

NAUTICAL CHART ACTIVITIES IN THE U.S. ARMY CORPS OF ENGINEERS

NOAA Open House on Nautical Cartography
26 July 2019

Tony Niles
Headquarters, Directorate of
Research and Development
441 G St, NW
Washington, DC

- *Navigation Program and challenges*
- *IENC update*
- *eHydro update*



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USACE NAVIGATION MISSION

Provide safe, reliable, efficient, effective and environmentally sustainable waterborne transportation systems for movement of commerce, national security needs, and recreation.

COASTAL NAVIGATION ASSETS

- 19 lock chambers
- 13,000 miles of channels
- 929 navigation structures
- 844 bridges



INLAND NAVIGATION ASSETS

- 27 Inland River Systems
- 207 lock chambers @ 171 lock sites
- 12,000 miles of inland river channels



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EXTENSIVE WATERWAY MAINTENANCE AND CONSTRUCTION ACTIVITIES

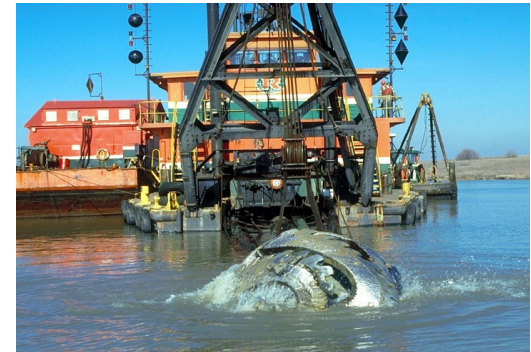
***** *Resulting in timely and accurate chart data* ****

Authorized Navigation Channel Projects

- | | |
|--------------------------------|-----|
| • High Use: > 10M tons | 56 |
| • Moderate Use: 1M to 10M tons | 74 |
| • Low Use: < 1M tons | 938 |



Channel dredging averages 280M cubic yards per year



122 survey vessels

- | | |
|-------------------------|-----------|
| • 58 Multibeam systems | • Four |
| • Some vessels include; | Atonomous |
| ✓ Surface LiDAR | Survey |
| ✓ Magnetometer | Vehicles |
| ✓ Side-scan | |

* *Contractor services also used*



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CONSTRUCTION PROJECTS IN FY18 REGULAR APPROPRIATION



7

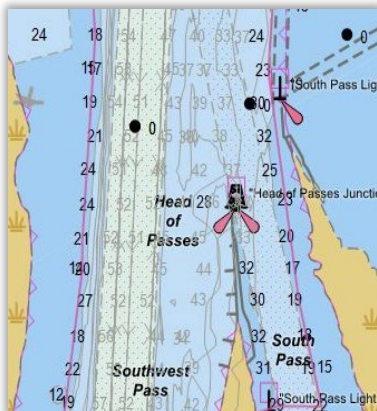
(\$10 M or More)



Lower Mississippi Dredging Challenges

Sustained high water conditions generating extensive shoaling

- Five hopper dredges currently operating
- Three survey vessels performing daily surveys
- Surveys and shoaling polygons available in eHydro portal



*Electronic chart overlays
being produced from daily
surveys, and published
weekly*



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2017-2018 Emergency Response Channel Re-Openings

Multiple ports surveyed and re-opened following hurricane activity



- Harvey
- Irma
- Maria
- Florence
- Michael



Interagency efforts to survey and clear obstructions – most ports and channels re-opened within three days

Extremely valuable help from NOAA survey vessels clearing remote ports in PR, and finding obstructions in Key West and Wilmington

Impacting




- TX & LA Coasts
- Florida
- Puerto Rico
- Carolina Coasts
- AL & FL Gulf Coasts



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NAVIGATION CHALLENGES

- **Attracting and retaining knowledgeable personnel**
- **Constrained Funding - can't maintain authorized/constructed channel dimensions** 
- **Low Commercial Use Projects**
- **Increased cost of doing business** 
- **Aging infrastructure**
- **Environmental Issues** 
 - **Air and water quality requirements**
 - **Threatened, endangered, and invasive species**
 - **Dredging windows**



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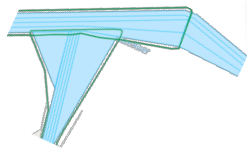
Increased cost



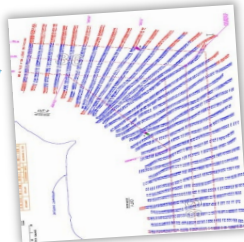
Constrained funding

MORE EFFICIENT USE OF DREDGING RESOURCES

Data Sources



Framework



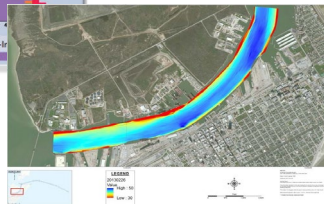
Surveys

+

Existing Tools



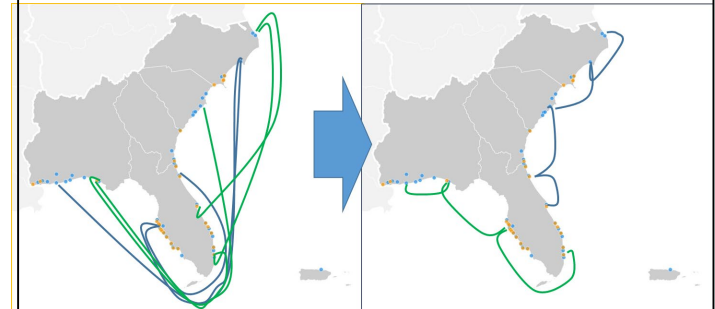
Channel Portfolio Tool



Corps Shoaling Analysis Tool



Dredge Fleet Scheduling Recommendations



Dredge Project Selection Suggestions

Systems-based approach, sorted by avg. funding

| Rank | Project Name |
|------|---|
| 1 | MISS RIVER - BR TO GULF (0000068) |
| 2 | MOBILE HARBOR (0011670) |
| 3 | DELAWARE RIVER; PHILADELPHIA TO THE SEA (0004570) |
| 4 | GULF INTRACOASTAL WATERWAY; TX (0007140) |
| 5 | SABINE-NECHES WATERWAY (0015780) |
| 6 | HOUSTON SHIP CHANNEL (0007780) |
| 7 | SAVANNAH HARBOR (0075085) |
| 8 | BALTIMORE HARBOR & CHANNELS; MD & VA (0074955) |
| 9 | PORTLAND HARBOR (0000367) |
| 10 | CALCASIEU RIVER AND PASS; LA (0002440) |

Current Practice, sorted by Pres. Budget Avg.

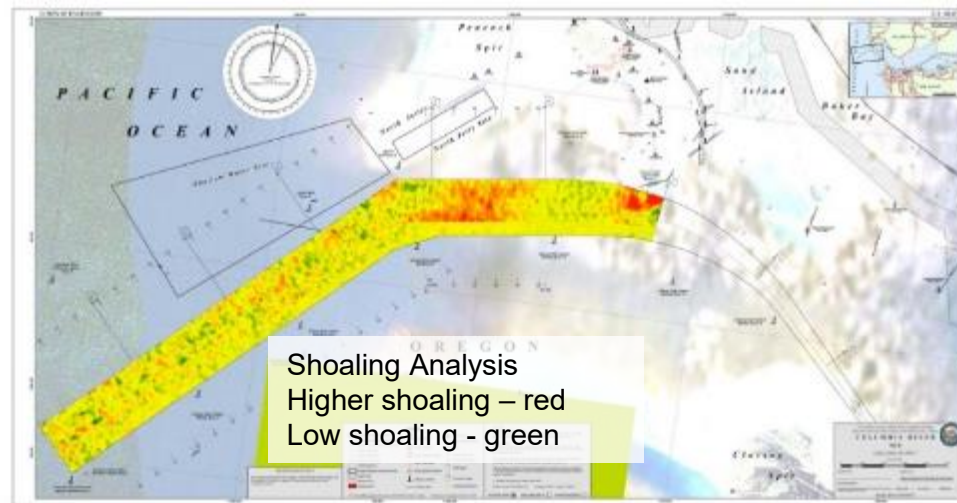
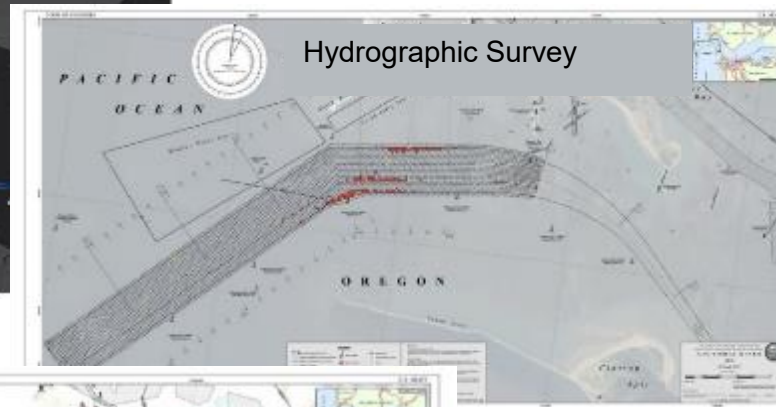
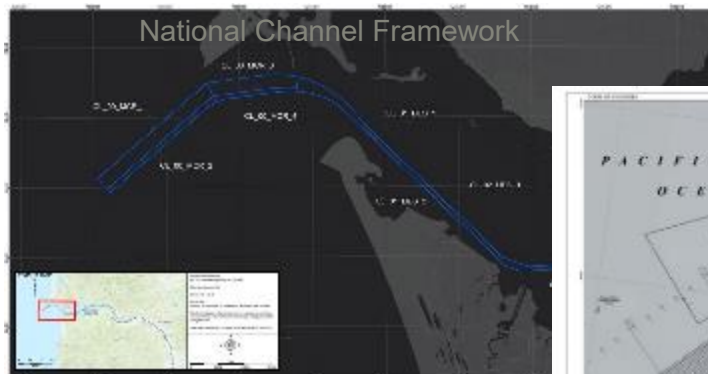
| Rank | Project Name |
|------|--|
| 1 | MISS RIVER - BR TO GULF (0000068) |
| 2 | GULF INTRACOASTAL WATERWAY, TX (0007140) |
| 3 | C AND LW RIVERS BELOW VANCOUVER WA & PORTLAND OR (0003630) |
| 4 | MOBILE HARBOR (0011670) |
| 5 | GULF INTRACOASTAL WATERWAY (NEW ORLEANS DISTRICT) (0000062) |
| 6 | DELAWARE RIVER, PHILADELPHIA TO THE SEA (0004570) |
| 7 | IWW DELAWARE RIVER TO CHESAPEAKE BAY (CHESAPEAKE AND DELAWARE CANAL) (0008160) |
| 8 | HOUSTON SHIP CHANNEL (0007780) |
| 9 | SAVANNAH HARBOR (0075085) |
| 10 | CALCASIEU RIVER AND PASS, LA (0002440) |

U.S. Army Corps of Engineers



CORPS SHOALING ANALYSIS TOOL

Historical shoaling rates to predict future dredging volumes at various channel depth intervals



**Shoaling rate prediction
for Columbia River, OR
using eHydro data**

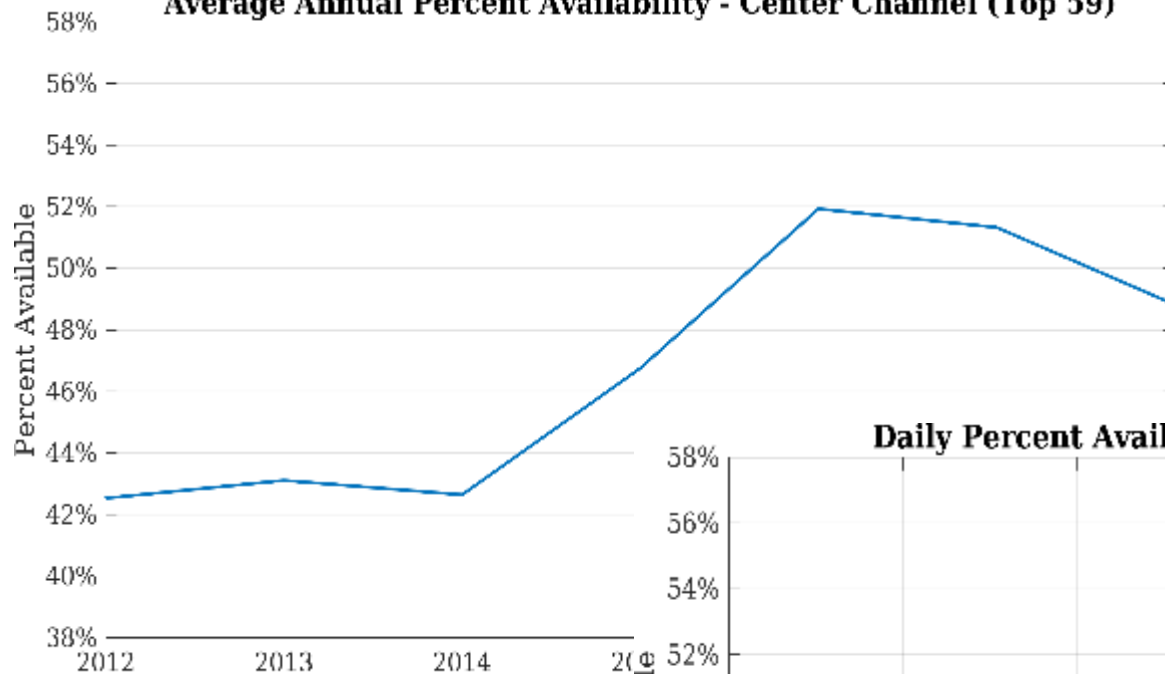


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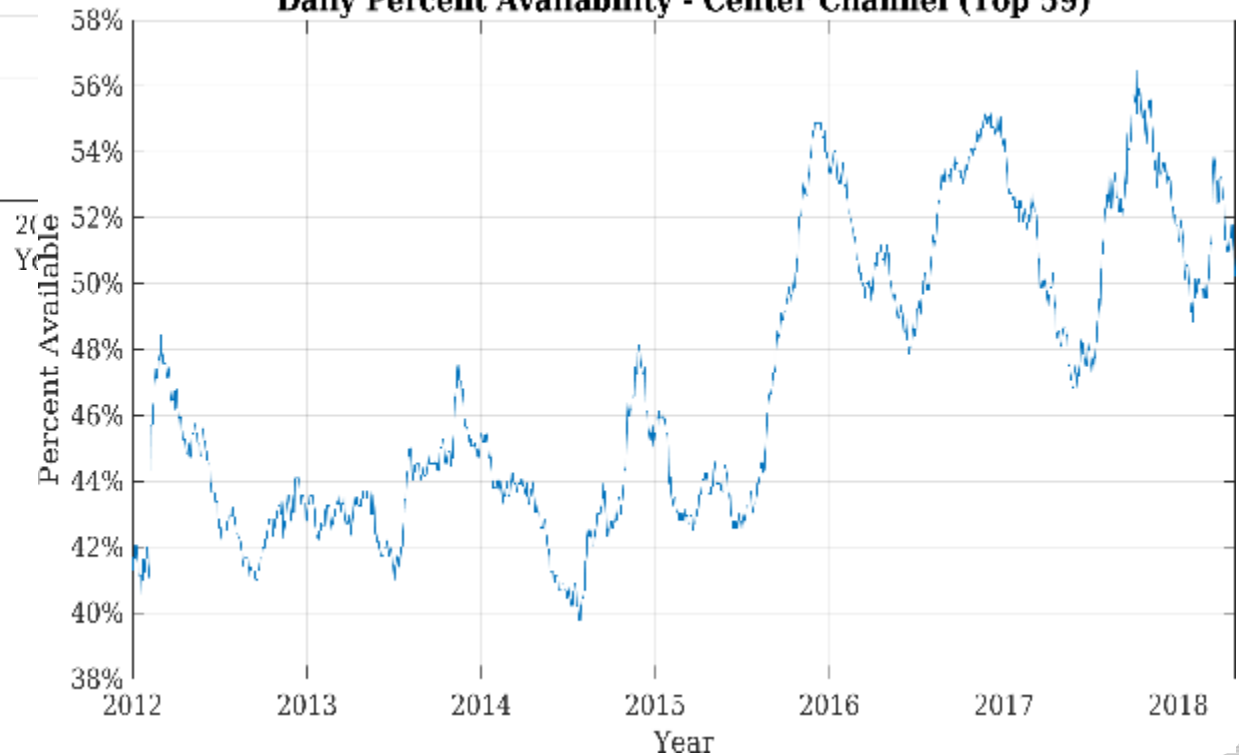


NATIONAL LEVEL VIEW – TOP 59 CHANNEL AVAILABILITY¹⁰

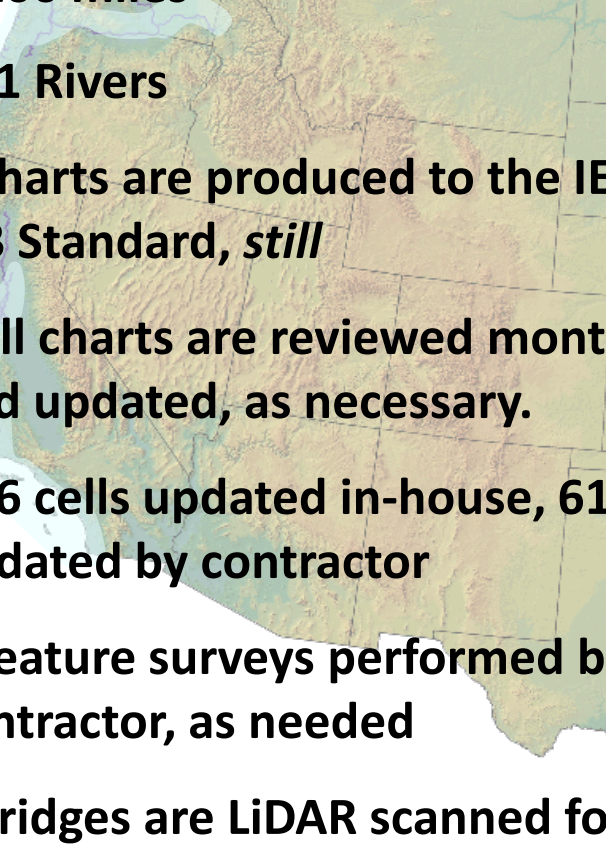
Average Annual Percent Availability - Center Channel (Top 59)

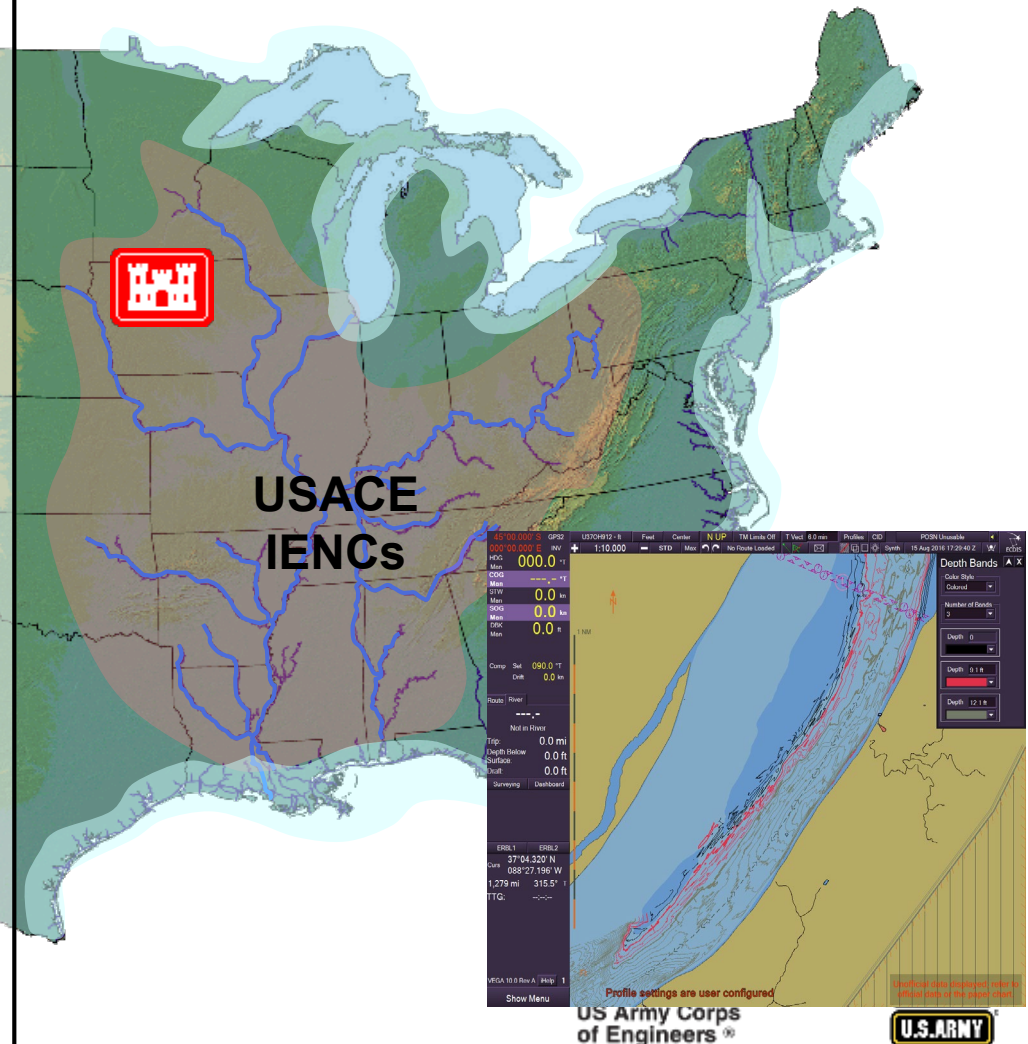


Daily Percent Availability - Center Channel (Top 59)



INLAND ELECTRONIC NAVIGATIONAL CHARTS

- 
- 107 IENC cells covering over 7,200 miles
 - 21 Rivers
 - Charts are produced to the IENC 2.3 Standard, *still*
 - All charts are reviewed monthly and updated, as necessary.
 - 46 cells updated in-house, 61 updated by contractor
 - Feature surveys performed by contractor, as needed
 - Bridges are LiDAR scanned for precise dimension and clearance data



IENC Overlays: USCG Buoys

- Buoy acquisition software installed on 18 USCG Cutters, 2 Aids to Navigation Teams, 3 USACE vessels
- USCG Cutters upload buoy data to USAIMS, which creates a tabular file of coordinates and identifying data
- USACE updates and publishes Buoy Overlay files, containing over 12,000 buoys, weekly, using locations sent automatically via email by the USCG



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IENC CLOUD PORTAL



- Amazon Web Service Geocloud Program through the Federal Geographic Data Committee (FGDC) ending September 2019.
- IENC Portal moving to Microsoft Azure L4 cloud services.
- ArcGIS Server 10.1 to be retained.

INLAND ELECTRONIC NAVIGATIONAL CHARTS

[HOME](#) [ABOUT](#) [BACKGROUND](#) [FEATURES](#) [LINKS](#) [CONTACT](#)

<https://www.ienccloud.us>

About

The U.S. inland navigation system consists of 8,200 miles of rivers maintained by the Corps of Engineers in 22 states, and includes 276 lock chambers with a total lift of 6,100 feet. The highly adaptable and effective system of barge navigation moves over 625 million tons of commodities annually, which includes coal, petroleum products, various other raw materials, food and farm products, chemicals, and manufactured goods (Reference Corps Navigation Data Center).

The shallow draft waterways have many unique characteristics and difficulties over coastal harbor and ocean navigation; river levels can change by over 30 feet in a seasonal cycle, the navigation channel can shift significantly within the river banks, and shifting yet ever present river currents pose constant challenges in these confined waterways. Electronic chart systems can offer significant benefits to vessels including accurate and real-time display of vessel position relative to waterway features, voyage planning and monitoring, training tools for new personnel and integrated display of river charts, radar, and Automatic Identification Systems.



2001

Year Established

700+

Data Products

7,260

miles of Electronically Charted Inland Waterways

13+...

Millions Data Products Downloaded

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INTERNATIONAL IENC STANDARDS AND DEVELOPMENT



- Non-Governmental International Organization recognized by IHO
- Organized to develop and to maintain a standard for IENCs world-wide
- Standard based on the existing standards of International Hydrographic Organization for 'maritime' ENCs (S-57)
- Currently working to align the S-401 IENC standard with the maritime S-101 standard

Members

| | |
|-------------|---------------|
| Austria | Belgium |
| Brazil | Bulgaria |
| China | Czech Rep |
| France | Germany |
| Hungary | Italy |
| Netherlands | Peru |
| Poland | Romania |
| Russia | Serbia |
| South Korea | United States |
| Venezuela | |

➤ **Next meeting: 22-24 October 2019 in New Orleans**

- **Updates to Encoding Guide and Product Specification**
- **Alignment of the Inland ENC Product Specification with S-101**
- **Election of the chairs, co-chairs and technical coordinators**

A One-Stop-Shop for all USACE
Paper Chart Books
– 21/22 Chart Books Available
• White River release TBD

Current production guidance
– EP 1130-2-520 NAVIGATION AND
DREDGING OPERATIONS AND
MAINTENANCE GUIDANCE AND
PROCEDURES


<https://bookstore.gpo.gov/agency/1784>



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RIVER NEWS: IENCS NOW SATISFY CARRIAGE REQUIREMENTS!!

| | | |
|---|---|---|
| U.S. Department of Homeland Security United States Coast Guard |  | Commandant United States Coast Guard 2703 Martin Luther King Jr Ave, SE, STOP 7418 Washington, DC 20593-7501 Staff Symbol: CG-NAV-2 Phone: (202) 372-1565 Fax: (202) 475-4173 Email: cgnav@uscg.mil |
|---|---|---|

COMDTCHANGE NOTE 16700.4
10 July 17

COMMANDANT CHANGE NOTICE 16700.4

Subj: CH-1 TO USE OF ELECTRONIC CHARTS AND PUBLICATIONS IN LIEU OF
PAPER CHARTS, MAPS AND PUBLICATIONS, NVIC 01-16, COMDTPUB 16700.4

Ref: (a) Title 33, Code of Federal Regulations, Parts 164 and 161
(b) Title 46, Code of Federal Regulations, various Parts

- PURPOSE.** This Commandant Change Notice publishes a change to *Use of Electronic Charts and Publications in Lieu of Paper Charts, Maps and Publications*, Navigation and Vessel Inspection Circular number 01-16, 16700.4.
- ACTION.** Officers in Charge, Marine Inspection (OCMI) should bring this Notice to the attention of marine inspectors and the maritime industry within their zones of responsibility. Internet release authorized.

**Commandant
Change Notice: use
of Electronic Charts
and Publications *IN
LIEU OF* Paper
Charts**

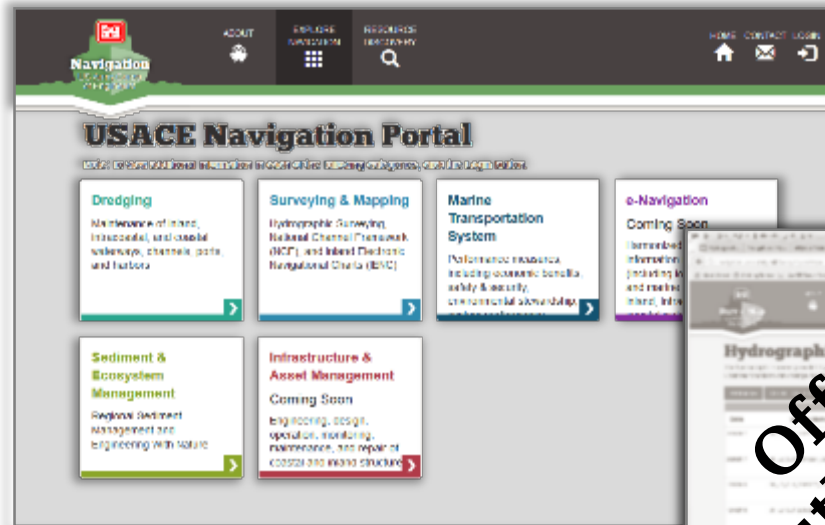


??? Will paper charts continue to be needed ???

- IENCS and ECS are used by virtually all river commercial vessels
- IENCS are far more accurate and up-to-date, and offer more navigation information
- Paper chart books are a cost burden on channel maintenance programs

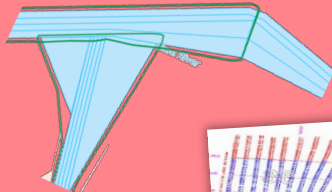
eHydro

Application and Reporting Process



District

eHydro Application
esri



Framework



Surveys



**Channel Maintenance and
Construction Activities**



eHydro Reporting Districts

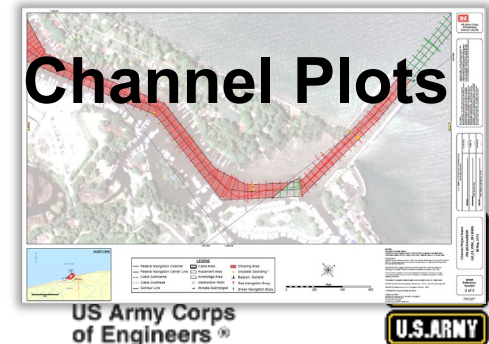
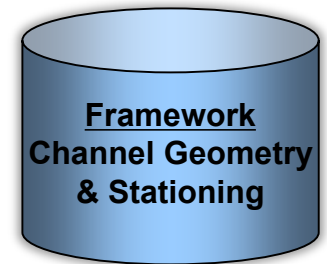
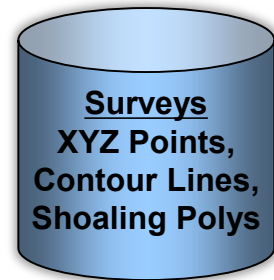
Coastal

| | |
|--------------|---------------|
| New England | Galveston |
| New York | Los Angeles |
| Philadelphia | San Francisco |
| Baltimore | Sacramento |
| Norfolk | Portland |
| Wilmington | Seattle |
| Charleston | Alaska |
| Savannah | Honolulu |
| Jacksonville | Buffalo |
| Mobile | Detroit |
| New Orleans | Chicago |

Inland

| | |
|-------------|-------------|
| New Orleans | Mobile |
| Vicksburg | Pittsburgh |
| Memphis | Huntington |
| St. Louis | Nashville |
| Rock Island | Louisville |
| St. Paul | Little Rock |
| Kansas City | Tulsa |
| Omaha | |

eHydro



eHydro Portal

USACE Hydrographic Surveys powered by eHydro

USACE District:
All

USACE Channel:
All

Channel ID:
All

Survey Date Range:
All Surveys Last 60 days
Custom Date Range

Use the dropdown menus or simply pan and zoom on the map to filter the Hydrographic Survey data.

Use any combination to drill down to the data you are interested in. To remove the filter, set the filter to "All".

Select Survey:
To download a survey, either click Download Data in the Survey List below or click on a survey footprint (green area) and then click Download Data.

District: CENAO
Name: DEEP CREEK (AIWW)
Survey ID: IW_05_ADC_20180208_CS
Survey Date: 2/7/2018
[Download Data](#)

District: CENAO
Name: CRANEY ISLAND REHANDLING BASIN
Survey ID: NH_11_CIR_20171218_CS
Survey Date: 12/17/2017
[Download Data](#)

District: CENAO
Name: HAMPTON
Last update: a few seconds ago

[Survey List](#)

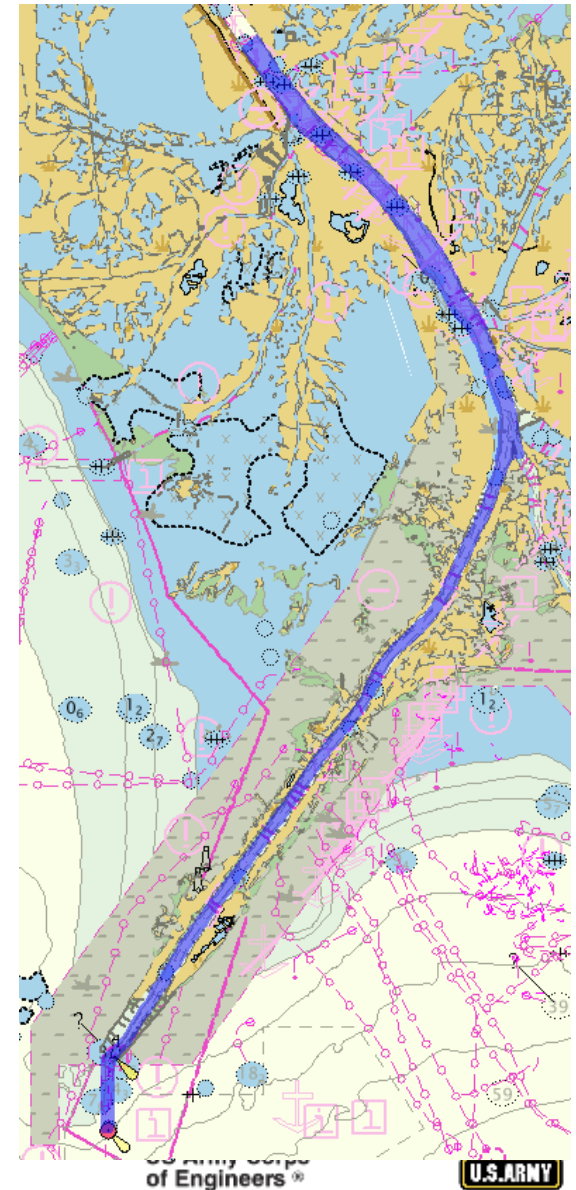
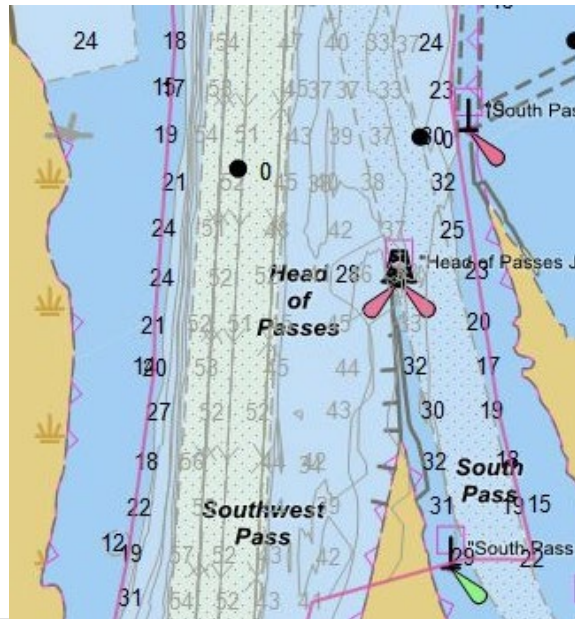
Number of Surveys
30,898
1,079 last 60 days
Last update: a minute ago

Earthstar Geographics, CNES/Airbus DS | USACE |

IENC OVERLAY: MISSISSIPPI RIVER (SOUTHWEST PASS)

- USACE survey data for SW Pass → updated weekly
- Overlay file, 3UASW000 overlays on NOAA ENC's (US4LA30M & US4LA33M)
- USACE Survey data for 3 other areas on the Lower MS River → updated monthly or as needed

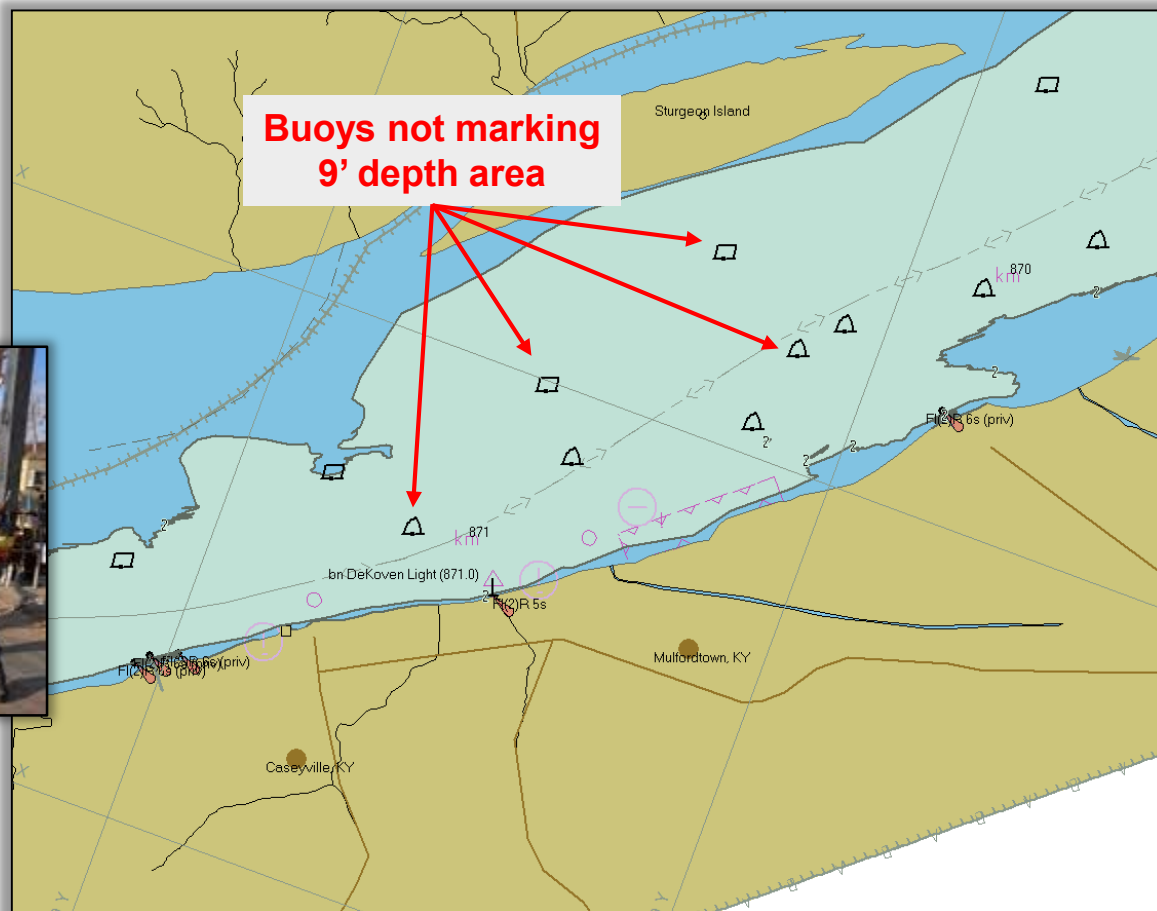
Overlays have fulfilled critical need during shoaling and draft restrictions!



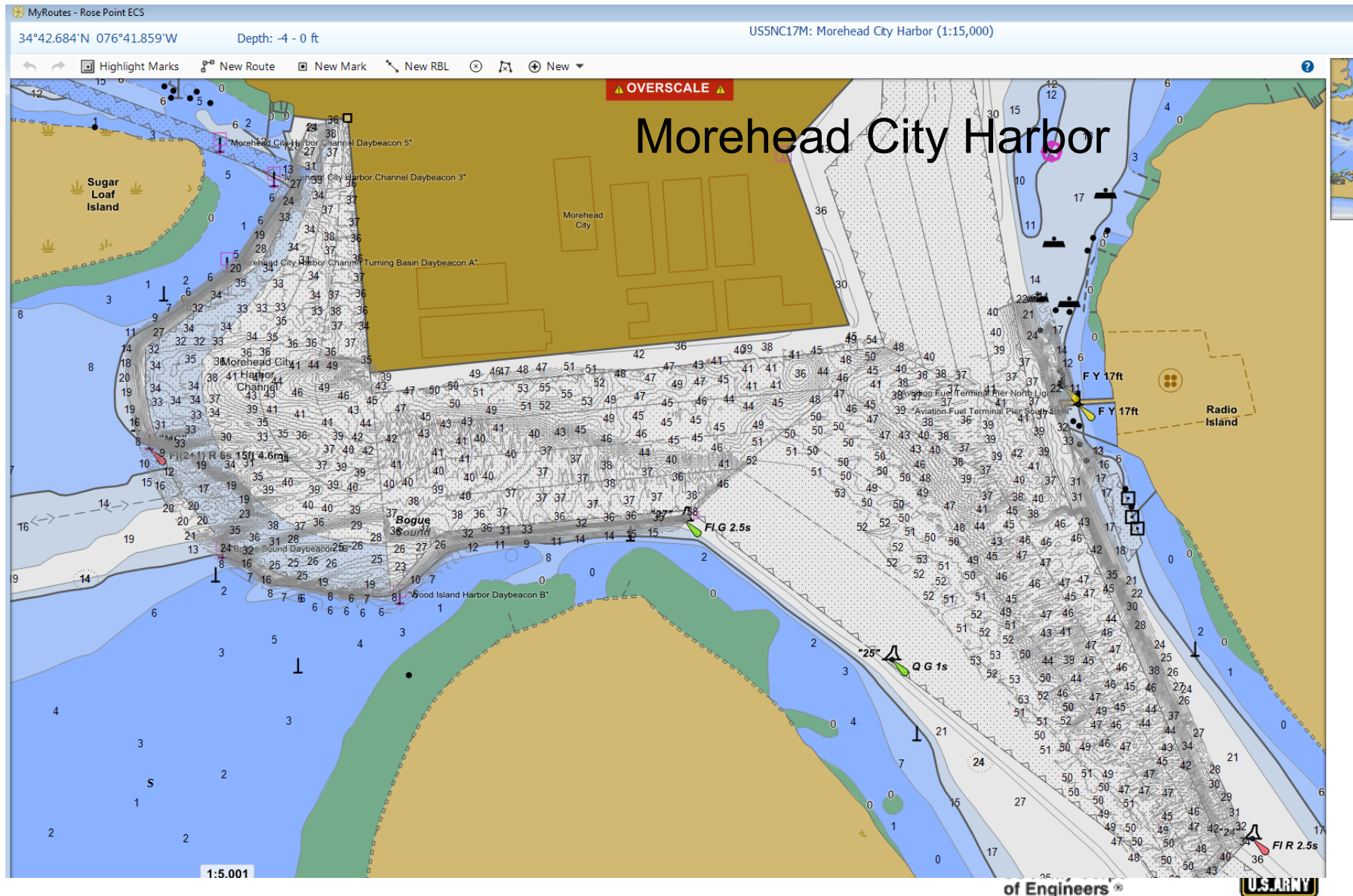
Federal Agency Need:

Buoy Placement On Inland Waterways

- USCG river tenders need latest conditions to place buoys
- Chart overlay needed to guide operators

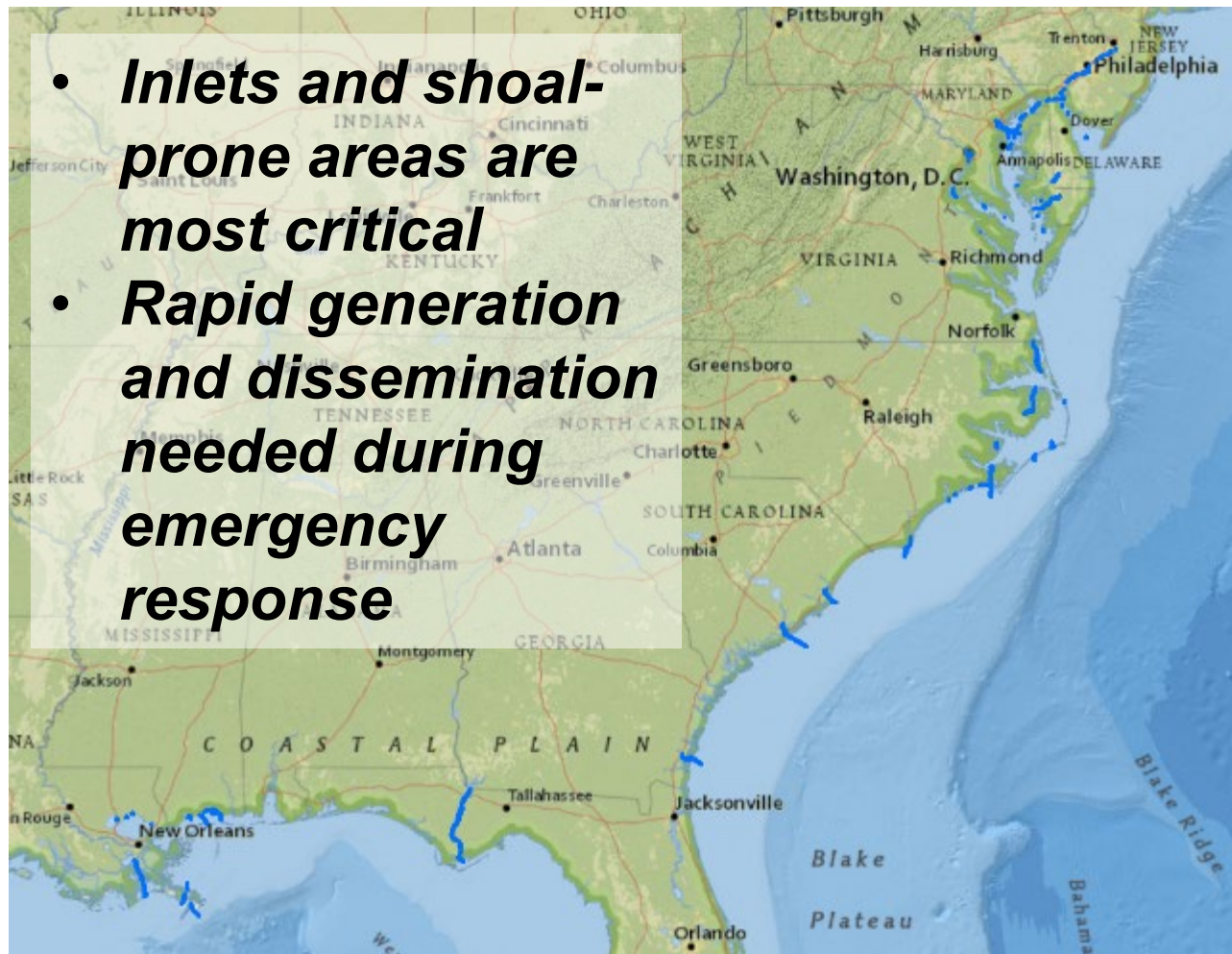


Sample Coastal Survey Overlay from eHydro



Locations of Coastal Overlays

- ***Inlets and shoal-prone areas are most critical***
- ***Rapid generation and dissemination needed during emergency response***

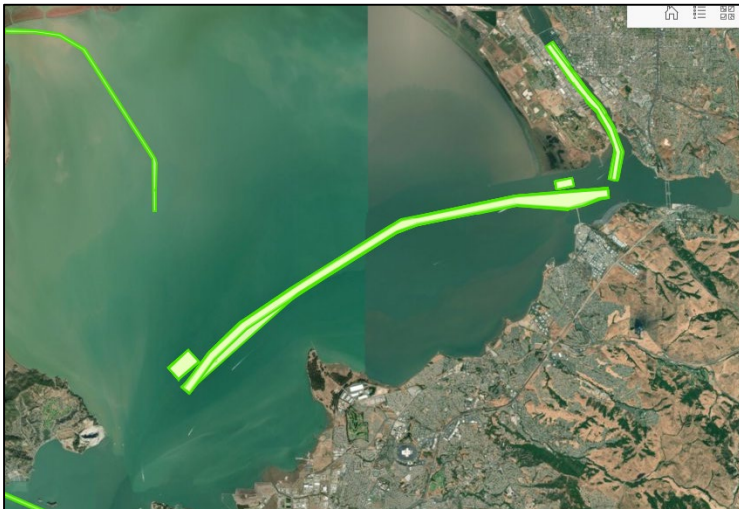
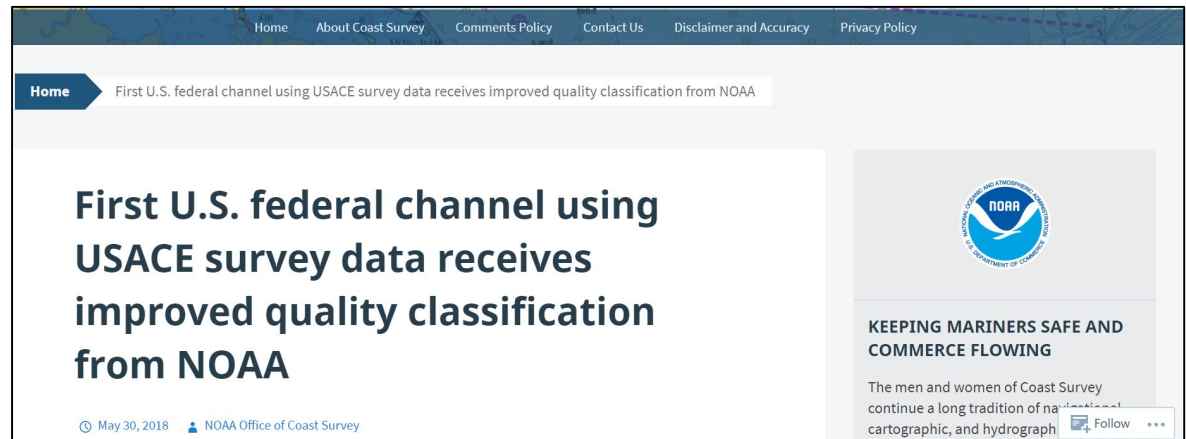


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CATZOC Improvement

DE River chart improved to A2 after Philadelphia District survey equipment and procedures certified



Possible CATZOC improvement in SF Bay being coordinated with SF District

**Objective:
Map CATZOC standards to USACE survey standards, so all ports and channels can be evaluated**

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