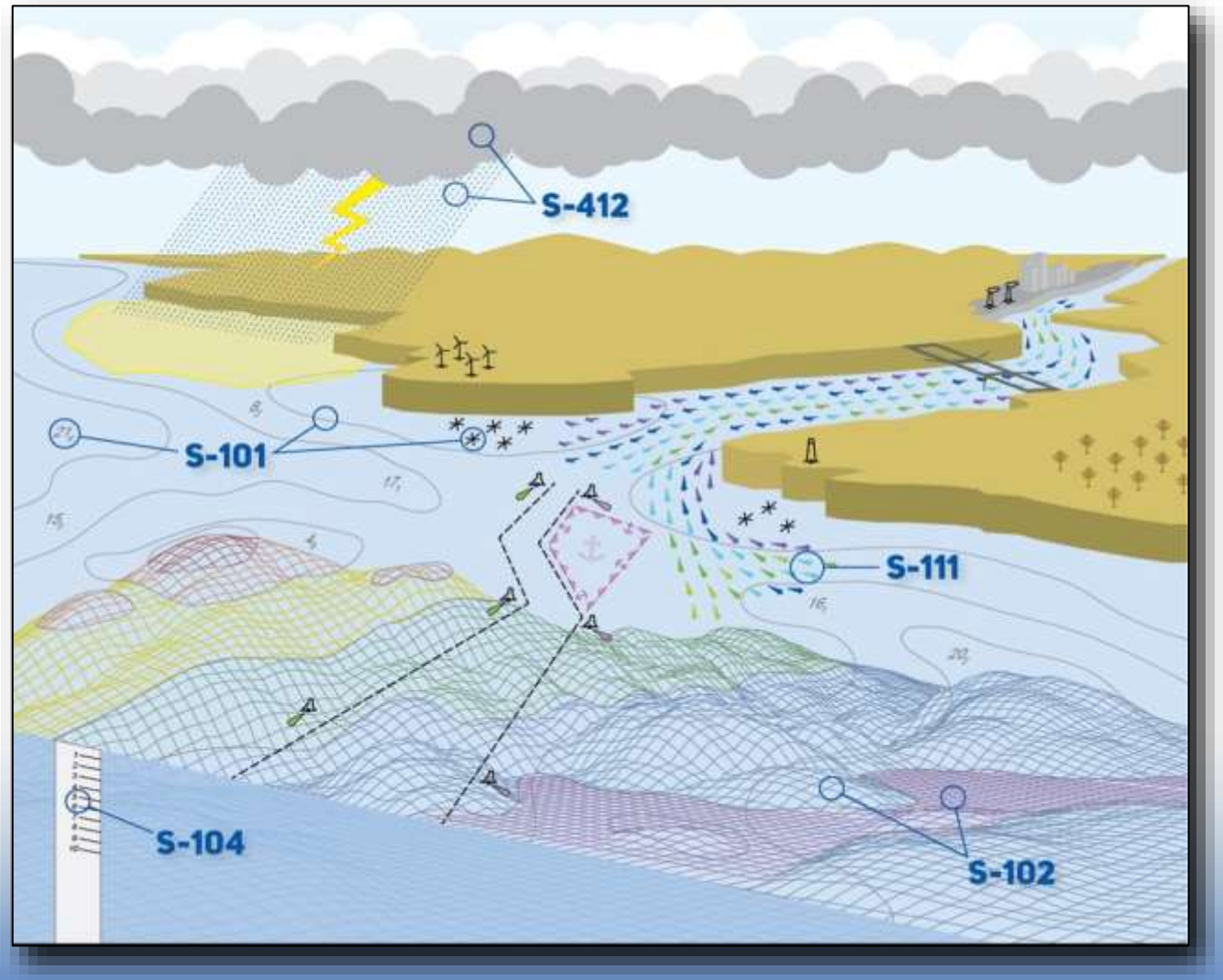
**…the ability of a vessel to safely and efficiently navigate and operate in close proximity to the seafloor, bridges, narrow channels, or other marine hazards.**

# Precision Marine Navigation Program

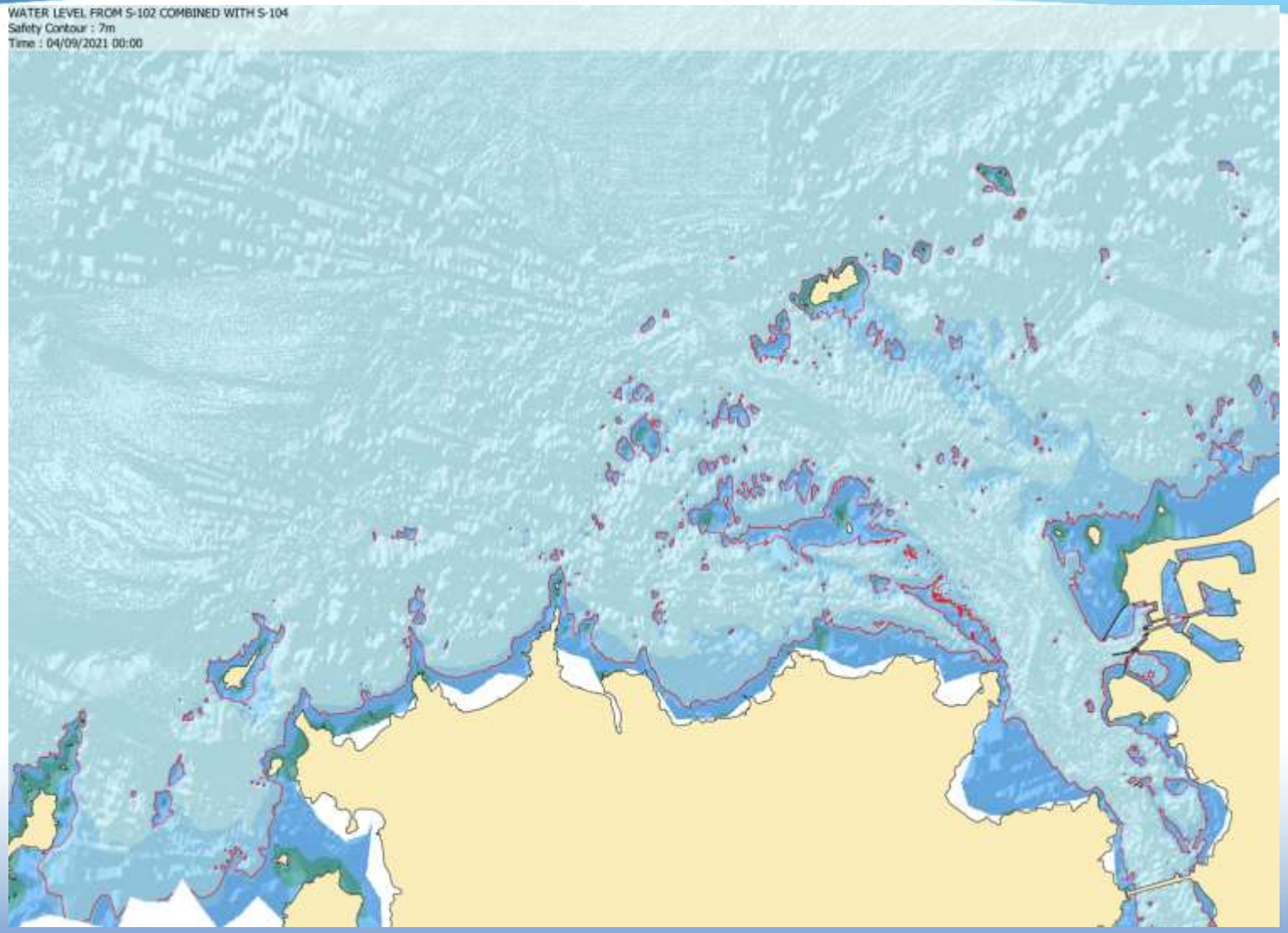
## S-100 Data Framework

### S-100 Data Products

- **S-101**: Electronic Navigational Charts (ENC)
- **S-102:** Bathymetric Surface
- **S-104:** Water Level Information
- **S-111:** Surface Currents
- **S-41X:** Weather Overlays



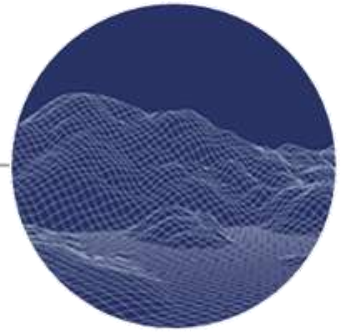
# Integrated Water Level and Bathymetry




Animation Courtesy of SHOM

7m Safety Contour. The safety contour changes are based on S-102 bathymetry and Water Level Adjustment (WLA), using S-104, over a period of 21 hours.

# National Bathymetric Source Program

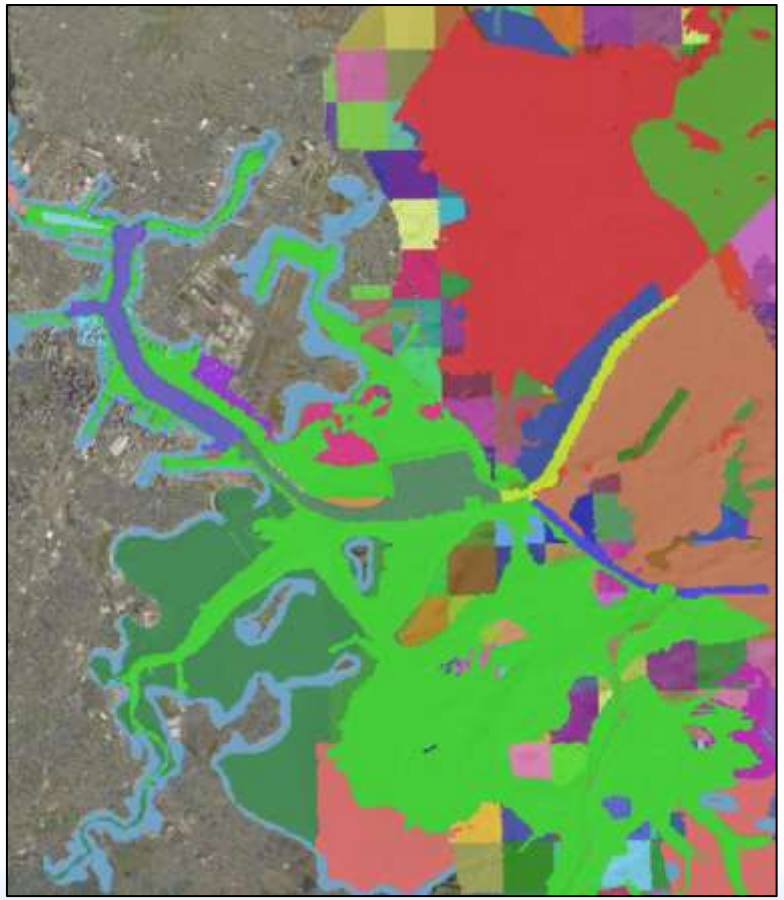


Navigation

Internal

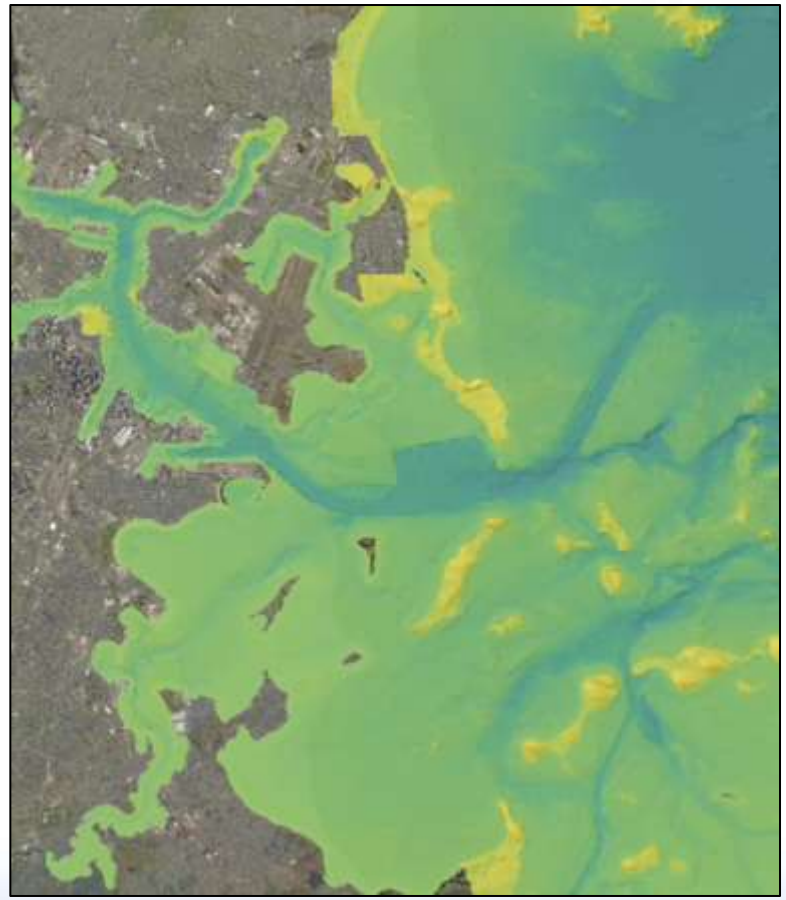
Public

# National Bathymetric Source Program



Bathymetry Sources

Compile curated bathymetry



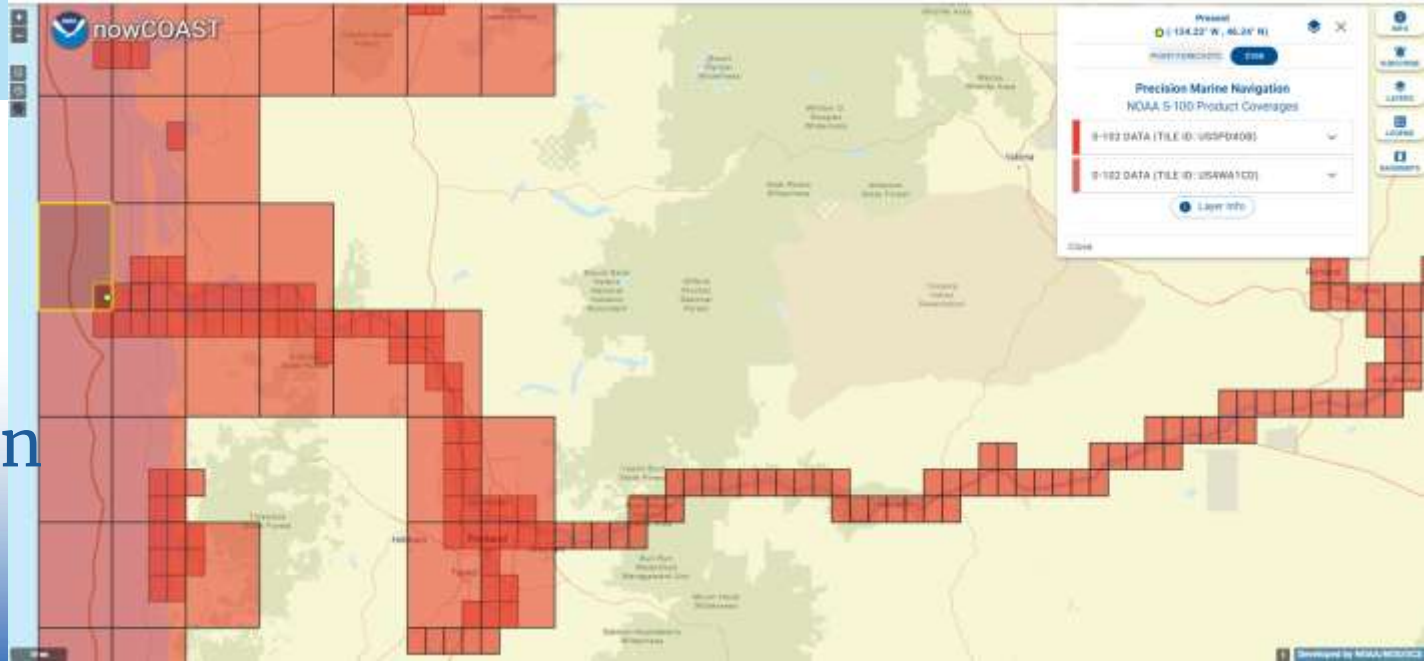
Compiled Bathymetry

NOAA Coast Survey

# NOWCOAST.NOAA.GOV

Blue Topo Layer (Currently being built out)

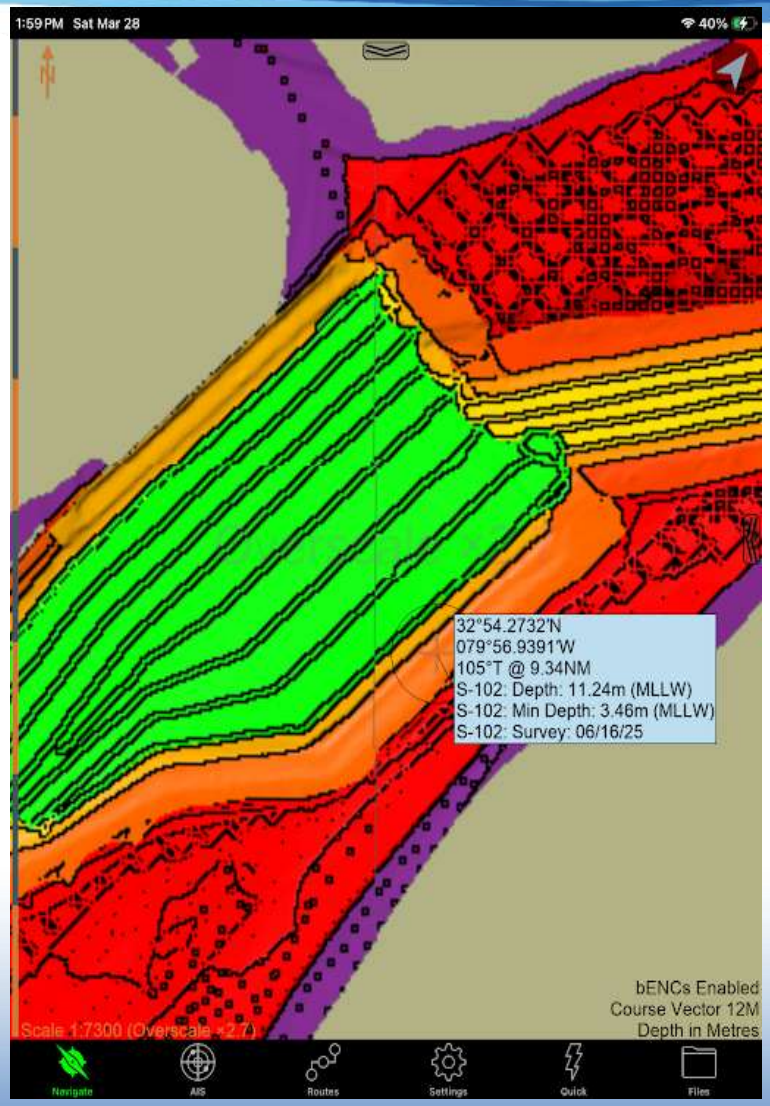
S-102 Bathy Layers – Have arrived in the Columbia River!



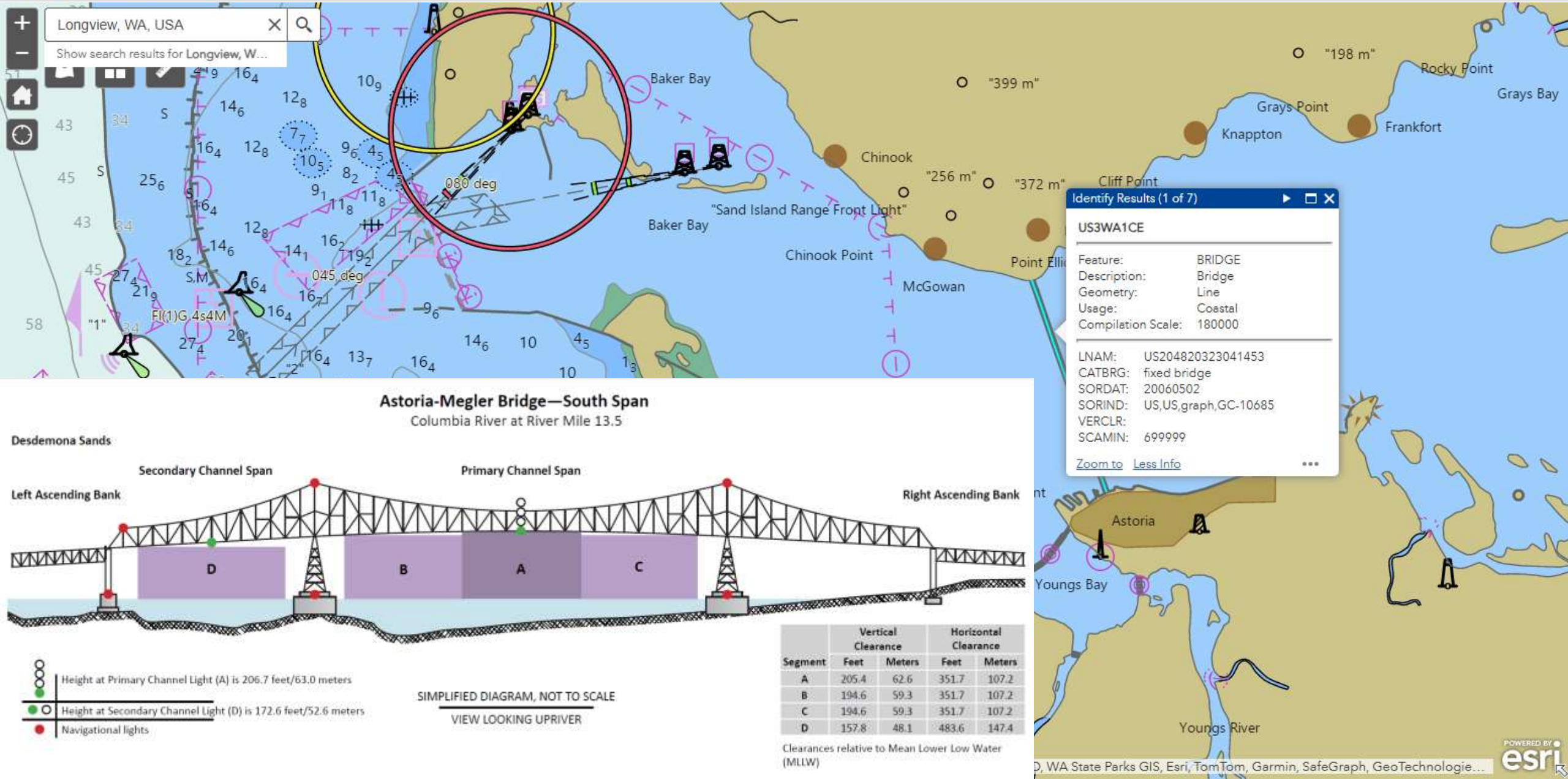
NOAA Coast Survey

# NOWCOAST.NOAA.GOV

## S-102 on SeaIQ PPU



# Columbia River PICREPs




## Astoria-Megler Bridge—South Span

Columbia River at River Mile 13.5




Height at Primary Channel Light (A) is 206.7 feet/63.0 meters

Height at Secondary Channel Light (D) is 172.6 feet/52.6 meters

Navigational lights

SIMPLIFIED DIAGRAM, NOT TO SCALE

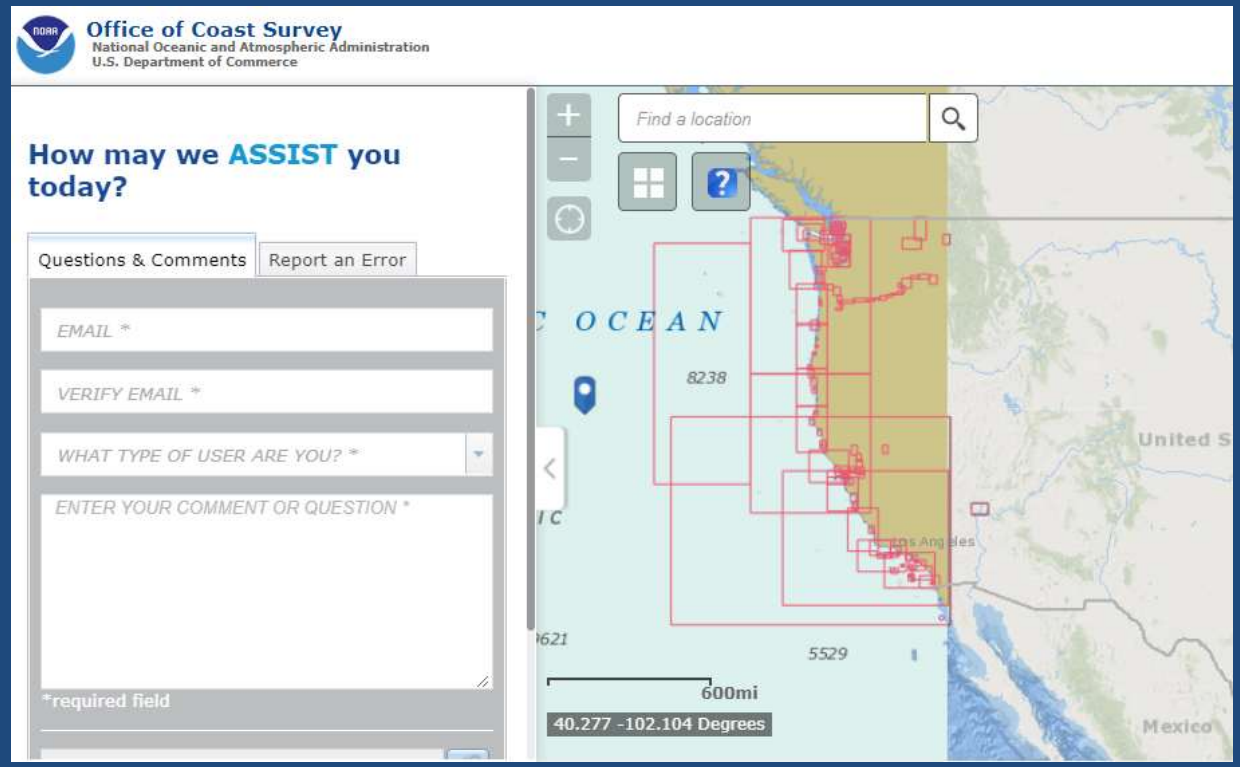
VIEW LOOKING UPRIVER

| | Vertical Clearance | | Horizontal Clearance | |
|---|---|---|---|---|
| Segment | Feet | Meters | Feet | Meters |
| A | 205.4 | 62.6 | 351.7 | 107.2 |
| B | 194.6 | 59.3 | 351.7 | 107.2 |
| C | 194.6 | 59.3 | 351.7 | 107.2 |
| D | 157.8 | 48.1 | 483.6 | 147.4 |

Clearances relative to Mean Lower Low Water (MLLW)

# We want to hear from you!

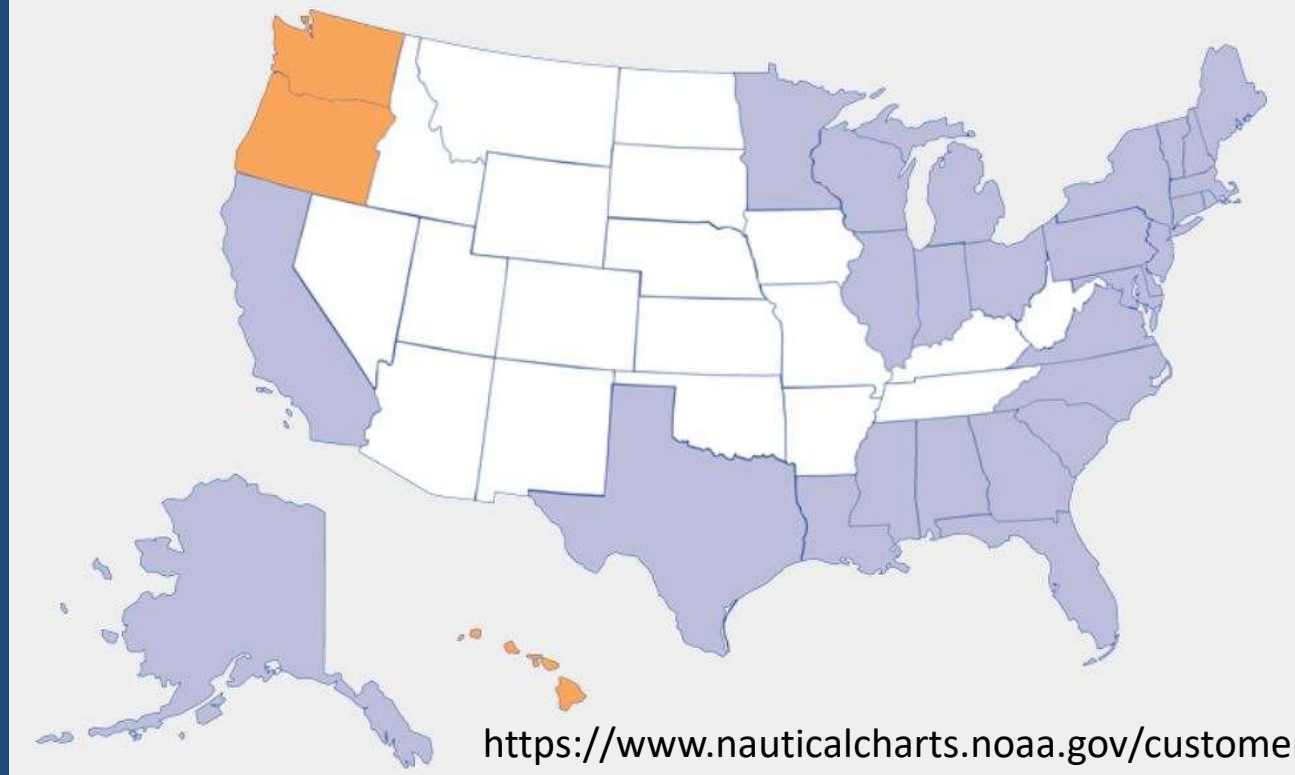
- ASSIST Tool – online method for reporting chart discrepancies and errors or general feedback




https://www.nauticalcharts.noaa.gov/customer-service/assist/

# Regional Navigation Managers

## Regional Navigation Manager Coverage



https://www.nauticalcharts.noaa.gov/customer-service/regional-managers/index.html

# Thank You!

laura.pagano@noaa.gov
northwest.navmanager@noaa.gov