COASTAL NAVIGATION PORTFOLIO MANAGEMENT (CNPM)

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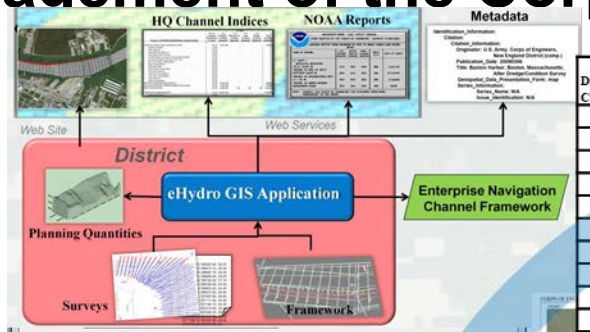
US Army Corps of Engineers

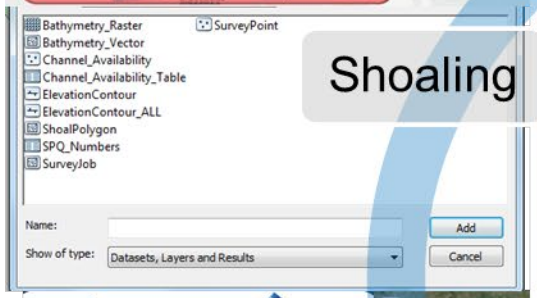
CHL COASTAL & HYDRAULICS LABORATORY

ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER

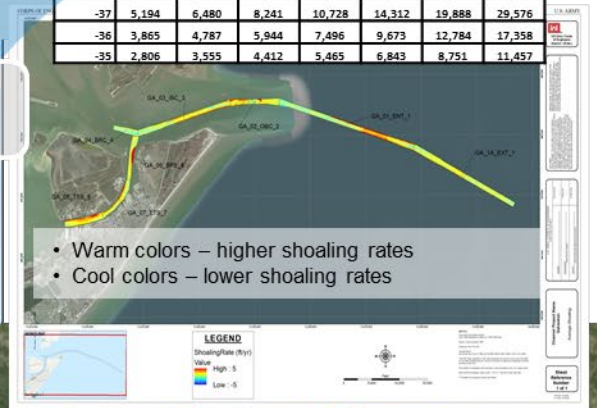
BLUF

Advance objective, quantitative, and systems-based approaches to management of the Corps' large coastal navigation portfolio of projects.



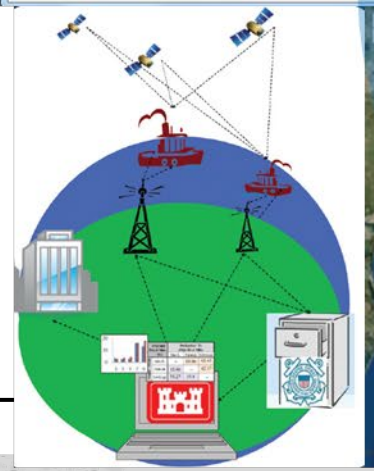


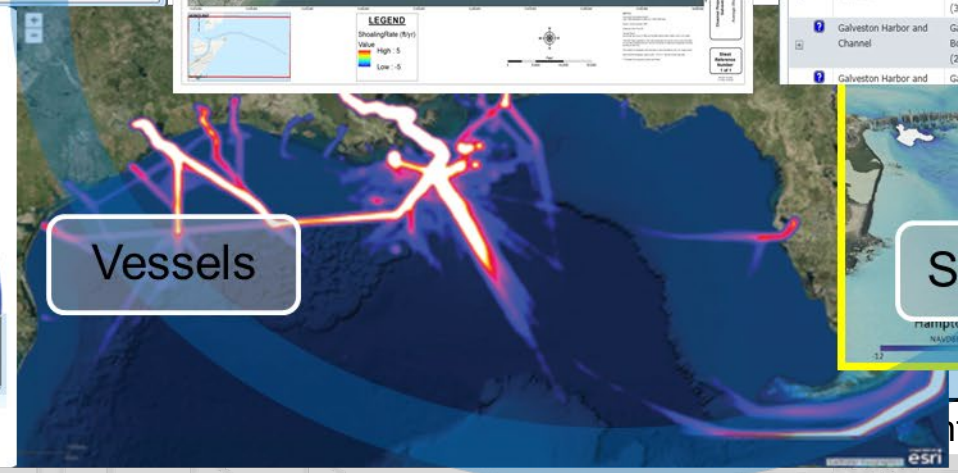
Shoaling



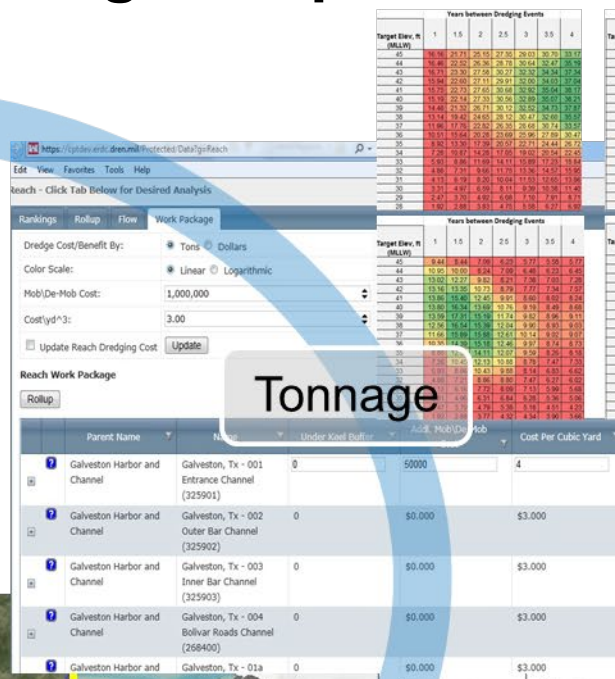
Dredge Cut (ft)	Now (CY)	6 months (CY)	12 months (CY)	18 months (CY)	24 months (CY)	30 months (CY)	36 months (CY)
-45	195,320	271,020	373,070	49[illegible],200	624,890	771,020	931,220
-44	125,140	173,140	238,620	33[illegible],710	[illegible]	[illegible]	[illegible]
-43	76,249	109,860	153,260	21[illegible],570	293,080	399,730	522,310
-42	43,628	65,655	95,990	135,350	186,480	258,070	356,920
-41	24,409	37,093	56,313	83,402	119,100	165,270	227,370
-40	14,958	21,022	31,470	48,147	72,041	104,370	146,170
-39	10,060	13,343	18,250	26,832	41,017	61,922	91,020
-38	7,083	9,092	11,945	16,084	23,035	34,823	53,059
-37	5,194	6,480	8,241	10,728	14,312	19,888	29,576
-36	3,865	4,787	5,944	7,496	9,673	12,784	17,358
-35	2,806	3,555	4,412	5,465	6,843	8,751	11,457

Surveys

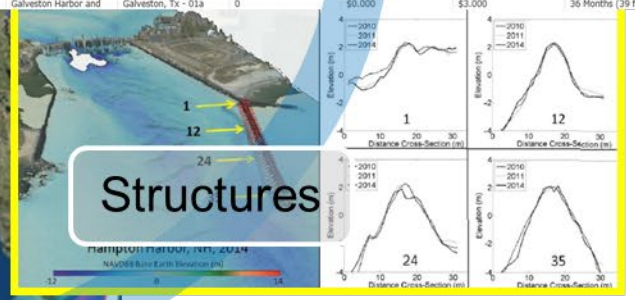




Vessels



Tonnage

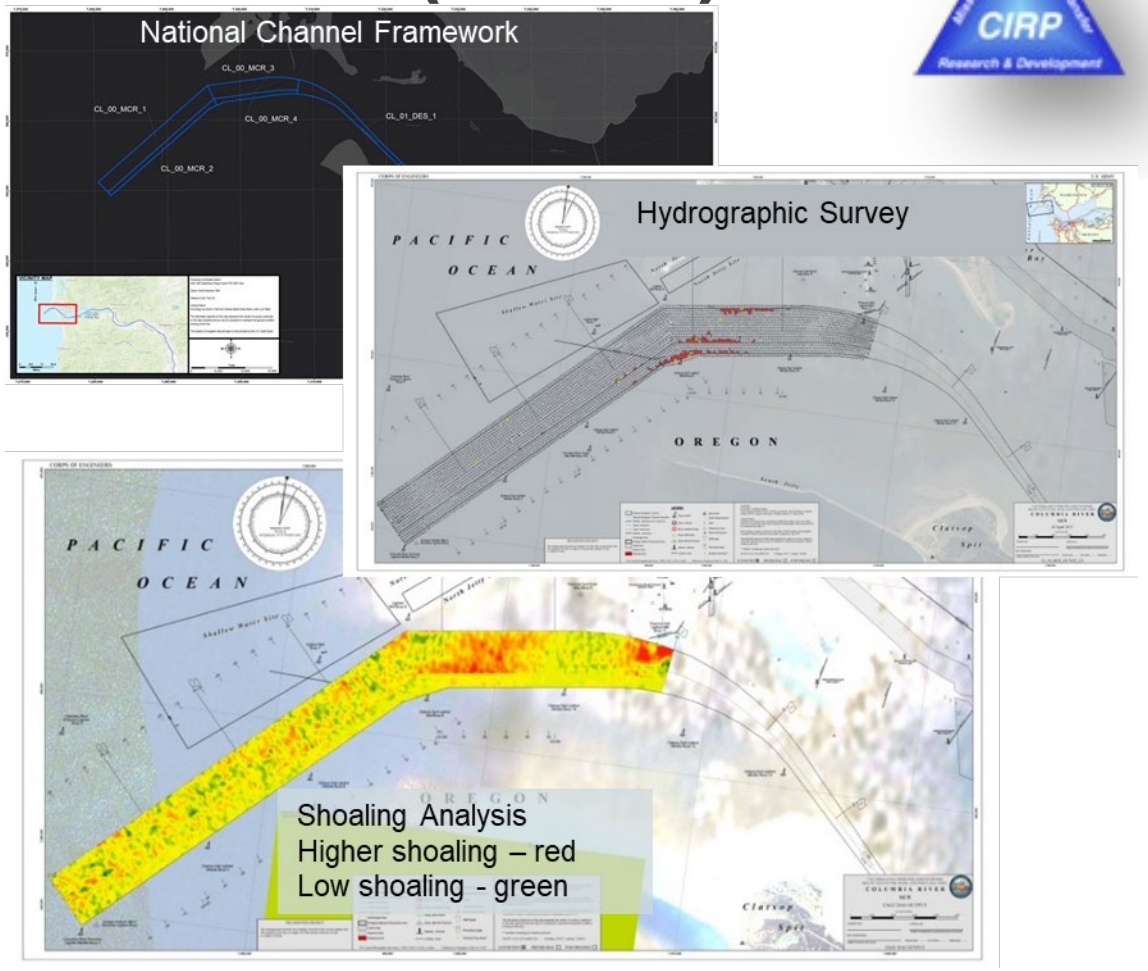


Structures

Corps Shoaling Analysis Tool (CSAT)

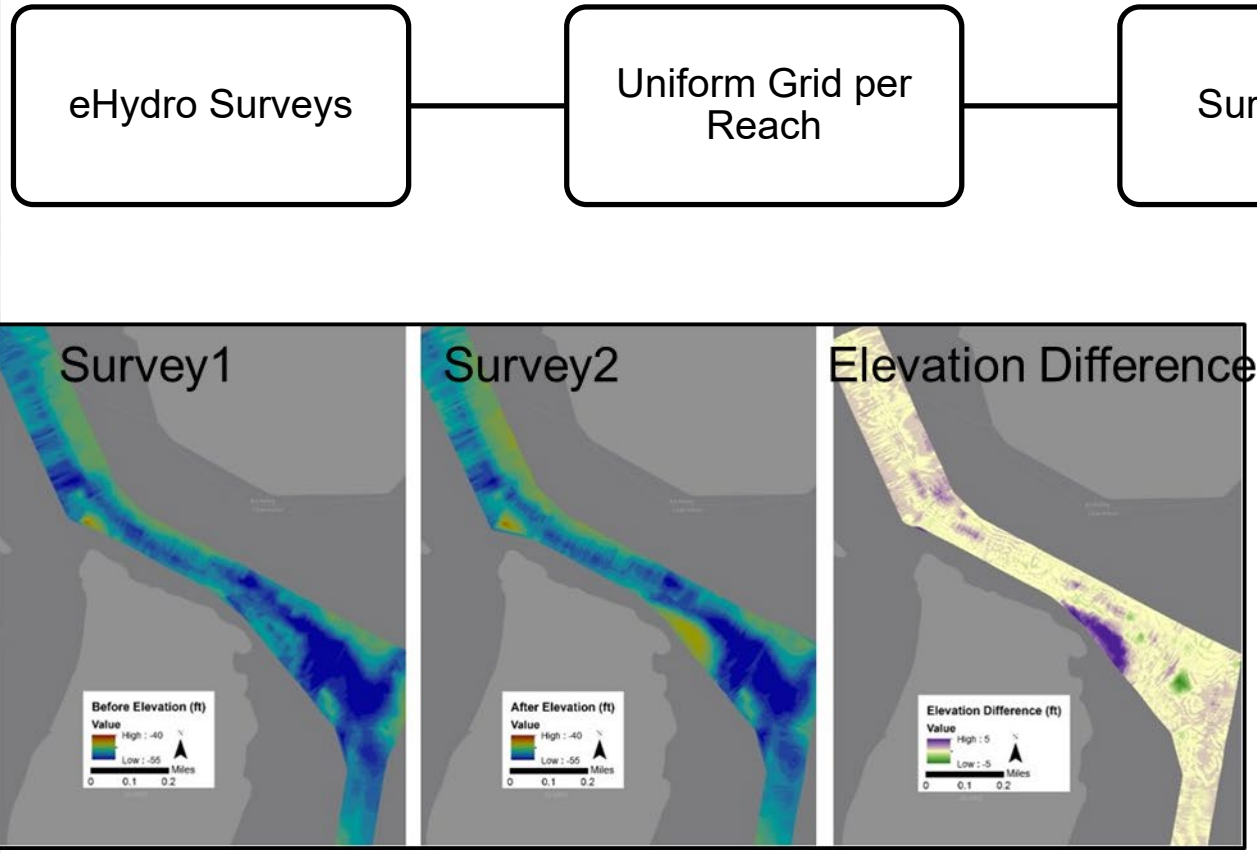
Description

- CSAT estimates shoaling rates using hydrographic surveys within the boundary of the National Channel Framework.
- CSAT uses the historical shoaling rates to predict future dredging volumes at various channel depth intervals.
- Where are shoaling 'hot spots' within the navigation channel?
- How has shoaling changed as a result of meteorological events (extratropical storm, rainfall or drought periods), dredge schedule change or dredge type change?



National Channel Framework, hydrographic survey map sheet from eHydro, and the shoaling rate prediction for Columbia River, OR.

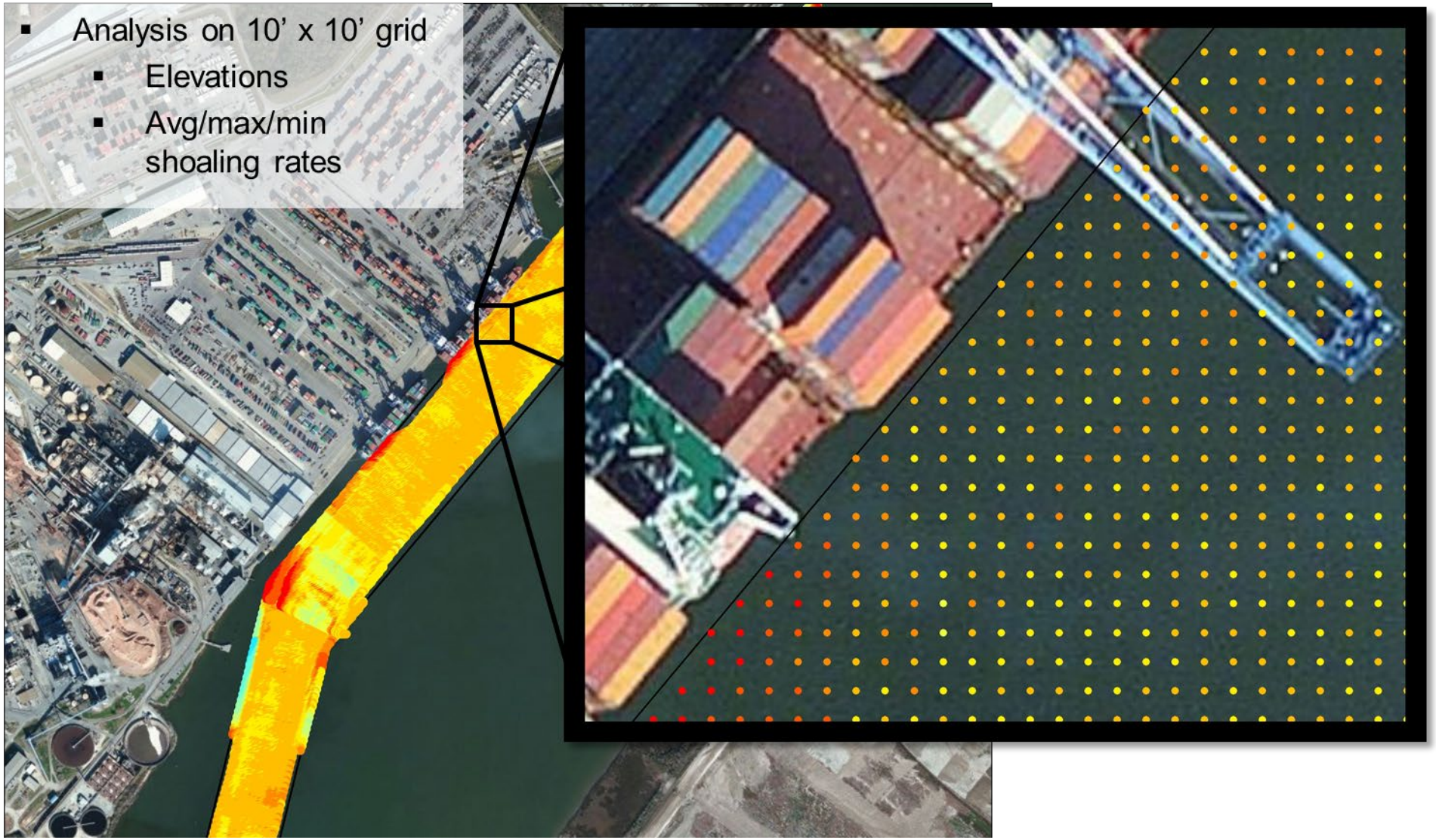
CSAT Survey Workflow



eHydro Surveys → Uniform Grid per Reach → Survey check

- Survey Type (After-dredge, Before dredge, Condition)
- Partial coverage
- Duplicate surveys
- User Classification

Shoaling Analysis on 10ft x 10ft grid



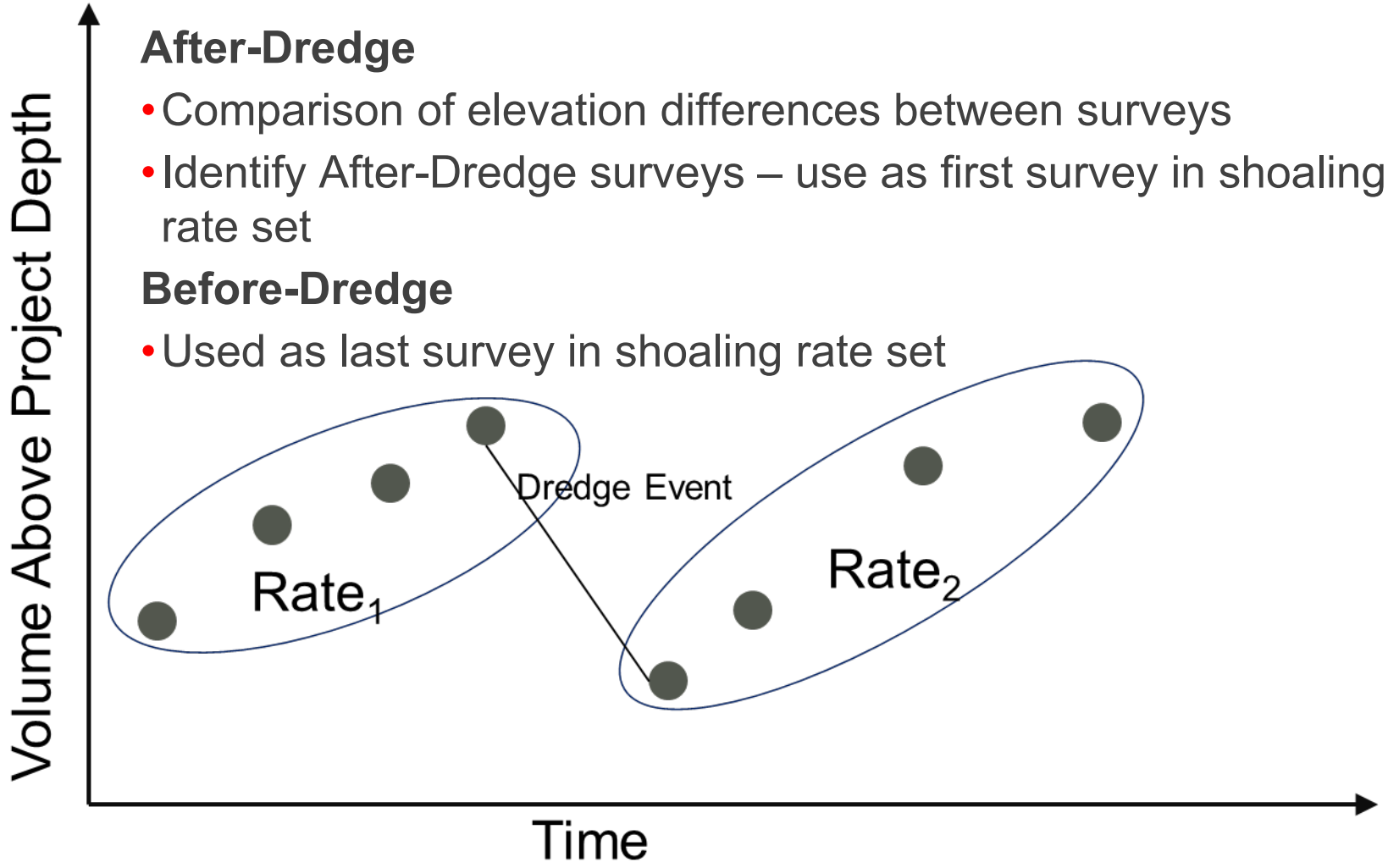
CSAT Workflow – Survey Type

After-Dredge

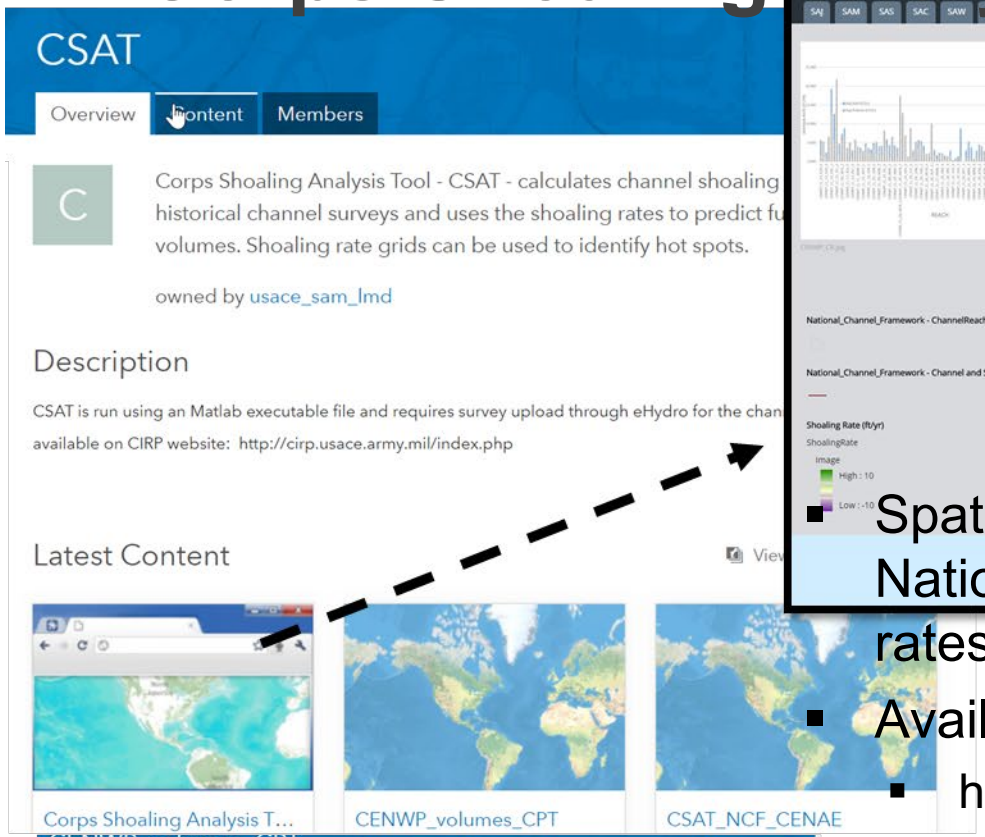
- Comparison of elevation differences between surveys
- Identify After-Dredge surveys – use as first survey in shoaling rate set

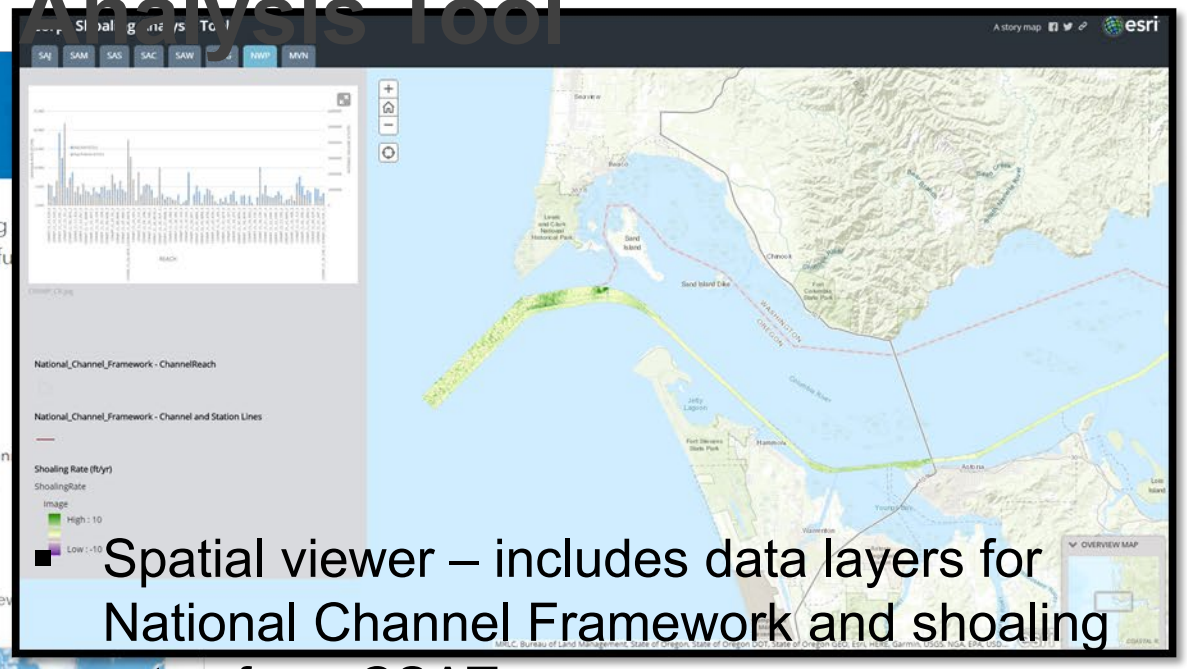
Before-Dredge

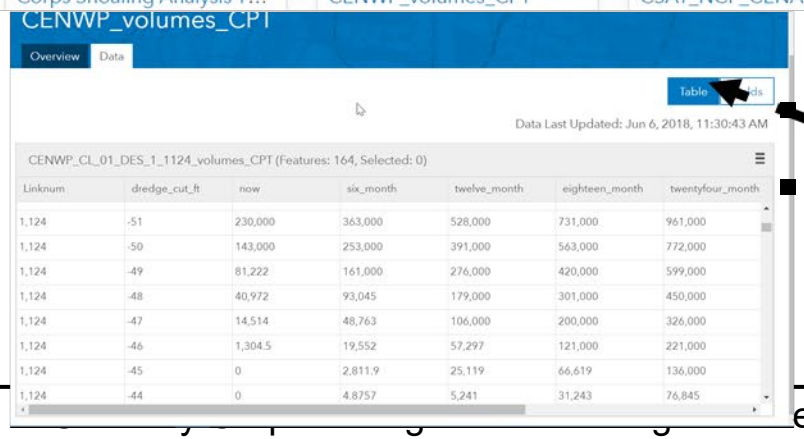
- Used as last survey in shoaling rate set



Corps Shoaling Analysis Tool



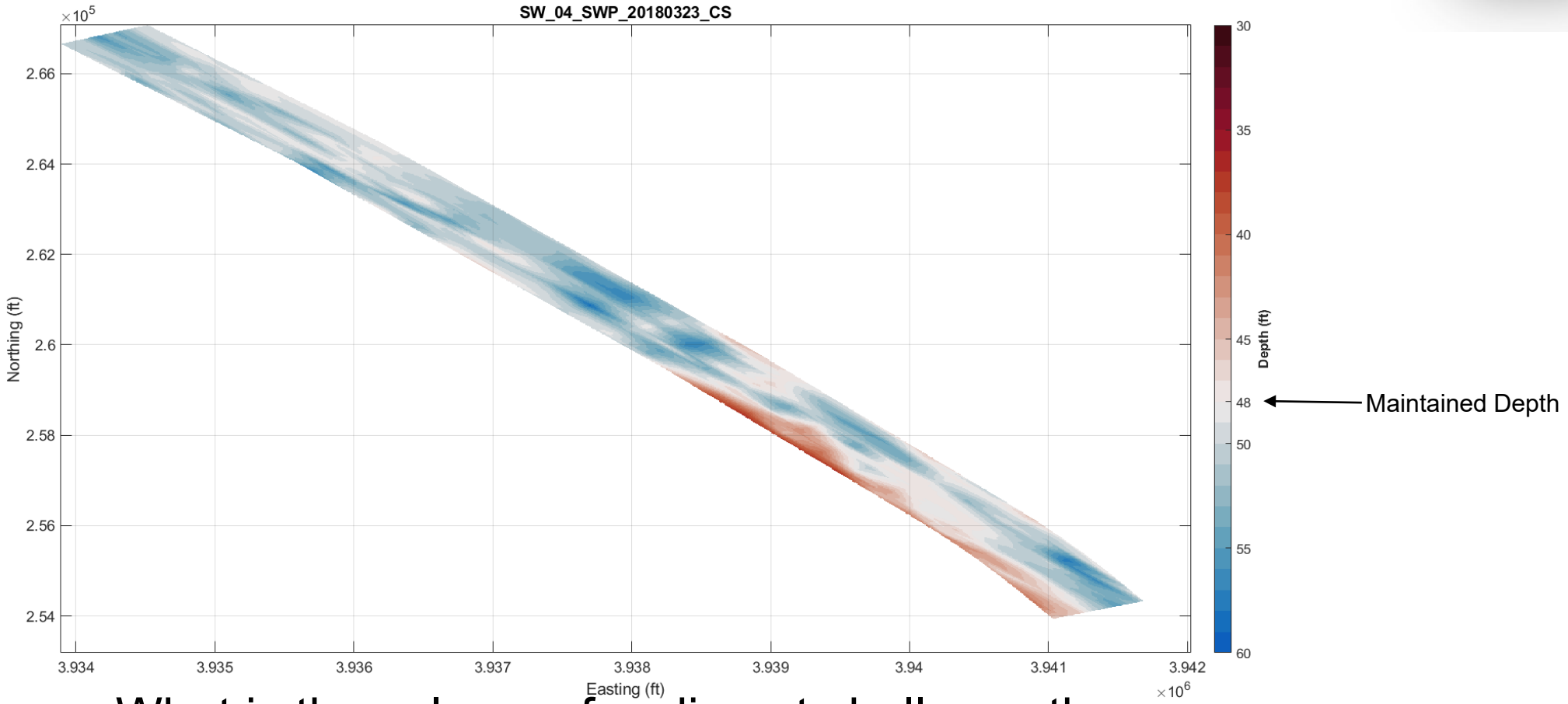




- Spatial viewer – includes data layers for National Channel Framework and shoaling rates from CSAT
- Available for download and viewing:
  - https://arcg.is/094Lur
  - Executable available for Districts
- ‘Live’ in December – 580 views to site
- Rest services created for CSAT output files
  - Volume tables linked within CPT

NEW
Python Version

Survey Planning Quantities (SPQ)



What is the volume of sediment shallower than Maintained Depth?

CSAT Output – Reach Level or CWIS level Rollup – Volume Tables

- Report volumes at different depth/time intervals and shoaling rates

Oakland Harbor (12990)

RelativeDepth	0_Months	6_Months	12_Months	18_Months	24_Months	30_Months	36_Months
VA_s5	170	268	17011	110995	256638	439863	651617
VA_s4	380	629	37849	160493	333984	543181	777208
VA_s3	822	1848	73338	230601	435783	671386	928089
VA_s2	1760	10408	131878	330139	568150	830209	1107008
VA_s1	8097	46367	228386	470456	739993	1024519	1318239
VA_p0	22591	131827	382466	663121	956930	1258243	1564307
VA_p1	69944	325969	618266	919374	1226110	1536123	1848464
VA_p2	352952	646087	948645	1257045	1568686	1882661	2198080
VA_p3	699612	1002390	1312029	1625199	1940585	2257072	2574207
VA_p4	1076911	1386917	1701263	2017559	2334818	2652699	2970999
VA_p5	1476264	1791251	2108145	2425936	2744281	3062973	3381847

0_months column is equivalent to Summary Planning Quantities (SPQs)

CSAT Example Viewer - NAO

Jeff Swallow – NAO – FiNDeR

N40 - Town Point Reach @ Maintained Depth: 40 Feet - SPQ Volumes (Cubic Yards)

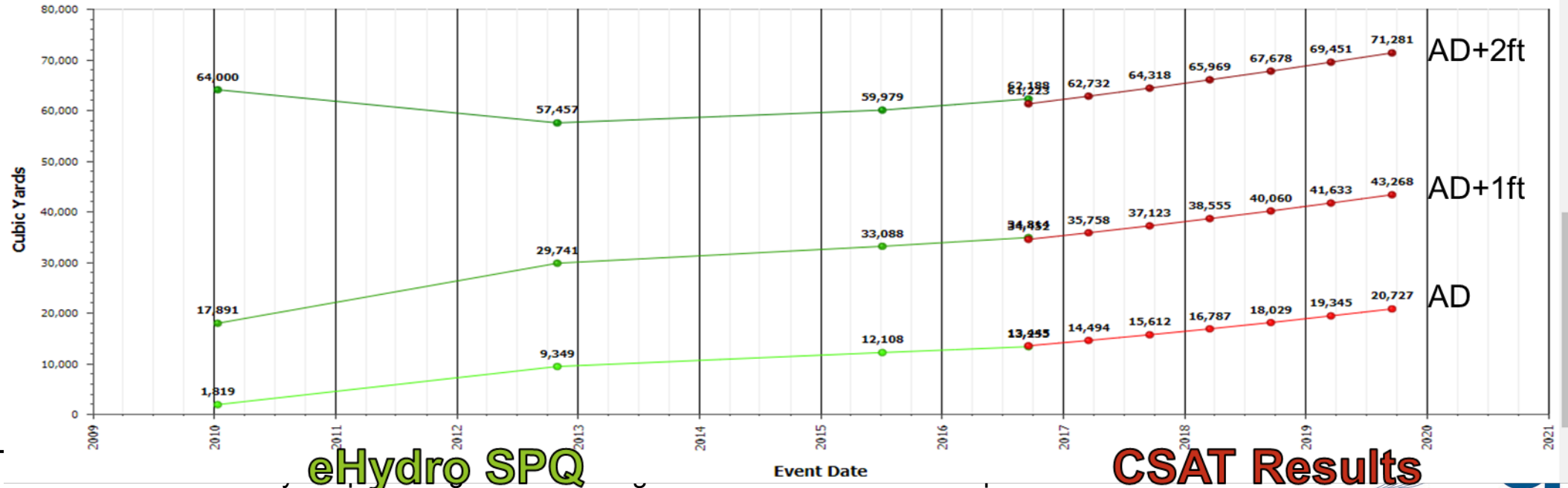
Name	Survey Date	CY to Maint. Depth	CY to Maint. Depth +1'	CY to Maint. Depth +2'
N40 - Town Point Reach	01/12/2010	1,819	17,891	64,000
N40 - Town Point Reach	10/31/2012	9,349	29,741	57,457
N40 - Town Point Reach	07/07/2015	12,108	33,088	59,979
N40 - Town Point Reach	09/19/2016	13,255	34,814	62,188

N40 - Town Point Reach CSAT Projected Volumes (Cubic Yards)

Name	Survey Date	CSAT @ Mnt. Depth	CSAT @ Mnt. Depth +1'	CSAT @ Mnt. Depth +2'
LAMBERTBENDTOPARADISECREEK	09/19/2016	13,445	34,452	61,223
LAMBERTBENDTOPARADISECREEK	03/19/2017	14,494	35,758	62,732
LAMBERTBENDTOPARADISECREEK	09/19/2017	15,612	37,123	64,318
LAMBERTBENDTOPARADISECREEK	03/19/2018	16,787	38,555	65,969
LAMBERTBENDTOPARADISECREEK	09/19/2018	18,029	40,060	67,678

1 - 5 Next

N40 - Town Point Reach @ Maintained Depth: 40 Feet - Spatial Planning Quantities and CSAT Projections (If Available)



eHydro SPQ

CSAT Results

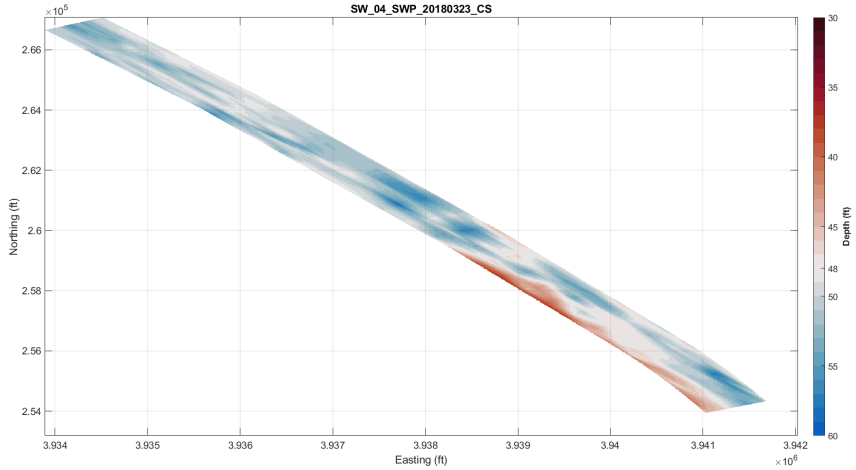
New approach for defining channel availability

How good of a job are we doing maintaining our channels? Historically evaluated using “channel availability”.

Controlling Depth is the minimum depth in a channel quarter

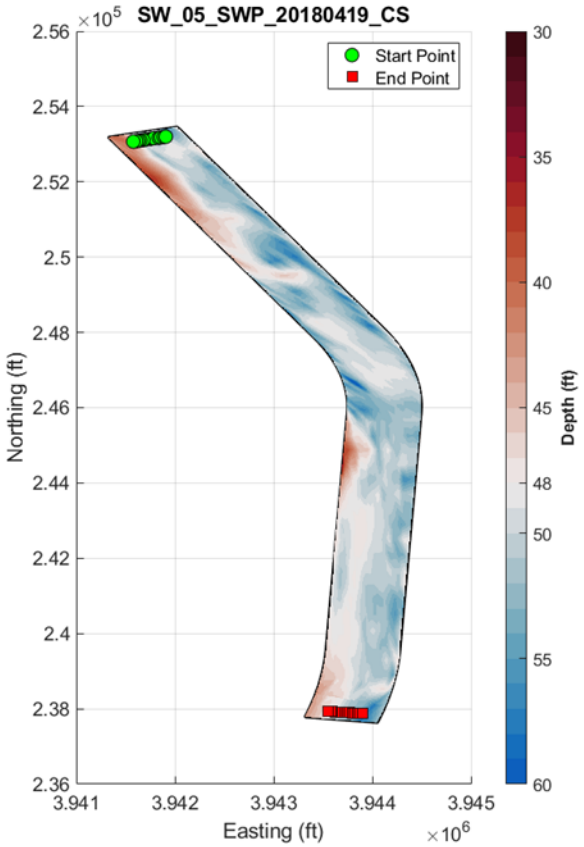
Currently testing Controlling Depth vs Project Depth:

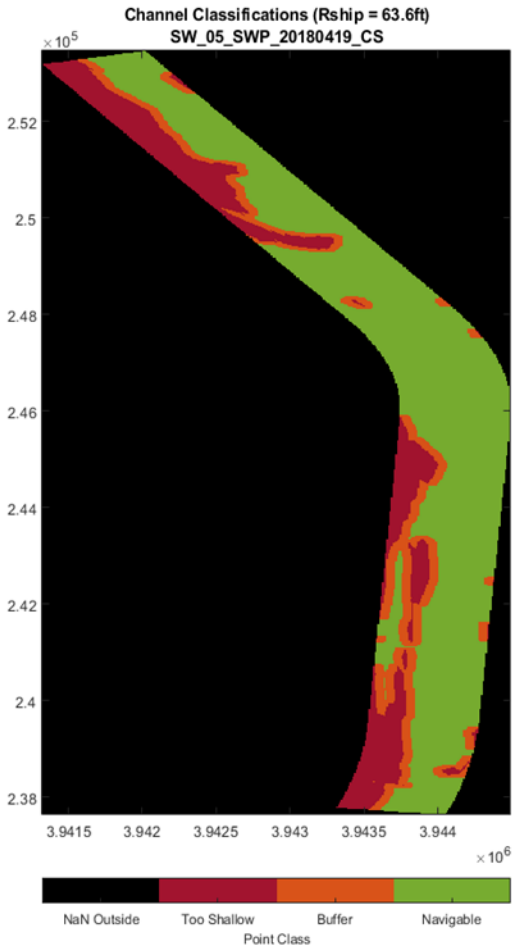
```
if controllingDepth < projectDepth
        channelAvailable = true;
else
        channelAvailable = false;
end
```

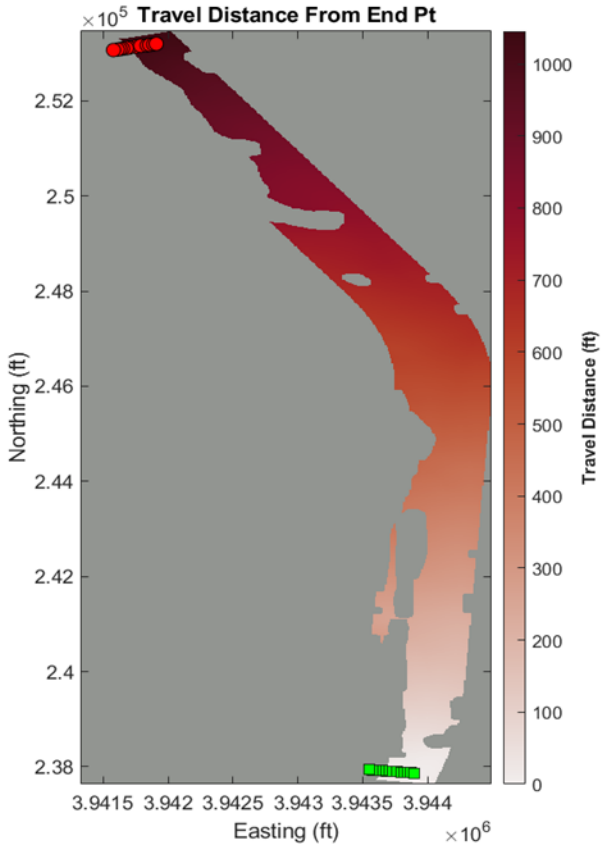


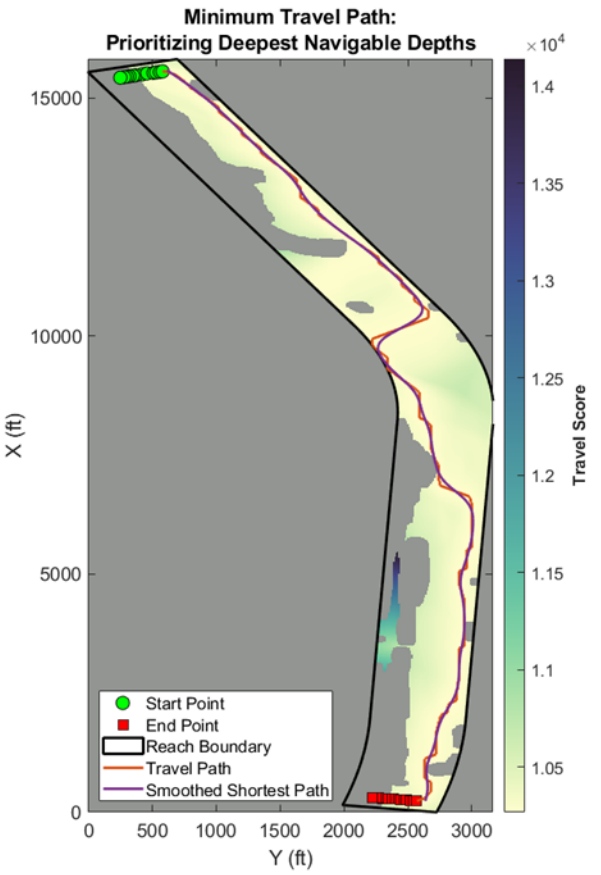
This definition means that it is possible for a single survey point to declare the entire channel as unavailable. Does that single point actually impact the vessel traffic though?

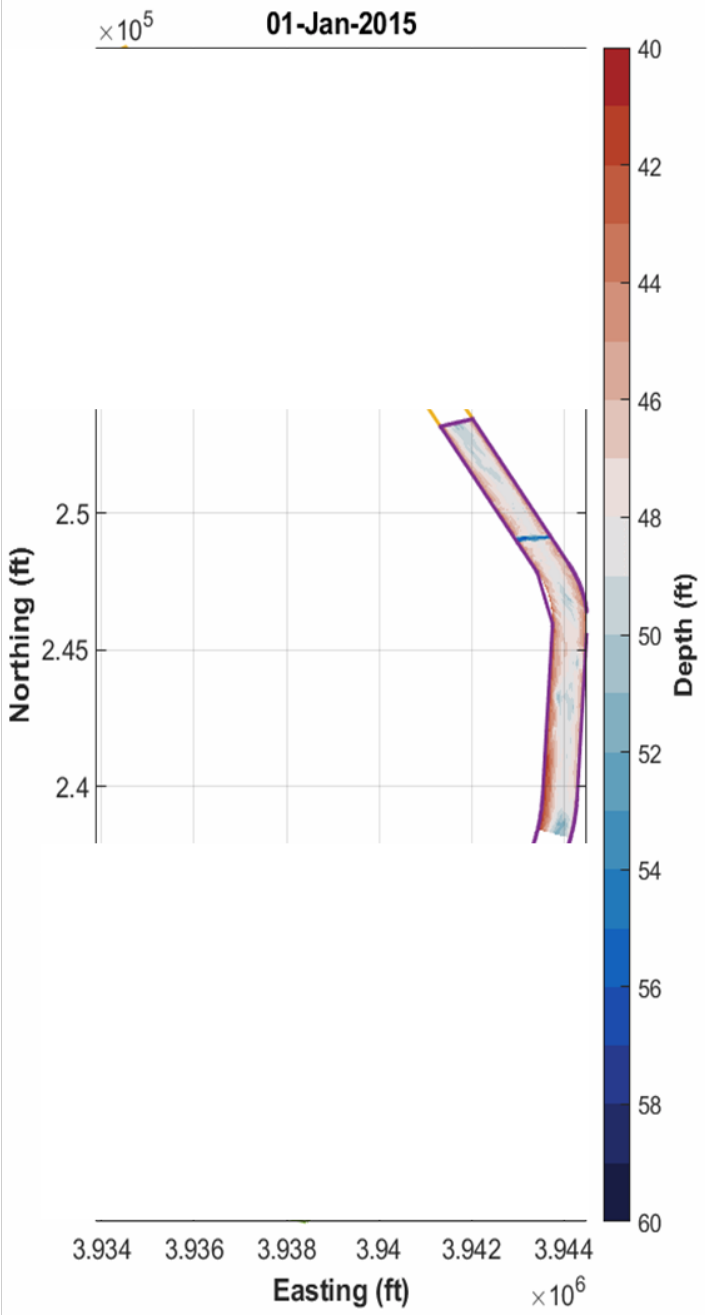
Channel Navigability

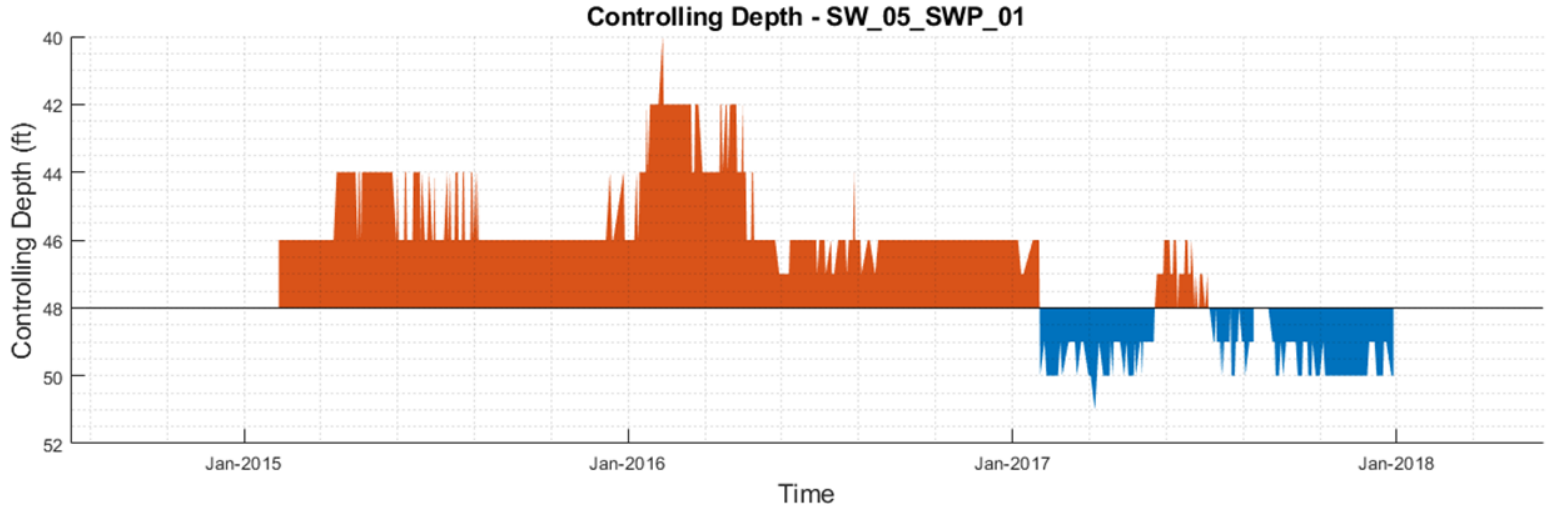


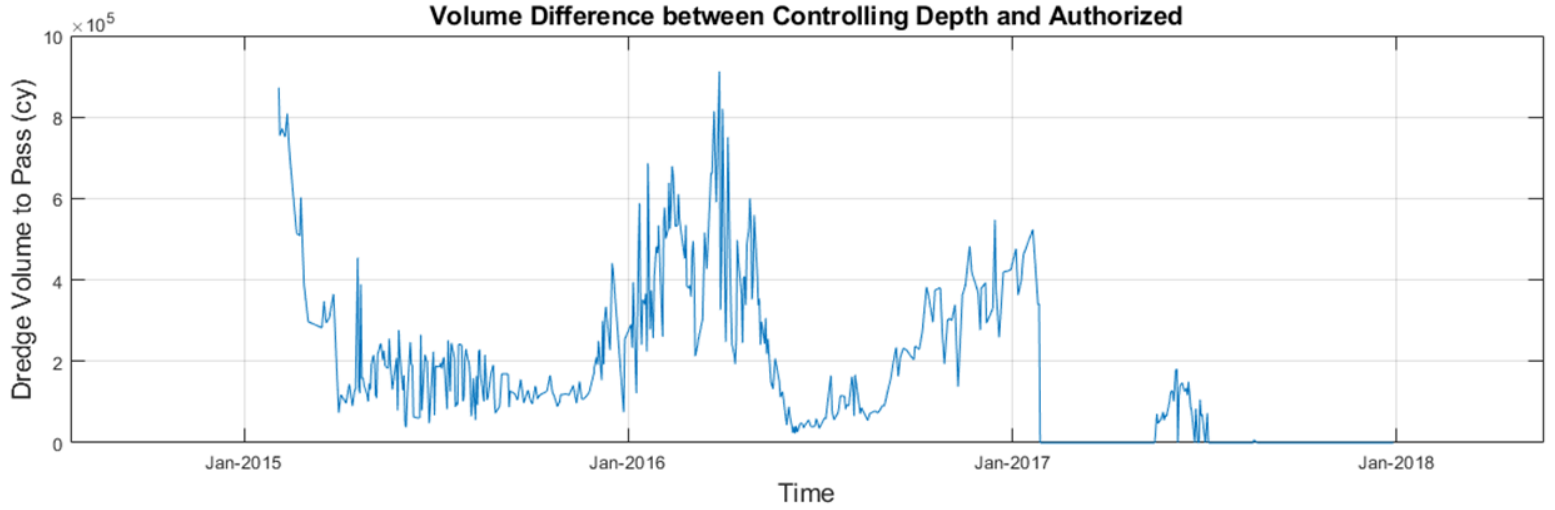












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Conclusion

FY 19

- Tech Transfer: CSAT Webinars with Districts
- Creation of CSAT-python
- Integration of CSAT results supporting Dredge Schedule Optimization
- Assessment of historic channel availability performance

FY 20

- CSAT running in a cloud-based environment
- Improved Channel Navigability Metric
  - Journal Publication: Channel Navigability Metric