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

NOAA Open House on Nautical Cartography
26 July 2019

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

• Navigation Program and challenges
• IENC update
• eHydro update
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
**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
- Some vessels include:
  - Surface LiDAR
  - Magnetometer
  - Side-scan
- Four Autonomous Survey Vehicles

*Contractor services also used*
CONSTRUCTION PROJECTS IN FY18
REGULAR APPROPRIATION
($10 M or More)

Numbers in circles = $million budgeted
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
2017-2018 Emergency Response Channel Re-Openings
Multiple ports surveyed and re-opened following hurricane activity

**Hurricanes**
- Harvey
- Irma
- Maria
- Florence
- Michael

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

*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*
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
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

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CORPS SHOALING ANALYSIS TOOL

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

Shoaling Analysis
Higher shoaling – red
Low shoaling - green

Shoaling rate prediction for Columbia River, OR using eHydro data
NATIONAL LEVEL VIEW – TOP 59 CHANNEL AVAILABILITY

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
– 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.

https://www.ienccloud.us
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

➢ 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

Members

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Inland ENC Harmonization Group
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
RIVER NEWS: IENCS NOW SATISFY CARRIAGE REQUIREMENTS!!

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

- 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

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

Surveys
XYZ Points, Contour Lines, Shoaling Polys

Framework
Channel Geometry & Stationing

Metadata

Channel Availability Reports

Channel Plots

US Army Corps of Engineers
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

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

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

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".
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

Buoys not marking 9’ depth area
Sample Coastal Survey Overlay from eHydro

Morehead City Harbor
Locations of Coastal Overlays

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