

CARIS & IENC *Case Study*

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Cartographer

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Brief Overview of CARIS

- Over 30 Years in the GIS Software Development
- CARIS software in 80+ countries
- 180 employees
 - Canada, Netherlands, USA, Australia, UK
 - Developers, Technical Support, QA, Project Management, Sales, Marketing
- Industry leading team of Technical Support professionals with industry and academic experience, and many languages
- 20+ Alliance Companies in other countries
- ISO 9001:2008 certified
- Focused on the use and development of GIS standards
 - OGC, ISO/TC 211, IHO, ONSWG, MSDIWG



CARIS Ping-to-Chart Workflow

PROCESSING



CARIS
Notebook

ANALYSIS



CARIS
BASE Editor



PRODUCTION



DISCOVERY



WORKFLOW MANAGEMENT



CARIS 2014

15th International User Group Conference

Developing the Blue Economy À l'appui de l'Économie Bleue



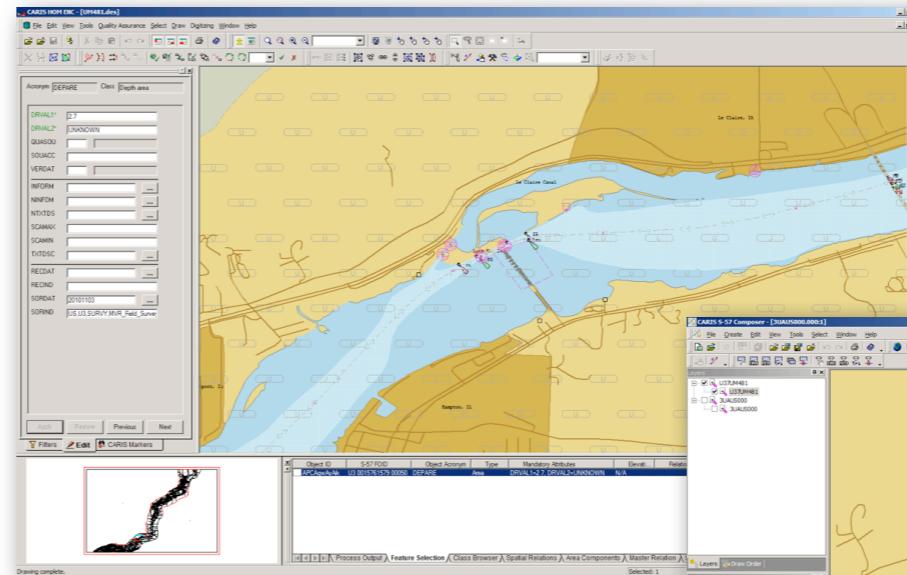
CARIS 2014

June 2-5 | Brest, France | 2-5 juin

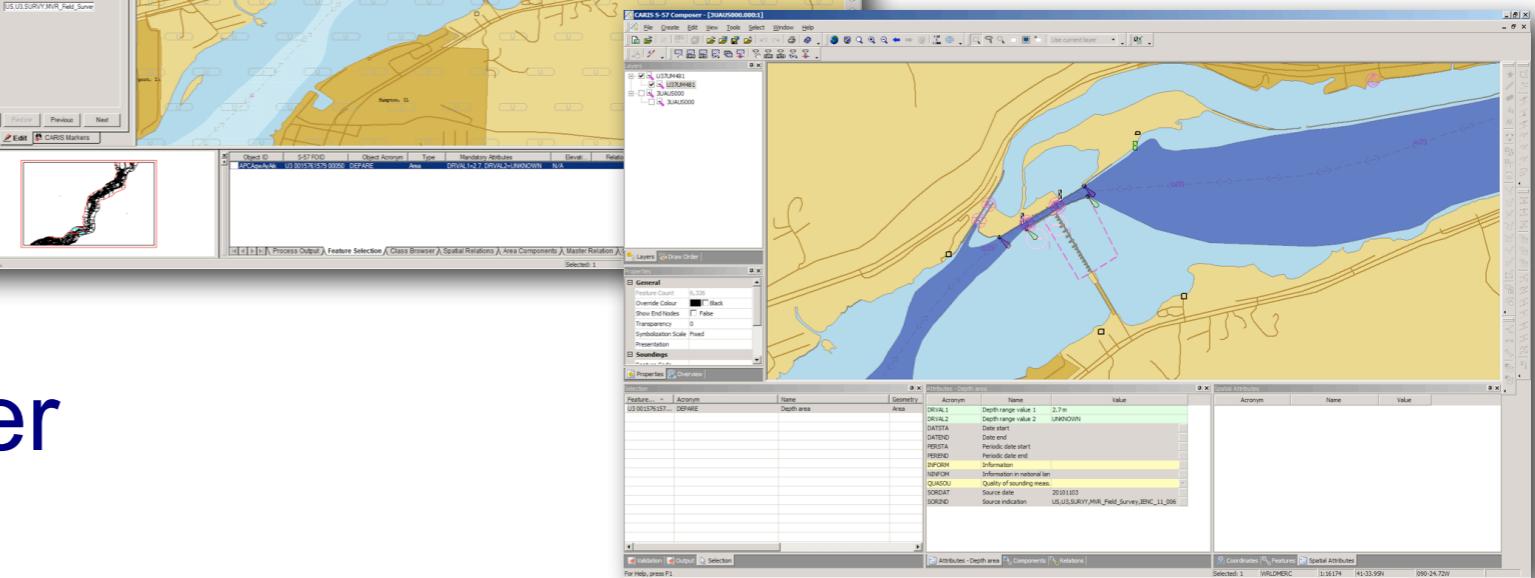
caris
www.caris.com

CARIS IENC Support

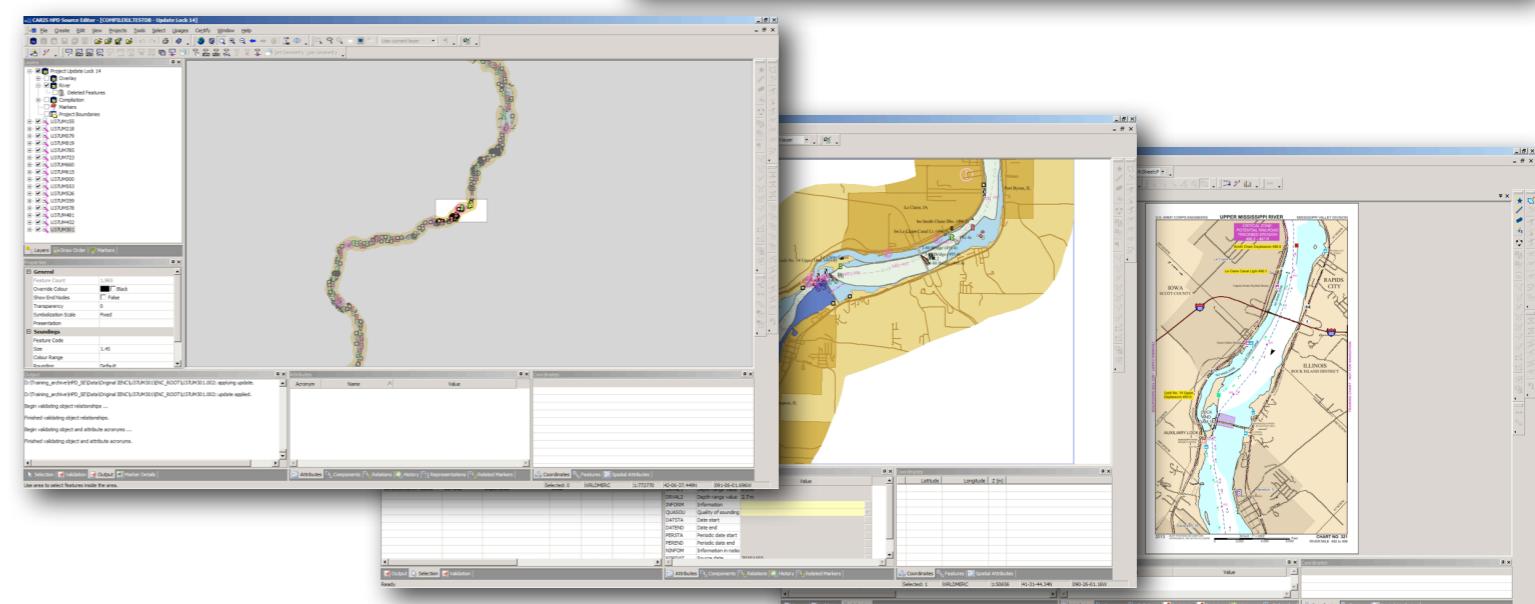
- CARIS HOM
 - 1990's to 2006
 - IENC 1.0
 - USACE IENC 3.1, 4.0



- CARIS S-57 Composer
 - 2008 ➔
 - IENC 2.0, 2.1, 2.2, 2.3
 - USACE IENC 4.0

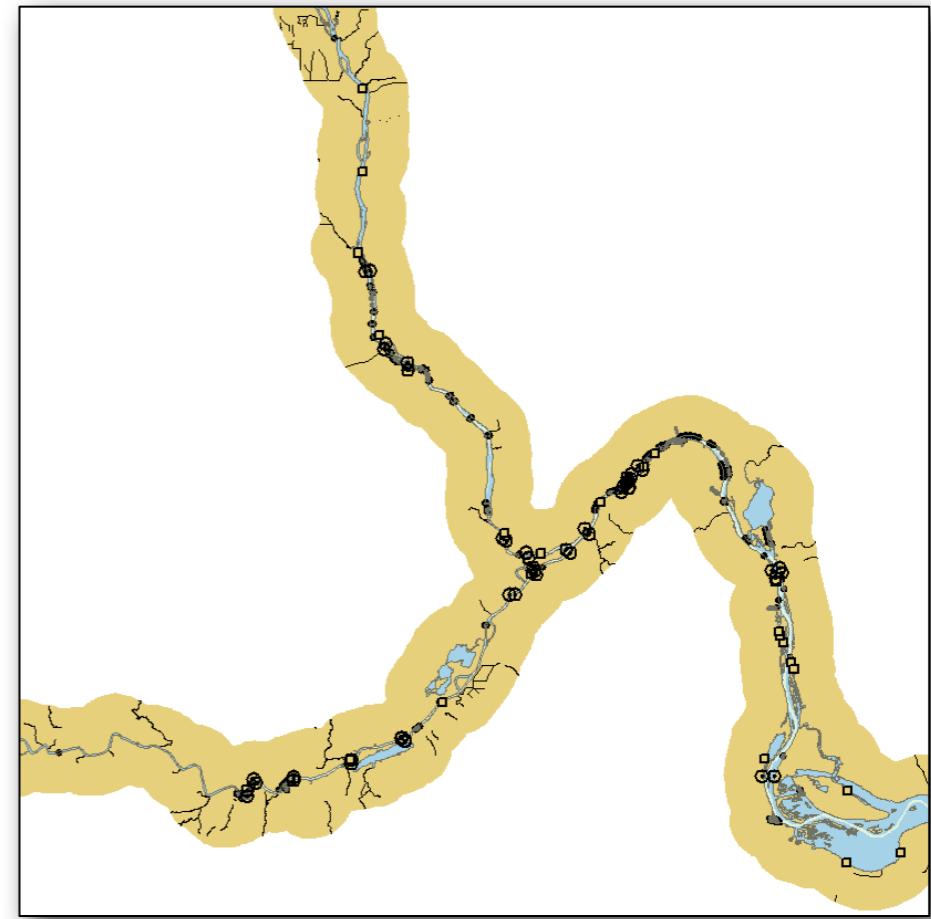


- CARIS HPD
 - IENC 2.0, 2.1, 2.2, 2.3



USACE & CARIS Charting

- CARIS HOM
 - 2005-2008
 - QA of USACE IENC 4.0
- CARIS S-57 Composer
 - 2008 - ...
 - QA of USACE IENC 4.0
 - Creation of IENC 2.2
 - Conversion of USACE IENC 4.0 to IENC 2.2
 - Creation of IENC 2.2 Overlays
 - USCG Channel Buoys
 - Low water hazards



Hydro International, Dec 2005

Feature

Reprinted from
Hydro
INTERNATIONAL

In 2001, the US Army Corps of Engineers (USACE) began to produce Inland Electronic Navigational Charts (IENCs) for US waterways. A paper chart was made from IENC data by IIC, working with the Corps; now improved HPD technology has been used to further investigate this concept and its ramifications for multiple product consistency, currency and ease of production.

By Ralph A. Scheid, US Army Corps of Engineers, New Orleans District, New Orleans, Louisiana, USA and Ed Kuwalek, IIC Technologies, North Vancouver, BC, Canada

US Army IENCs and Hydrographic Database Technology

An essential feature of any charting programme is continual maintenance and dissemination of consistent, updated and significant products. With recent advances in Hydrographic Product Database (HPD) technology it is now possible to link and merge paper-chart and IENC production. Since USACE paper charts vary in currency, format and presentation, new production methods are being explored. As part of its navigation programme the US Army Corps of Engineers provides nautical charts for more than 9,100 miles of inland waterways in 23 different river/waterway systems. Thirty-five of the forty-five Corps District & Division offices independently contribute to or publish navigation charts. These chart folios are based on satisfying local needs and requirements, resulting in numerous variations in physical format, size, symbol-set and publication frequency.

Inland Waterway IENCs

In 2001, the Corps initiated an electronic-chart programme to develop and support new digital charts for electronic navigation on US inland waterways. The programme began by transforming existing digital river data and digital chart data into a new product: the Inland Electronic Navigational Chart (IENC). As of September 2004, 56 IENC cells have

been produced and published online. Updating navigation charts, whether paper or electronic, is an essential safety element for any vessel. Numerous changes regularly occur in the river system, including channel dredging, construction, navigation-aid maintenance and natural variations in river bottom. Once significant changes occur a new edition chart is often published. Currently, the IENC programme is producing new-edition electronic charts and updating them at a faster pace than does the Corps

paper-chart programme, where chart editions may be five to seven years old and must be updated manually.

Mississippi River

In 2003, in conjunction with the USACE, IIC and 30001 Inc. developed a prototype paper chart derived from Mississippi River IENC data. The principal objective of this project was to determine the practicality of producing paper-chart products from IENC data using existing CARIS GIS and



Figure 1: Currently published IENCs for the US Inland Waterways.

Hydro INTERNATIONAL

USACE HPD Trial Project Timeline

Q4 2011

- *CARIS HPD for IENC Production*

White Paper

White Paper

CARIS Hydrographic Production Database

*A Cost-Effective Production Environment for
Inland Electronic Navigational Chart Production*

- Pilot Project Proposal

– Trial of HPD in a District

- CARIS HPD Live Demo

– Source, IENC & Paper charts

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USACE HPD Trial Project Timeline

2012

- Rock Island District selected for Pilot Project
- Creation of custom support files
 - Paper chart symbology
 - IENC 2.2 > USACE IENC 4.0 mapping
- CARIS HPD Source Training - Dec 2012
 - *Source Editor & Administration*
- CARIS HPD Products Training - Feb 2013
 - *Product Editor & Paper Chart Editor*

USACE HPD Trial Project Timeline

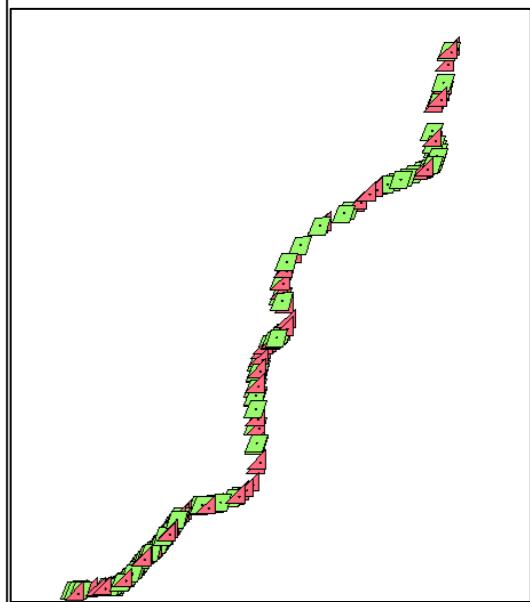
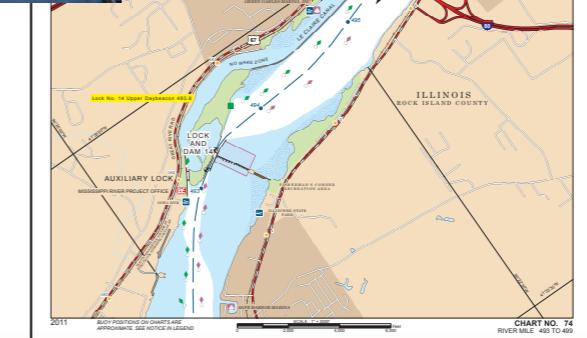
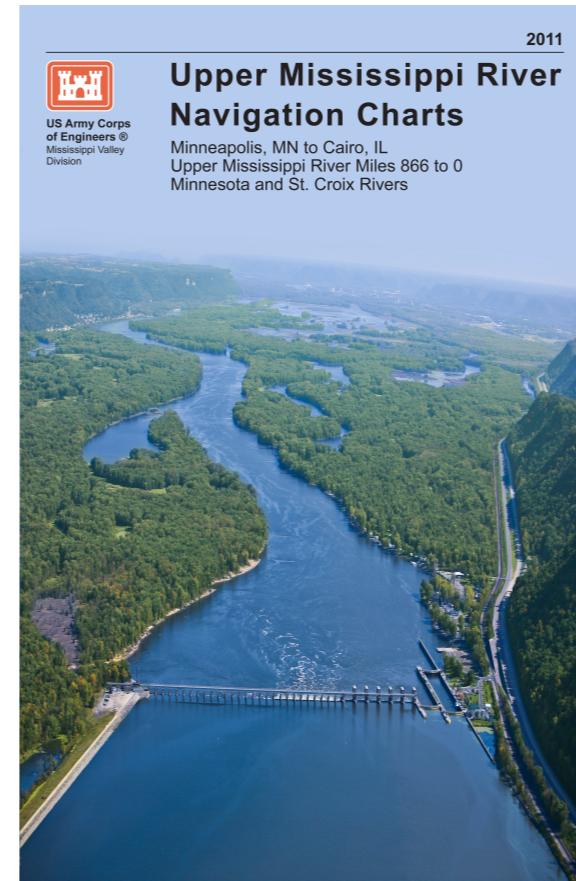
- Pilot HPD database, Dec 2012
 - Setup and loading
 - Source Additions
 - Source Maintenance (ongoing)
- IENC Program Review, May 2013
 - USACE Project Status Update Presentation/Demo
 - Via WiFi from 4G router!

USACE Product Requirements

- IENC 2.2
- *USACE IENC 4.0*

- River Chartlets

- IENC 2.2 Overlays
 - *Buoys Overlays*
 - *Low water Hazards*



Paper Chart Symbol Examples



Boat Ramp



Marina



USACE Building



Arrival Point



Interstate Sign



Highway Sign



Buoy - red / green



Buoy - green, can



Light - red



Light - green



Light - yellow



Light - white



Rock Wall

Helicopter
Landing sitePower
Transmission Pylon

Daymark - TR



Gauge - USGS



Daymark - NG

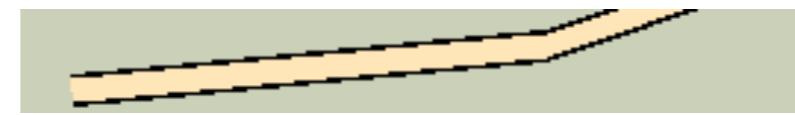
Paper Chart Line Symbol Examples



Road, Interstate



Road Highway



Road, local

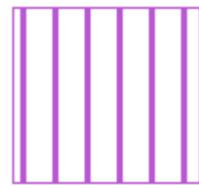


Road Unimproved (Grey Dash)



Road Tunnel (purple dash)

Paper Chart Area Symbol Examples



Marina



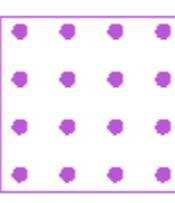
Submerged Utility



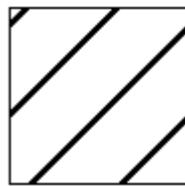
Land



Lock Chamber



Caution Area



Land Restricted



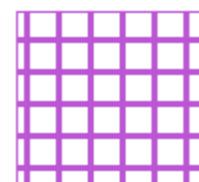
Dam



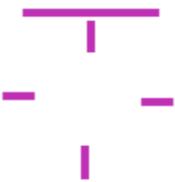
Restricted Area



Public Land



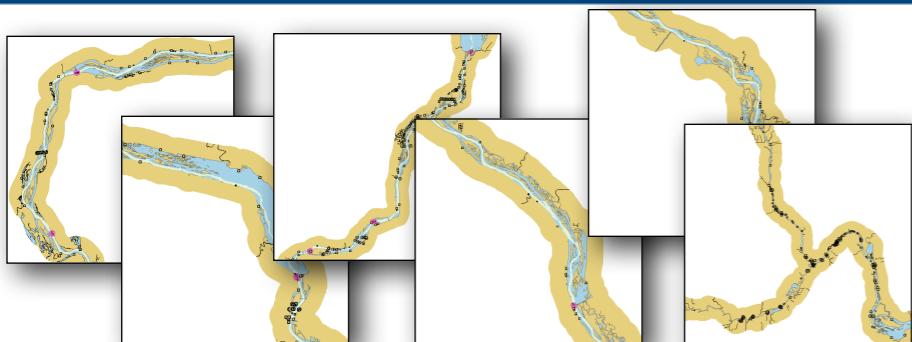
Vessel Traffic Service Area



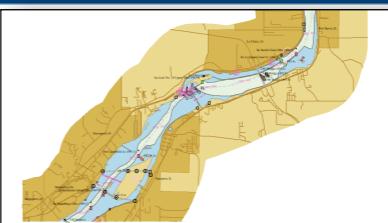
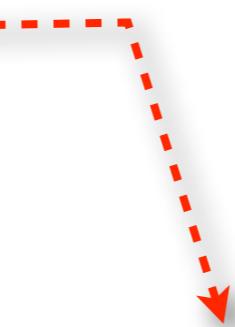
Hazard Zone



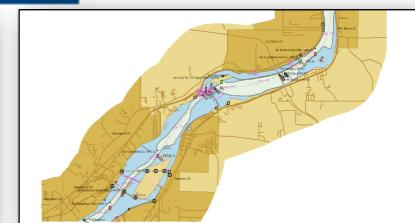
Runway



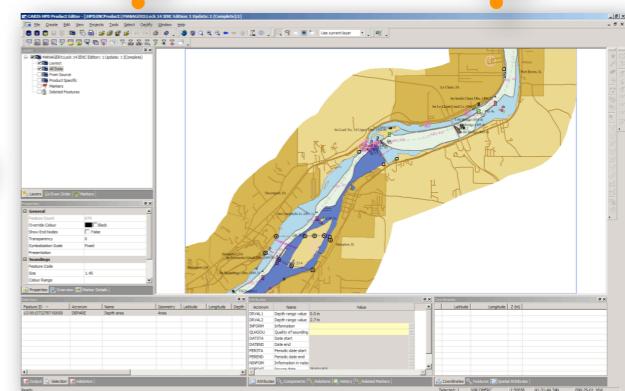
Bulk Load of Existing IENC 2.2 cells



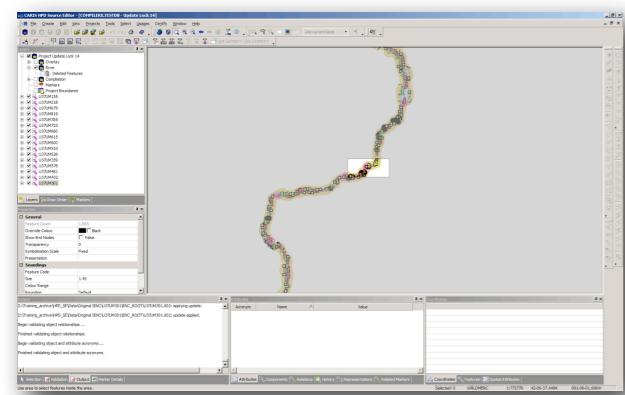
IENC 2.2



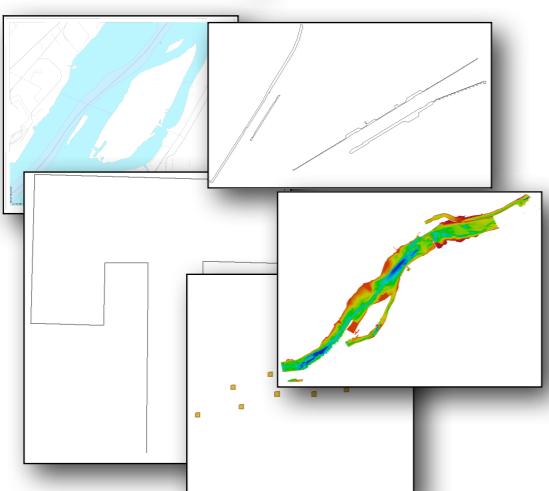
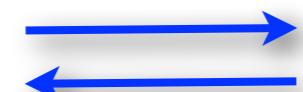
USACE IENC 4.0



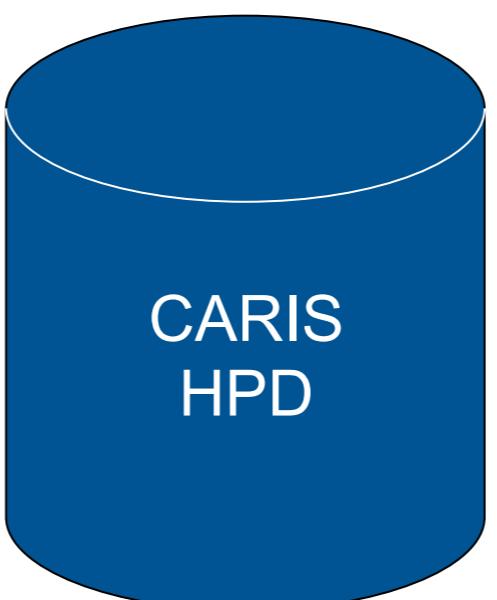
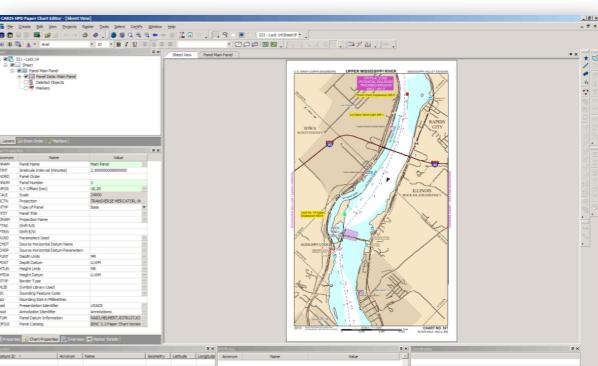
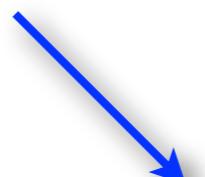
CARIS HPD Product Editor



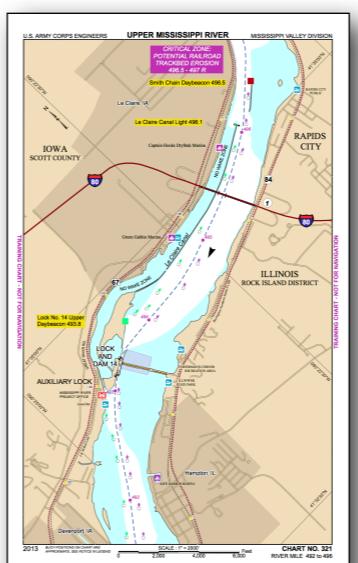
CARIS HPD Source Editor



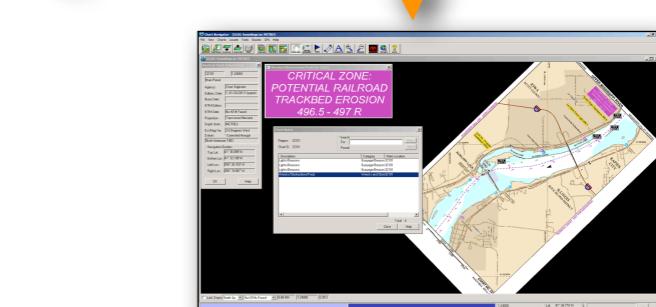
Other Source Data

CARIS
HPD

CARIS HPD Paper Chart Editor



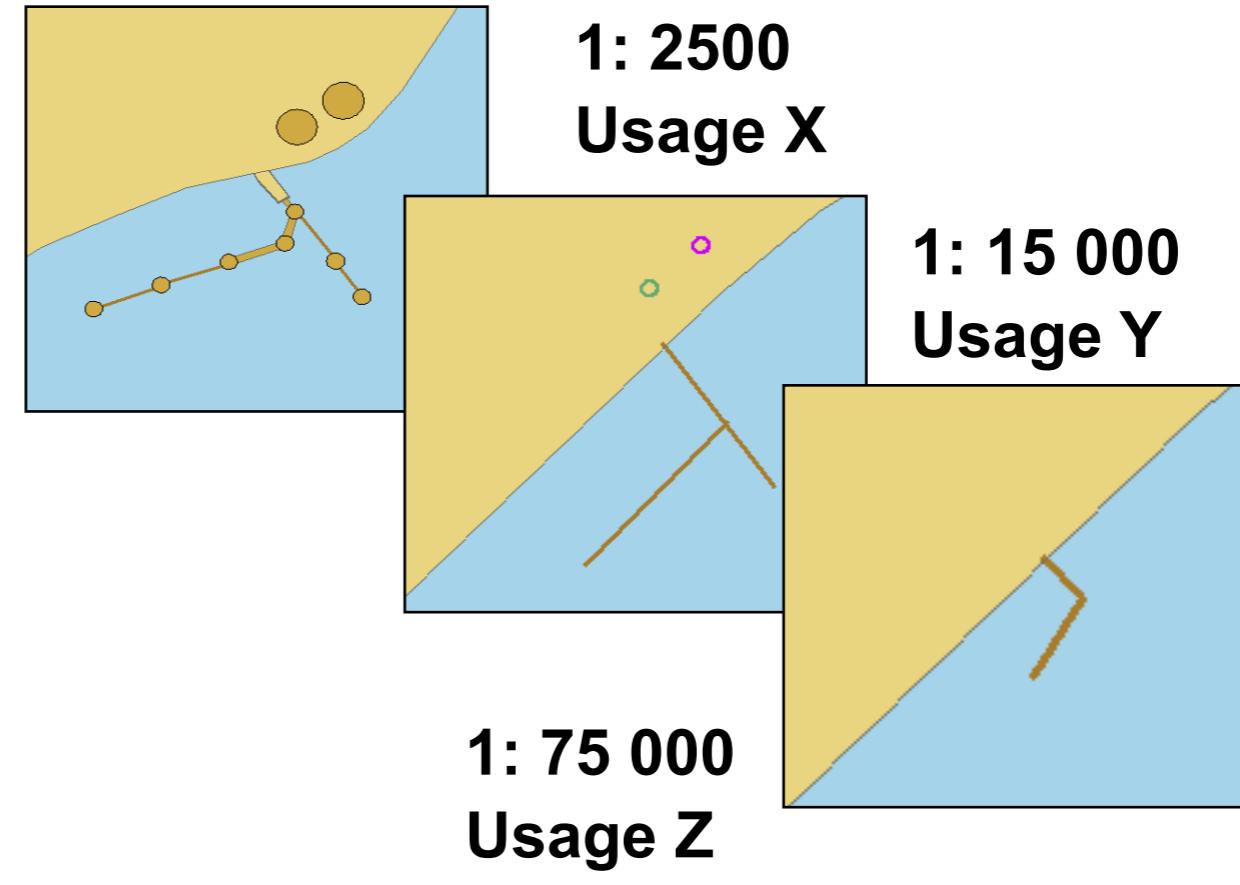
River Paper Chartlet



BSB raster chart

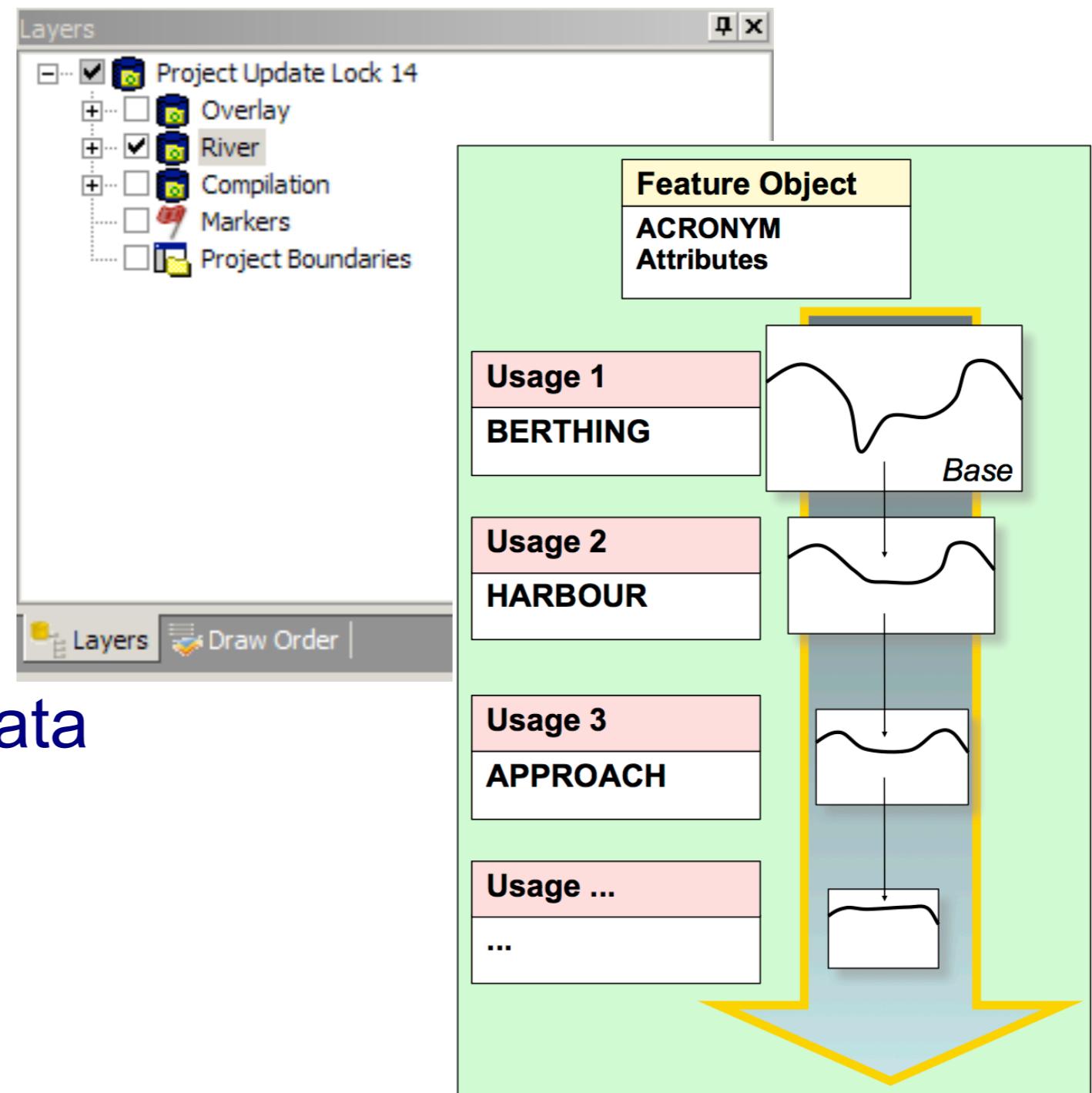
HPD Features & Representations

- If a feature is shown on different Usages it may have several representations
 - representations may be identical, or may be generalised
 - cartographer decides type and level of generalisation



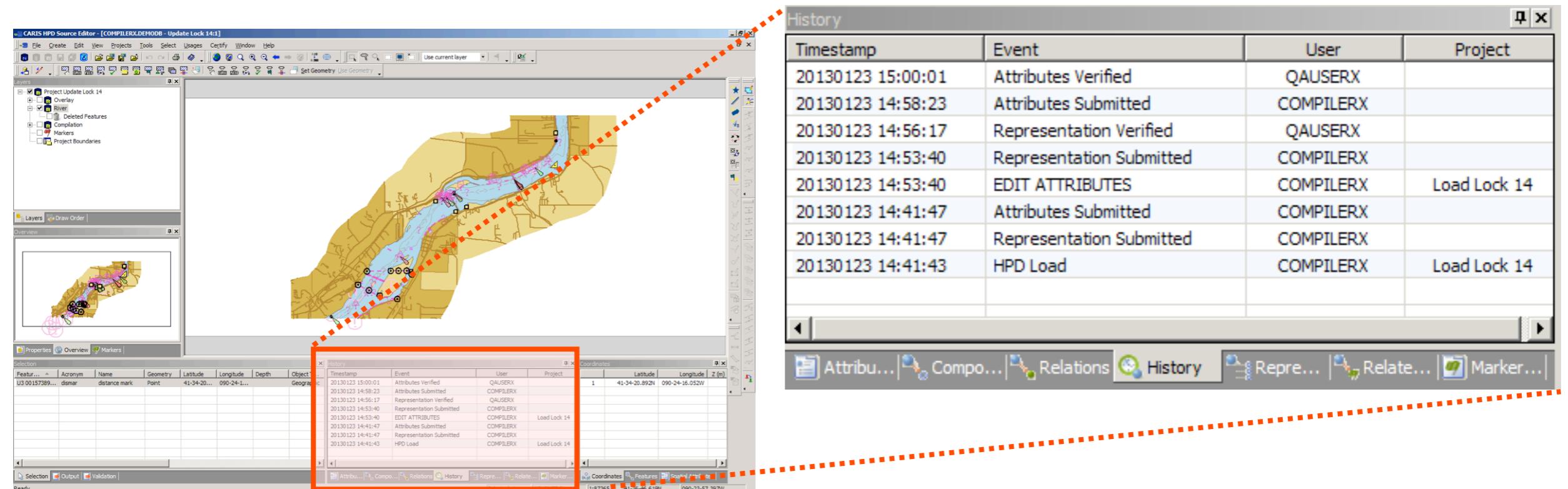
USACE HPD Usages

- River (usage 7)
- Overlay
 - Scaleless
- Compilation
 - highest resolution data



HPD Feature Change Tracking

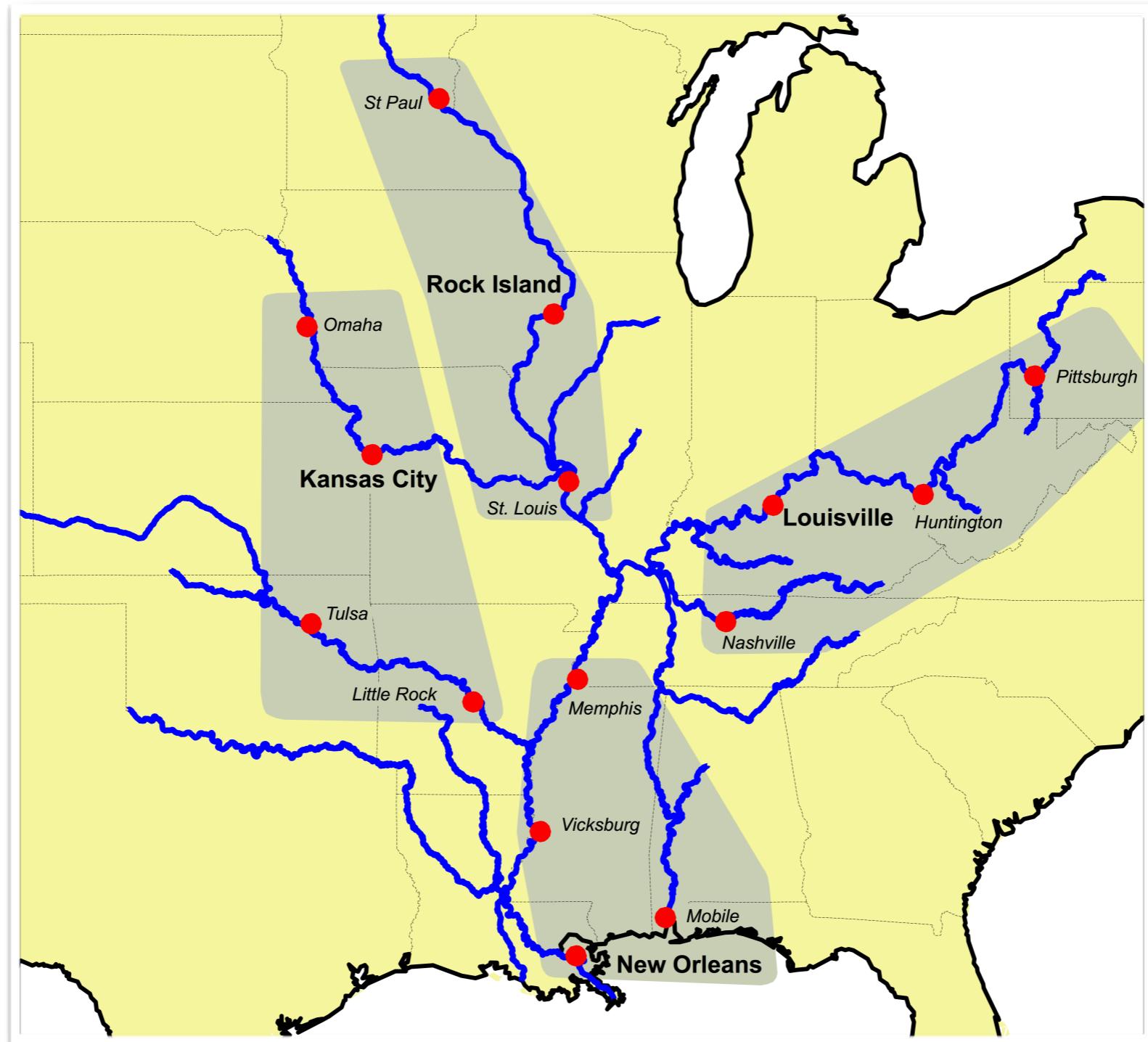
- Feature history tracking
 - History of changes to all features is tracked
 - All changes are stored: spatial, attribute, relational, ...
 - Changes include associated user and project names
 - Deleted objects are *not* removed from the database



USACE IENC Production

- Current Production
 - 16 individual districts across 5 divisions
 - Intimate local knowledge
 - Inefficient use of scarce resources
- Potential Solution
 - ‘Regionalise’ production processes
 - Efficiencies of scale
 - Build up domain expertise
 - Intra-team collaboration
 - Sharing of specialised knowledge

Regional Navigation Product Centers



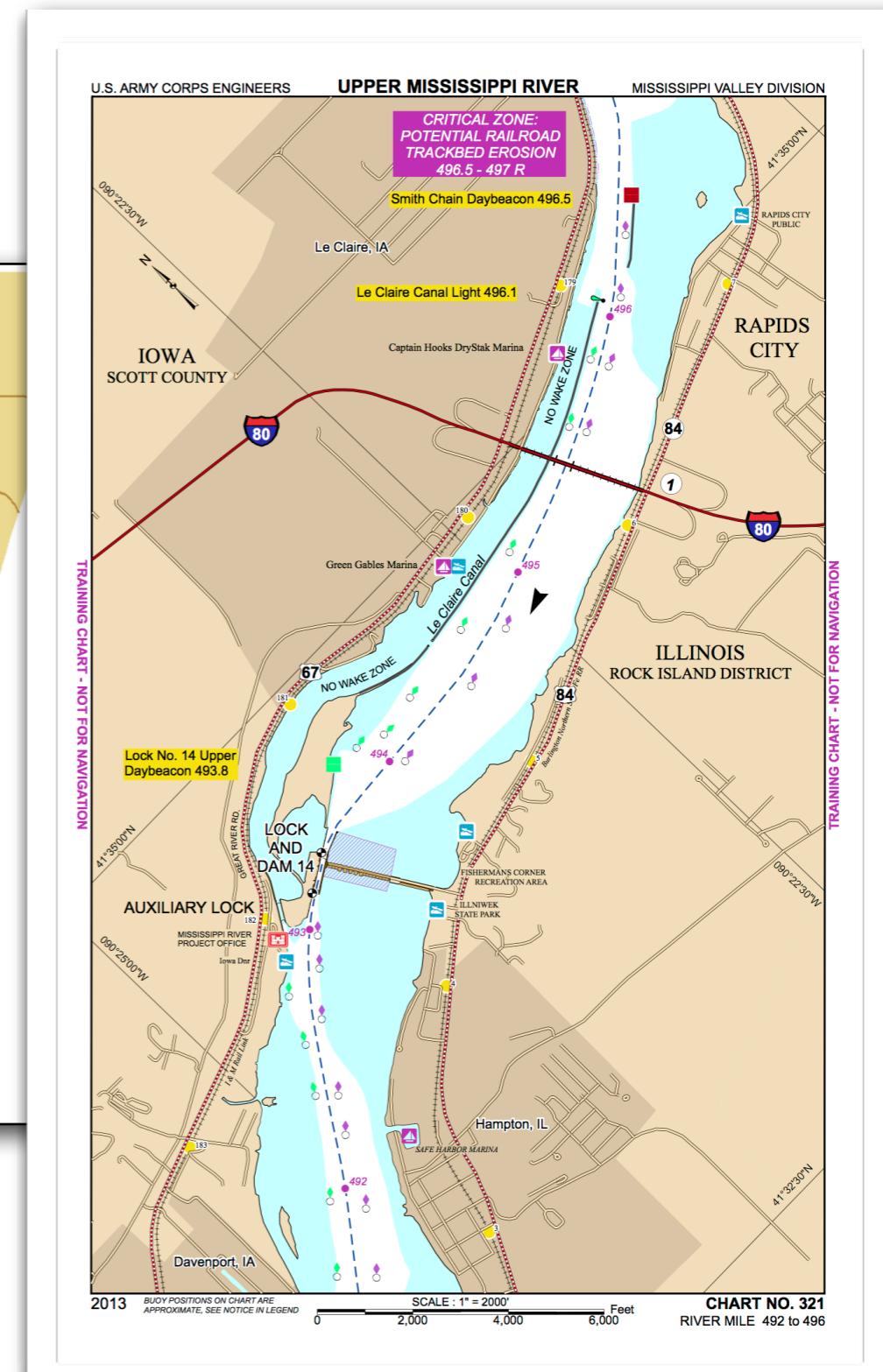
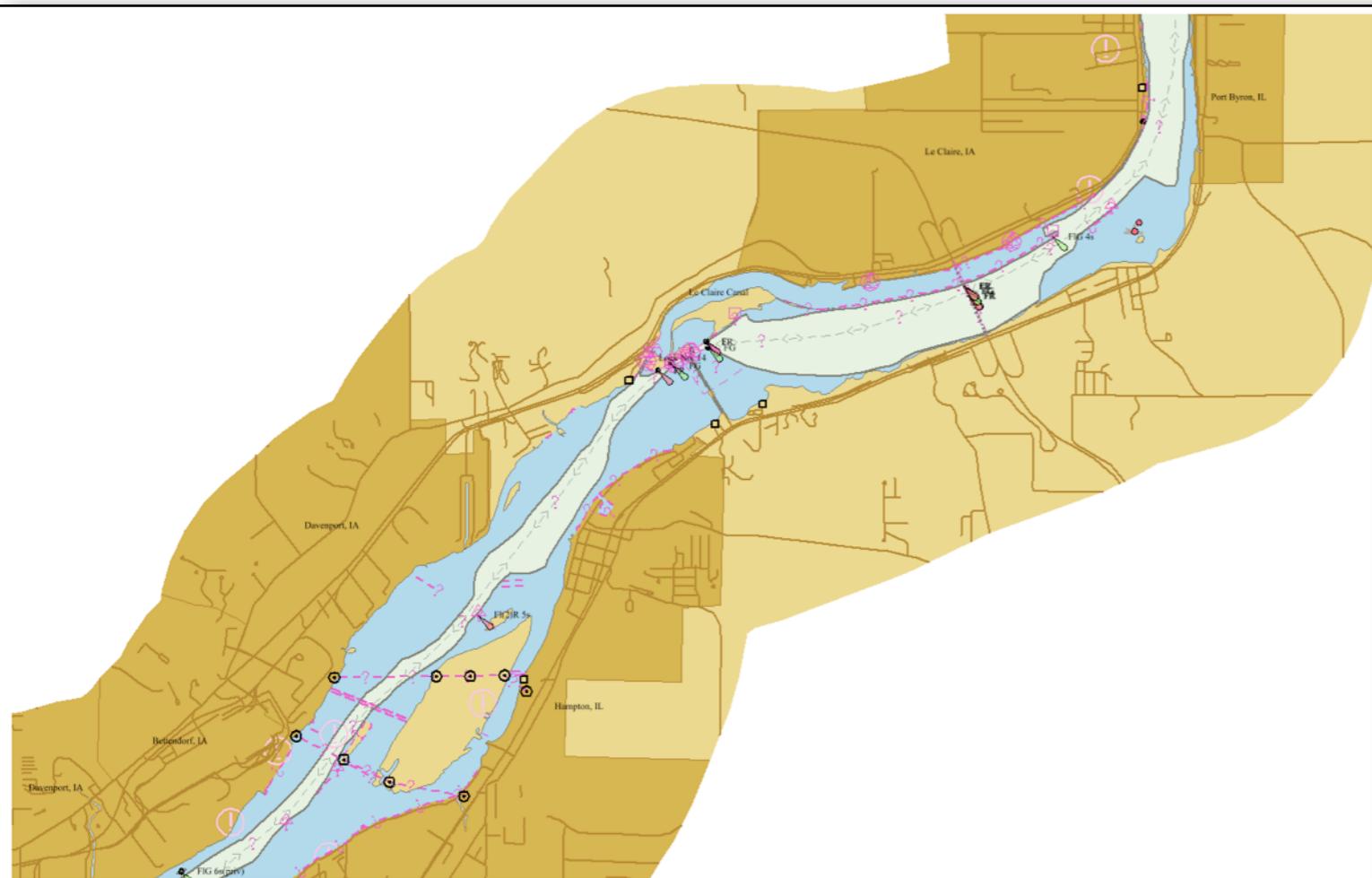
Users and Roles

User Type	Location	HPD User Roles	Sample Tasks and Responsibilities
<i>'Source Creator'</i>	District/Region	Source Loader Source Editor (Source) Project Manager QA - Accept Markup Editor Markup Verify	- Gather and QA source data (external) - Conflate New Source into the database - QA 1 (<i>cross-check</i>)
<i>'Product Creator'</i>	Region	Product Manager Product Editor Paper Chart Editor Project Manager QA Markup Editor Markup Verify	- QA 2 - Define and Edit products
<i>'Product Checker'</i>	National	Project Manager Product Manager QA Markup Editor Markup Verify	- QA (product level) - Publish products
<i>'Manager'</i>	All	Administration Project Manager Product Manager	- Add & manage users - Modifications to 'Data model'

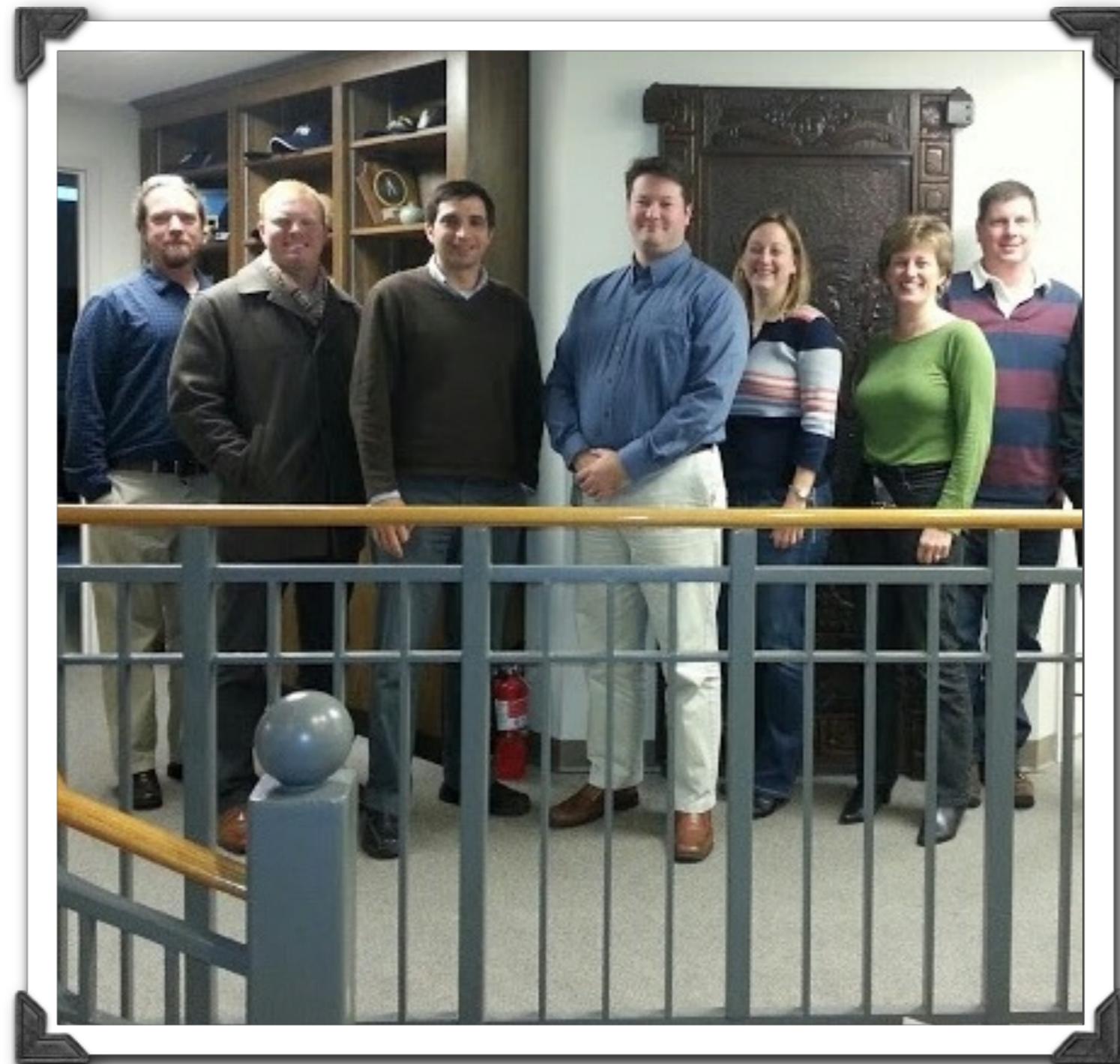
Production Workflow

Task	User Type	QA status	Location/Level
<u>Source Conflation</u> <i>Features being added or edited</i>	Source Creator	<pre> graph TD A[Under Construction] --> B[Not Verified] B --> C[Accepted] C --> D[Verified] D --> E[Verified Source Database] E --> F[Product Under Construction] F --> G[Product Not Verified] G --> H[Product Verified] H --> I[Published] C -.-> B C -.-> F B -.-> F B -.-> G G -.-> H H -.-> I </pre>	District Level
<u>Quality Assurance 1</u> <i>Correct to Source Documents?</i>	Source Creator		District Level
<u>Quality Assurance 2</u> <i>Correct to Encoding Guide and Specifications?</i>	Product Creator		Region Level
<u>Product Creation</u> <i>Product defined, populated and product-specific features added</i>	Product Creator		Region Level
<u>Product Quality Assurance</u> <i>Correct to Encoding Guide and Specifications</i>	Product Checker	<pre> graph TD A[Under Construction] --> B[Not Verified] B --> C[Accepted] C --> D[Verified] D --> E[Verified Source Database] E --> F[Product Under Construction] F --> G[Product Not Verified] G --> H[Product Verified] H --> I[Published] C -.-> B C -.-> F B -.-> F B -.-> G G -.-> H H -.-> I </pre>	National Level

USACE Example Products



What A Cheerful Group!



Thank You



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