

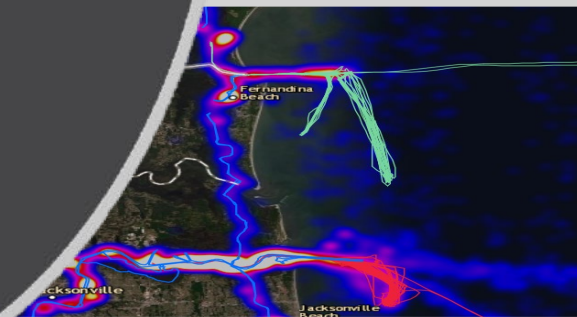
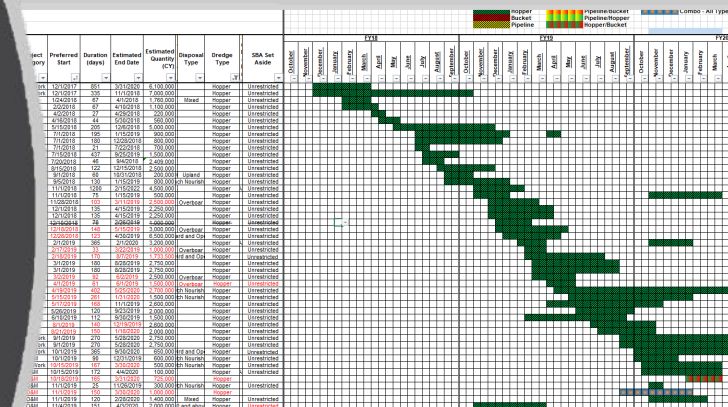


Marine Transportation Infrastructure Sustainability

Ned Mitchell, PhD

U.S. Army Engineer Research and Development Center (ERDC)
Coastal and Hydraulics Lab
Vicksburg, Miss.

Maritime Administration/TRB Marine Board
Maritime Education, Training, Research & Innovation (METRI)
Virtual Summit



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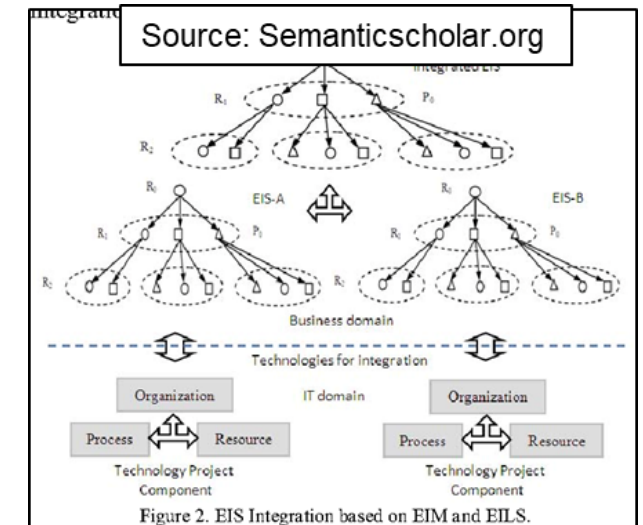
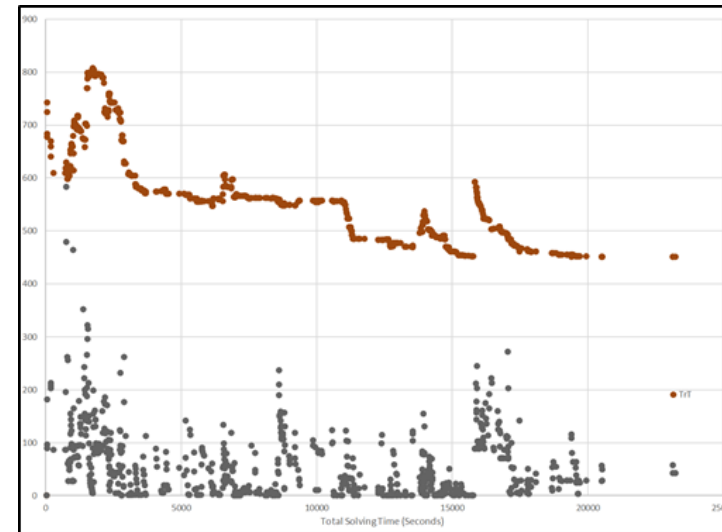
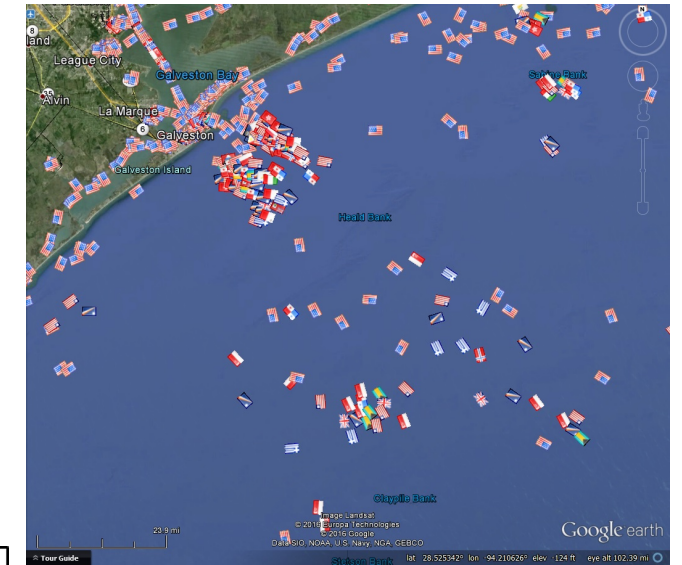
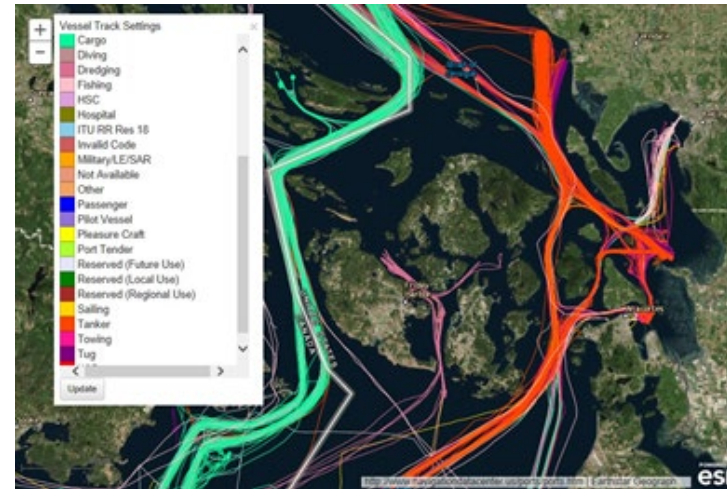
USACE Navigation Mission

- Corps is tasked with operating and maintaining a vast, aging water resources infrastructure portfolio that is critical to national well-being.
- Navigation projects at coastal ports and along inland waterways facilitate marine transportation and help support complex, dynamic, global freight supply chains.
- Responsible stewardship of limited taxpayer dollars compels the Corps to push for both tactical efficiencies, strategic vision, and lifecycle optimization of the navigation infrastructure portfolio.



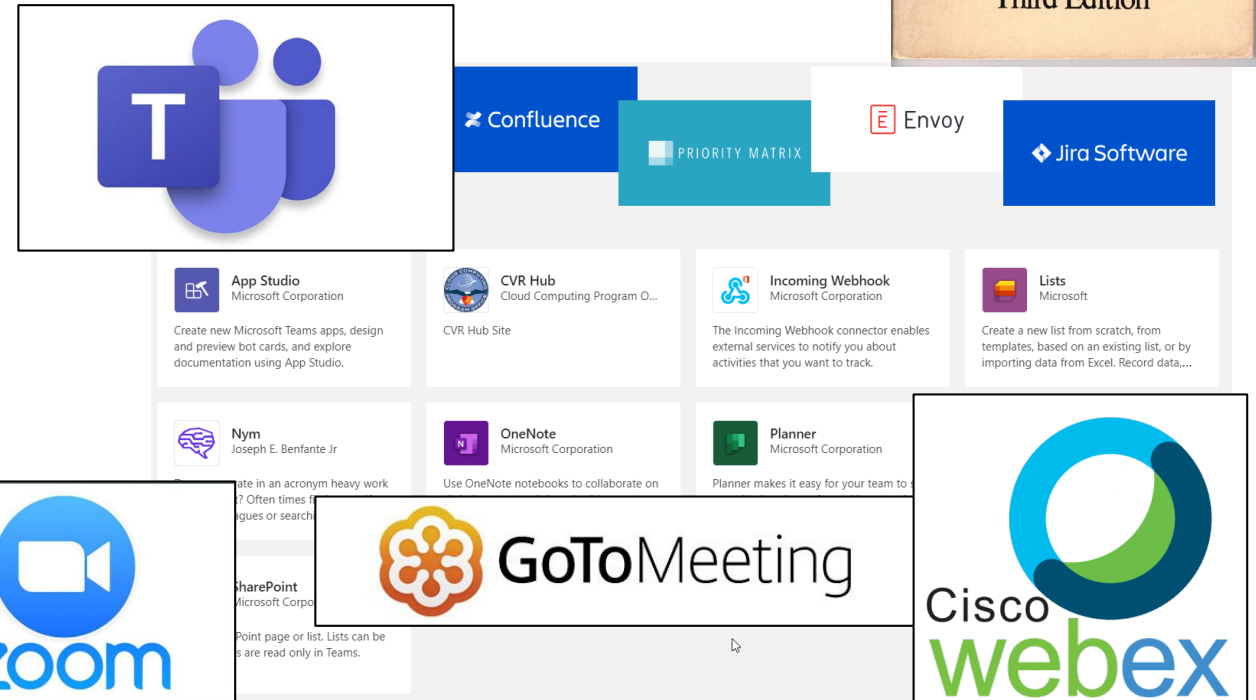
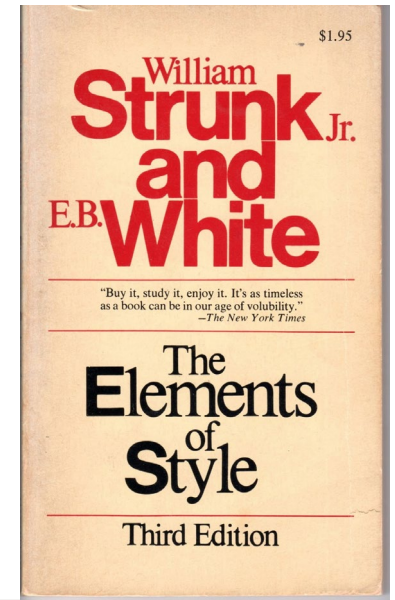
Needed Technical Skillsets

- Data Science
 - Machine learning
 - Data mining/data fusion
 - Trade space analytics
 - Real-time information feeds
- Operations Research
 - Systems optimization
 - Network analysis
 - Risk propagation (components to systems)
- Programming Agility
 - not just syntax



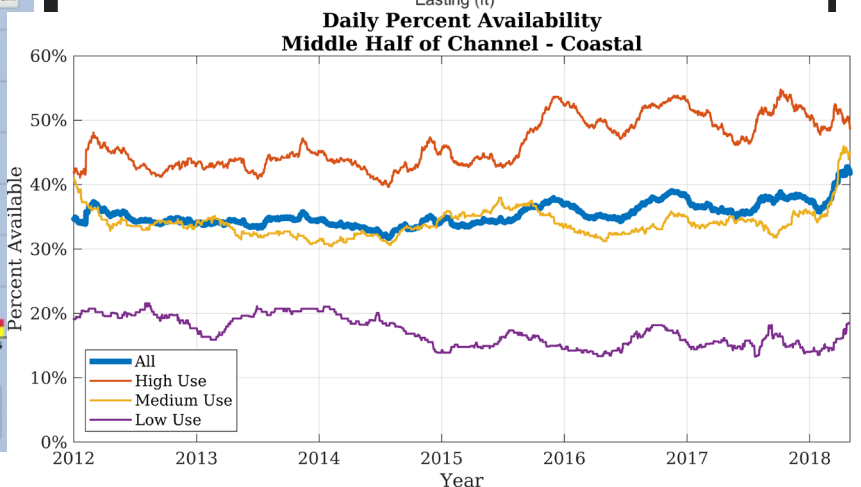
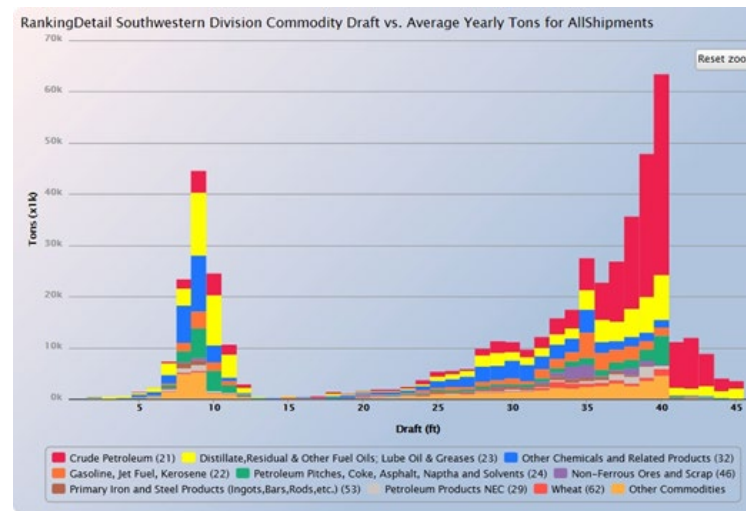
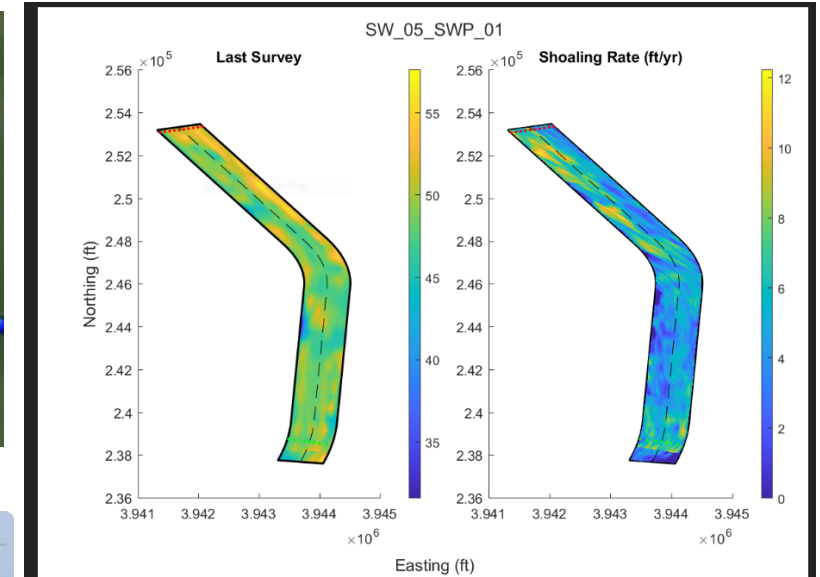
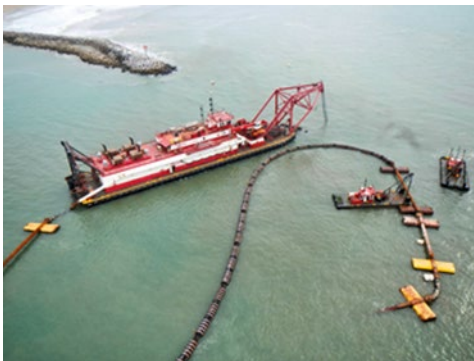
Needed Soft Skillets

- Adapt to new social norms
- Concise technical writing
- Proactive communication/reporting
- Virtual collaborative spaces
- Self-motivation/discipline



Case Study Example: Channel Conditions

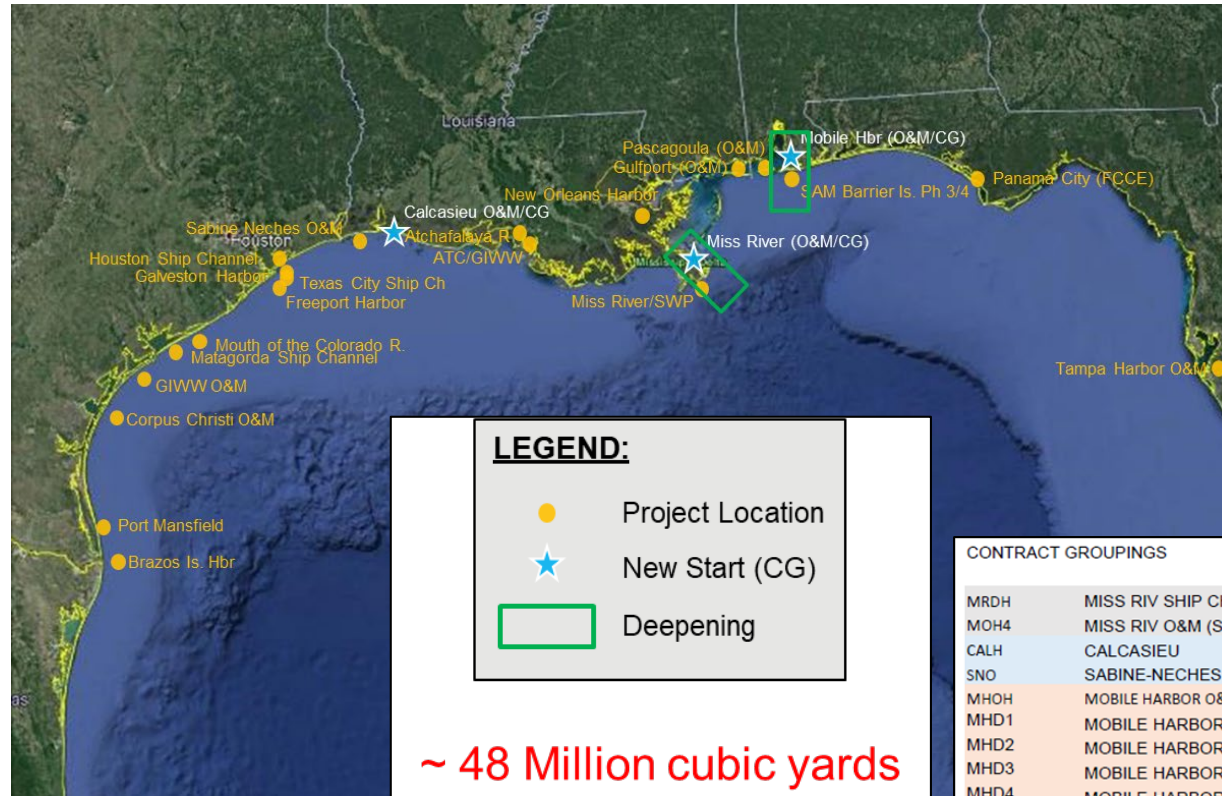
- National Channel Framework (NCF)
- eHydro – compendium of hydrographic surveys
- Corps Shoaling Analysis Tool (CSAT) – empirical projections of near-term shoaling
- Channel Portfolio Tool (CPT)



Case Study Example: Dredge Project Selection Optimization

Row Labels	Sum of Year 3Volume Removed (CY)	Sum of Year 4Volume Removed (CY)	Sum of Year 5Volume Removed (CY)	Sum of Year 6Volume Removed (CY)	Sum of Year 7Volume Removed (CY)	Sum of Year 8Volume Removed (CY)	Sum of Year 9Volume Removed (CY)	Sum of Avg. CY
TACOMA HARBOR-072902-NWS	154,512	154,512	154,512	186,089	154,504	154,504	154,904	160,903
SEATTLE HARBOR-067318-NWS	148,724	148,724	148,724	148,724	148,724	148,724	148,724	148,724
MILWAUKEE HARBOR WISCONSIN-011270-LRE	323,172	101,024	109,076	101,024	109,110	315,154	109,110	148,695
DELAWARE RIVER AT CAMDEN -043005-NAP	288,278	13,068	227,332	28,826	227,332	28,826	227,332	147,930
PANAMA CITY HARBOR-013640-SAM	89,763	89,763	258,196	57,293	67,181	258,196	57,293	139,632
SUISUN BAY CHANNEL-017720-SPN	136,249	136,249	136,249	136,249	136,249	136,249	136,249	136,249
COLUMBIA RIVER BETWEEN VANCOUVER WA AND THE DALLES OR-003620-NWP	150,484	195,828	81,834	100,683	65,216	263,328	156,287	133,870
NEW YORK HARBOR-012490-NAN	174,760	101,123	101,123	174,760	101,123	101,123	174,760	130,578
SAGINAW RIVER MICHIGAN-057420-LRE	11,217	302,357	11,217	302,357	11,217	302,357	11,217	127,673
BURNS WATERWAY HARBOR-002250-LRC	-	305,424	-	305,424	-	305,424	-	122,170
BILOXI HARBOR-001520-SAM	58,091	83,303	57,009	72,391	203,220	108,327	127,305	113,692
MIAMI HARBOR FL-074378-SAJ	5,972	158,324	5,631	55,963	442,090	46,622	15,972	113,556
BARBOUR TERMINAL CHANNEL-088912-SWG	176,837	3,958	176,837	3,958	176,837	3,958	176,837	107,685
CHOCOLATE BAYOU - GULF INTRACOASTAL WATERWAY-076085-SWG	8,011	240,324	8,011	240,324	8,011	240,324	8,011	100,936
PRESQUE ISLE HARBOR MICHIGAN-048012-LRE	97,411	97,411	97,411	97,411	97,411	97,411	97,411	97,411
PALM BEACH HARBOR FL-013590-SAJ	63,133	271,083	13,038	87,031	26,338	334,434	13,038	94,956
RARITAN RIVER-014860-NAN	47,105	162,270	47,105	162,270	47,105	162,270	47,105	93,171
PORT EVERGLADES HARBOR-076031-SAJ	16,627	183,284	38,457	183,284	16,627	183,284	16,627	87,656
GULF INTRACOASTAL WATERWAY-007130-SAM	150,988	42,494	42,494	150,988	42,494	42,494	150,988	85,892
ROUGE RIVER MICHIGAN-015590-LRE	77,313	77,313	77,313	77,313	77,313	77,313	77,313	77,313
CAPE COD CANAL-002620-NAE	134,244	2,179	123,160	2,179	123,160	2,179	134,244	76,984
SAN DIEGO HARBOR-016110-SPL	35,924	35,924	378,236	-	-	-	-	75,647
NAPA RIVER-074703-SPN	73,933	73,933	73,933	73,933	73,933	73,933	73,933	73,933
FALL RIVER HARBOR, MA-000414-NAE	65,152	109,050	65,152	65,152	109,050	65,152	65,152	73,932
MANATEE HARBOR, FL-010166-SAJ	11,644	216,960	11,644	111,035	122,371	106,233	16,446	73,546
FLUSHING BAY AND CREEK-041016-NAN	-	181,562	-	181,562	-	181,562	-	72,625
CHANNEL TO NEWPORT NEWS , VIRGINIA-073783-NAO	-	-	177,893	-	-	177,893	-	71,157
CANAVERAL HARBOR FL-002520-SAJ	73,809	60,672	60,672	60,672	60,672	73,809	60,672	63,299
SAN JUAN HARBOR, PR-016190-SAJ	87,785	77,526	713	148,140	17,171	61,068	87,785	62,975
PORT HUENEME-074656-SPL	63,980	13,366	63,980	13,366	63,980	13,366	63,980	43,734
BARBERS POINT HARBOR, OAHU-000910-POH	36,737	36,737	36,737	36,737	36,737	36,737	36,737	36,737

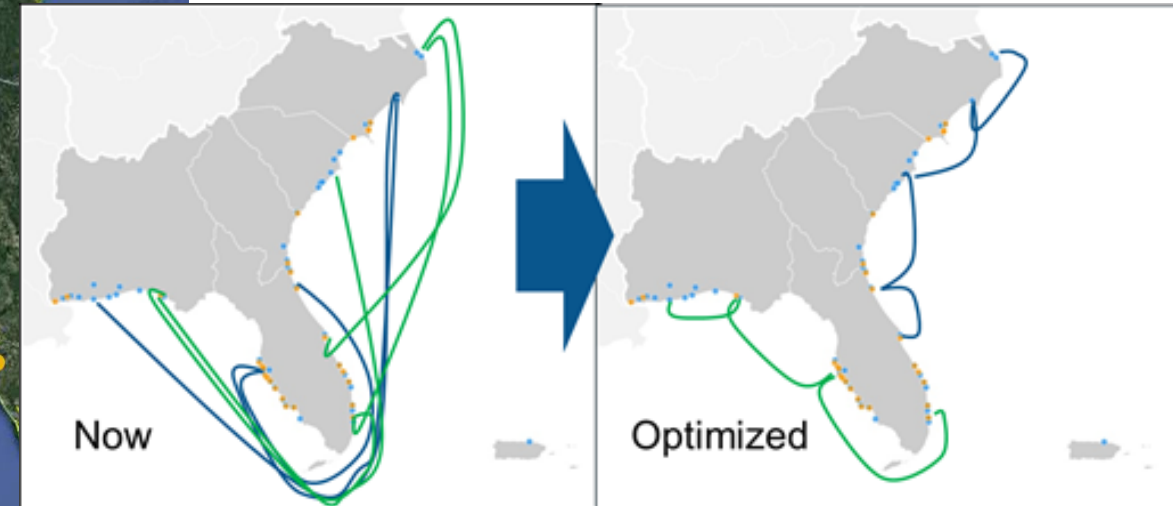
Case Study Example: Dredging Optimization Strategies



LEGEND:

- Project Location
- ★ New Start (CG)
- ▭ Deepening

~ 48 Million cubic yards

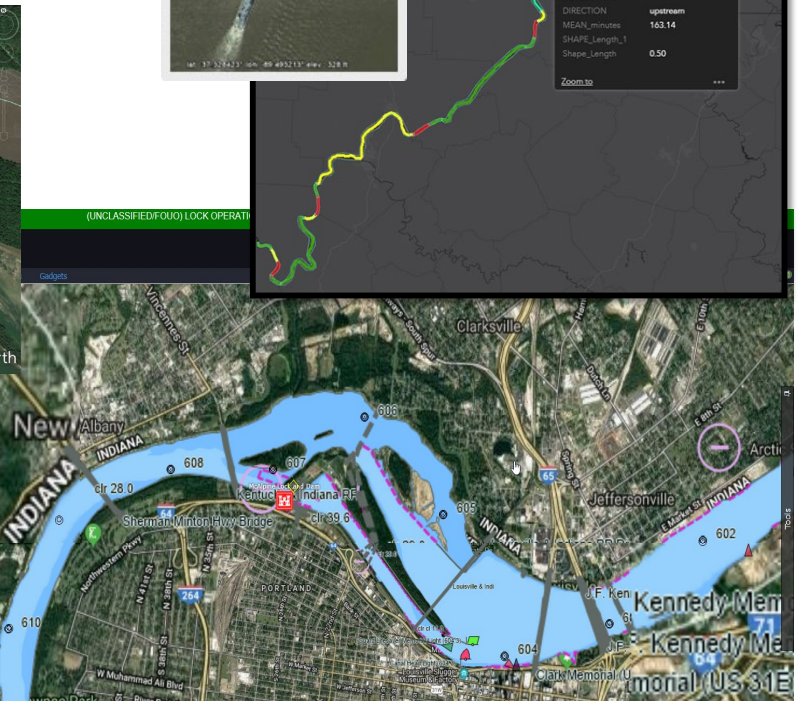
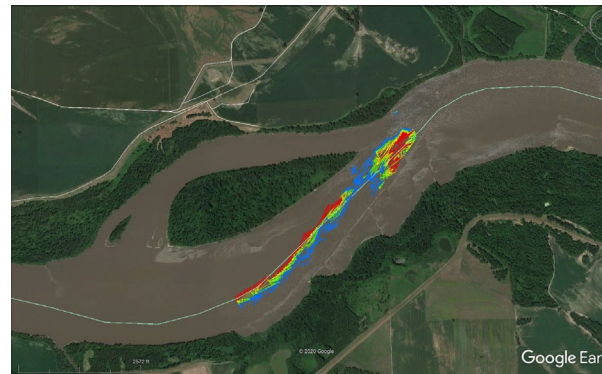


The 2020 Energy and Water Development Appropriations Bill (Senate Report 116-102) requires USACE to implement a Regional Dredge Demonstration Program, with particular focus on the Central Gulf Coast Region.

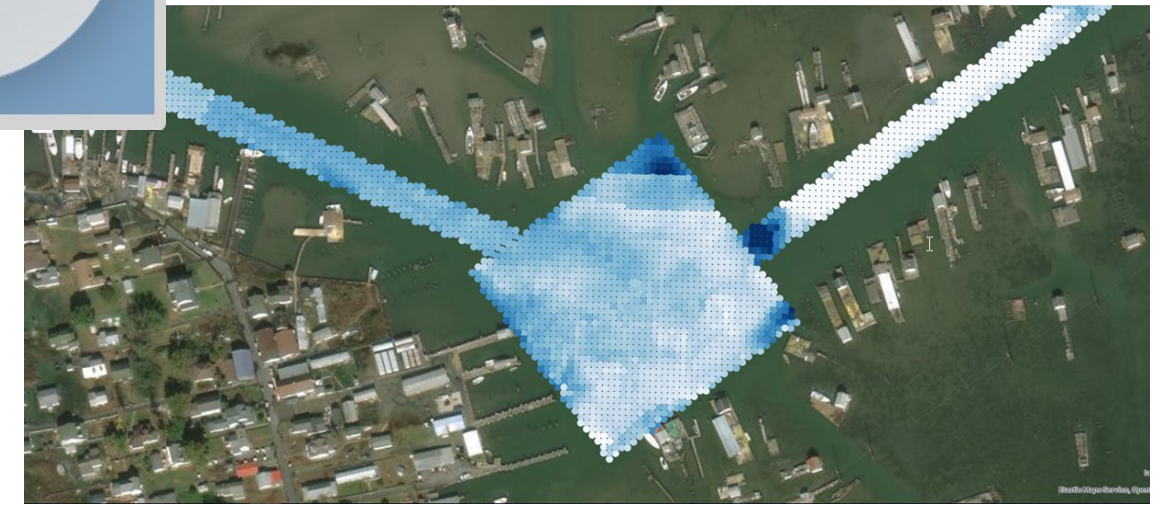
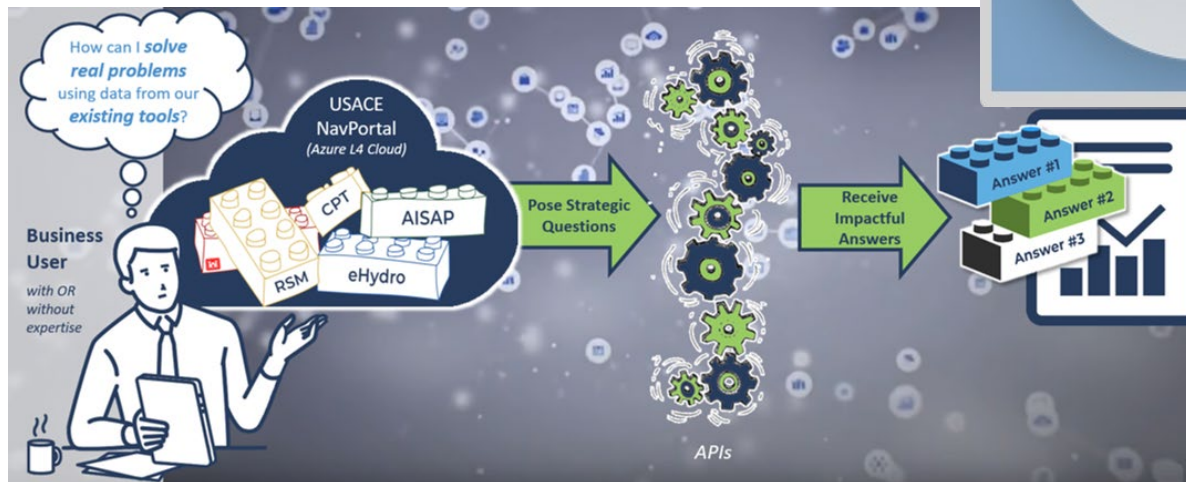
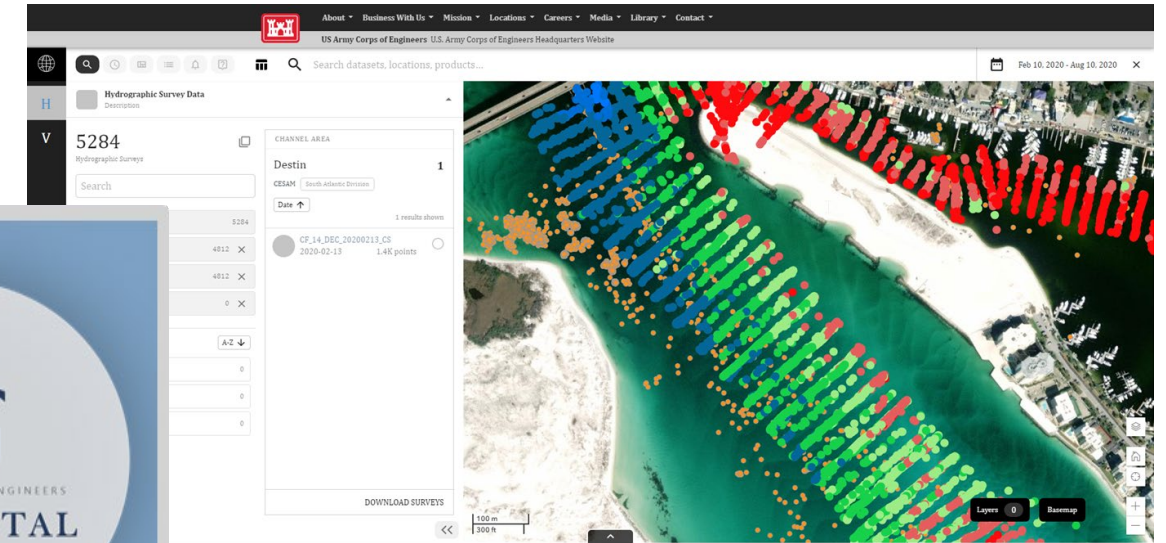
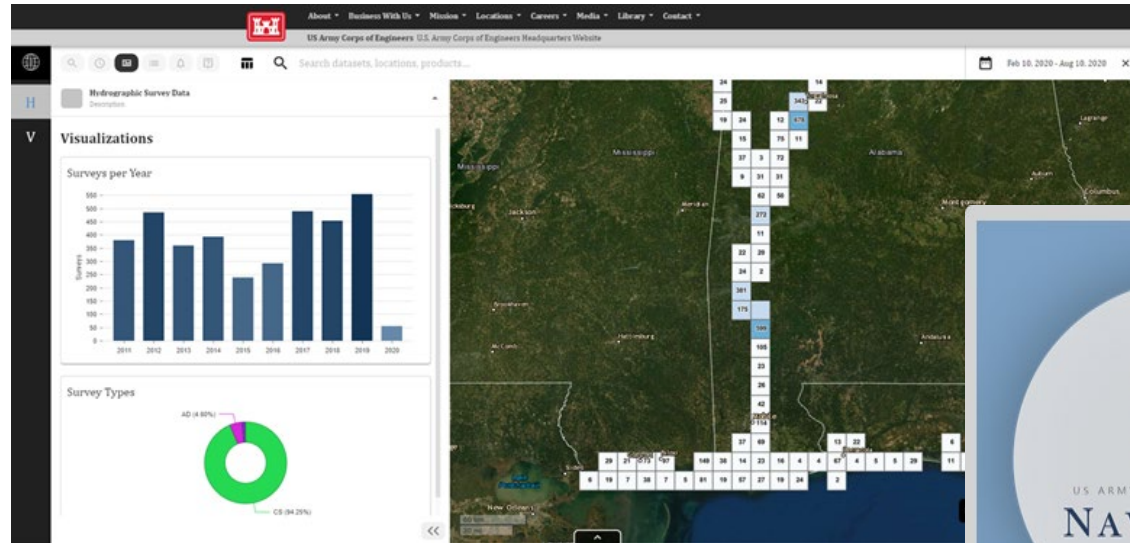
CONTRACT GROUPINGS		COST	CY	COST/CY	Typ MOB
MRDH	MISS RIV SHIP CHANNEL DEEPENING - Hopper #1	\$ 22,000,000	7,000,000	\$ 3.14	\$ 615,000
MOH4	MISS RIV O&M (SWP Hopper #4)	\$ 12,400,000	4,000,000	\$ 3.10	\$ 615,000
CALH	CALCASIEU	\$ 6,000,000	8,000,000	\$ 0.75	\$ 200,000
SNO	SABINE-NECHES WATERWAY - O&M (Outer Bar and Bank)	\$ 8,000,000	3,835,000	\$ 2.09	\$ 1,000,000
MHOH	MOBILE HARBOR O&M - hopper	\$ 8,000,000	2,500,000	\$ 3.20	\$ -
MHD1	MOBILE HARBOR DEEPENING PHASE I	\$ 22,300,000	2,640,000	\$ 8.45	\$ -
MHD2	MOBILE HARBOR DEEPENING PHASE II	\$ 56,000,000	6,100,000	\$ 9.18	\$ -
MHD3	MOBILE HARBOR DEEPENING PHASE III	\$ 78,000,000	6,100,000	\$ 12.79	\$ -
MHD4	MOBILE HARBOR DEEPENING PHASE IV	\$ 88,000,000	6,100,000	\$ 14.43	\$ 1,384,740
GUL	GULFPORT O&M	\$ 4,355,000	5,000,000	\$ 0.87	\$ 500,000
PASH	PASCAGOULA O&M - hopper	\$ 625,000	250,000	\$ 2.50	\$ 350,000
MHOP	MOBILE HARBOR O&M - pipeline	\$ 18,000,000	6,000,000	\$ 3.00	\$ -
MHD5	MOBILE HARBOR DEEPENING PHASE V	\$ 65,000,000	4,600,000	\$ 14.13	\$ 2,083,738
PASP	PASCAGOULA O&M - pipeline	\$ 3,000,000	2,000,000	\$ 1.50	\$ 500,000
MRD1	MISS RIV SHIP CHANNEL DEEPENING - Cutter #1	\$ 20,000,000	6,250,000	\$ 3.20	\$ 2,300,000
MOP1	MISS RIV O&M (SWP Cutter #1)	\$ 16,000,000	5,000,000	\$ 3.20	\$ -
MRD2	MISS RIV SHIP CHANNEL DEEPENING - Cutter #2	20000000	6250000	\$ 3.20	\$ 2,300,000
MOP2	MISS RIV O&M (SWP Cutter #2)	16000000	5000000	\$ 3.20	\$ -

Case Study Example: River Information Services

- River Water Level Predictions
- Bridge Air Gap Clearance
- Lock Maintenance Schedule Automation
- Travel Time Prediction
- Marine Safety Information Automation
- Lock Maintenance Schedule Optimization
- Incident Impact Assessment Tool
- Commodity/Tow Diagram e-Reporting
- Incident Abatement Prediction Tool
- NTNI/NTM Harmonization
- Certain Dangerous Cargo (CDC) Tracker
- Under Keel Clearance Prediction
- Non-Commercial Vessel Lockage Coordination
- River Currents Predictions
- Commodity Movement Forecaster



Case Study Example: NavPortal Developments



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Questions?

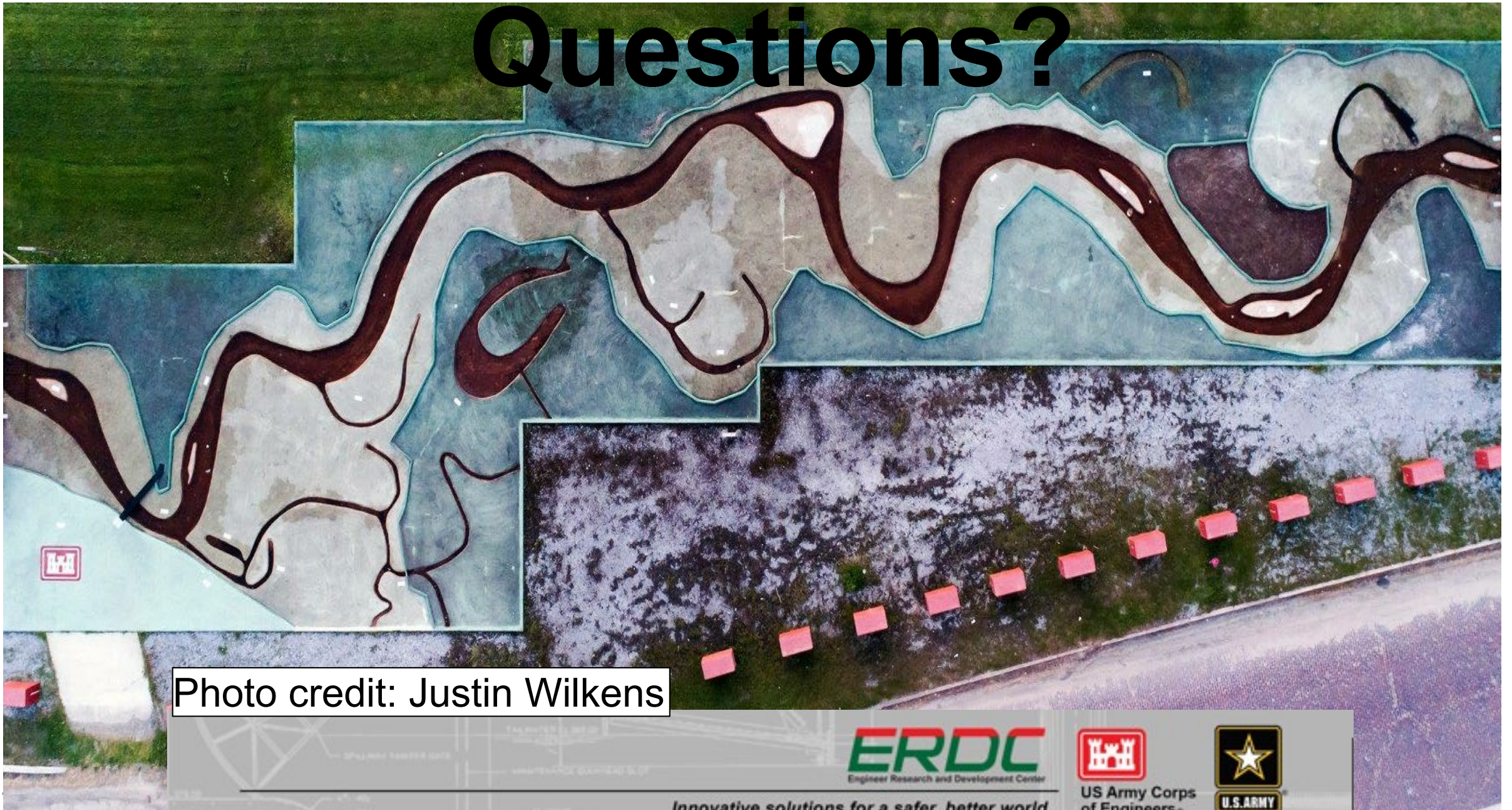


Photo credit: Justin Wilkens

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Questions?

Dr. Ned Mitchell
ERDC Dredging Innovations Group (DIG)
Kenneth.n.Mitchell@usace.army.mil
601-529-9005



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