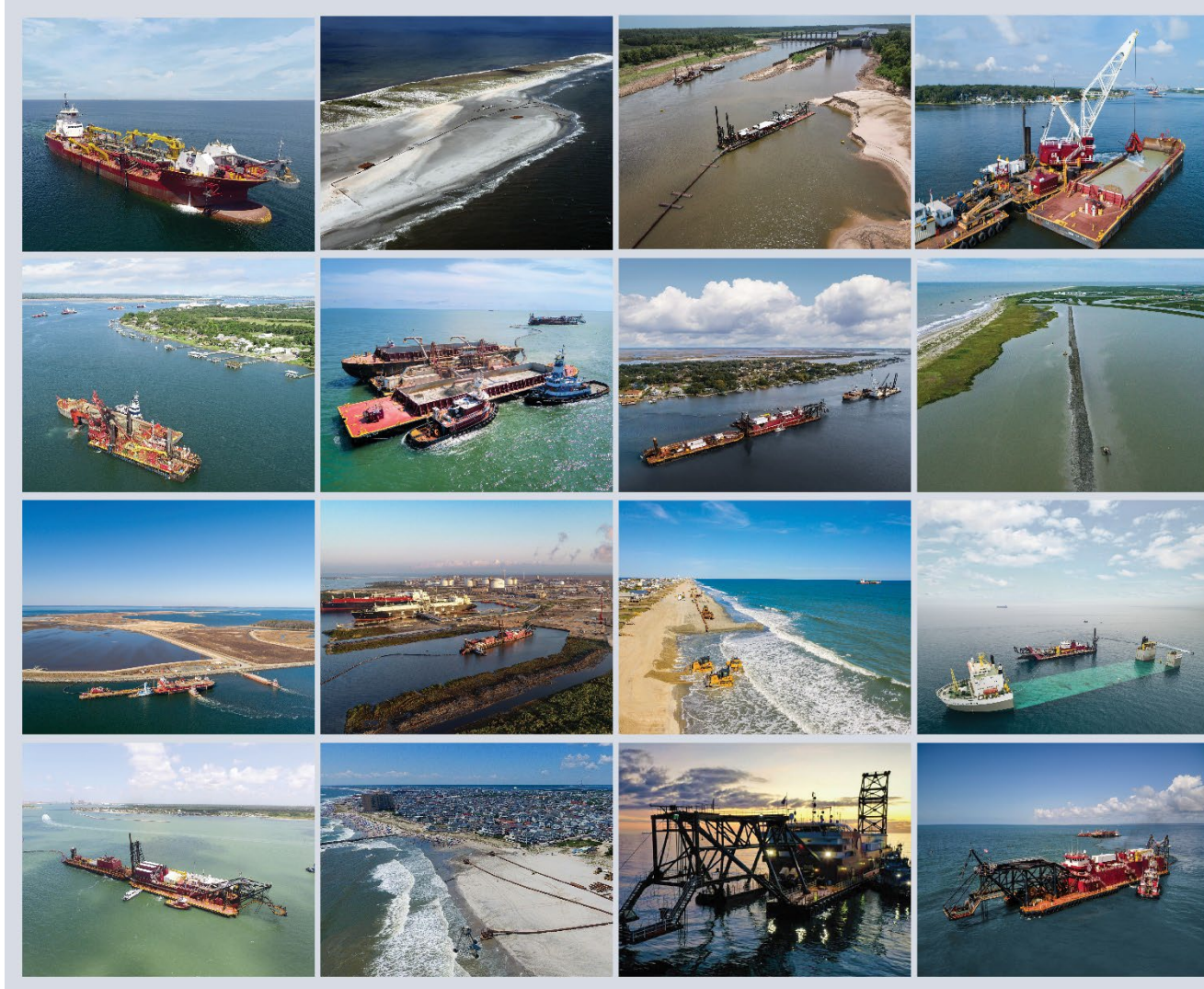




Panel Discussion Current Cost Drivers for The Dredging Industry

WEDA Eastern Chapter Meeting October 19, 2022

GREAT LAKES DREDGE & DOCK COMPANY, LLC



Cost Drivers For Dredging

Panel Discussion

It All Starts With Dredging®



Dredging Cost Drivers

Fuel Costs

Crude Oil WTI (UTC-5)

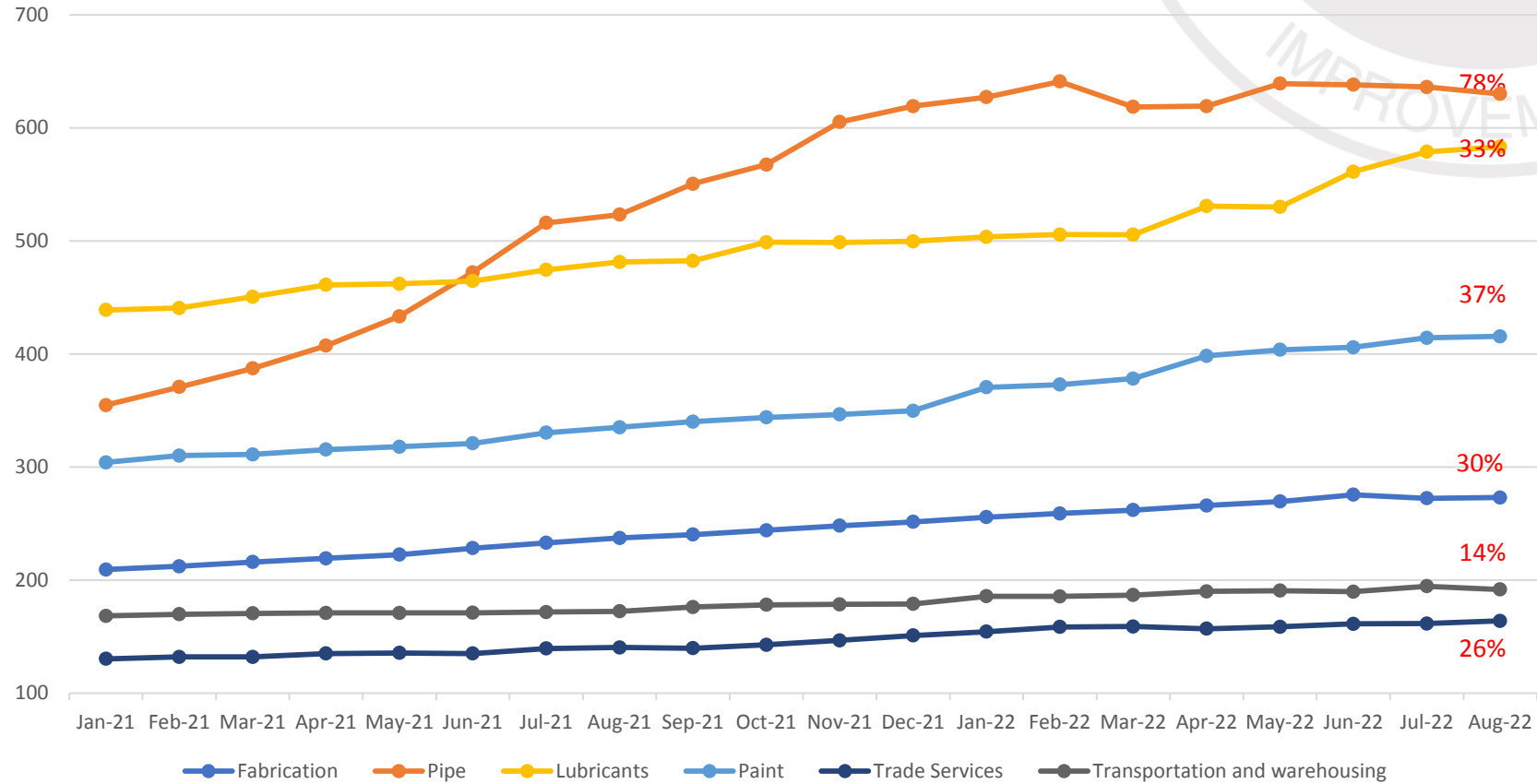


source: tradingeconomics.com



Dredging Cost Drivers

2021 – 2022 YTD Producer Price Index Variation



Dredging Cost Drivers

Direct Costs

- Labor Shortages
- Site Overhead Increases
 - Housing
 - Travel Expenses
 - Trucking
 - Salaries

Project Specific Factors

- Complexity of the Project
- Dredge Areas
 - Depths
 - Material Types
 - Pumping Distances
- Time of Year & Weather
- Market





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*New Jersey Department of Transportation
Office of Maritime Resources*

*Cost Drivers for Beneficial Use – EWN Projects
Owner’s Perspective from NJ*

W. Scott Douglas, Dredging Program Manager

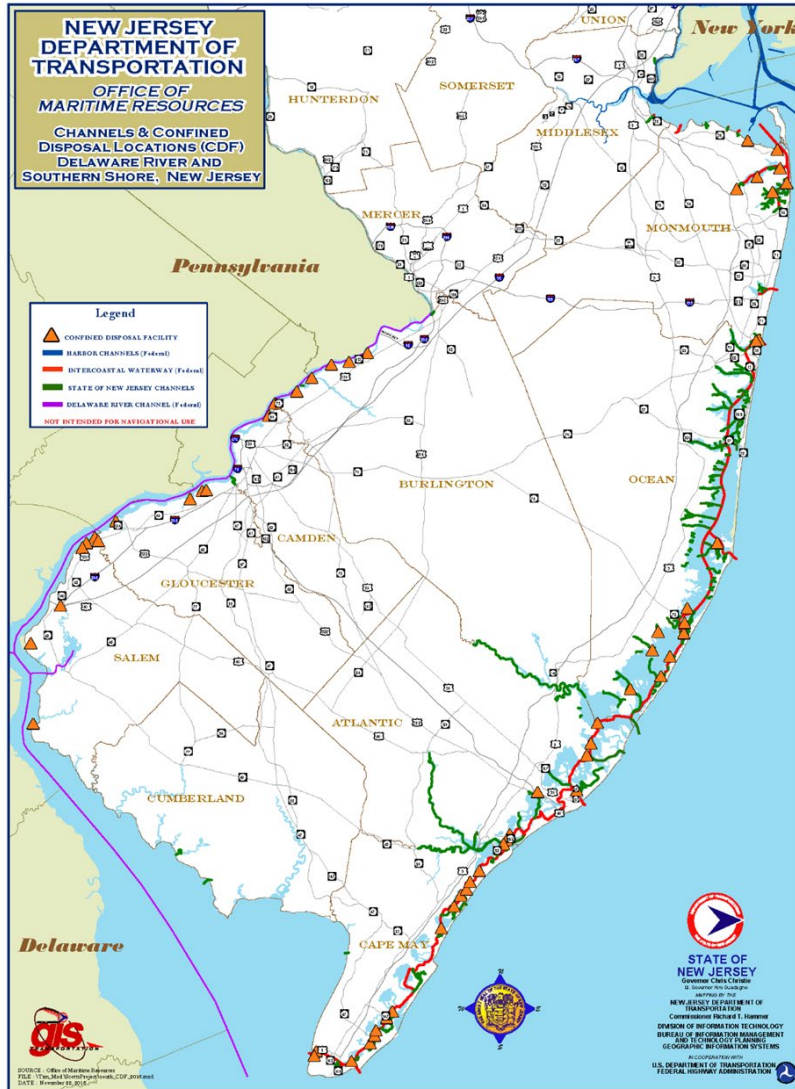
WEDA Eastern Chapter Meeting, October 2022



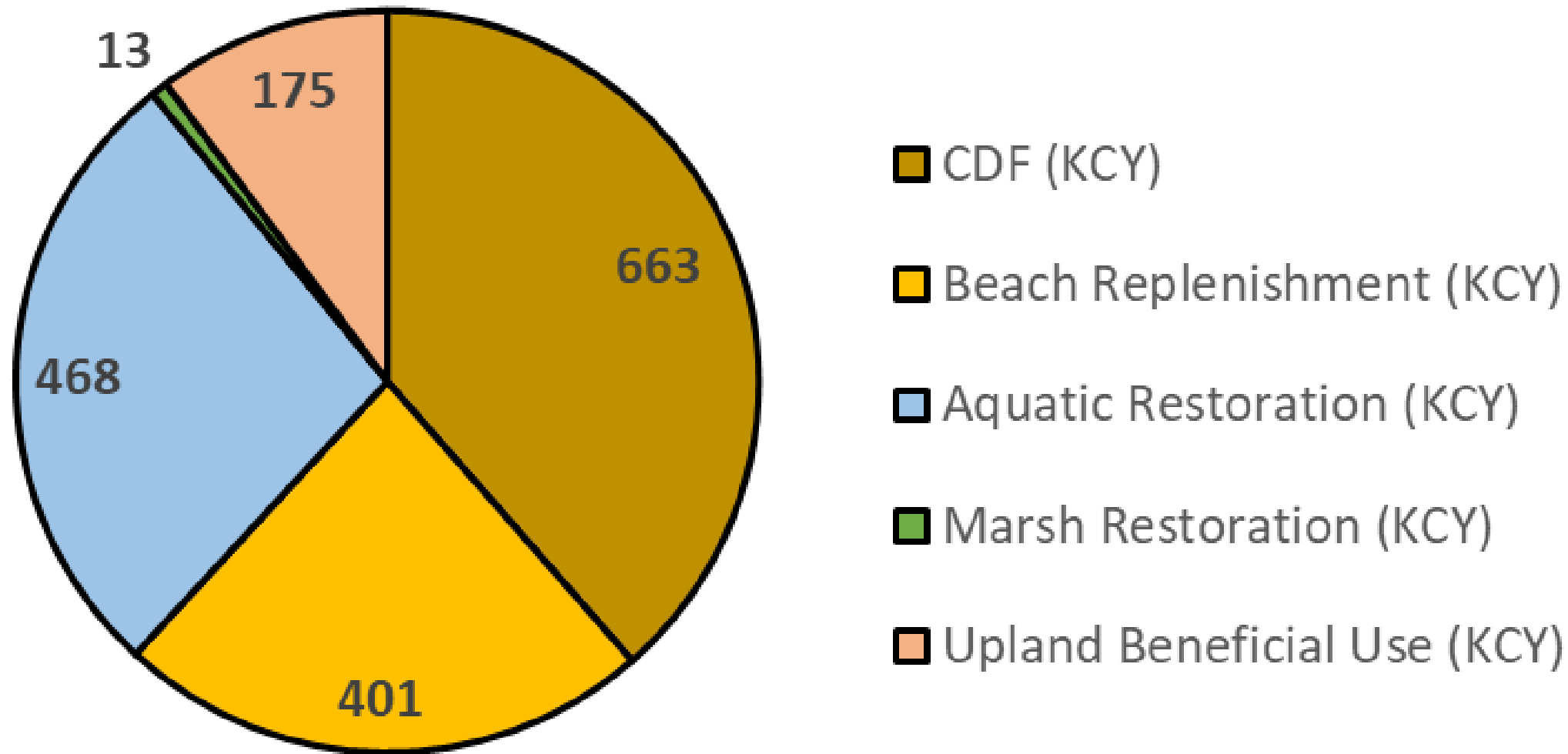
Context

Atlantic Coastal Zone: Sandy Hook to Cape May

- 110 miles of coastline
- 40 shore communities
- \$1 Billion commercial fishery
- 400 marinas and 40,000 private berths
- 190,000 acres of marsh
- >300 miles of local, state and federal channels
- 500,000 CY of sediment annually



SCDP Management of Dredged Material



Average Construction Cost/CY



Cost Drivers for Beneficial Use – EWN projects

- Site Selection

- Land ownership
- Interagency agreements
- Location and Timing

- Site Evaluation

- Habitat Assessment
- Coastal Engineering
- Multiple locations/strategies

Increases timelines by about a year

- Design

- Pre and post construction Hydrology
- Material inflow modeling
- Sediment fate and transport

- Permitting

- Interagency coordination, preapplication
- Iterative process
- Adaptive Management Plan

Increases costs by 25%

- Construction

- Small size (for now)
- Increased Inspection
- Complexity – multiple sites/methods
- Sensitive Habitat
- Adaptive Management

Can double or triple construction costs

- Monitoring

- Multi-year
- Adaptive Management

Costs about \$250,000 per project



Considerations for Costs/Benefits

Placement Site	Placement Type	Design Capacity (cyd)	Available Volume (cyd)	Acres/Linear ft created/restored	Cost per cubic yard placed	Cost per acre restored/enhanced
Ring Island	Upland Habitat	7,000	7,000	1 acre	\$101	\$706,970 per acre
Mordecai Island	Island Restoration	28,000	28,000	4 acres	\$35	\$245,275 per acre
Avalon Marsh	Marsh Enhancement	55,300	55,300	52 acres	\$50.57	\$53,744 per acre
Fortescue Marsh	Marsh/Dune/Beach Enhancement	54,300	37,140	8.2 acres/1100 ft	\$140.03	\$396,597 per acre \$1,772 per ft
Dredged Hole 18	Benthic Restoration	180,000	244,106	9.0 acres	\$78.10	\$2,118,355 per acre
Good Luck Point Marsh/Beach	Marsh/Beach Enhancement	10,200 +	12,000	5.2 acres/750 ft	\$240	\$279,177 per acre \$1,920 per ft
Boot/Sunflower Islands	Benthic/shoreline Enhancement	29,000	24,843	23.6 acres/500 ft	\$67.56	\$71,115 per acre \$1,320 per ft
Popular Point Marsh	Marsh Enhancement	100,000	230,000	120 acres/2100 ft		
Shaw/Ephraim Island	Marsh/Shoreline Restoration	135,000	135,000	50 acres/1600 ft		
Stout's Creek Marsh	Marsh Restoration	250,000	140,000	80 acres		
Abbott's Meadow	Marsh Restoration	1,200,000	1,200,000	360 acres		



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Current Dredging Cost Drivers

Western Dredging Association

Eastern Chapter Meeting

10/19/2022





Preliminaries

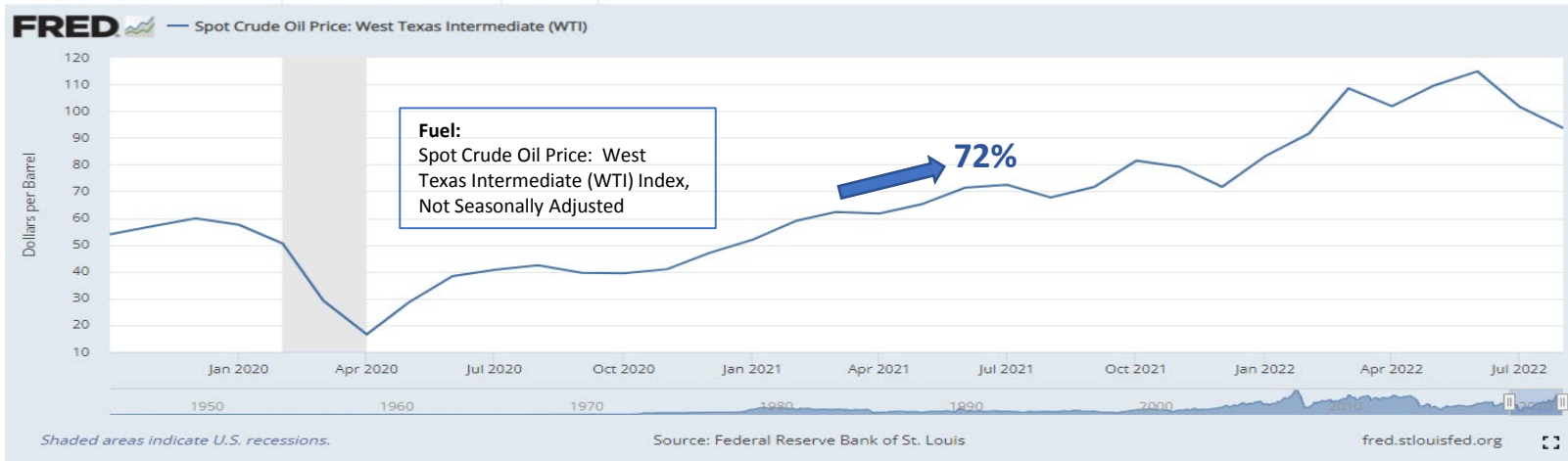
- At the most basic level, dredging project cost = daily cost x number of days
- Therefore, anything that increases daily cost or number of days will increase total cost
- Examples include:
 - Time of year restrictions – if worse weather, this increases the number of days. The potential for equipment damage increases daily cost
 - Endangered species protection – Observers, trawlers and the like increase daily cost. Devices such as turtle excluder devices (TEDs) that interfere with the dredging process increase fuel consumption and reduce production, increasing both cost and number of days
 - Other restrictions such as ODMDS bin size increase the number of days
 - Beneficial Use of Dredged Material (BUDMAT). Assuming the current disposal method is least-cost, the BUDMAT alternative will likely cost more
- This is not meant as a criticism of any of the foregoing measures which have been implemented over the years for reasons that are well-understood and laudable. All have benefits that are presumed to outweigh their costs. But it would be naïve to think that they haven't increased cost.
- For the typical dredging project, the primary components of daily cost are fuel, labor, ownership, and maintenance/repair/consumables. Let's take a look at how these have changed over the last two years



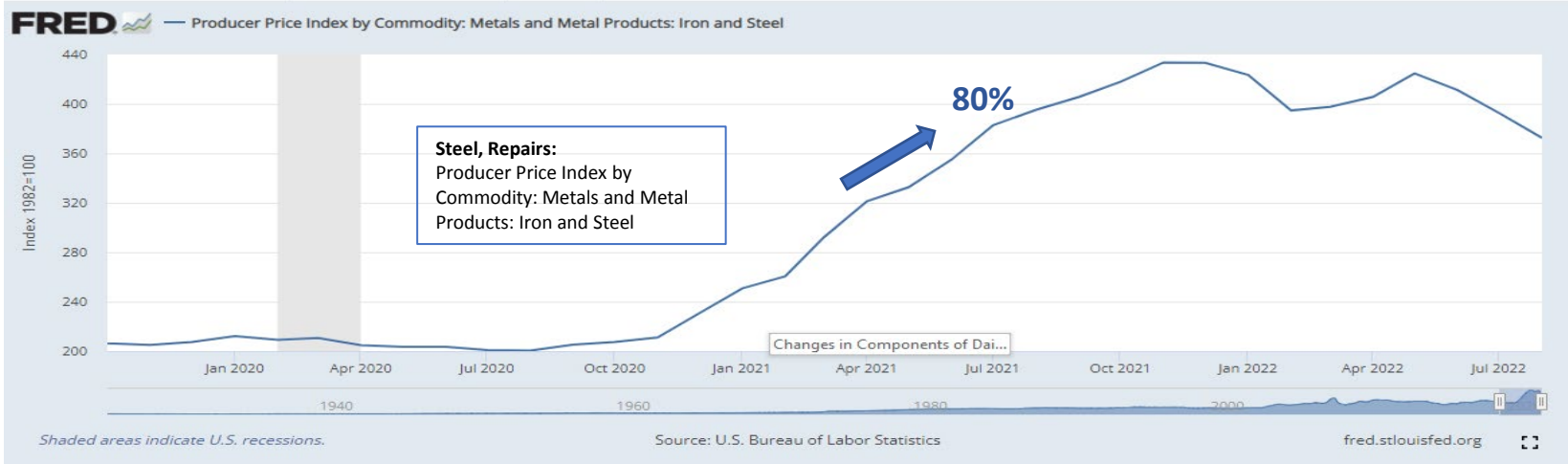
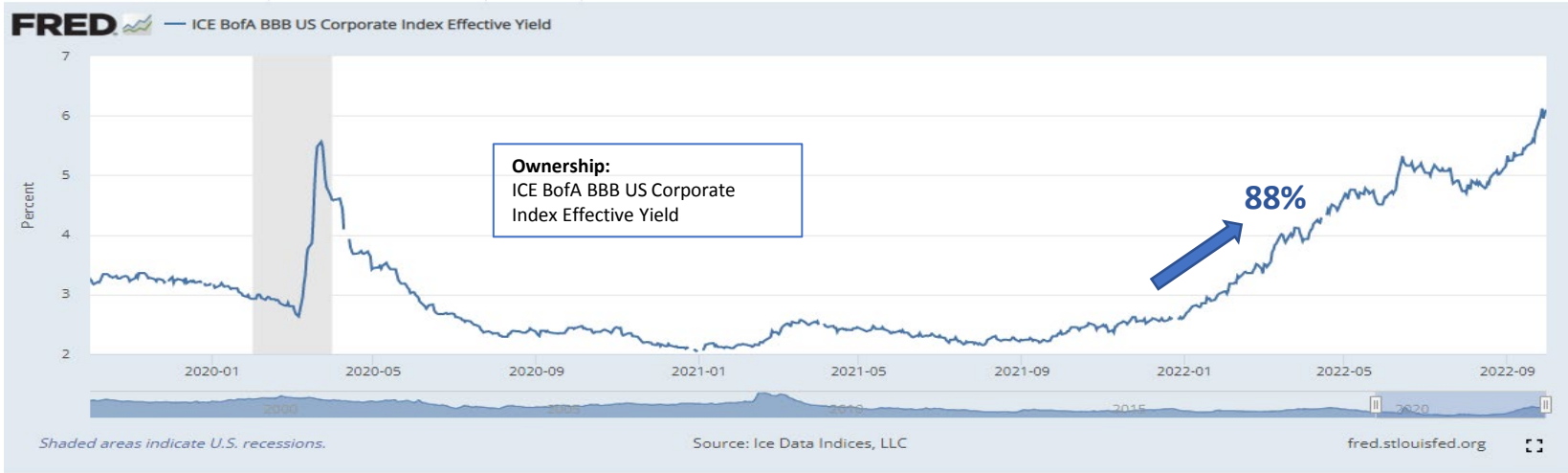
Changes in Components of Daily Cost



The Federal Reserve Bank of St Louis produces various cost indices that can be used as an indication of changes in cost over time



Changes in Components of Daily Cost (cont'd)



CWCCIS



- Since the major components of cost have all increased dramatically, we can conclude that dredging costs are significantly higher today than they were two years ago.
- The Corps of Engineers has a Civil Works Construction Cost Index System (CWCCIS). The CWCCIS website states,

These cost indices are provided for use in the escalation of U.S. Army Corps of Engineers (USACE) Civil Works project costs.

For programming and budget preparation purposes, project costs are escalated for inflation. Indices used to escalate costs from the past to the present are developed from actual historic data. Indices for future escalation are developed using the “Updating Factors” in table 1, of the Engineer Circular (EC)(number changes yearly), Civil Works Direct Program Development Policy Guidance. These factors are based on the current annual Office of Management and Budget (OMB) inflation factors.

TABLE 2, YEARLY COST INDICES BY CWBS FEATURE CODE
Base Year 1967 = 100

CWBS - FEATURE CODES	Wt %	FY16	FY17	FY18	FY19	FY20	FY21	FY22*	FY23*
		Oct 15 - Sep 16	Oct 16 - Sep 17	Oct 17 - Sep 18	Oct 18 - Sep 19	Oct 19 - Sep 20	Oct 20 - Sep 21	Oct 21 - Sep 22	Oct 22 - Sep 23
02 RELOCATIONS	5%	832.79	859.30	884.89	911.04	932.34	1030.21	1152.30	1185.59
03 RESERVOIRS	5%	937.08	959.65	978.58	1016.57	1043.05	1091.64	1159.07	1192.57
04 DAMS	15%	817.17	839.16	861.72	891.83	903.48	981.54	1091.32	1122.86
05 LOCKS	2%	810.83	835.60	863.01	892.69	902.67	991.32	1110.35	1142.44
06 FISH & WILDLIFE FACILITIES	5%	799.48	825.23	852.14	877.89	889.77	982.29	1101.54	1133.37
07 POWER PLANT	10%	747.89	762.73	784.18	805.56	814.65	881.37	984.70	1013.16
08 ROADS, RAILROADS & BRIDGES	10%	832.79	859.30	884.89	911.04	932.34	1030.21	1152.30	1185.59
09 CHANNELS & CANALS	3%	869.54	886.04	891.70	935.51	956.98	998.59	1065.81	1096.61
10 BREAKWATER & SEAWALLS	5%	834.86	846.72	850.19	891.09	908.30	947.95	1024.40	1054.00
11 LEVEES & FLOODWALLS	5%	836.00	856.90	873.74	910.78	920.16	993.70	1096.06	1127.74
12 NAVIGATION PORTS & HARBORS	10%	764.23	808.76	870.77	868.29	847.06	955.09	1048.12	1078.41
13 PUMPING PLANT	5%	782.46	808.93	841.84	866.18	864.03	993.71	1156.75	1190.18
14 RECREATION FACILITIES	5%	782.46	808.93	841.84	866.18	864.03	993.71	1156.75	1190.18
15 FLOODWAY CONTROL & DIVERSION STRUCTURE	2%	799.48	825.23	852.14	877.89	889.77	982.29	1101.54	1133.37
16 BANK STABILIZATION	2%	864.44	887.18	907.07	945.32	972.50	1018.77	1097.42	1129.13
17 BEACH REPLENISHMENT	2%	879.53	899.53	909.86	949.07	970.60	1011.91	1073.43	1104.45
18 CULTURAL RESOURCE PRESERVATION	2%	782.46	808.93	841.84	866.18	864.03	993.71	1156.75	1190.18
19 BUILDINGS, GROUNDS & UTILITIES	5%	782.46	808.93	841.84	866.18	864.03	993.71	1156.75	1190.18
20 PERMANENT OPERATING EQUIPMENT	2%	782.46	808.93	841.84	866.18	864.03	993.71	1156.75	1190.18
COMPOSITE INDEX (WEIGHTED AVERAGE)	100%	810.92	835.57	862.56	888.57	897.19	985.03	1098.29	1130.03
YEARLY PERCENTAGE CHANGE		0.7%	3.0%	3.2%	3.0%	1.0%	9.8%	11.5%	2.9%

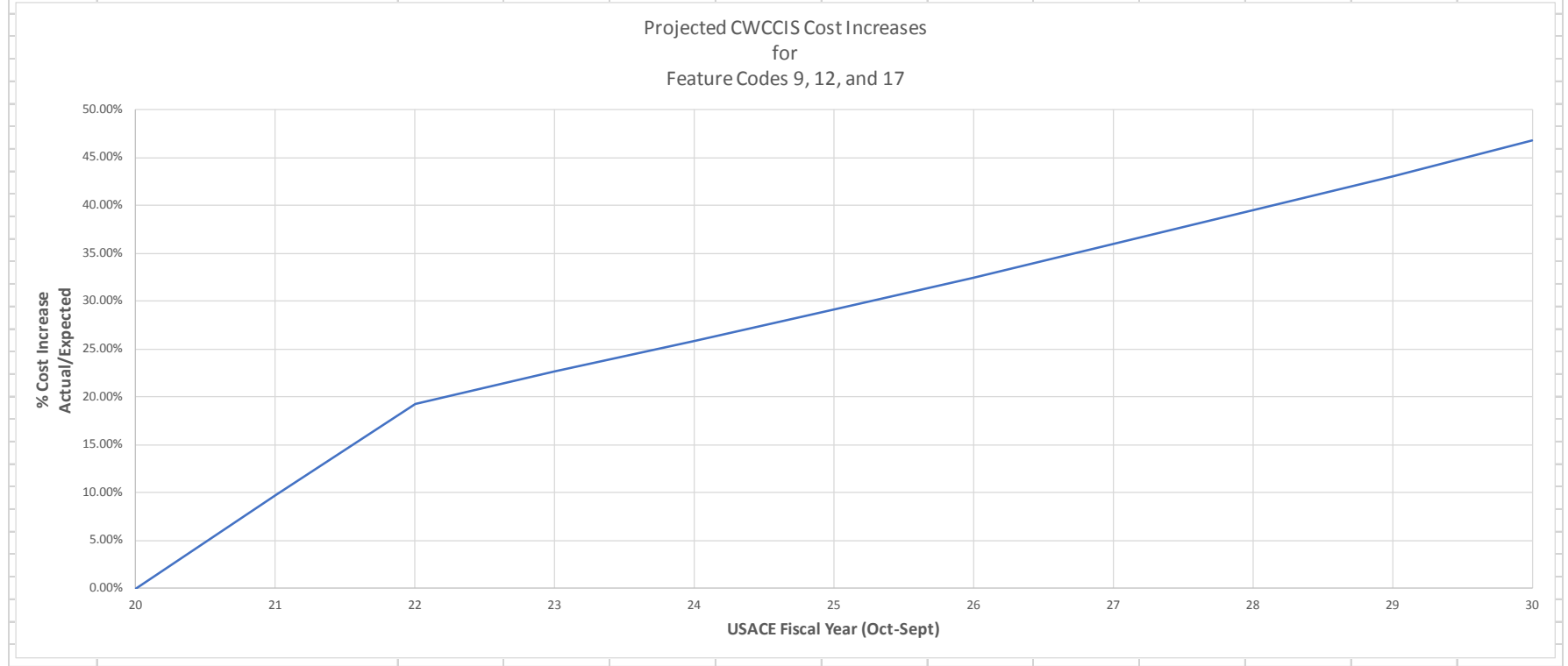
Note: FY* indicates data developed based on OMB projections.

A typical page from the current report is above at right. Note feature codes for Channels & Canals, Navigation Ports & Harbors, and Beach Replenishment. It is possible to construct an index using only the dredging-related feature codes, which looks something like:





Column1	Column2	FY20	FY21	FY22*	FY23*	FY24*	FY25*	FY26*	FY27*	FY28*	FY29*	FY30*
		20	21	22	23	24	25	26	27	28	29	30
	CWWBS - FEATURE CODES	Oct 19 -Sep 20	Oct 20 -Sep 21	Oct 21 -Sep 22	Oct 22 -Sep 23	Oct 23 -Sep 24	Oct 24 -Sep 25	Oct 24 -Sep 25	Oct 24 -Sep 25	Oct 24 -Sep 25	Oct 24 -Sep 25	Oct 24 -Sep 25
	9 CHANNELS & CANALS	956.98	998.59	1065.81	1096.61	1125.12	1154.37	1184.39	1215.18	1246.77	1279.19	1312.45
	12 NAVIGATION PORTS & HARBORS	847.06	955.09	1048.12	1078.41	1106.45	1135.22	1164.73	1195.02	1226.09	1257.96	1290.67
	17 BEACH REPLENISHMENT	970.60	1011.91	1073.43	1104.45	1133.17	1162.63	1192.86	1223.87	1255.69	1288.34	1321.84
	Weighted Average	885.10	971.18	1054.95	1085.44	1113.66	1142.61	1172.32	1202.80	1234.07	1266.16	1299.08
	Indexed to FY20	0.00%	9.73%	19.19%	22.63%	25.82%	29.09%	32.45%	35.89%	39.43%	43.05%	46.77%





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Project Cost Drivers for The Dredging Industry

Jason Raimondi
Geosyntec Consultants, Inc.

Primary Cost Drivers

Volume (Dredge/Backfill/Cap)

- Incremental increase and decrease with direct and indirect impacts
 - Removal, processing, and disposal (Reuse vs Landfill)
 - Schedule (environmental monitoring, H&S, CM, etc.)

Allowable Tolerance

- The closer we get to perfect, the more it will cost.
 - Lower removal rates (Production Cut vs Coverage Cut)
 - Schedule (environmental monitoring, H&S, CM, etc.)

Owner Controlled Risk Based Cost Drivers

Bid Form Structure

- The more risk that is pushed to Contractor, the more contingency bids may include.
 - Be clear on M&P
 - Add General Requirements Item (PM, H&S, CM, etc.)
 - Break Items into pieces (e.g., Cap Material Procurement and Cap Placement as one Item vs. Separate Item)

Measurement & Confirmation Methods

- Stringent measurements add cost
 - Survey with tight grids vs. looser grids
 - Allow for multiple lines of evidence (visual)
 - Dredging approval: 100% compliance vs. 95% compliance with no contiguous area greater than 5,000 ft² and no high spots greater than 6 inches.

Uncontrolled Controlled Risk Based Cost Drivers

Validation Requirements (Physical vs. Analytical)

- Physical (Bathymetric) – Risk is mostly on Contractor
- Analytical (Chemical) – Typically Regularity Driven
 - Bid Form structure can help manage risk for all
 - Owner and Contractor may have different levels of risk
 - Redredging (Increased volume, lower production [schedule])

Economic Variables

- Costs that we generally have no control over
 - Contractor Availability – Very busy industry
 - Fuel – Variation in price
 - Labor – Limited labor and hire rates
 - Equipment and Materials – Longer lead times and limited supply



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**Sevenson
Environmental
Services, Inc.**

Niagara Falls, USA | Established 1917

CURRENT COST DRIVERS FOR THE DREDGING INDUSTRY

An Environmental Dredging Contractors Vantage

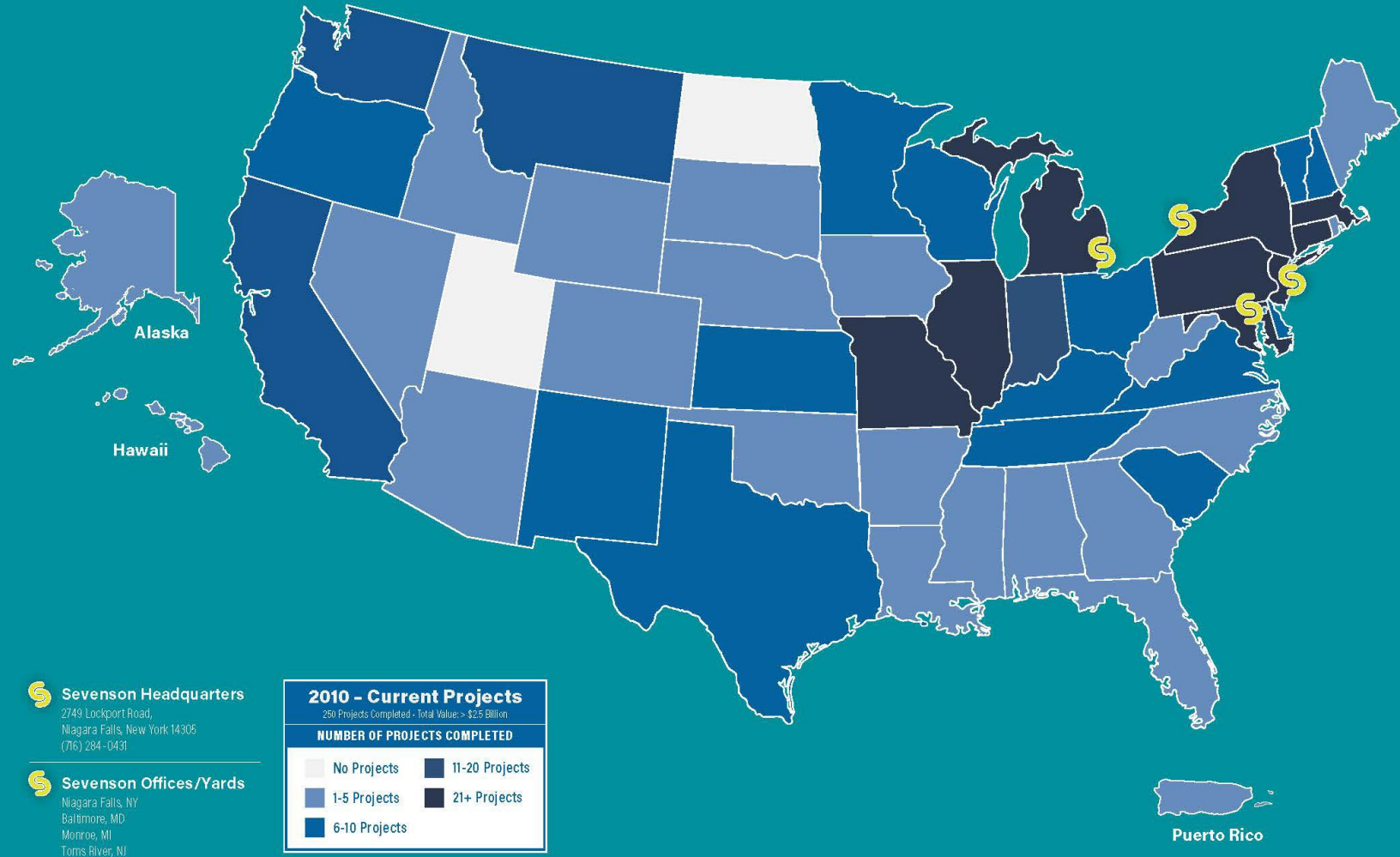
October 19, 2022



Lowest Bidder

Estimator

Profitability



Major Cost Drivers

- COVID Pandemic
- Infrastructure Investment and Jobs Act
- Global Politics & Policies
 - OPEC Production
 - Russian Invasion of Ukraine



Effects

- Increased Fuel Pricing
- Transportation Surcharges
- Materials
 - Long Leadtime
 - Shortages
 - Increased Pricing
 - Operational Fuel Surcharges
- Labor
 - Reduced Availability
 - Increased Rates



Cost Changes YOY

July 2021 vs July 2022

Diesel Fuel +71%

Trucking Rates +22%

Construction Wages +6%*

Construction Inflation +17%**

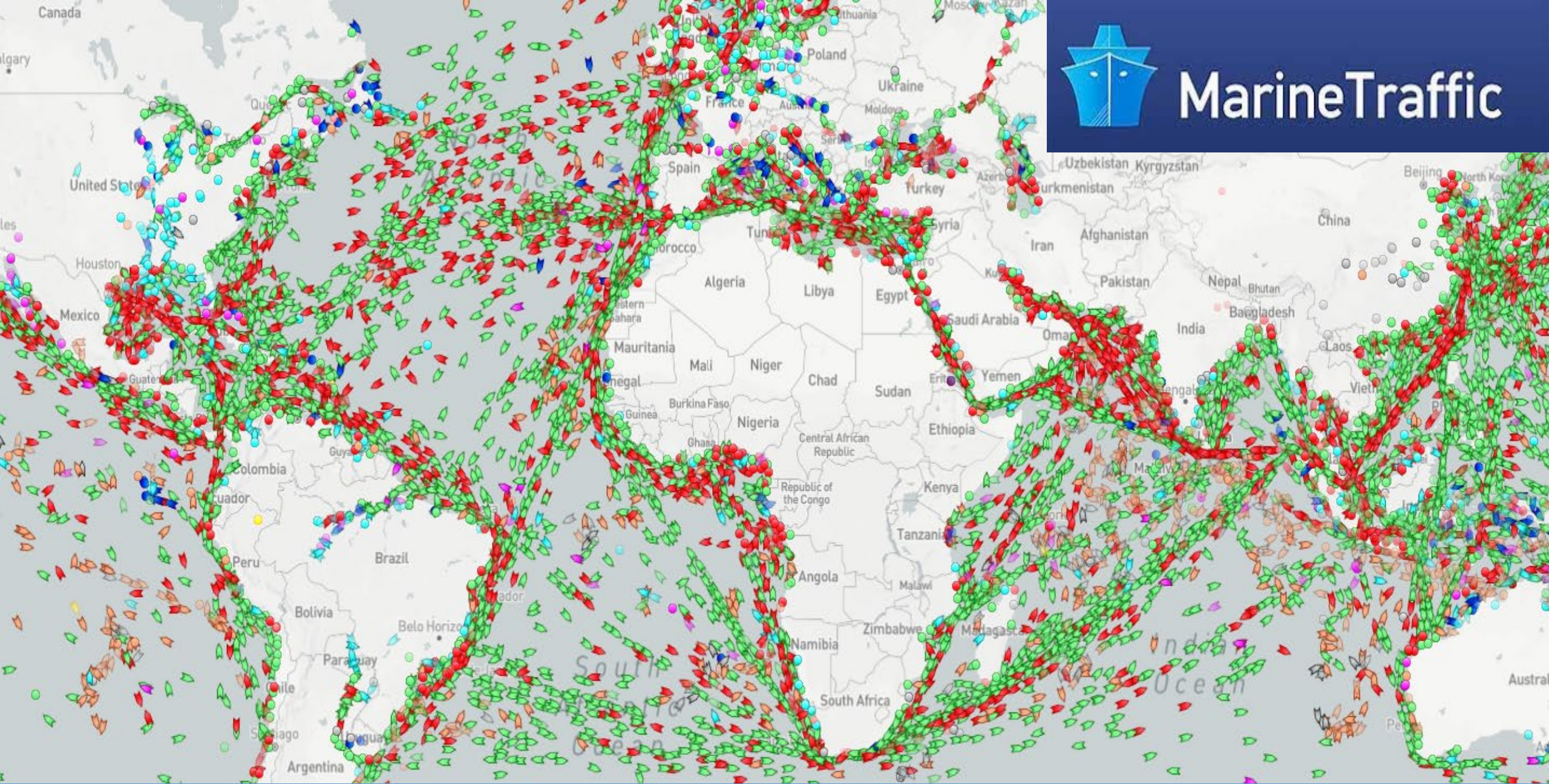
Project Specific Example Scanlon Reservoir Remediation

- Timeline
 - 2021 1st Solicitation Canceled
 - 2022 Award & Subcontract Provided February 25, 2022
 - In-Water Work Allowed to Commence on July 1, 2022
 - In-Water Work Completed Prior to October 2022
- Specified Capping Materials:
Location & Transportation





Ships, Trains & Trucks



MarineTraffic

Project Specific Example Scanlon Reservoir Remediation

- Timeline
- Capping Materials Location & Transportation
- Cost Implications
 - Delayed Start
 - Shipping Container Cost Increases
 - Estimated cost: \$12,500/container
 - Actual cost: \$26,000/container
 - Causes:
 - › Fuel Price Increase
 - › Container Ship Increase in Demand

