Office of Coast Survey

Utilizing GIS to improve navigation safety

Julia Powell
Who is Coast Survey?

• First science agency of the U.S.
• Responsible for surveying 3.4 million square nautical miles
• Creates and Updates Nautical Products
• Speeds re-opening of ports after hurricanes and other disasters
• Develops hydrodynamic models for coastal management
• Provides global hydrographic leadership
Scope of coverage

U.S. marine transportation system:
- 95,000 miles of coastline
- 25,000 miles of navigable channels
Producing navigational information for diverse groups of users

- 1022 traditional paper charts
- 1022 raster navigational charts (NOAA RNC®)
- 958 electronic navigational charts (NOAA ENC®)
- 1007 Print-on-Demand charts, sold by OceanGrafix
- Updated on a weekly basis for critical corrections
Meeting legislative & regulatory mandates

• Coast and Geodetic Survey Act of 1947
  – Authorized Coast Survey to support maritime commerce with nautical charts & products
  – Authorizes Director of Coast Survey as the National Hydrographer
  – Represents the United States at the International Hydrographic Organization

• Title 33 of Code of Federal Regulations
  – Mandated that NOAA nautical charts, *U.S. Coast Pilot*, and tidal and current information be carried on all self-propelled vessels bigger than 1600 gross tons, including passenger vessels

• IMO Safety of Life at Sea – Chapter V
  – Nautical chart or nautical publication is a special purpose map or book, or a specially compiled database... that is issued officially or on the authority of a Government, authorized Hydrographic Office ... and is designed to meet the requirements of marine navigation
IHO and IMO

• International Hydrographic Organization
  – 80 Member States
  – Support safety of navigation through standardization
    • S-57 – Electronic Navigational Chart
    • S-100 – Universal Hydrographic Model
    • S-101 – New Electronic Navigational Chart Specification

• International Maritime Organization
  – 160 Coastal States
  – Responsibility for the safety and security of shipping
    • Electronic Chart Display and Information System (ECDIS) Performance Standard
ECDIS

• Computer based Navigation System
• Integrated AIS and RADAR
• Must use an official ENC for primary navigation
• Improves the safety and efficiency of marine operations
  – Depending on the navigation scenario alarms and warnings are triggered based on the ships draft and surrounding chart elements
• SOLAS (V) was amended in 2012 that ships of certain size must carry and ECDIS
Exxon Valdez – what if it had an ECDIS?
NOAA ENC Coverage

- 1997 – First ENC
- 2012 – Complete Coverage
NOAA ENC Distribution

- Two Methods
  - Available for free download on the internet
    - www.nauticalcharts.gov
  - Or through a Certified ENC Distributor
    - PRIMAR
    - UKHO
    - Jepessen
    - Chart World
    - Maris

- Updated to the latest Notice to Mariners
NOAA Chart Production – moving to a GIS

Source Data
- Raster Data
- Vector Data
- Notice To Mariners

Data applied one time
Updates sent to products

Product Databases

Published Products
- RNC
- ENC
- Paper
- POD

Weekly Updates

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Why a GIS based approach?

• **Increase the efficacy of the production system**
  - One time source load, evaluation, and application
  - Variety of formats supported
  - Workforce trained on multiple products, versus product specialization

• **Improved product for the mariner**
  - Multiple products from single database provides consistency
  - Product synchronization
  - More up-to-date product

• **Integrated end-to-end COTS solution**
Product Finishing
Product Finishing
Improving ENC Standards

• Currently based on IHO S-57
  – While good it can be better
    • Not flexible
    • Takes Years to make a change

• IHO introduced S-100 – Universal Hydrographic Model
  – Leverages the ISO Geographic Information System Standards
  – Flexible Catalogue Structure
S-101

- S-101 represents a major step forward in product specifications for ENCs
- Dynamic content
  - Exchangeable and Machine Readable Catalogues
    - New content will NOT take years to implement
    - Or require new type approval for ECDIS
  - Will allow for real-time tidal information
  - Interoperability with other S-100 product specifications
    - Sailing Directions
    - High Resolution Bathymetry
S-100 Enabled ECDIS

S-101 ENC

S-10X Tides

S-10X Nautical Publications

S-102 Bathymetry

Nautical Publications