

AOC Revitalization and the Beneficial Use of Dredged Materials

Collective decisions and the **Dredged Materials Management Tool** (DMDT)

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Mini-session Overview

- Dredging overview
 - -Great Lakes dredging needs
- Dredged material beneficial use
 - -Why is beneficial use a good option for revitalization?
 - -Potential uses
 - -Challenges
 - -Examples
- Dredged Materials Decision Tool (DMDT)
 - -Explanation
 - -Application
 - -Demonstration



Great Lakes Shipping



Superior Entry: https://dredgeresearchcollaborative.org



Dredging in the Great Lakes

- "Excavation of material from a water environment"
- USACE mandate under Section 10 of Rivers & Harbors Act of 1899 for O&M
- 2-5 million cubic yards annually for O&M
 - >Where can it go?!
 - CDF, open water disposal, or BU



Mprnews.org



- "productive and positive uses of dredged material, which cover broad use categories ranging from fish and wildlife habitat development, to human recreation, to industrial/commercial uses" (USACE Beneficial Uses of Dredged Material, Engineer Manual 1110-2-5026)
 - Beach nourishment
 - Habitat construction
 - Brownfield reconstruction
 - Material/product creation
 - Terrestrial capping





• Duluth Harbor examples:

Interstate Island



Stlouisriverestuary.org

21st Ave West Restoration Site



Stlouisriverestuary.org



• Duluth Harbor examples:

Atlas Industrial Park



Northlandconnection.com



- Typical challenges:
 - -Funding / cost
 - -Timing
 - -Regulations
 - -Material characteristics matching
 - -Complex stakeholder coordination
- How can beneficial use become a bigger piece of dredged materials management solutions?



Great Lakes Dredge & Dock



Dredged Materials Decision Tool

• Originally developed under contract by EPA Region 5 for use in Cleveland, OH

		Scoring																	
							Alternative 2 Alternative 3												
		CL	F Dispo	al		ficial U	se:	Beneficial Use: Land											
											R	lecycler		Reclamation					
			50,000 cy		50),000 cy		50	,000 cy										
		5,	000,000	у	1,0	00,000 c	y	100	0,000 cy	(
			OK			OK.			OK										
							Unit cost	\$	46.80	per cy	S	3.57	per cy	S	3.06 p	er cy			
							Total cost	S	2.34 1	nillion	\$	0.18 1	nillion	S	0.21 m	illion			
EES Category	Criterion	Sub-criterion or Metric	С	Per-	Adjust		Scoring Scale												
			Rank	centile	WF	(WF)		U	W	С	U	W	С	U	W	С			
	Bird habitat				137	Scale: 0.05 to 1.0								<u> </u>					
Environment	Bird habitat Characterization	Improve bird habitat? Has sediment been characterized?	22		1X 1X	0.05		x	0.1		x	0.1			0.0				
	Diversion to construction	Reduction in demand on terrestrial	1	0.00%		1.00		x	1.0			0.0			0.0				
	Diversion to construction	borrow sources?	7	28.50%	1X	0.73		x	0.7		x	0.7			0.0				
	Enhanced shoreline	Enhance shoreline?	10	42.80%	1X	0.59	x = yes	x		100%		0.6	29%			20%			
	Lake habitat	Improve lake habitat?	4	14.20%	1X	0.87	blank = no	x	0.9		-	0.0			0.0				
	D. I	Remove or reduce contamination or	2	4.70%	IX														
	Reduce contamination	risk?	2	4.70%		0.96		x	1.0			0.0		x	1.0				
	Wetlands	Improve or create wetlands?	12	52.30%	1X	0.50		x	0.5			0.0			0.0				
	Capital cost	Less unit cost than CDF disposal?	6	23.80%	1X	0.77			0.0		x	0.8		x	0.8				
	Diversion to construction	Reduction in the cost of construction materials?	13	57.10%	1X	0.46		x	0.5			0.0			0.0				
	Lake habitat	Increase tourism, fishing, or recreation revenue?	11	47.60%	1X	0.55		x	0.6			0.0			0.0				
	Maintain shipping	Maintain or increase draft for shipping?	3	9.50%	1X	0.91		x	0.9			0.0			0.0				
Economy	Reuse business profit	Result in a profitable, viable business?	17	76.10%	1X	0.28	x = yes blank = no	x		82%		0.0	18%	x	0.3	30%			
	Secondary economic benefit	Produce secondary economic benefits?	18	80.90%	1X	0.23		x				0.0		x	0.2				
Ab	out Help Ana	lysis ScorecardA	Scor	ecardE	Cc	stMaster	Alt1Cost		Alt2C	ost	Alt	t3Co	st .	(+)	:	•			



Dredged Materials Decision Tool

Score • Adjust weights and • Gather information criteria as necessary and stakeholders • Enter data from • Complete worksheets • Discuss and evaluate worksheets and and scorecards results scorecards into DST • Review results Profile Decide



Stakeholder Assembly - DMDT

- Resource managers
- Local government
- US Army Corps of Engineers
- EPA
- NGOs
- Community groups
- Local business





Information Gathering - DMDT

		Governanc	e	
Maintain navigations chan	nels:			
Yes		Like	lihood (of action):	Select an answer
		Magnitude (ii	mpact of action on	
No			alternative):	Select an answer
Unsure			n (how does action mative feasibility):	Select an answer
Consideration of liability (p	ast, pres	ent and future fo	r project/ project sit	e):
Yes		Likelihood:	Select an answer	-
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Enrolled in a voluntary pro	gram (of	ten assessment/cl	ean-up support):	
Yes		Likelihood:	Select an answer	•
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Able to be completed insid	e of relev	vant environment	al windows:	
Yes		Likelihood:	Select an answer	•
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Referred to or included in e	existing g	guidance documer	its:	
Yes		Likelihood:	Select an answer	•
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Permitting timeline conduc	ive to pr	oject timeline:		
Yes		Likelihood:	Select an answer	-
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Meets zoning requirement	s:			
Yes		Likelihood:	Select an answer	-
No		Magnitude:	Select an answer	•
Unsure		Direction:	Select an answer	•
Flexible timeframe:				
Yes		Likelihood:	Select an answer	•
No		Magnitude:	Select an answer	-
Unsure		Direction:	Select an answer	-
Replicable in other harbors	s, ports, e	environments, juri	sdictions, or project	s:
Yes		Likelihood:	Select an answer	-
res				
No		Magnitude:	Select an answer	•

Criteria Worksheets

Arlington Avenue Conifers

Project Phase: Idea

Site Location: -92.1327847155148, 46.7935910297451

Description: Seed in conifers in a very sparse aspen-dominated forest across Arlington Ave from the soccer fields. Minimal prep work will be needed. Property ownership varies within the area; it's not a solid block of city-owned land.

Environmental Lens

Priority Areas: • Trout stream watershed; • Nature Conservancy Resiliency Site

Species Support:

Watershed Location: Upper half

Habitat Types & Enhancement:

Aquatic: •Rivers and streams; •Wetland

Terrestrial: •Forest

Notes: Restoring conifers to upland sites will cool groundwater that feeds the headwaters of Buckingham Creek.

Project Site Profiles



Collective Values - DMDT

-	Funding pathway identified							
	Funding application prepared							
	Partnerships established							
2	Potential partnerships identified							
E	Feasible transportation of dredged materials to the placement site							
Economy	Accept materials (5 years)							
, m	Accept materials long-term (20 years)							
	Lead to creation/growth of viable business							
	Secondary benefits created							
	Long-term maintenance required							
	Improve access to parks or natural spaces							
	Potential for indirect job creation							
	Improve aesthetics							
Social	Community engagement							
So	Reduced human exposure to contaminants							
	Improved access to ecosystem services							
	Improved infrastructure condition							
	New/improved infrastructure services for community							

28Rankcentil29Aquatic habitat gain/loss22.20'30Shoreline habitat gain/loss2042.20'31River habitat gain/loss1224.40'33Wetland habitat gain/loss1224.40'34Wetland habitat gain/loss2553.30'35Terrestrial habitat gain/loss4286.60'36Aquatic habitat improved/harmed34.40'36Shoreline habitat improved/harmed1326.60'37Biophysical Environment (16)River habitat improved/harmed1326.60'38Priority habitat improved/harmed1326.60'40River habitat improved/harmed1326.60'41Restore or manage native vegetation4388.80'42Reduce invasive vegetation4897.70'43Reduce invasive vegetation1633.30'44Stormwater control or protection4591.10'45Funding pathway1020.00'	1	А	В	С	D
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33 Wetland habitat gain/loss 25 53.303 34 Terrestrial habitat gain/loss 42 86.603 35 Aquatic habitat improved/harmed 3 4.403 36 Shoreline habitat improved/harmed 21 44.403 37 River habitat improved/harmed 13 26.603 38 Biophysical Environment (16) River habitat improved/harmed 13 26.603 39 Wetland habitat improved/harmed 13 26.603 26 55.503 39 Priority habitat improved/harmed 13 26.603 26 55.503 40 Priority habitat improved/harmed 13 26.603 26 55.503 40 Restore or management concern 31 66.603 66.603 41 Species of management concern 31 66.603 42 Reduce invasive vegetation 48 97.703 43 Reduce invasive vegetation 16 33.303 44 Funding pathway 10 20.003	31		Shoreline habitat gain/loss	20	42.20%
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35 35 36 37 37 Biophysical Environment (16) 40 Aquatic habitat improved/harmed 41 13 42 44 44 45 46 Funding pathway 40 Funding pathway	33		Wetland habitat gain/loss	25	53.30%
36 37 38 39 40 40 41 42 43Biophysical Environment (16)Shoreline habitat improved/harmed2144.400 2638 39 40 40 41 42 43Biophysical Environment (16)Wetland habitat improved/harmed1326.600 2640 40 41 42 42 43 44 45Metland habitat improved/harmed2655.500 2640 41 42 43 44 45Species of management concern3166.600 33.300 33.300 33.300 33.300 33.300 33.300 33.300 34.	34		Terrestrial habitat gain/loss	42	86.60%
37 38 39 40 40 41 42 43Biophysical Environment (16)River habitat improved/harmed1326.600 55.500 Terrestrial habitat improved/harmed40 41 42 43 44 444388.800 88.800 Priority habitat3573.300 3540 41 42 43 44 454388.800 88.800 Priority habitat3573.300 3544 4544 45505066.600 8944 4544 Feduce invasive vegetation4897.700 4546Funding pathway1020.000	35		Aquatic habitat improved/harmed	3	4.40%
38Biophysical Environment (16)Wetland habitat improved/harmed2655.5039404388.8097.3040403573.3041423573.3042Species of management concern3166.6043Restore or manage native vegetation4897.7044Stormwater control or protection4591.1045Funding pathway1020.00	36		Shoreline habitat improved/harmed	21	44.40%
38Wetland habitat improved/harmed2655.5039Terrestrial habitat improved/harmed4388.8040Priority habitat3573.3041Species of management concern3166.6042Restore or manage native vegetation4897.7043Reduce invasive vegetation1633.3044Stormwater control or protection4591.1045Reduce contamination611.1046Funding pathway1020.00	37	D: 1 : 1E :	River habitat improved/harmed	13	26.60%
40Priority habitat3573.30341Species of management concern3166.60342Restore or manage native vegetation4897.70343Reduce invasive vegetation1633.30344Stormwater control or protection4591.10345Reduce contamination611.10346Funding pathway1020.003	38	Biophysical Environment (10)	Wetland habitat improved/harmed	26	55.50%
41Species of management concern3166.6042Restore or manage native vegetation4897.7043Reduce invasive vegetation1633.3044Stormwater control or protection4591.1045Reduce contamination611.1046Funding pathway1020.00	39		Terrestrial habitat improved/harmed	43	88.80%
42 Restore or manage native vegetation 48 97.70 ⁴ 43 Reduce invasive vegetation 16 33.30 ⁴ 44 Stormwater control or protection 45 91.10 ⁴ 45 Reduce contamination 6 11.10 ⁴ 46 Funding pathway 10 20.00 ⁴	40		Priority habitat	35	73.30%
43 Reduce invasive vegetation 16 33.304 44 Stormwater control or protection 45 91.104 45 Reduce contamination 6 11.104 46 Funding pathway 10 20.004	41		Species of management concern	31	66.60%
44 Stormwater control or protection 45 91.103 45 Reduce contamination 6 11.103 46 Funding pathway 10 20.003	42		Restore or manage native vegetation	48	97.70%
Reduce contamination 6 11.10 46 Funding pathway 10 20.00	43		Reduce invasive vegetation	16	33.30%
46 Funding pathway 10 20.00	44		Stormwater control or protection	45	91.10%
	45		Reduce contamination	6	11.10%
	46		Funding pathway	10	20.00%
47 Application information prepared 23 48.80	47		Application information prepared	23	48.80%
AR Established nartnershine 29 62.20	18		Established nartnershins	29	62.20%

Criteria List

Criteria Ranking



Project Scoring - DMDT

													Scoring								
												ernative	2	Alternative 3							
												ficial U	se:	Beneficial Use: La							
											R	lecycler		Reclamation							
				0,000 cy),000 cy		50,												
			5,0	00,000	cy	1,0	00,000 c	y),000 cy											
					Is sediment	dredged \leq available			OK			OK		OK							
							Unit cost	+	46.80				oer cy		3.06 p	-					
TTOO						WILL THE	Total cost	S	2.34	million	S	0.18 1	nillion	\$	0.21 n	nillion					
EES Category	Criterion	Sub-criterion or Metric	Rank	Per- centile	Adjust WF	Weighting Factor (WF)	Scoring Scale	U	W	с	U	W	c	U	W	c					
			Канк	centile	wr	Scale: 0.05 to 1.0	•	U		C	U U		۲ I	U	"	۲					
	Bird habitat	Improve bird habitat?	22	******	1X	0.05		x	0.1		x	0.1			0.0						
Environment	Characterization	Has sediment been characterized?	1	0.00%	1X	1.00	-	x	1.0		_	0.0			0.0						
	Diversion to construction	Reduction in demand on terrestrial borrow sources?	7	28.50%	1X	0.73		x	0.7		x	0.7			0.0						
	Enhanced shoreline	Enhance shoreline?	10	42.80%	1X	0.59		x	0.6	100%	x	0.6	29%		0.0	20%					
	Lake habitat	Improve lake habitat?	4	14.20%	1X	0.87	Diank - no	x	0.9			0.0			0.0						
	Reduce contamination	Remove or reduce contamination or risk?	2	4.70%	1X	0.96	5	x	1.0			0.0		x	1.0						
	Wetlands	Improve or create wetlands?	12	52.30%	1X	0.50		x	0.5			0.0			0.0						
	Capital cost	Less unit cost than CDF disposal?	6	23.80%	1X	0.77	1		0.0		x	0.8		x	0.8						
	Diversion to construction	Reduction in the cost of construction materials?	13	57.10%	1X	0.46	5	x	0.5			0.0			0.0						
	Lake habitat	Increase tourism, fishing, or recreation revenue?	11	47.60%	1X	0.55	i	x	0.6			0.0			0.0						
	Maintain shipping	Maintain or increase draft for shipping?	3	9.50%	1X	0.91	x = yes	x	0.9			0.0			0.0						
Economy	Reuse business profit	Result in a profitable, viable business?	17	76.10%	1X	0.28	hlank = no	x	0.3	82%		0.0	18%	x	0.3	30%					
	Secondary economic benefit	Produce secondary economic benefits?	18	80.90%	1X	0.23	5	x	0.2			0.0		x	0.2						
Ab	out Help Anal	ysis ScorecardA	Scor	ecardE	B Co	stMaster	Alt1Cost	A	lt2C	ost	Alt	t3Co	st	. (+)	:	•					



Project Scoring - DMDT

Sheet Page	Project Name	Total Score	Environment	Priority Areas	Economy	Social	Governance
10	Hartley Pond & Tischer Creek Warm Water Mitigation						
16	(Design & Construction)	11.40	5.49	1.07	2.77	0.38	2.76
4	Buckingham Creek Headwaters Preservation	10.48	6.07	0.81	1.86	0.13	2.42
9	Chester Creek at Rice Lake Road	9.73	5.23	0.81	2.70	0.13	1.67
28	Regional Planning (LCD, 1W1P, DuWAC)	9.29	5.58	1.16	2.32	0.13	1.26
7	Buckingham Creek Restoration Phase 2	9.09	5.81	0.55	0.73	0.13	2.42
5	Buckingham Creek Phase 2 (Design)	8.99	4.97	0.55	1.47	0.13	2.42
6	Buckingham Creek Phase 2 (Construction)	8.99	4.97	0.55	1.47	0.13	2.42
11	Coffee Creek Culverts near Arlington	8.89	5.23	0.81	1.86	0.13	1.67
25	Minnesota Point Dune & Rare Species Protection	8.44	5.33	0.61	1.31	0.13	1.67
22	Lower Knowlton Creek Fish Passage (Design & Construction)	8.04	3.31	0.81	3.06	0.00	1.67
20	Keene Creek at Grassy Point (Design & Construction)	7.96	4.23	0.81	1.93	0.13	1.67
24	Minnesota Point SNA Living Shoreline Demonstration Project	7.64	2.06	0.26	3.06	0.51	2.01
17	Hartley Tier 1 Areas: NW, SC, & SE Corners	7.47	4.49	1.07	1.31	0.00	1.67
23	Miller Creek Restoration (Between Swan Lake Road and Airport Road)	7.37	5.23	0.81	0.17	0.13	1.84
12	Dam Removal on Keene Creek	6.91	5.06	0.64	0.22	0.13	1.50
15	Goose Management Plan	6.74	2.83	1.16	1.77	0.13	2.01
▶ 0.Ma	in Ranking Sheet 01.Arlington Ave Conifers 02.Bird Monitoring	03.Black Asł	Restoration	. + : 4		• • •	



Duluth-Superior Harbor Working Group DMDT Workshop (March 2020)

							Allou	ez Bay Gro	nıp 1	Allouez Bay Group 2			Allouez Bay Group 3											
						Sediment	to be dredged		50,000 cy			50,000 cy		50,000 cy										
				D	isposal capac	ity available on	7/19/19	1	,000,000 cy	i	1.	,000,000 cy	,	1,000,000 cy										
						I≤available dis			OK			OK		OK										
Criterion	C Rank	Per-	Adjust	Weighting Factor	WF Sum	WF Share	Scoring Scale																	
		centile	WF	(WF)				U	W	С	U	W	С	U	W	С								
				Scale: 0.05 to 1.0			Min = 1 Max = 5																	
Aquatic habitat gain/loss	2	2.10%	1X	0.98				5	4.9		5	4.9		4	3.9									
Shoreline habitat gain/loss	20	41.30%	1X	0.61				5	3.1		5	3.1		4	2.4									
River habitat gain/loss	12	23.90%	1X	0.77				5	3.9		3	2.3		1	0.8									
Wetland habitat gain/loss	25	52.10%	1X	0.51												5	2.6		5	2.6		5	2.6	
Terrestrial habitat gain/loss	42	86.90%	1X	0.17											1	0.2		3	0.5		1	0.2		
Aquatic habitat improved/harmed	3	4.30%	1X	0.96				5	4.8		5	4.8		4	3.8									
Shoreline habitat improved/harmed	21	43.40%	1X	0.59				5	3.0		5	3.0		4	2.4									
River habitat improved/harmed	13	26.00%	1X	0.75				5	5 3.8	3	2.3		1	0.8										
Wetland habitat improved/harmed	26	54.30%	1X	0.48	8.8	36%	1 to 5	5	2.4	88%	5	2.4	83%	5	2.4	65%								
Terrestrial habitat improved/harmed	43	89.10%	1X	0.15				1	0.2		3	0.5		1	0.2									
Priority habitat	35	71.70%	1X	0.32				5	1.6		5	1.6		4	1.3									
Habitat quality objectives	35	71.70%	1X	0.32				5	1.6		5	1.6		4	1.3									
Species of management concern	31	65.20%	1X	0.38				5	1.9		5	1.9		5	1.9									
Restore or manage native vegetation	48	97.80%	1X	0.07				5	0.4		5	0.4		5	0.4									
Reduce invasive vegetation	16	32.60%	1X	0.69				5	3.5		5	3.5		4	2.8									
N		A1 000/	117																					





Dredged Materials Decision Tool

Demonstration – switch over to MS Excel for criteria ranking exercise



DMDT Wrap-Up

Link to DMDT material downloads: *https://www.epa.gov/research/dredgedmaterial-decision-tool-dmdt*

Link to DMDT Project Report: *https://www.epa.gov/sciencematters/finding-beneficial-uses-sediment-dredged-waterways*



THANK YOU!

ORD GLTED Research Team Katie Williams

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