

Appendix 4. Summarized data from fish, benthos and habitat sampling by ODW and NEORSO for application to Index Metrics (ICI, IBI, MIwb, and QHEI) to this project.

Appendix 4. Table 1. ODW electrofishing catches and DELT anomalies observed from measured fish.

Date	Location	Sample#	#DELTS	#measured	add'l #obs	summary: DELTs by location, year			
						#DELTS	# fish measured	%	
4/13/2011	LR0	C001	0	55	8				
4/13/2011	LR0	C002	1	11	76				
4/14/2011	LR0	C004	2	46	62				
4/14/2011	LR0	C005	0	15	139				
4/14/2011	LR0	C006	1	21	236				
5/5/2011	LR0	C019	1	9	3				
5/5/2011	LR0	C020	3	31	20				
5/25/2011	LR0	C025	4	51	10				
5/25/2011	LR0	C030	0	46	70				
5/25/2011	LR0	C031	0	4	185				
5/25/2011	LR0	C032	0	1	146				
6/30/2011	LR0	C033	0	7	1				
6/30/2011	LR0	C034	6	11	2				
10/25/2011	LR0	C10001	1	56	29				
10/25/2011	LR0	C10002	0	20	127				
10/25/2011	LR0	C10003	0	7	10				
11/18/2011	LR0	C11001	0	75	492*				
11/18/2011	LR0	C11002	0	7	12	19	473	4.0%	
4/14/2011	LR1	C007	0	18	158				
4/14/2011	LR1	C008	0	3	274				
4/13/2011	LR1h	C003	0	6	19				
4/14/2011	LR1h	C009	0	1	335				
5/5/2011	LR1h	C024	0	8	34				
5/25/2011	LR1h	C026	2	68	66				
6/30/2011	LR1h	C035	1	23	0				
10/25/2011	LR1h	C10004	0	4	5				
11/18/2011	LR1h	C11003	0	0	22	3	131	2.3%	
4/14/2011	LR2	C010	0	0	235				
4/14/2011	LR2	C011	0	1	151				
4/14/2011	LR2	C012	0	2	89				
4/21/2011	LR2	C017	0	58	189				
5/5/2011	LR2	C021	0	33	164				
5/25/2011	LR2	C027	0	13	32				
6/30/2011	LR2	C036	0	3	0				
10/25/2011	LR2	C10005	0	41	7				
10/25/2011	LR2	C10006	0	6	12				
11/18/2011	LR2	C11004	0	36	500*	0	193	0.0%	
4/14/2011	LR2itb	C013	0	0	75				
4/21/2011	LR2itb	C018	0	17	237				
5/5/2011	LR2itb	C022	1	5	43				
5/25/2011	LR2itb	C028	0	9	21				
6/30/2011	LR2itb	C037	2	10	0				
10/25/2011	LR2itb	C10007	0	3	5				
11/18/2011	LR2itb	C11005	0	43	0	3	87	3.4%	
4/21/2011	OC1	C014	0	15	9				
6/30/2011	OC1	C038	0	30	30				
10/25/2011	OC1	C10008	1	41	24				
11/18/2011	OC1&2	C11006	0	70	1000*				
4/21/2011	OC2	C015	0	11	810				
5/5/2011	OC2	C023	0	10	78				
5/25/2011	OC2	C029	2	9	21				
6/30/2011	OC2	C039	0	42	75				
10/25/2011	OC2	C10009	0	10	8				
						3	238	1.3%	
						All 2011	28	1122	2.5%

* = field estimates of fish abundance

Appendix 4. Table 1. continued.

Date	Location	Sample#	#DELTs	#measured	add'l #obs	summary: DELTs by location, year			
						#DELTs	# fish measured	%	
8/23/2012	H1	8001	0	22	43				
8/23/2012	H1	8002	2	68	38				
8/23/2012	H1	8003	0	1	123				
8/23/2012	H1	8004	0	12	503*				
8/23/2012	H1	8005	0	5	0	2	108	1.9%	
8/23/2012	H2	8006	0	28	314*				
8/23/2012	H2	8007	3	77	38				
8/23/2012	H2	8008	0	29	36				
8/23/2012	H2	8009	0	46	111				
8/23/2012	H2	8010	1	9	523*				
8/23/2012	H2	8011	2	28	540*	6	217	2.8%	
4/12/2012	LR0	C001	0	35	68				
4/12/2012	LR0	C002	0	16	34				
4/12/2012	LR0	C003	0	21	262				
5/17/2012	LR0	C05025	0	19	165				
5/17/2012	LR0	C05026	0	6	339*				
8/8/2012	LR0	-03	0	22	336*				
8/8/2012	LR0	-04	0	5	57				
11/9/2012	LR0	-01	0	47	5000*	0	171	0.0%	
4/12/2012	LR1	C004	0	23	12101*				
5/17/2012	LR1	C05001	13	51	80				
8/8/2012	LR1	-05	1	4	76				
11/9/2012	LR1	-02	0	46	5000*				
4/12/2012	LR1h	C005	0	0	12000*				
5/17/2012	LR1h	C05002	1	22	52				
8/8/2012	LR1h	-06	0	0	237*				
11/9/2012	LR1h	-03	0	3	5000*	15	149	10.1%	
4/12/2012	LR2	C006	0	3	15811*			**distressed GzS	
5/17/2012	LR2	C05023	1	36	84				
8/8/2012	LR2	-07	0	6	27				
8/8/2012	LR2	-08	2	12	96				
11/9/2012	LR2	-04	0	12	5000*	3	69	4.3%	
4/12/2012	LR2itb	C007	0	3	32005*				
5/17/2012	LR2itb	C05024	0	5	168				
8/8/2012	LR2itb	-09	0	0	73				
11/9/2012	LR2itb	-05	0	9	5000*	0	17	0.0%	
4/12/2012	OC1	C008	0	5	6309*				
4/12/2012	OC1	C009	0	8	13505*				
5/17/2012	OC1	C05028	1	15	1026*				
8/8/2012	OC1	-02	2	32	96				
11/9/2012	OC1	-06	0	6	5000*				
5/17/2012	OC2	C05027	0	21	1816*				
8/8/2012	OC2	-01	1	25	26				
11/9/2012	OC2	-07	0	1	5000*	4	113	3.5%	
* = field estimates of fish abundance						All 2012	30	844	3.6%

Appendix 4. Table 1. continued.

Date	Location	Sample#	#DELTS	#measured	add'l #obs	summary: DELTs by location, year		
						#DELTS	# fish measured	%
4/26/2013	LR0	134001	2	84	253*			
4/26/2013	LR0	134002	4	21	3007*			
4/26/2013	LR0	134003	0	0	2001*			
10/18/2013	LR0	131002	4	40	38			
10/18/2013	LR0	131003	0	24	0	10	169	5.9%
4/26/2013	LR1	134004	0	7	2002*			
10/18/2013	LR1	131004	0	22	65			
4/26/2013	LR1h	134005	0	0	2	0	29	0.0%
4/26/2013	LR2	134006	0	32	1999*			
10/18/2013	LR2	131001	1	68	81			
10/18/2013	LR2	131006	0	7	126*			
10/18/2013	LR2	131007	0	0	46			
10/18/2013	LR2	131008	0	0	275*	1	107	0.9%
10/18/2013	LR2itb	131009	0	3	60	0	3	0.0%
4/26/2013	OC1	134007	1	6	120			
10/18/2013	OC1	131010	0	2	102*			
4/26/2013	OC2	134008	0	7	4			
10/18/2013	OC2	131011	0	7	707*	1	22	4.5%
					All 2013	12	330	3.6%
5/5/2014	LR0	2	0	5	4			
8/15/2014	LR0	815001	1	15	11			
8/15/2014	LR0	815002	1	9	8	2	29	6.9%
5/5/2014	LR1	3	0	8	39			
5/5/2014	LR1	15	3	21	11			
8/15/2014	LR1	815003	0	25	9	3	54	5.6%
5/5/2014	LR2	4	0	1	132*			
5/5/2014	LR2	14	0	34	55			
8/15/2014	LR2	815004	0	20	38			
8/15/2014	LR2	815005	3	60	26	3	115	2.6%
5/5/2014	LR2itb	5	0	1	273*			
8/15/2014	LR2itb	815006	0	10	18	0	11	0.0%
8/15/2014	OC1	815007	0	16	186*	0	16	0.0%
					All 2014	8	225	3.6%
			78	2521	All Study Years			3.1%

* = field estimates of fish abundance

Appendix 4. Tables 2 & 3.

Table 2. NEORSD Invertebrate Community Index and Lacustuary-Invertebrate Community Index values taken at Cuyahoga River stations in the Study Area from 2011-2014. Values below the ICI or L-ICI represent the # of species/density of individuals per sq ft where reported.

RM	Type	2011	2012	2013	2014
7.0	ICI	26 ^f	30 ^{mg}	38 ^{mg}	28 ^f
	#/dens	52/592	50/970	49/--	46/--
5.9	L-ICI	48 ^g	28 ^f	38 ^f	28 ^f
	#/dens	39/238	40/486	45/--	31/--
2.75	L-ICI	--	34 ^f	--	36 ^f
	#/dens	--	18/--	--	25/--
0.2	L-ICI	38 ^f	18 ^p	--	26 ^f
	#/dens	27/259	29/212	4/--	15/--

rankings:

p- poor

f- fair

mg- marginally good

g- good based on rankings by OEPA, undated

Table 3. NEORSD Fish IBI and mIWB scores for Cuyahoga River stations for 2011-2014

RM	Type	2011	2012	2013	2014
7.0 (LR0)	IBI	34	32	34	32
	mIWB	9.4	9.1	8.4	7.6
	DELTs	4.55%	0.76%	1.50%	0.00%
	IBI	30	26	34	--
	mIWB	7.4	8.0	8.1	--
	DELTs	3.57%	0.68%	0.57%	--
5.9 (LR1)	IBI	36	30	18	11
	mIWB	8.2	7.6	6.5	7.1
	DELTs	0.00%	0.93%	0.59%	1.52%
	IBI	26	32	24	11
	mIWB	6.3	8.5	6.1	6.4
	DELTs	0.00%	0.78%	3.03%	1.85%
2.75 (LR2)	IBI	28	20	--	--
	mIWB	7.9	5.6	--	--
	DELTs	1.85%	3.85%	--	--
	IBI	30	26	--	29
	mIWB	8.3	8.2	--	8.8
	DELTs	2.38%	1.02%	--	0.54%
0.2 (LR3)	IBI	34	35	25	20
	mIWB	6.6	7.4	5.8	5.9
	DELTs	0.29%	1.43%	0.00%	1.10%
	IBI	26	32	21	26
	mIWB	7.0	7.4	6	5.1
	DELTs	1.03%	0.31%	0.00%	0.00%

Table 3b. NEORSD Fish assessment results above the ODW GLRI Study Area sites in 2011.

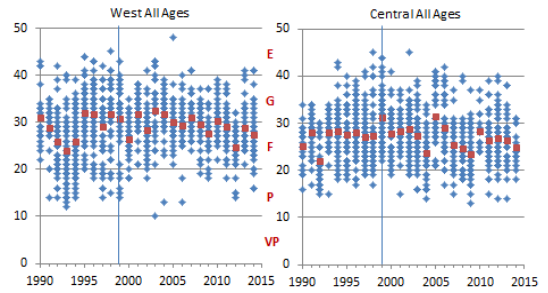
RM	Type	2011
16.2	IBI	46
dns	mIWB	9.6
Tinkers Cr	DELTs	1.33%
	IBI	48
	mIWB	9.5
	DELTs	1.84%
11.95	IBI	40
ups	mIWB	8.6
Mill Cr	DELTs	4.27%
	IBI	38
	mIWB	8.8
	DELTs	0.00%
11.3	IBI	34
dns	mIWB	8.5
Mill Cr	DELTs	1.11%
	IBI	36
	mIWB	9.2
	DELTs	1.90%
10.75	IBI	46
ups	mIWB	9.5
Southerly	DELTs	2.76%
WWTP	IBI	42
	mIWB	9.5
	DELTs	2.41%
10.1	IBI	42
dns	mIWB	9.1
Southerly	DELTs	1.81%
WWTP	IBI	30
	mIWB	9
	DELTs	0.77%
8.6	IBI	42
ups	mIWB	8.7
Big Cr	DELTs	0.91%
	IBI	38
	mIWB	8.8
	DELTs	2.94%

Table 4. ODW Fish IBI scores for Cuyahoga River stations in this study for 2011-2014 ". "= no sample taken

SRN	LOC	IBI	SRN	LOC	IBI	SRN	LOC	IBI	SRN	LOC	IBI	Location	2011	2012	2013	2014
2011001	LR0	22	2012001	LR0	20	2013001	LR0	24	2014001	LR0	20	LR0	22.8	24.2	22.8	22.0
2011002	LR0	22	2012002	LR0	18	2013002	LR0	24	2014002	LR1	26	LR1	24.0	28.0	29.0	23.3
2011003	LR1h	20	2012003	LR0	32	2013003	LR0	24	2014003	LR2	32	LR1h	23.3	26.0	16.0	.
2011004	LR0	24	2012004	LR1	30	2013004	LR1	26	2014004	LR2itb	32	LR2	26.0	26.0	28.0	28.5
2011005	LR0	24	2012005	LR1h	24	2013005	LR1h	16	2014005	LR2	32	LR2itb	26.9	26.5	30.0	27.0
2011006	LR0	22	2012006	LR2	28	2013006	LR2	24	2014006	LR1	18	OC1	23.5	27.2	28.0	24.0
2011007	LR1	24	2012007	LR2itb	28	2013007	OC1	24	2014007	LR0	24	OC2	27.6	25.3	34.0	.
2011008	LR1	24	2012008	OC1	30	2013008	OC2	28	2014008	LR0	22	H1	.	31.5	.	.
2011009	LR1h	24	2012009	OC1	28	2013009	LR2	26	2014009	LR1	26	H2	.	33.7	.	.
2011010	LR2	24	2012010	LR0	24	2013010	LR0	20	2014010	LR2	20					
2011011	LR2	26	2012011	LR0	24	2013011	LR0	22	2014011	LR2	30					
2011012	LR2	24	2012012	LR1	24	2013012	LR1	29	2014012	LR2itb	22					
2011013	LR2itb	22	2012013	LR1h	24	2013013	LR1h	.	2014013	OC1	24					
2011014	OC1	20	2012014	LR2	28	2013014	LR2	34								
2011015	OC2	26	2012015	LR2itb	24	2013015	LR2	24								
2011016	H1	.	2012016	OC2	26	2013016	LR2	32								
2011017	LR2	30	2012017	OC1	26	2013017	LR2itb	30								
2011018	LR2itb	28	2012018	OC2	26	2013018	OC1	32								
2011019	LR0	18	2012019	OC1	28	2013019	OC2	34								
2011020	LR0	30	2012020	LR0	26											
2011021	LR2	28	2012021	LR0	26											
2011022	LR2itb	30	2012022	LR1	24											
2011023	OC2	28	2012023	LR1h	32											
2011024	LR1h	22	2012024	LR2kr	24											
2011025	LR0	24	2012025	LR2	24											
2011026	LR1h	24	2012026	LR2itb	30											
2011027	LR2	30	2012027	H1	30											
2011028	LR2itb	28	2012028	H1	32											
2011029	OC2	24	2012029	H1	32											
2011030	LR0	24	2012030	H1	32											
2011031	LR0	28	2012031	OB1	.											
2011032	LR0	28	2012032	H2	32											
2011033	LR0	20	2012033	H2	36											
2011034	LR0	22	2012034	H2	32											
2011035	LR1h	24	2012035	H2	38											
2011036	LR2	24	2012036	H2	32											
2011037	LR2itb	24	2012037	H2	32											
2011038	OC1	24	2012038	LR0	24											
2011039	OC2	28	2012039	LR1	34											
2011040	LR0	22	2012040	LR1h	24											
2011041	LR0	24	2012041	LR2	24											
2011042	LR0	16	2012042	LR2itb	24											
2011043	LR1h	28	2012043	OC1	27											
2011044	LR2	26	2012044	OC2	24											
2011045	LR2	24														
2011046	LR2itb	32														
2011047	OC1	26														
2011048	OC2	32														
2011049	LR0	24														
2011050	LR0	16														
2011051	LR1h	22														
2011052	LR2	24														
2011053	LR2itb	24														
2011054	OC1	24														
AVG		24.5	AVG		27.5	AVG		26.4	AVG		25.2					
			avg R		25.9											
			avg H		32.8											

LE Open Water IBI Metrics for LEQI: (for general comparison)

Karr IBI Scores for ALL Fish in for Individual Trawls



O/S L Erie IBI ranges, means

	W Basin			C Basin		
	Min	Mean	Max	Min	Mean	Max
2011	18	28.9	38	15	26.3	39
2012	14	24.7	32	14	26.9	40
2013	21	28.8	41	14	26.3	38
2014	16	27.4	41	18	24.9	31

Appendix 4. Table 5a. QHEI data from 2011 and 2012 by NEORS and ODW.

ODW stations	Aug. 2011					
loc	type	date	score	sum		
LR1-LR3; OC1 & OC2						
RM 1-5	substrate		2			
	cover		6			
	channel		8			
	erosion/riparian		3			
	pool/current		8			
	riffle/run		0			
	gradient		1	28		
LR0	substrate		14			
RM 6.6	cover		13			
	channel		10			
	erosion/riparian		5			
	pool/current		10			
	riffle/run		7			
	gradient		6	65		
L-QHEI	Aug. 2011	site>	<u>H1</u>	<u>H2</u>	<u>OB1</u>	<u>OB2</u>
	substrate		11	7	17	18
	cover		16	6	18	17
	shoreline morph		7	8	10	10
	riparian/erosion		3	1	0	0 *breakwall
	aq vegetation		4	0	0	0
	sum		41	22	45	45

Appendix 4. Table 5b. QHEI data from 2011 and 2012 by NEORSD.

loc	type	date	score	sum	date	score	sum
RM 0.2		8/24/2011			10/12/2012		
	substrate		1			5	
	cover		4			8	
	channel		6			6	
	erosion/riparian		3			3.25	
	pool/current		9			8	
	riffle/run		0			0	
	gradient		6	29		6	36.25
RM 2.75		8/24/2011			10/12/2012		
	substrate		1			1	
	cover		4			8	
	channel		7			6	
	erosion/riparian		3.25			3.25	
	pool/current		8			8	
	riffle/run		0			0	
	gradient		6	29.25		6	32.25
RM 5.9		8/24/2011			10/12/2012		
	substrate		1			1	
	cover		6			9	
	channel		7			7	
	erosion/riparian		3.5			3.75	
	pool/current		8			8	
	riffle/run		0			0	
	gradient		6	31.5		6	34.75
RM 7.0		10/12/2011			10/9/2012		
	substrate		15			14	
	cover		10			11	
	channel		12.5			13	
	erosion/riparian		5.25			5	
	pool/current		12			12	
	riffle/run		5			6	
	gradient		10	69.75		10	71
RM 8.6		8/19/2011			10/9/2012		
	substrate		15			15.5	
	cover		13			12	
	channel		15			14.5	
	erosion/riparian		5			5.75	
	pool/current		12			12	
	riffle/run		5.5			5	
	gradient		10	75.5		10	74.75

Appendix 4. Table 5b continued. QHEI data from 2011 and 2012 by NEORS.

RM	Date			Date		
RM 10.1	10/12/2011			10/9/2012		
		substrate	16			14
		cover	8			13
		channel	14			13.5
		erosion/riparian	3.75			4.25
		pool/current	12			12
		riffle/run	5			5.5
gradient	10	68.75	8	70.25		
RM 10.75	8/23/2011			10/9/2012		
		substrate	15			13.5
		cover	10			17
		channel	12			14
		erosion/riparian	3.25			3.5
		pool/current	12			10
		riffle/run	6.5			4.5
gradient	10	68.75	10	72.5		
RM 11.3	8/23/2011			10/9/2012		
		substrate	15			14
		cover	12			15
		channel	12.5			12.5
		erosion/riparian	4.5			3.75
		pool/current	11			11
		riffle/run	5.5			5.5
gradient	10	70.5	10	71.75		
RM 11.95	10/12/2011			10/9/2012		
		substrate	14			14
		cover	7			14
		channel	11			10.5
		erosion/riparian	5			4
		pool/current	11			11
		riffle/run	6			0
gradient	10	64	10	63.5		
RM 16.2	10/12/2011			10/9/2012		
		substrate	16			14
		cover	8			14
		channel	12			13
		erosion/riparian	7.75			6.25
		pool/current	12			11
		riffle/run	5			5.5
gradient	10	70.75	10	73.75		