National Dredging Meeting 2014

eHydro: Channel Condition Data Collection Tool

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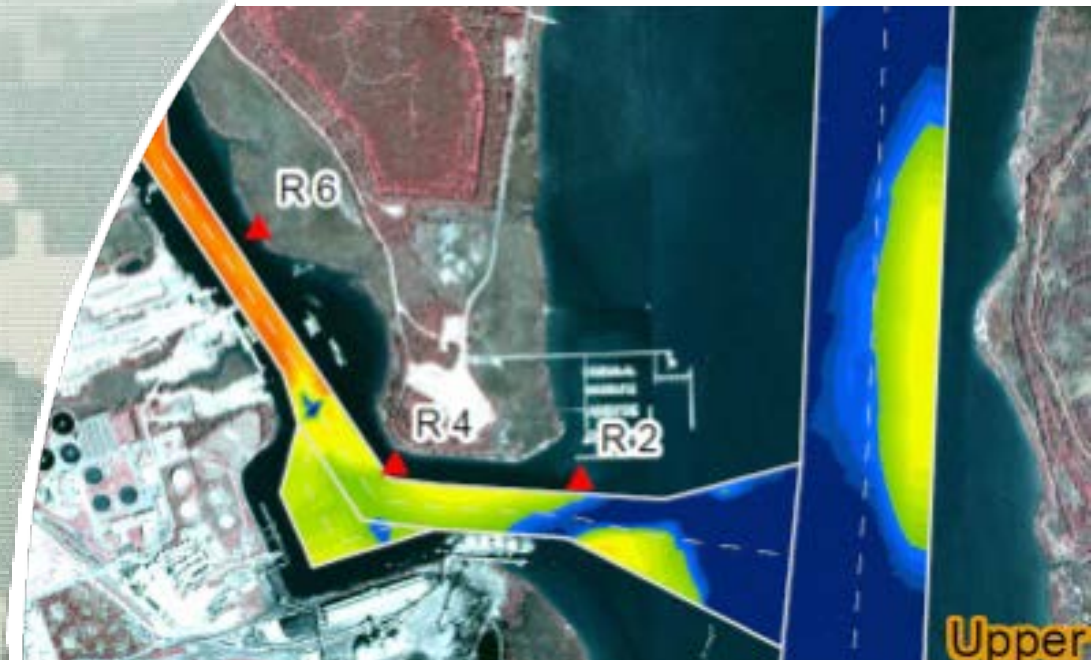

US Army Corps of Engineers
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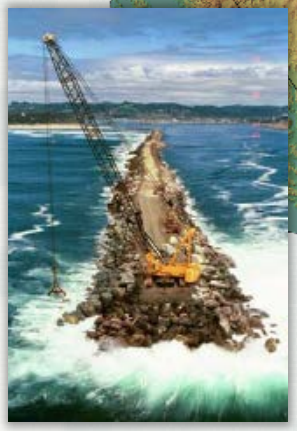
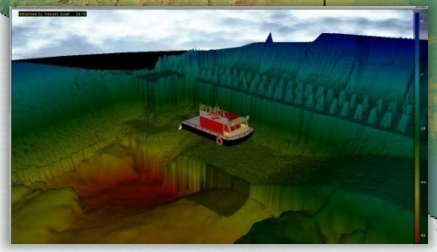
USACE Coastal Navigation Mission

- Largest Business Line
- Mission includes;
  - 1,067 Navigation Projects
  - 19 lock chambers
  - 13,000 miles of channels
  - 929 navigation structures
  - 844 bridges



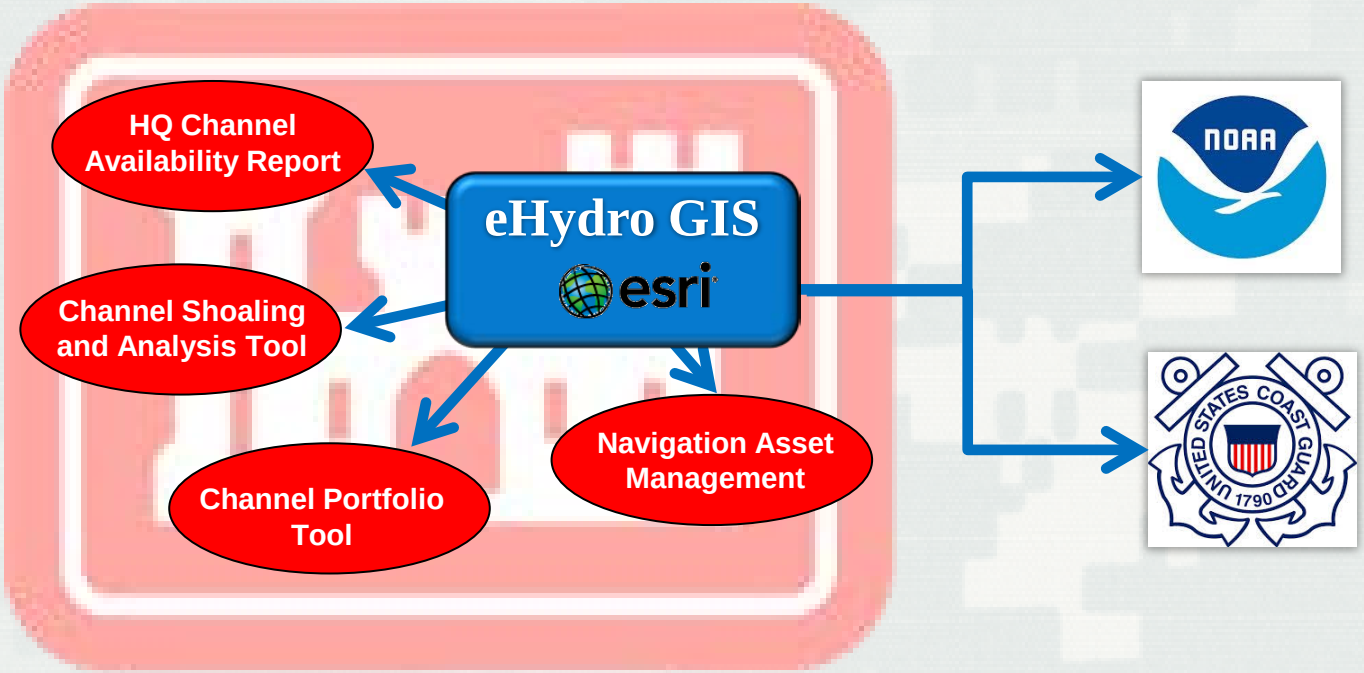


Coastal Navigation Issues - Nationwide

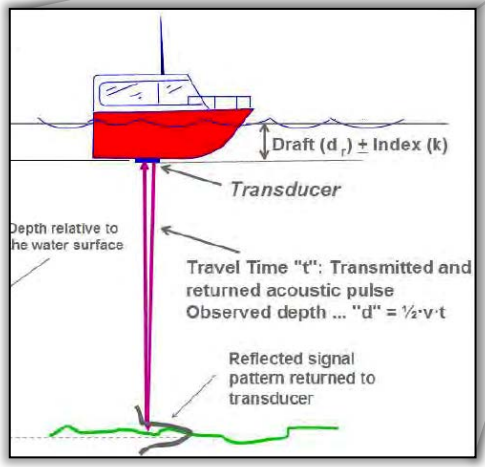
- **Budget Reductions**
- **Dredging Costs Increasing**
- **Dredged Material Placement Capacity Issues**
- **Environmental ‘Windows’: Increasing restrictions on when dredging can be performed**
- **Low Use Navigation Projects**

Enterprise Needs for Channel Condition Data

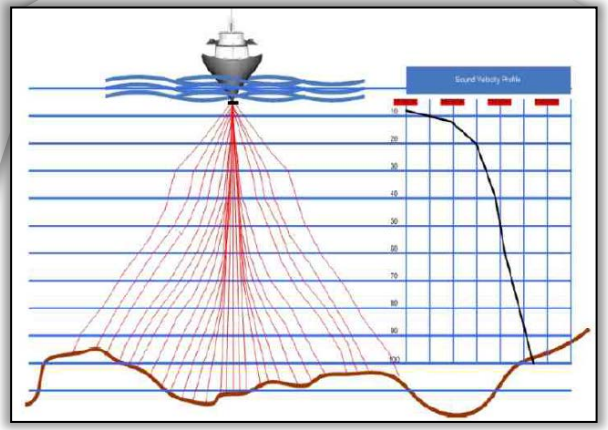
- Data must be **consistent and timely** to enable **accurate, objective and uniform** analyses on all channels in the navigation portfolio of projects.



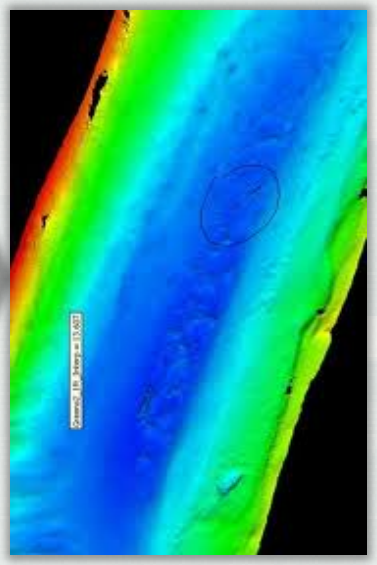
Assessing Channel Conditions



Single-Beam



Multi-Beam



Accurate Channel Condition Data

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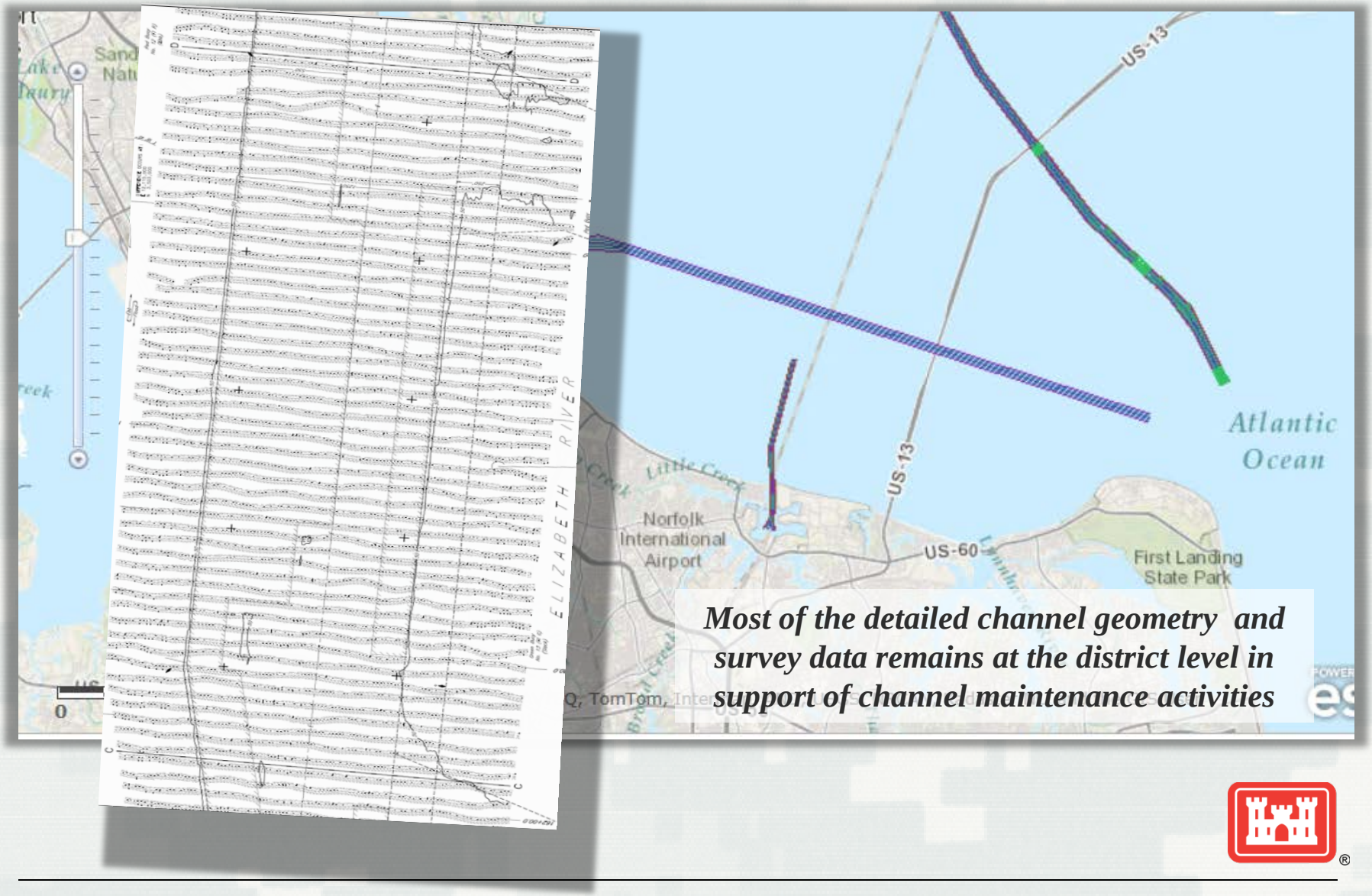
Channel Geometry and Survey Data



Most of the detailed channel geometry and survey data remains at the district level in support of channel maintenance activities

Channel Condition Products to NOAA

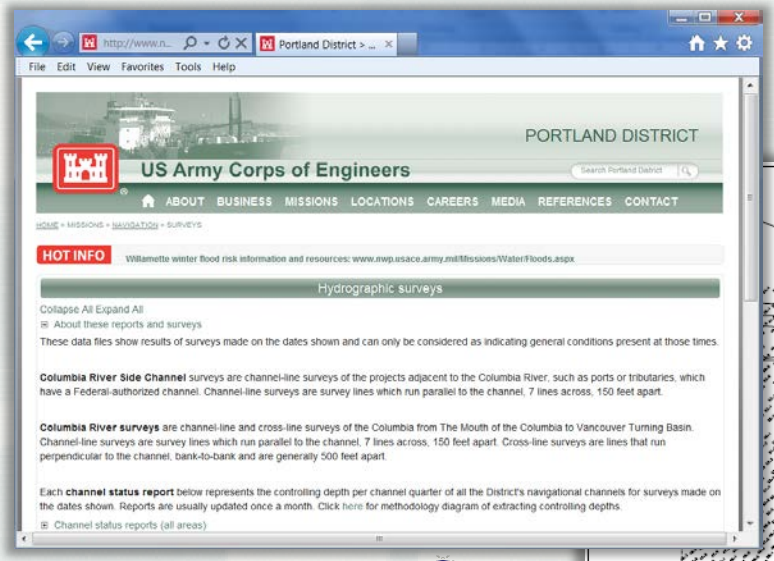
33 CFR Sec 209.325: USACE is required to provide results of hydrographic surveys to NOAA within one month of the survey.

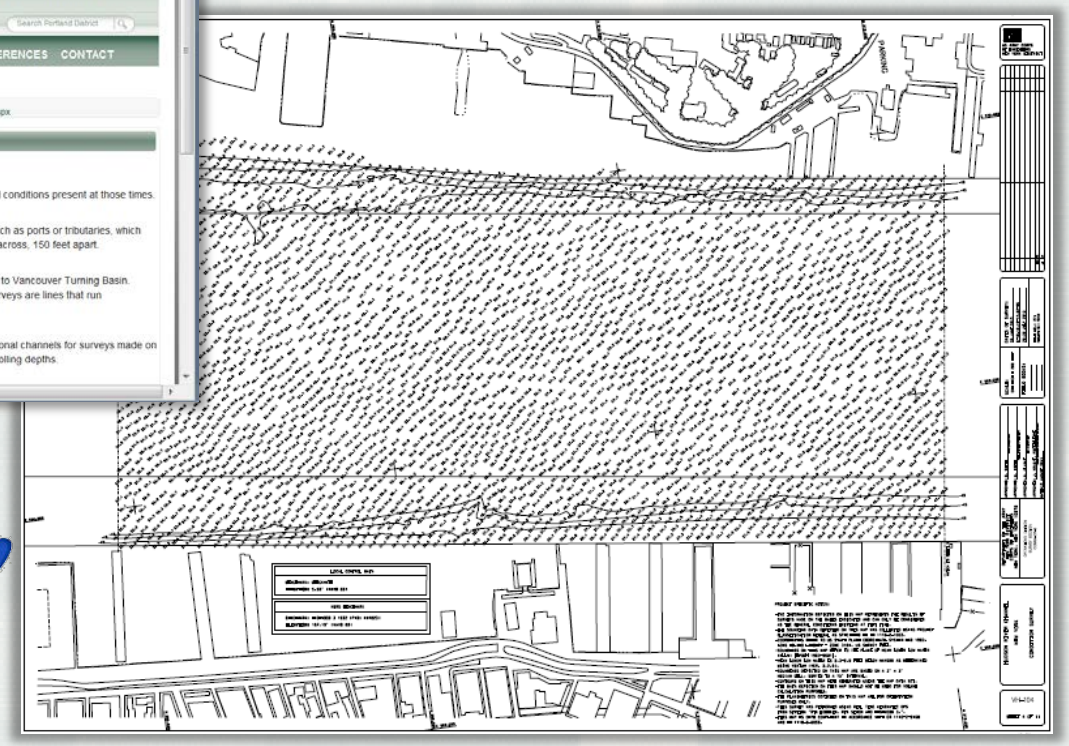
LEFT OUTSIDE QUARTER (feet)	LEFT INSIDE QUARTER (feet)	RIGHT INSIDE QUARTER (feet)	RIGHT OUTSIDE QUARTER (feet)
37.1	43.5	41.1	44.8
21.2	27.5	30.0	33.6
41.0	37.9	30.1	18.5

Tabular Channel Condition Report

Digital Survey and Navigation Channel Framework Data

Channel Condition Product to Navigation Interests

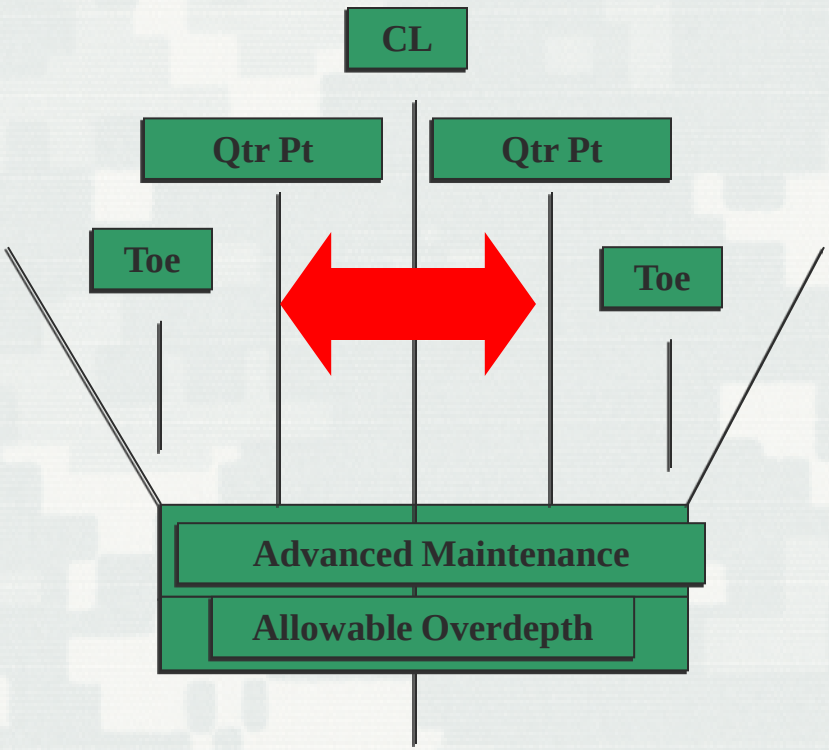




Survey Plot of Reach or Project Area

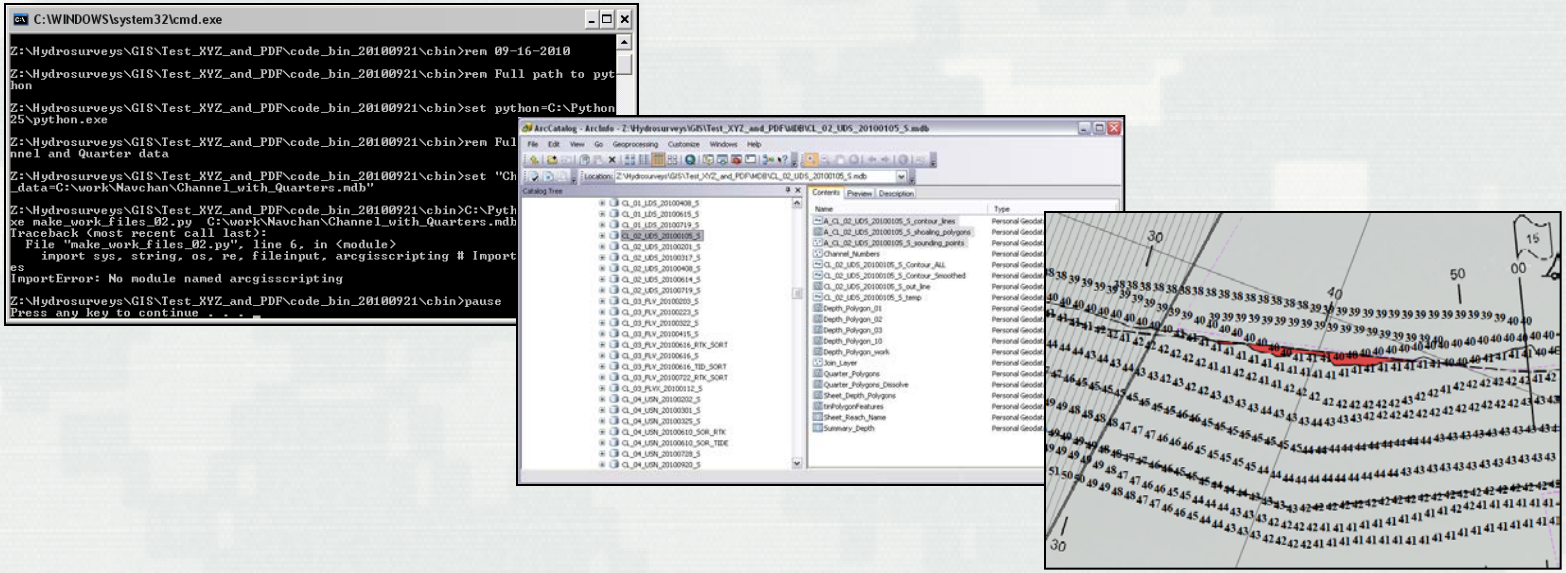
Channel Performance – Coastal
High Use Channels, >10M tons/year

- Goal: Half channel width, 95% of time
- Actual: 35% of time
- Analogy to building a 2-lane road; Present funding allows one lane, one-third of the year



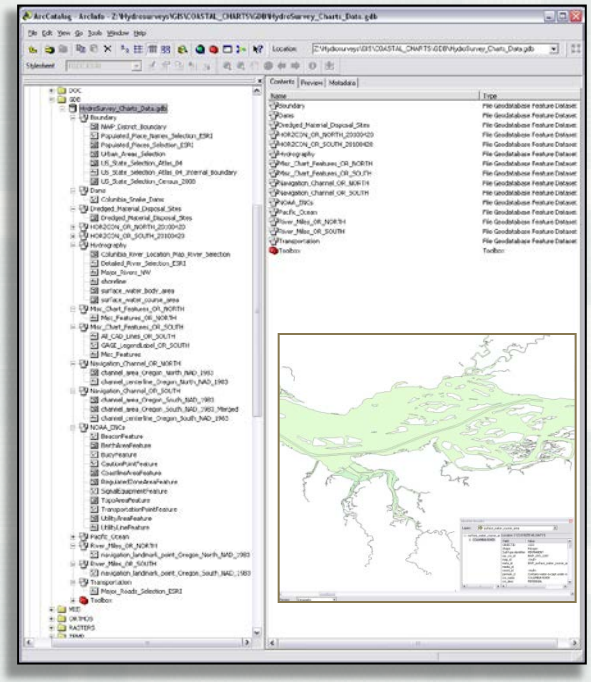
Geoprocessing XYZ Data

- **Python programming language with ArcGIS**
  - Script automates the XYZ data geoprocessing – using ArcGIS tools
  - Outputs sounding points, contour lines and shoaling areas
  - Python used to manipulate chart template and export map to PDF
  - Chart available for review (typically **15 minutes** per chart)



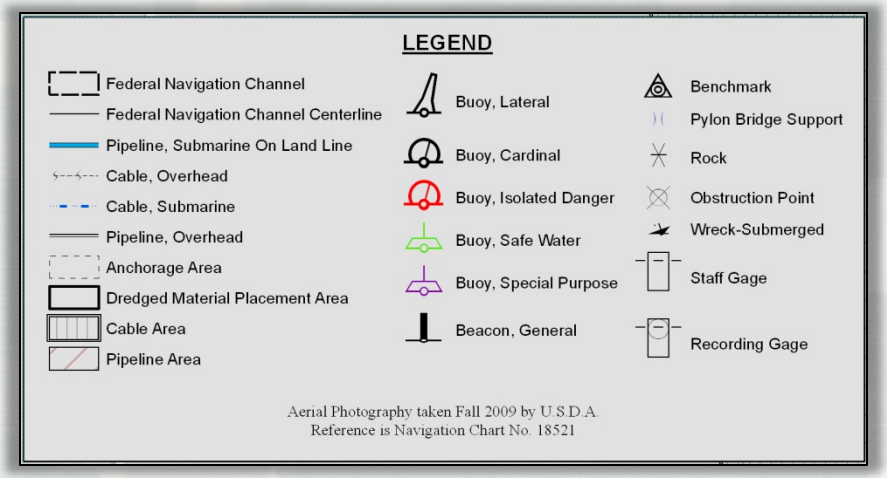
GIS Data Management

- **eHydro geodatabase/folder structure**
  - Improves chart performance by directing all data layers to a single data repository
  - Independent from other Corps GIS databases - allows for district management of chart specific data
  - Data updates can be easily integrated into charting system



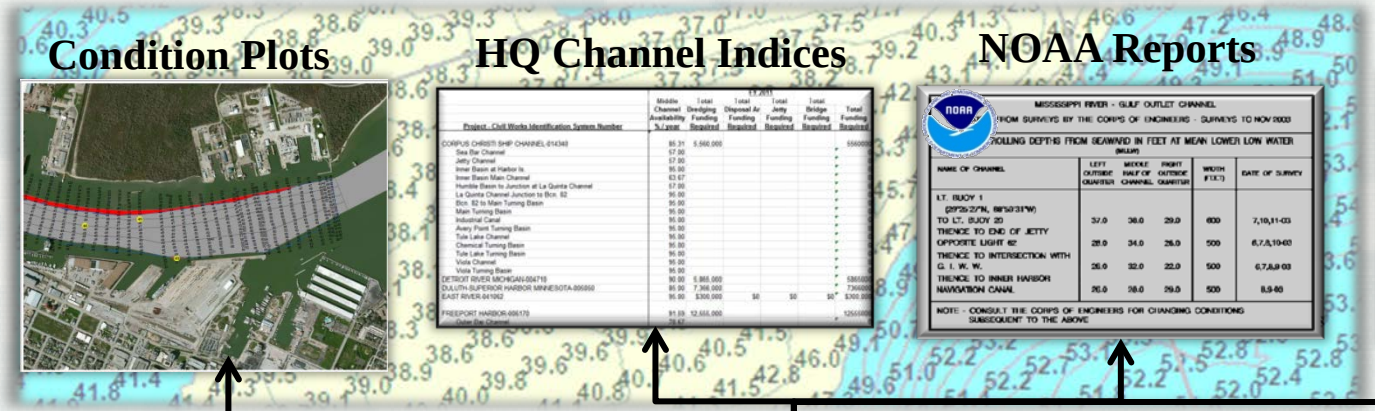
GIS Data Management

- **Multi-agency data usage**
  - Allows for standardization of data and symbols
  - Allows for frequent updating of chart features (buoys, lights)
  - Removes duplication of data collection efforts



- **NOAA Electronic Navigation Charts**
  - **US Coast Guard Light List**
  - **USDA/FSA NAIP Imagery**
- **USGS National Hydrography Dataset**

eHydro Application and Reporting Process



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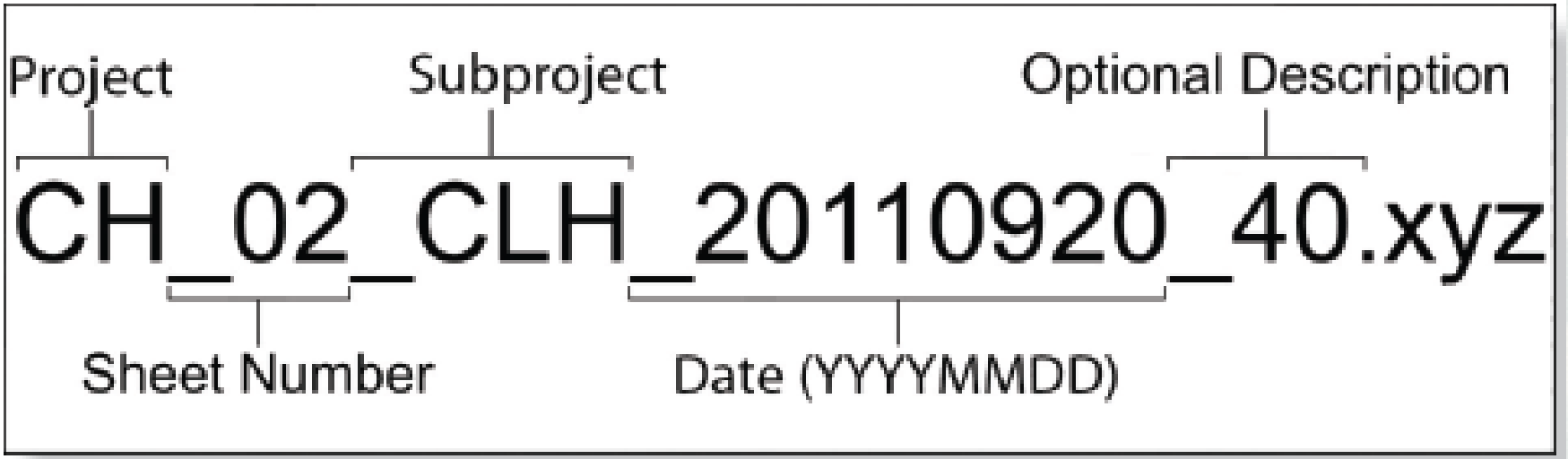
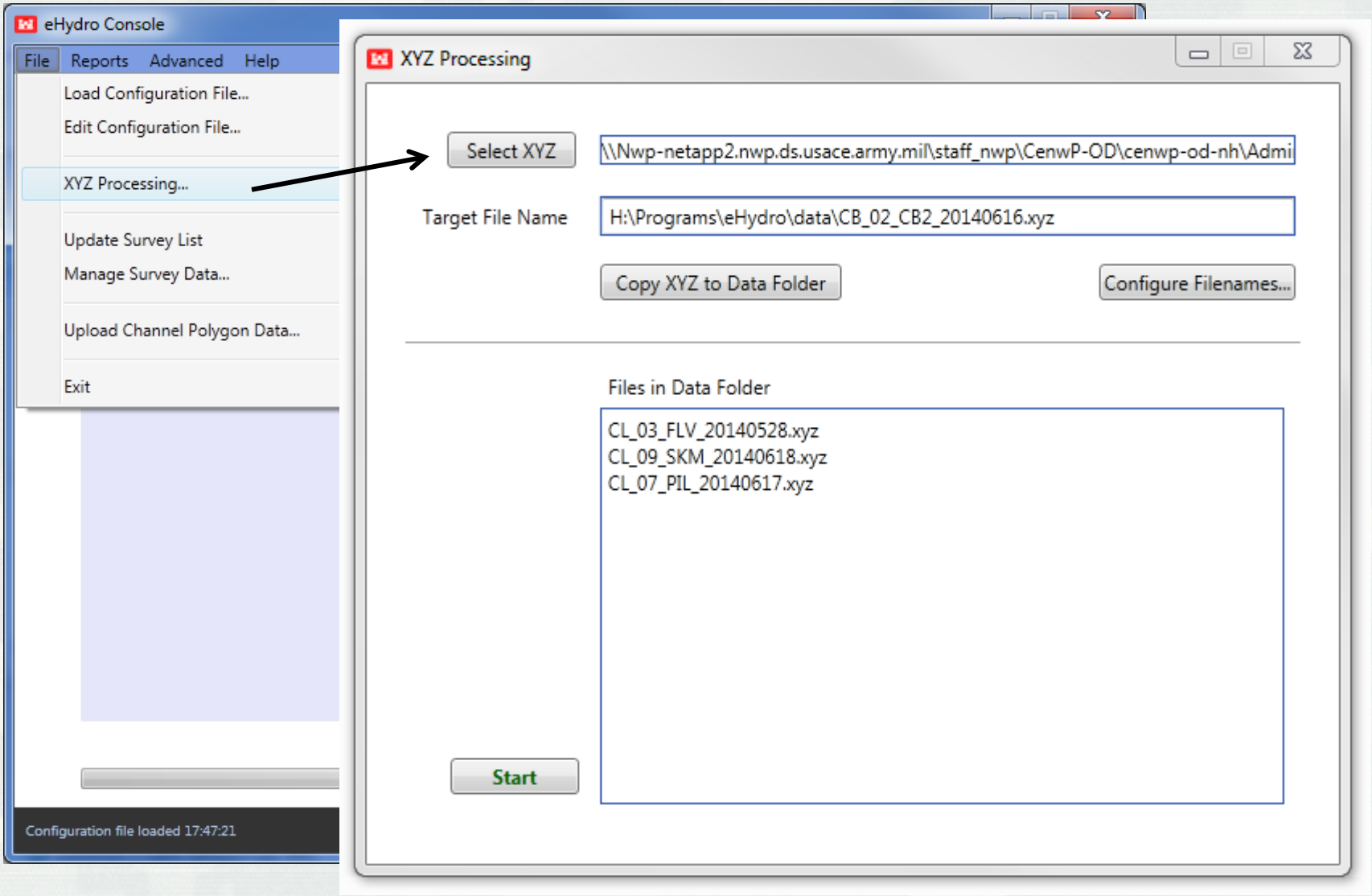
Using eHydro

Naming Conventions



eHydro - User Console



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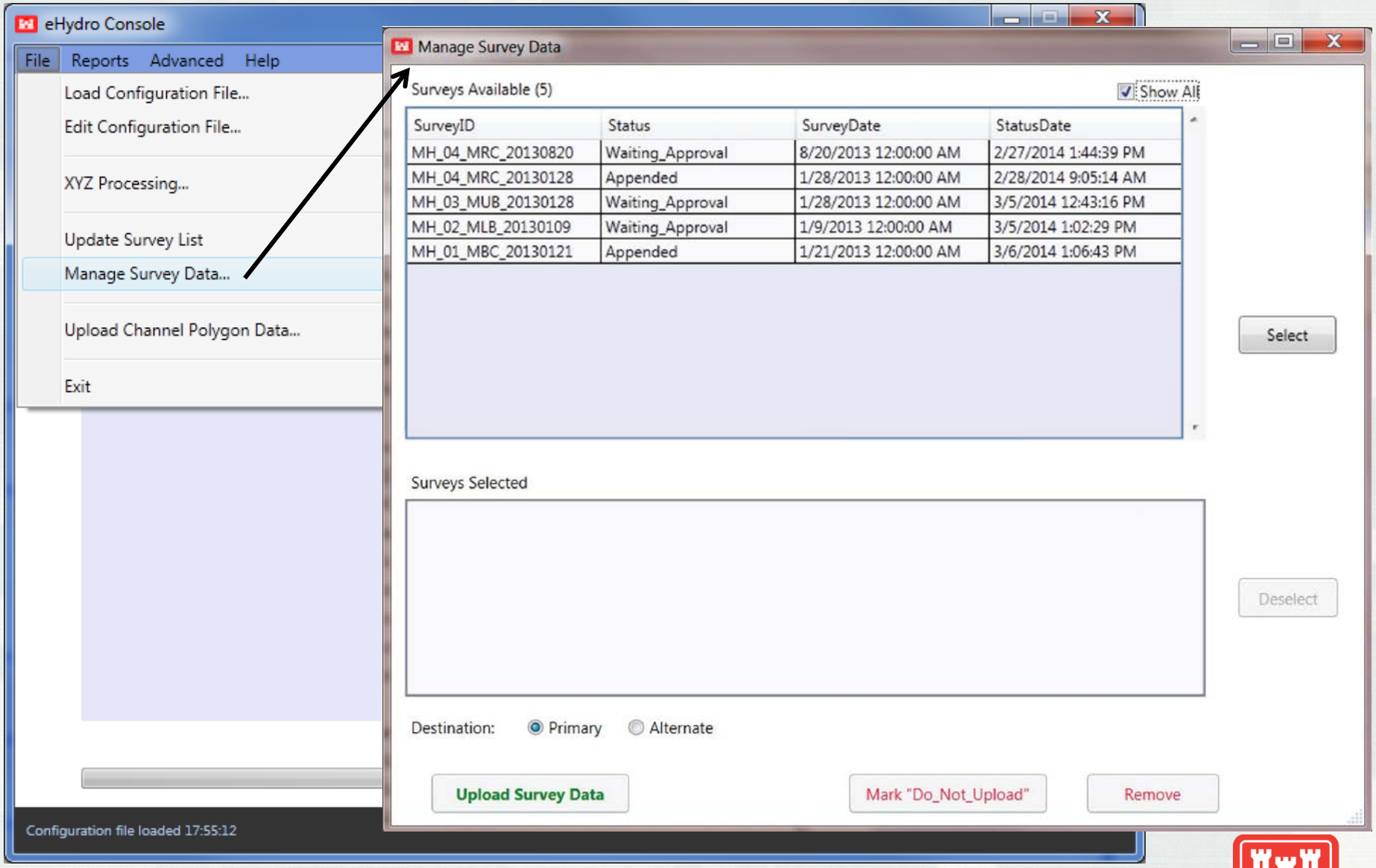

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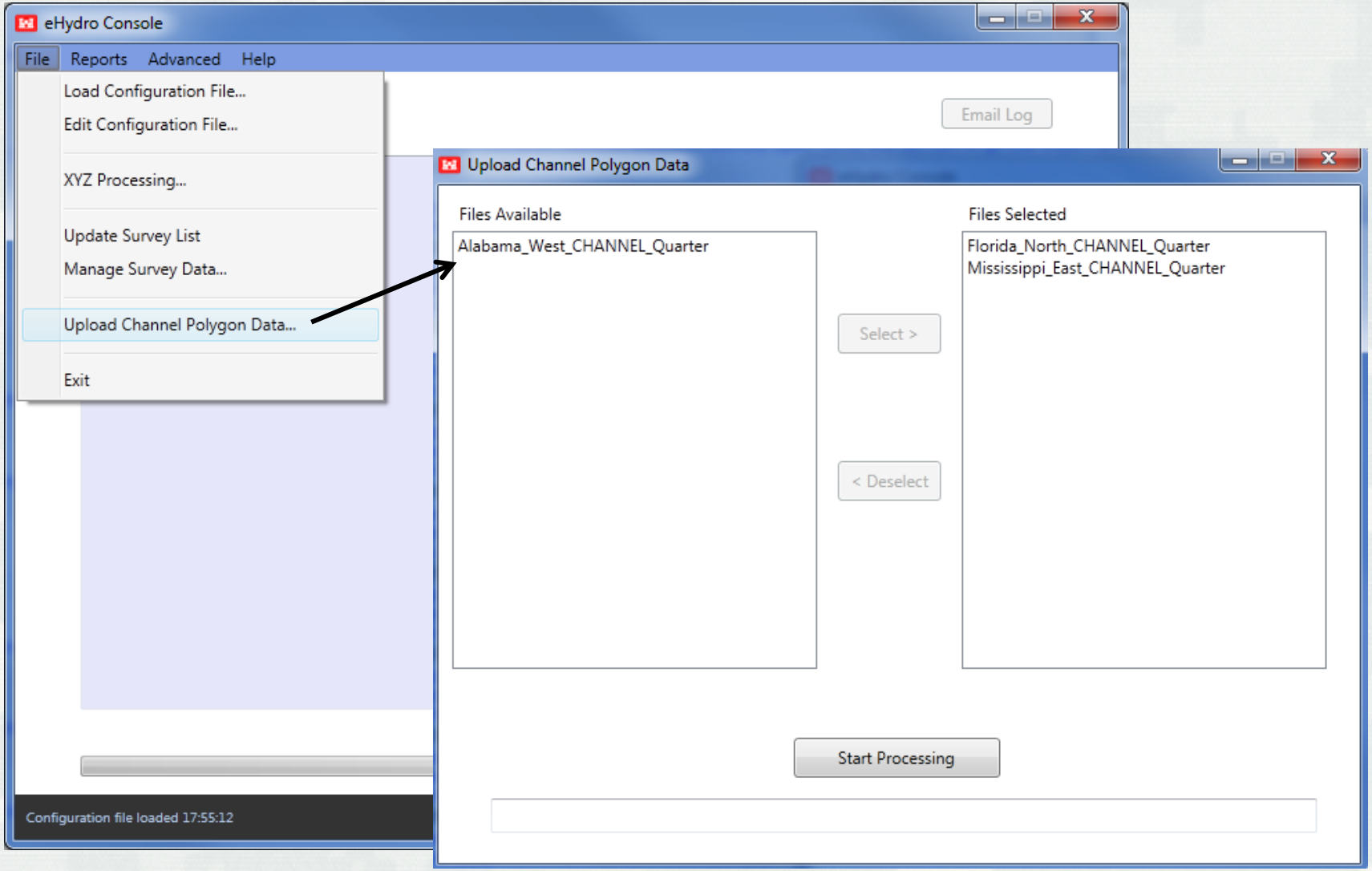

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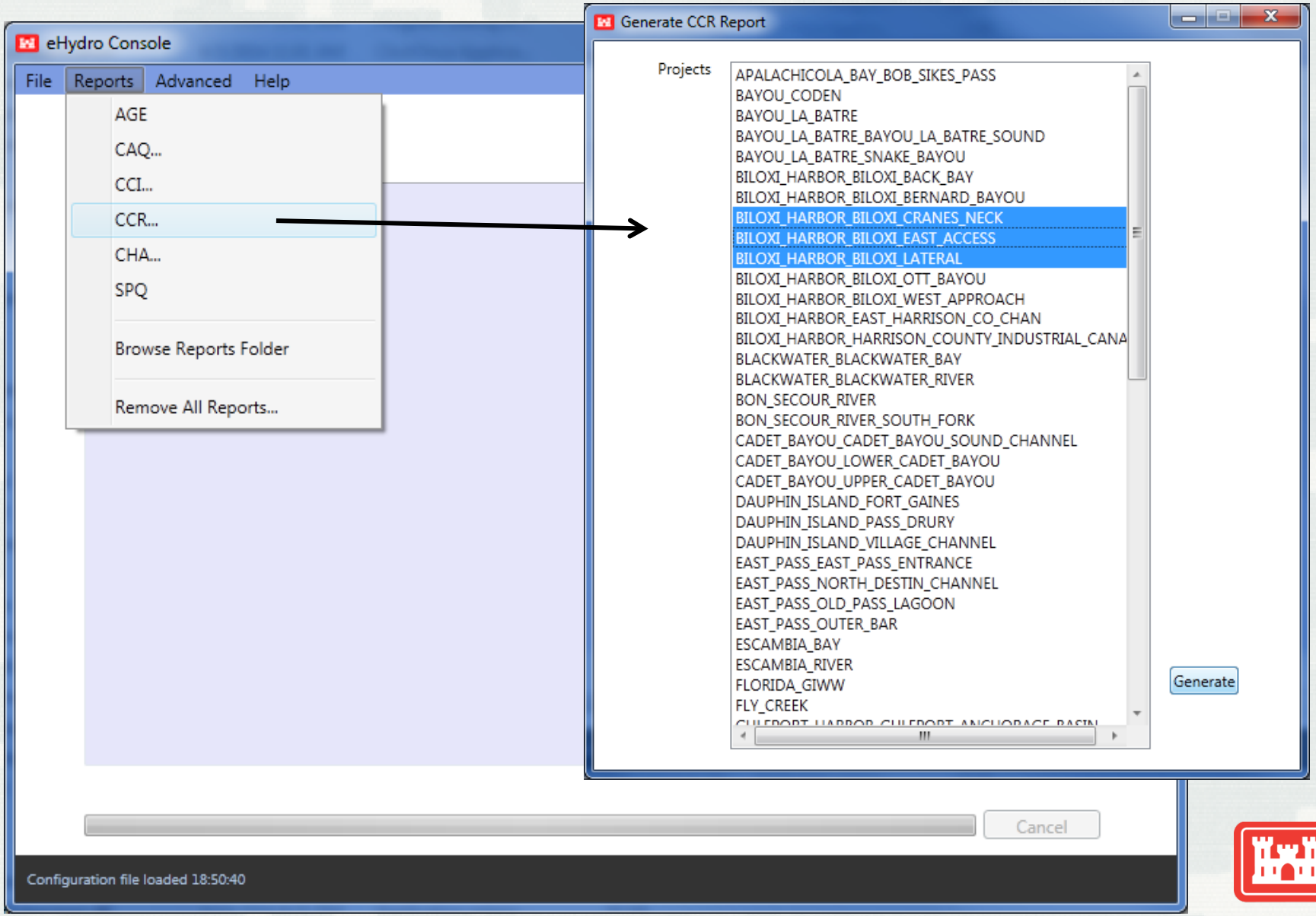


eHydro - Channel Condition Report

RIVER/HARBOR NAME AND STATE COOS BAY OREGON					MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD		
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT			LEFT OUTSIDE QUARTER (feet)	MIDDLE HALF (feet)	RIGHT OUTSIDE QUARTER (feet)
		WIDTH (feet)	LENGTH (miles)	DEPTH (feet)			
COOS BAY ENTRANCE Entrance Range	09-03-2013	0	1.90	47	35	40	40
COOS BAY RANGES Entrance Range & Turn	06-06-2013	300	0.80	37	38	42	34
COOS BAY RANGES Coos Bay Inside Range	06-06-2013	300	0.80	37	36	38	39
COOS BAY RANGES Coos Bay Range	06-06-2013	300	0.90	37	38	37	38
COOS BAY AND EMPIRE RANGES Empire Range	07-23-2013	300	2.30	37	35	38	30

eHydro - Channel Condition Index

COOS BAY OREGON						Date 09/18/2013
Sheet Name	Reach Number	Depth	Left Outside Quarter	Middle Half	Right Outside Quarter	Survey Name
COOS BAY ENTRANCE	1	47	35	40	40	CB_01_CB1_20130903
COOS BAY RANGES	1	37	38	42	34	CB_02_CB2_20130606
COOS BAY RANGES	2	37	36	38	39	CB_02_CB2_20130606
COOS BAY RANGES	3	37	38	37	38	CB_02_CB2_20130606
COOS BAY AND EMPIRE RANGE	1	37	35	38	30	CB_03_CB3_20130723
JARVIS RANGES	1	37	34	38	22	CB_04_CB4_20130718
JARVIS RANGES	2	37	37	37	33	CB_04_CB4_20130718

eHydro – Annual Channel Availability

COLUMBIA 43 FOOT FY2012

Sheet Name	Reach Number	Depth	Left Outside Quarter	Left Inside Quarter	Right Inside Quarter	Right Outside Quarter
LOWER DESDEMONA SHOAL	1	43	45\100\4	47\100\4	49\100\4	47\100\4
UPPER DESDEMONA SHOAL	1	43	42\36\4	43\100\4	44\100\4	42\91\4
FLAVEL BAR	1	43	38\0\10	40\64\10	42\81\10	33\0\10
UPPER SANDS	1	43	41\0\9	43\100\9	44\100\9	42\93\9
UPPER SANDS	2	43	42\24\9	43\100\9	43\100\9	42\3\9
TONGUE POINT CROSSING	1	43	38\0\11	41\96\11	42\96\11	41\96\11
TONGUE POINT CROSSING	2	43	38\0\11	40\62\11	40\64\11	35\0\11
MILLER SANDS	1	43	41\52\11	39\92\11	37\61\11	31\0\11
MILLER SANDS	2	43	37\0\11	43\100\11	41\71\11	31\33\11
MILLER SANDS	3	43	37\3\11	40\54\11	40\74\11	38\9\11
PILLAR ROCK RANGES	1	43	37\17\13	41\72\12	38\60\12	37\0\12
PILLAR ROCK RANGES	2	43	32\38\12	40\53\12	41\90\12	41\37\12

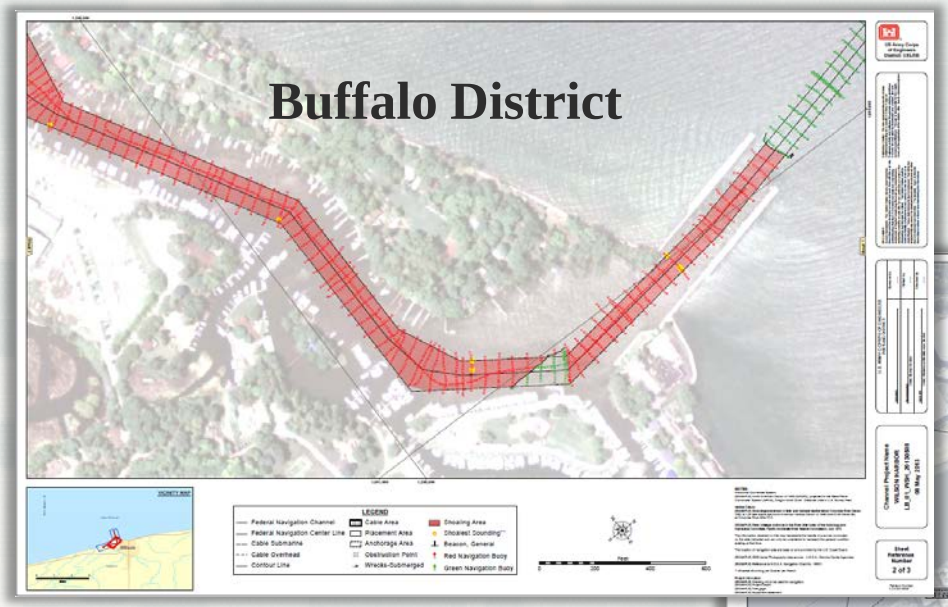
eHydro - Metadata

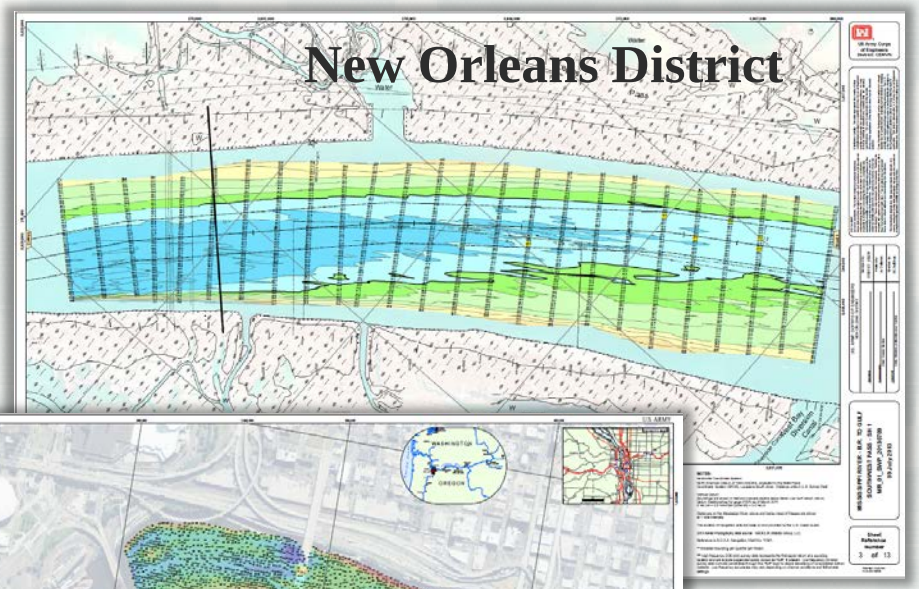
FGDC or ISO Standard….

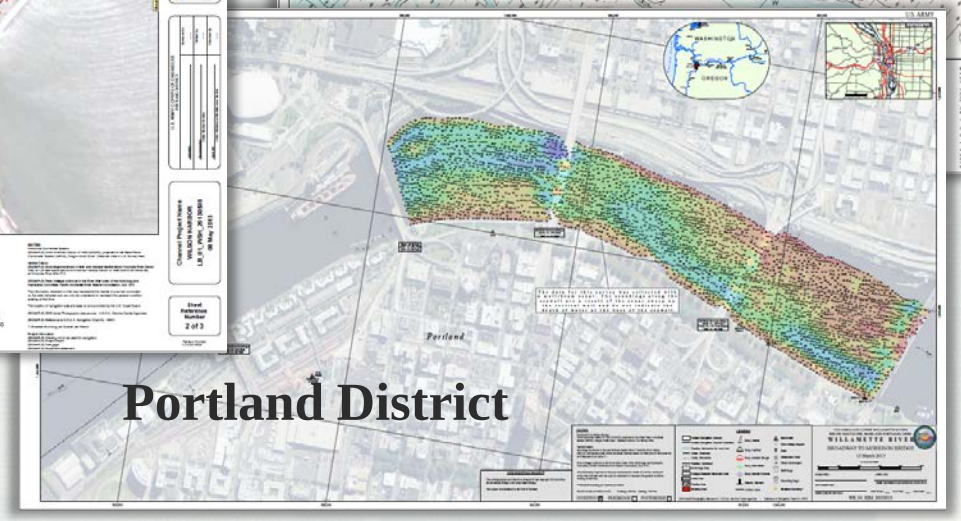
Identification_Information:
Citation:
Citation_Information:
Originator: U.S. Army, Corps of Engineers,
New England District (comp.)
Publication_Date: 20090306
Title: Boston Harbor, Boston, Massachusetts,
After Dredge/Condition Survey
Geospatial_Data_Presentation_Form: map
Series_Information:
Series_Name: N/A
Issue_Identification: N/A
Publication_Information:
Publication_Place: Concord, MA
Publisher: Navigation, Project M
Management Section, NE District

eHydro – Condition Plots

- Minimum list of features to include NAIP Imagery, channel geometry, controlling depths, official NAVAIDs
- additional features to suit local requirements
- flexible size and orientation
- basic notes







eHydro Deployment Status

- Coastal Districts have been directed to use eHydro
- 21 of 22 Districts ready to begin operational use on all High and Medium use channels
- 9 Districts have uploaded Channel Framework
- 6 Districts are in the process of uploading surveys
- All 22 districts to be operational with all High and Moderate use channels by the end of FY14.

To Summarize, eHydro Tool that allows us to collect Channel condition and Framework data that is;

- **quantitative**
- **objective**
- **repeatable**
- **consistent**
- **usable**

Questions?

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