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

NOAA Open House on Nautical Cartography
27 July 2018

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Headquarters, Directorate of Research and Development
441 G St, NW
Washington, DC
INLAND NAVIGATION ASSETS
27 Inland River Systems
207 lock chambers @ 171 lock sites
12,000 miles of inland river channels

COASTAL NAVIGATION ASSETS
19 lock chambers
13,000 miles of channels
929 navigation structures
844 bridges

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

55 Inhouse Hydrographic Survey Vessels
INLAND ENC COVERAGE IN USA

- 107 IENC cells covering over 7,200 miles
- 21 Rivers
- Charts are produced to the IENC 2.3 Standard
- All charts are reviewed monthly and updated, as necessary.
Welcome to the IENC Chart Discrepancy Reporting System

The IENC Chart Discrepancy Reporting System provides registered users the opportunity to report inaccuracies in and problems with IENC charts.

Do You Need An Account?
If you are not a registered user, click the button below.

Register For An Account

Registered Users:
If you are a registered user, log in here.

Login To My Account
IENC CLOUD BACKGROUND

– Federal Geographic Data Committee (FGDC) issued an RFP in Dec, 2011 to sponsor pilot project with 10 Federal agencies to distribute their public data free for one year on Amazon Web Services (cloud), ending March, 2013. Named the Geocloud Program.

– IENC was chosen because of relatively small dataset and expertise with ArcGIS. Approval was given by CIO, USACE to distribute public navigation data on AWS

– https://www.ienccloud.us
IENC CLOUD BACKGROUND

- Advantages include
  - very high reliability of server performance
  - cost effective data hosting
  - scalable CPU availability
  - remote access for data updates

- ArcGIS Server 10.1
  - Over 6000 GIS layers uploaded
  - Clients
    - ArcMap, ArcGIS Explorer
    - ArcGIS JavaScript
    - Google Earth
    - ArcGIS.com

- Experienced over 9 million downloads
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

<table>
<thead>
<tr>
<th>Austria</th>
<th>Belgium</th>
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<tr>
<td>Brazil</td>
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<td>South Korea</td>
<td>United States</td>
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<td>Venezuela</td>
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Examples of unique features found in waterways which are not found in maritime waters

- Casino / Gaming Boats
- Fleeting Areas
- Ice Breakers
- Lock Guide Walls
- Exceptional Navigation Structures (Lift bridges/viaducts)
Traffic patterns and density obtained from AIS feeds

Old – White
New - Orange
INLAND CHART BOOKS – STILL PRODUCED AND AVAILABLE

- Compiled from Computer-Aided Design and Drafting files
- Working toward common database with IENCs
A One-Stop-Shop for all USACE Paper Chart Books

- 20/22 Chart Books Available
  - 1 to be released in 2017
  - 1 to be released in 2018

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

https://bookstore.gpo.gov/agency/1784
Navigation Channel Data Needs

Division, Headquarters

District

Hydrographic Surveys

Framework

Channel Maintenance and Construction Activities

Performance based Budgeting

Asset Management

Shoaling Analysis

Channel Conditions vs Draft/Tonnage

X,y,z
2317765.70,186583.60,-38.20
2317758.10,186615.10,-38.30
2317746.50,186660.10,-38.20
2317741.20,186689.80,-38.20
2317733.00,186738.20,-37.10
2317733.60,186768.50,-34.30
2317738.90,186803.20,-34.40
2317758.70,186972.80,-38.60
2317761.30,187002.80,-38.60
2317768.60,187111.80,-39.20
2317772.20,187149.70,-39.30
2317778.40,187212.80,-39.10
2317781.30,187249.30,-39.10
2317786.20,187319.80,-39.10
2317788.10,187353.80,-39.20
2317792.00,187434.80,-39.50
eHydro Application and Reporting Process

- District
  - eHydro Application
    - esri
  - Framework
  - Surveys
  - Channel Maintenance and Construction Activities

- Official, Authoritative Data

- eHydro Application
  - USACE Navigation Portal
    - Dredging
    - Surveying & Mapping
    - Marine Transportation System
    - Sediment & Ecosystem Management
    - Infrastructure & Asset Management
    - e-Navigation

eHydro Outputs

- Surveys XYZ Points, Contour Lines, Shoaling Polys
- Framework Channel Geometry & Stationing
- Channel Plots
- Channel Availability Reports
- Channel Condition Reports
- Metadata

Table: Minimum Depths in Each 1/4 Width of Channel Entering From Seaward

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<tr>
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<th>Left Outside Quarter (feet)</th>
<th>Middle Half (feet)</th>
<th>Right Outside Quarter (feet)</th>
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eHydro Portal

USACE Hydrographic Surveys powered by eHydro

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.

Survey List:
- District: CENAO
- Name: DEEP CREEK (AIWW)
- Survey ID: RW_05_ADC_20180208_C
- Survey Date: 2/7/2018
  - Download Data

- District: CENAO
- Name: GRANEY ISLAND REHANGLING BASIN
- Survey ID: NH_11_CIR_20171218_C
- Survey Date: 12/17/2017
  - Download Data

- District: CENAO
- Name: HAMPTON
  - Last update: a few seconds ago
  - Download Data

Number of Surveys:
- 30,898
- 1,079 last 60 days

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".
Inland eHydro Channel Analysis

- AIS-generated sailing line plotted between shorelines
- Critical navigation depth contour plotted from the survey
- Lines perpendicular to the sailing line, known as “fishbones”, are plotted
- Fishbones trimmed to 9’ contour, and only longest continuous pieces of fishbones that intersect the sailing line are retained.
- Shortest line, highlighted in this example – 487’, represents the most constrained section of channel.
CORPS SHOALING ANALYSIS TOOL

- Use historical survey data from eHydro and generate difference grid sets between dredging events
- Predict average shoaling rates and dredging requirements per channel reach
- Report volumes at different depth/time intervals and shoaling rates
- Efficiently process large spatial datasets
- Outputs to users: map, shoaling rate table
RIVER CONSTRUCTION NOTICE TO INDUSTRY

Full Time Locking Olmsted Locks and Dam

Olmsted Locks & Dam
MILE 964.6
TELEPHONE 502-315-7300
TELEPHONE 502-315-7301
MARINE CHANNEL 13

CONTACT WORK BOATS
- M/V GORDON STEVENS 270-748-2596
- M/V LIBSCOMB 270-823-3156

OHIO RIVER

CHART NO. 4D - Facing Page
Olmsted Locks and Dam August/September 2015
IENC OVERLAY: MISSISSIPPI RIVER (SOUTHWEST PASS)

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

 ENC displayed in electronic chart system on Coast Guard river tender;

- ENC overlay from eHydro process displayed,
- Optimum buoy positions based on river stage computed and displayed

Red/Green line placed for e-AtoN Movement; e-AtoN will “move” along with changing gage
IENC OVERLAYS: USCG BUOY PLACEMENT DURING LOW WATER EVENT 2012

- USACE Survey data \(\rightarrow\) USCG for rock pinnacle area on Upper Miss River near Grand Chain
- USCG Cutters used surveys to place buoys
- USCG \(\rightarrow\) Excel file with Buoy Locations
- USACE created Buoy Overlay for USCG & Towing
Sample Coastal Survey Overlay from eHydro

Morehead City Harbor
IENC Overlays: Chart U37UM079 with Proposed Fleet & Low Water Buoy Overlay (3UAJCPAF)