

Appendix D

Phase 2A Benthic Macroinvertebrate Assemblages Data

Appendix D1

2000 Data Tables

Appendix D1. Benthic Macroinvertebrate Taxa Collected in Onondaga Lake in 2000

					Sample No:	BI0001A	BI0001B	BI0001C	BI0001D	BI0001E	BI0004A
					Station:	S332	S332	S332	S332	S332	S337
					Date:	07/28/00	07/28/00	07/28/00	07/28/00	07/28/00	08/11/00
Phylum	Class	Order	Family	Genus/Species	Replicate:	REP1	REP2	REP3	REP4	REP5	REP1
Coelenterata	Hydrozoa	Hydroida	Hydrodae	Hydra americana							
Platyhelminthes	Turbellaria	Seriata	Planariidae	Duguesia tigrina							
Nematoda						4	8	7	1	4	
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera							
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata							
				Helobdella stagnalis							
			Piscicolidae	Myzobdella lugubris							
	Oligochaeta	Lumbriculida	Lumbriculidae	Stylodrilus heringianus							
				Dero digitata		10	10	4			40
		Tubificida	Naididae	Nais bretscheri							
				Nais communis							
				Ophidonais serpentina							
				Stylaria lacustris							
				Uncinaxis uncinata							
				Vejdovskyella intermedia		10					
						350	400	200	216	176	140
			Tubificidae	Aulodrilus americanus							
				Aulodrilus limnobius							
				Aulodrilus pigueti							4
				Branchiura sowerbyi							
				Ilyodrilus templetoni		10				8	20
				Limnodrilus cervix		20					28
				Limnodrilus cervix variant							
				Limnodrilus claparedeianus							
				Limnodrilus hoffmeisteri		42	42	28	44	16	32
				Limnodrilus profundicola							4
				Limnodrilus udekemianus							
				Potamothrix bavaricus					6	4	
				Potamothrix moldaviensis		100	40	12	36	16	
				Quistadrilus multisetosus							
				Tubifex tubifex							
				Manayunkia speciosa		10					
Mollusca	Polychaeta	Sabellida	Sabellidae	Dreissena polymorpha							
	Bivalvia	Heterodonta	Dreissenidae	Pisidium		4					
			Sphaeriidae	Pisidium casertanum							
	Gastropoda										
		Basommatophora	Physidae	Physa gyrina							
		Mesogastropoda	Valvatidae	Valvata piscinalis							

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0001A	BI0001B	BI0001C	BI0001D	BI0001E	BI0004A
					Station:	S332	S332	S332	S332	S332	S337
					Date:	07/28/00	07/28/00	07/28/00	07/28/00	07/28/00	08/11/00
					Replicate:	REP1	REP2	REP3	REP4	REP5	REP1
Arthropoda	Arachnida	Hydrachnida									
		Trombidiformes	Limnesiidae	Limnesia							
	Crustacea	Amphipoda	Gammaridae	Gammarus							
				Gammarus fasciatus		4		4		3	
				Gammarus pseudolimnaeus							
		Isopoda	Asellidae	Caecidotea							
		Podocopa									6
	Insecta	Coleoptera	Elmidae	Dubiraphia							
				Stenelmis							
		Diptera	Chironomidae			2			1	2	
				Chironomini-tribe							
				Chironomus				4	4	12	
				Chironomus cf. Riparius				2	6	14	
				Chironomus crassicaudaus							
				Chironomus decorus grp		10	12	7	7		2
				Chironomus plumosus							
				Chironomus species A							
				Cladopelma							
				Cladotanytarsus							
				Cricotopus sylvestris							
				Cryptochironomus					1		
				Dicrotendipes							
				Dicrotendipes modestus							
				Endochironomus							
				Glyptotendipes							
				Harnischia							
				Labrundinia							
				Microtendipes pedellus							
				Nanocladius distinctus							
				Parachironomus							
				Paratanytarsus							
				Polypedilum halterale							
				Procladius							2
				Procladius species A							
				Procladius-Holotanypus		2				1	
				Psectrocladius							
				Tanytarsus							
			Psychodidae								
			Tipulidae								
		Trichoptera	Leptoceridae								
				Oecetis							

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0004B	BI0004C	BI0004D	BI0004E	BI0005A	BI0005B	BI0005C	BI0005E
					Station:	S337	S337	S337	S337	S315	S315	S315	S315
					Date:	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00
					Replicate:	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP5
Coelenterata	Hydrozoa	Hydroida	Hydrodae	Hydra americana									
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina									
Nematoda						1	1	4			1		
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera									
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata									
				Helobdella stagnalis									
			Piscicolidae	Myzobdella lugubris									
	Oligochaeta												
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus									
		Tubificida	Naididae	Dero digitata		116	108	24	20		1		
				Nais bretscheri									
				Nais communis									
				Ophidonais serpentina									
				Stylaria lacustris									
				Uncinaxis uncinata									
				Vejdovskyella intermedia									
			Tubificidae			304	432	122	164	1	1	1	1
				Aulodrilus americanus									
				Aulodrilus limnobius									
				Aulodrilus pigueti		32	12		20				
				Branchiura sowerbyi									
				Ilyodrilus templetoni		8	36						
				Limnodrilus cervix		24		32	20				
				Limnodrilus cervix variant			24						
				Limnodrilus claparedeianus									
				Limnodrilus hoffmeisteri		32	48	24	24				
				Limnodrilus profundicola					4				
				Limnodrilus udekemianus									
				Potamothrix bavaricus					4	1			
				Potamothrix moldaviensis									
				Quistadrilus multisetosus									
				Tubifex tubifex									
	Polychaeta	Sabellida	Sabellidae	Manayunkia speciosa									
Mollusca	Bivalvia	Heterodonta	Dreissenidae	Dreissena polymorpha									
			Sphaeriidae	Pisidium		1							
				Pisidium casertanum									
	Gastropoda												
		Basommatophora	Physidae	Physa gyrina									
		Mesogastropoda	Valvatidae	Valvata piscinalis									

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0004B	BI0004C	BI0004D	BI0004E	BI0005A	BI0005B	BI0005C	BI0005E
					Station:	S337	S337	S337	S337	S315	S315	S315	S315
					Date:	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00
					Replicate:	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP5
Arthropoda	Arachnida	Hydrachnida											
		Trombidiformes	Limnesiidae	Limnesia									
	Crustacea	Amphipoda	Gammaridae	Gammarus									
				Gammarus fasciatus									
				Gammarus pseudolimnaeus									
		Isopoda	Asellidae	Caecidotea									
		Podocopa					7	1	1	1		1	1
	Insecta	Coleoptera	Elmidae	Dubiraphia									
				Stenelmis									
		Diptera	Chironomidae										
				Chironomini-tribe									
				Chironomus									
				Chironomus cf. Riparius									
				Chironomus crassicaudatus									
				Chironomus decorus grp		5	3	2	5	1	1	1	
				Chironomus plumosus									
				Chironomus species A		2							
				Cladopelma									
				Cladotanytarsus									
				Cricotopus sylvestris						1			
				Cryptochironomus									
				Dicrotendipes									
				Dicrotendipes modestus									
				Endochironomus									
				Glyptotendipes									
				Harnischia									
				Labrundinia									
				Microtendipes pedellus									
				Nanocladius distinctus									
				Parachironomus									
				Paratanytarsus									
				Polypedilum halterale									
				Procladius									
				Procladius species A		1							
				Procladius-Holotanypus			1		1				
				Psectrocladius									
				Tanytarsus									
			Psychodidae										
			Tipulidae										
		Trichoptera	Leptoceridae										
				Oecetis									

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0006A	BI0006B	BI0006C	BI0006D	BI0006E	BI0007A	BI0007B	BI0007C	BI0007D	BI0007E
					Station:	S317	S317	S317	S317	S317	S342	S342	S342	S342	S342
					Date:	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00
					Replicate:	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4	REP5
Coelenterata	Hydrozoa	Hydroida	Hydrodæ	Hydra americana											
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina											
Nematoda								4	4		4	4		3	
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera											
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata											
				Helobdella stagnalis											
			Piscicolidae	Myzobdella lugubris											
	Oligochaeta														
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus											
		Tubificida	Naididae	Dero digitata		100	104	48	44	28	10				6
				Nais bretscheri											
				Nais communis											
				Ophidonais serpentina											
				Stylaria lacustris											
				Uncinaxis uncinata											
				Vejdovskyella intermedia											
			Tubificidae			460	556	748	792	588	312	336	2	161	87
				Aulodrilus americanus											
				Aulodrilus limnobius											
				Aulodrilus pigueti		420	480	336	1,058	616					
				Branchiura sowerbyi											
				Ilyodrilus templetoni		20		24			10	8		4	
				Limnodrilus cervix		8	48	48	220	56	30			12	6
				Limnodrilus cervix variant											
				Limnodrilus claparedeianus											
				Limnodrilus hoffmeisteri			24	72	132	196	140	100		37	39
				Limnodrilus profundicola											
				Limnodrilus udekemianus											
				Potamothrix bavaricus			24								
				Potamothrix moldaviensis					4						
				Quistadrilus multisetosus											
				Tubifex tubifex											
				Manayunkia speciosa											
Mollusca	Polychaeta	Sabellida	Sabellidae	Manayunkia speciosa											
	Bivalvia	Heterodonta	Dreissenidae	Dreissena polymorpha							2		1		23
			Sphaeriidae	Pisidium								7	2		4
				Pisidium casertanum											
	Gastropoda													1	
		Basommatophora	Physidae	Physa gyrina											2
		Mesogastropoda	Valvatidae	Valvata piscinalis							2		1		

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0006A	BI0006B	BI0006C	BI0006D	BI0006E	BI0007A	BI0007B	BI0007C	BI0007D	BI0007E
					Station:	S317	S317	S317	S317	S317	S342	S342	S342	S342	S342
					Date:	08/11/00	08/11/00	08/11/00	08/11/00	08/11/00	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00
					Replicate:	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4	REP5
Arthropoda	Arachnida	Hydrachnida													
		Trombidiformes	Limnesiidae	Limnesia									1		1
	Crustacea	Amphipoda	Gammaridae	Gammarus								1			
				Gammarus fasciatus											1
				Gammarus pseudolimnaeus											
	Insecta	Isopoda	Asellidae	Caecidotea											
		Podocopa										4		1	4
		Coleoptera	Elmidae	Dubiraphia					4						
				Stenelmis											
		Diptera	Chironomidae									2			
				Chironomini-tribe											
				Chironomus							122	154	54	152	106
				Chironomus cf. Riparius							4		1		
				Chironomus crassicaudaus											
				Chironomus decorus grp		24	8	40	24	24	28	32	2		
				Chironomus plumosus											
				Chironomus species A											
				Cladopelma											
				Cladotanytarsus											
				Cricotopus sylvestris											
				Cryptochironomus											
				Dicrotendipes											
				Dicrotendipes modestus											2
				Endochironomus											
				Glyptotendipes											
				Harnischia											
				Labrundinia											
				Microtendipes pedellus											
				Nanocladius distinctus											
				Parachironomus											
				Paratanytarsus											
				Polypedilum halterale											
				Procladius											
				Procladius species A							12	14	4	7	
				Procladius-Holotanypus		8							1	5	
				Psectrocladius											
				Tanytarsus					4						
	Trichoptera	Psychodidae	Tipulidae												
		Leptoceridae													
				Oecetis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0008B	BI0008E	BI0009A	BI0009B	BI0009C	BI0009D	BI0010A	BI0010B	BI0010C	BI0010D
					Station:	S355	S355	S354	S354	S354	S354	S372	S372	S372	S372
					Date:	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00	08/11/00	08/11/00	08/11/00	08/11/00
					Replicate:	REP2	REP5	REP1	REP2	REP3	REP4	REP1	REP2	REP3	REP4
Coelenterata	Hydrozoa	Hydroida	Hydrodæ	Hydra americana											
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina											
Nematoda												5	124	332	76
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera											
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata											
				Helobdella stagnalis											
			Piscicolidae	Myzobdella lugubris											
	Oligochaeta														
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus											
		Tubificida	Naididae	Dero digitata	2							2			12
				Nais bretscheri										24	
				Nais communis									80	24	4
				Ophidonais serpentina									64		
				Stylaria lacustris								2	80	72	4
				Uncinaxis uncinata											
				Vejdovskyella intermedia										24	
			Tubificidae									98	352	672	137
				Aulodrilus americanus											
				Aulodrilus limnobius											
				Aulodrilus pigueti								4	80	144	28
				Branchiura sowerbyi											
				Ilyodrilus templetoni									16		4
				Limnodrilus cervix											
				Limnodrilus cervix variant											
				Limnodrilus claparedeianus											
				Limnodrilus hoffmeisteri								6	56	112	4
				Limnodrilus profundicola											4
				Limnodrilus udekemianus											
				Potamothrix bavaricus								2	32	24	
				Potamothrix moldaviensis								10	20	104	16
				Quistadrilus multisetosus											
				Tubifex tubifex											
				Manayunkia speciosa											
Mollusca	Polychaeta	Sabellida	Sabellidae	Dreissena polymorpha											
	Bivalvia	Heterodonta	Dreissenidae	Pisidium								1	308	288	20
			Sphaeriidae	Pisidium casertanum											
	Gastropoda														
		Basommatophora	Physidae	Physa gyrina											
		Mesogastropoda	Valvatidae	Valvata piscinalis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0008B	BI0008E	BI0009A	BI0009B	BI0009C	BI0009D	BI0010A	BI0010B	BI0010C	BI0010D
					Station:	S355	S355	S354	S354	S354	S354	S372	S372	S372	S372
					Date:	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00	08/10/00	08/11/00	08/11/00	08/11/00	08/11/00
					Replicate:	REP2	REP5	REP1	REP2	REP3	REP4	REP1	REP2	REP3	REP4
Arthropoda	Arachnida	Hydrachnida											8		
		Trombidiformes	Limnesiidae	Limnesia									8		
	Crustacea	Amphipoda	Gammaridae	Gammarus											
				Gammarus fasciatus									12	24	
				Gammarus pseudolimnaeus											
		Isopoda	Asellidae	Caecidotea											
	Insecta	Podocopa					1	1	2	1		9	72	108	9
		Coleoptera	Elmidae	Dubiraphia											
				Stenelmis											
	Diptera	Chironomidae		Chironomini-tribe											
				Chironomus											
				Chironomus cf. Riparius											
				Chironomus crassicaudaus											
				Chironomus decorus grp				1	2		1				
				Chironomus plumosus											
				Chironomus species A											
				Cladopelma								1		12	
				Cladotanytarsus								18	180	304	12
				Cricotopus sylvestris								1	20	8	
				Cryptochironomus									12	8	1
				Dicrotendipes									4		
				Dicrotendipes modestus									64	68	8
				Endochironomus									96	16	
				Glyptotendipes									4		
				Harnischia											
				Labrundinia											
				Microtendipes pedellus											
				Nanocladius distinctus											
				Parachironomus									20	68	1
				Paratanytarsus									20	4	1
				Polypedilum halterale									4	40	1
				Procladius											
				Procladius species A											
				Procladius-Holotanypus					1	1		1		4	
				Psectrocladius									28	8	1
				Tanytarsus								2	24	28	1
	Trichoptera	Leptoceridae	Psychodidae												
			Tipulidae											4	
			Leptoceridae												
				Oecetis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0010E	BI0011A	BI0011B	BI0011C	BI0011D	BI0011E	BI0012A	BI0012B	BI0012C	BI0012D
					Station:	S372	S320	S320	S320	S320	S320	S365	S365	S365	S365
					Date:	08/11/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00
					Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4
Coelenterata	Hydrozoa	Hydroida	Hydrodae	Hydra americana											
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina											
Nematoda						3	1								6
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera											
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata											
				Helobdella stagnalis											
			Piscicolidae	Myzobdella lugubris											
	Oligochaeta									2	2				
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus							1				
		Tubificida	Naididae	Dero digitata		5			20	10	28	80	18	56	48
				Nais bretscheri											
				Nais communis		1									
				Ophidonais serpentina											
				Stylaria lacustris		4									
				Uncinais uncinata											
				Vejdovskyella intermedia											
			Tubificidae			41	142	184	132	80	128	128	210	116	172
				Aulodrilus americanus											
				Aulodrilus limnobius											
				Aulodrilus pigueti		5	4		8	4					
				Branchiura sowerbyi											
				Ilyodrilus templetoni				12	4	4	12				
				Limnodrilus cervix			24	12	4	4	8			4	12
				Limnodrilus cervix variant											
				Limnodrilus claparedeianus									6		
				Limnodrilus hoffmeisteri		2	40	16	36	16	28	24	54	4	50
				Limnodrilus profundicola											
				Limnodrilus udekemianus											
				Potamothenrix bavaricus								4			
				Potamothenrix moldaviensis								2	72	16	84
				Quistadrilus multisetosus											
				Tubifex tubifex							4			4	
				Manayunkia speciosa											
Mollusca	Polychaeta	Sabellida	Sabellidae												
	Bivalvia	Heterodonta	Dreissenidae	Dreissena polymorpha		3						197	8	580	87
			Sphaeriidae	Pisidium											
				Pisidium casertanum											
	Gastropoda														
		Basommatophora	Physidae	Physa gyrina											
		Mesogastropoda	Valvatidae	Valvata piscinalis											

Appendix D1. (cont.)

					Sample No:	BI0010E	BI0011A	BI0011B	BI0011C	BI0011D	BI0011E	BI0012A	BI0012B	BI0012C	BI0012D		
					Station:	S372	S320	S320	S320	S320	S320	S365	S365	S365	S365		
					Date:	08/11/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00		
Phylum	Class	Order	Family	Genus/Species	Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4		
Arthropoda	Arachnida	Hydrachnida			1												
		TrombidIformes	Limnesiidae	Limnesia													
	Crustacea	Amphipoda	Gammaridae	Gammarus													
				Gammarus fasciatus													
				Gammarus pseudolimnaeus						2	2	4	4				
		Isopoda	Asellidae	Caecidotea								14	10	12	6		
	Insecta	Podocopa			6												
		Coleoptera	Elmidae	Dubiraphia													
				Stenelmis													
		Diptera	Chironomidae											2	4		10
				Chironomini-tribe													
				Chironomus										40	58	24	54
				Chironomus cf. Riparius													8
				Chironomus crassicaudaus													
				Chironomus decorus grp			1	5	4	4	4	36	72	16	98		
				Chironomus plumosus													
				Chironomus species A													
				Cladopelma		2							2		4		
				Cladotanytarsus		2											
				Cricotopus sylvestris													
				Cryptochironomus		1											
				Dicrotendipes													
				Dicrotendipes modestus									2		2		
				Endochironomus													
				Glyptotendipes											4		
				Harnischia													
				Labrundinia												2	
				Microtendipes pedellus													
				Nanocladius distinctus													
				Parachironomus											4		
				Paratanytarsus													
				Polypedilum halterale											2		
				Procladius												4	
				Procladius species A													8
				Procladius-Holotanypus				1				2	1		2		
				Psectrocladius				1									
				Tanytarsus													
				Psychodidae													
				Tipulidae													
		Trichoptera		Leptoceridae													
			Oecetis														

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0012E	BI0013A	BI0013B	BI0013C	BI0013D	BI0013E	BI0014A	BI0014B	BI0014C	BI0014D
					Station:	S365	S323	S323	S323	S323	S323	S305	S305	S305	S305
					Date:	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/12/00	08/12/00	08/12/00	08/12/00
					Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4
Coelenterata	Hydrozoa	Hydroida	Hydrodæ	Hydra americana											
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina											
Nematoda					1				2	3	3	4	12	12	20
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera											
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata											
				Helobdella stagnalis											
			Piscicolidae	Myzobdella lugubris											
	Oligochaeta														
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus											
		Tubificida	Naididae	Dero digitata	21	400	112	48	132	72	88	28	36	84	
				Nais bretscheri											
				Nais communis											
				Ophidonais serpentina											
				Stylaria lacustris											
				Uncinaxis uncinata											
				Vejdovskyella intermedia											
			Tubificidae		103	480	624	360	396	288	1,540	1,012	1,152	788	
				Aulodrilus americanus											
				Aulodrilus limnobius											
				Aulodrilus pigueti		180	112	84	36	40	264	112	396	252	
				Branchiura sowerbyi											
				Ilyodrilus templetoni		20		24		8				84	
				Limnodrilus cervix	4	4		48	12	12	44	140	72	56	
				Limnodrilus cervix variant											
				Limnodrilus claparedeianus											
				Limnodrilus hoffmeisteri	20	8	116	72	60	40	44	144	144	64	
				Limnodrilus profundicola							44				
				Limnodrilus udekemianus		4				8				4	
				Potamothrix bavaricus								60	36	84	
				Potamothrix moldaviensis	37						88	56	72	32	
				Quistadrilus multisetosus											
				Tubifex tubifex											
				Manayunkia speciosa											
Mollusca	Polychaeta	Sabellida	Sabellidae	Dreissena polymorpha	5			1		1	4				4
	Bivalvia	Heterodonta	Dreissenidae	Pisidium											
			Sphaeriidae	Pisidium casertanum											
	Gastropoda														
		Basommatophora	Physidae	Physa gyrina											
		Mesogastropoda	Valvatidae	Valvata piscinalis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0012E	BI0013A	BI0013B	BI0013C	BI0013D	BI0013E	BI0014A	BI0014B	BI0014C	BI0014D
					Station:	S365	S323	S323	S323	S323	S323	S305	S305	S305	S305
					Date:	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/13/00	08/12/00	08/12/00	08/12/00	08/12/00
					Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4
Arthropoda	Arachnida	Hydrachnida													
		Trombidiformes	Limnesiidae	Limnesia											
	Crustacea	Amphipoda	Gammaridae	Gammarus											
				Gammarus fasciatus								16			
				Gammarus pseudolimnaeus											
		Isopoda	Asellidae	Caecidotea											
		Podocopa										72	16	52	52
	Insecta	Coleoptera	Elmidae	Dubiraphia									4	4	12
				Stenelmis											
		Diptera	Chironomidae			5			1	1		4		8	
				Chironomini-tribe											
				Chironomus		54						20	20	32	16
				Chironomus cf. Riparius								40			52
				Chironomus crassicaudaus											
				Chironomus decorus grp		37	4	24	9	14	17	8	28	48	8
				Chironomus plumosus								8	16		4
				Chironomus species A											
				Cladopelma								12	4	4	4
				Cladotanytarsus											
				Cricotopus sylvestris											
				Cryptochironomus				4							
				Dicrotendipes		1									
				Dicrotendipes modestus				4							
				Endochironomus											
				Glyptotendipes											
				Harnischia											
				Labrundinia											
				Microtendipes pedellus											
				Nanocladius distinctus											
				Parachironomus											
				Paratanytarsus											
				Polypedilum halterale								4			
				Procladius											
				Procladius species A		1	1		3	4			8		
				Procladius-Holotanypus				16							
				Psectrocladius											
				Tanytarsus											
			Psychodidae												
			Tipulidae												
		Trichoptera	Leptoceridae												
				Oecetis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0014E	BI0015A	BI0015B	BI0015C	BI0015D	BI0015E	BI0016A	BI0016B	BI0016C	BI0017A
					Station:	S305	S302	S302	S302	S302	S302	S303	S303	S303	OT-7
					Date:	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/14/00
					Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP1
Coelenterata	Hydrozoa	Hydroida	Hydrodae	Hydra americana											
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina											
Nematoda						12		1	1		1				2
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera											
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata											
				Helobdella stagnalis											
			Piscicolidae	Myzobdella lugubris											
	Oligochaeta						8								
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus											
		Tubificida	Naididae	Dero digitata		16	8		2	12	2			1	1
				Nais bretscheri											
				Nais communis											
				Ophidonais serpentina											
				Stylaria lacustris											
				Uncinais uncinata											
				Vejdovskyella intermedia											
			Tubificidae			612	104	52	39	116	64				28
				Aulodrilus americanus											4
				Aulodrilus limnobius											1
				Aulodrilus pigueti		208	44	26	11	52	14				1
				Branchiura sowerbyi											
				Ilyodrilus templetoni		32	16	16	12	8	12				
				Limnodrilus cervix			12	2	5	8	14				
				Limnodrilus cervix variant											
				Limnodrilus claparedeianus											
				Limnodrilus hoffmeisteri		52	8	9	3	12	8				1
				Limnodrilus profundicola				2							
				Limnodrilus udekemianus											
				Potamothrix bavaricus											
				Potamothrix moldaviensis		20									
				Quistadrilus multisetosus		16									
				Tubifex tubifex											
				Manayunkia speciosa											
Mollusca	Polychaeta	Sabellida	Sabellidae	Dreissena polymorpha					1						4
	Bivalvia	Heterodonta	Dreissenidae	Pisidium											20
			Sphaeriidae	Pisidium casertanum											
	Gastropoda														
		Basommatophora	Physidae	Physa gyrina											
		Mesogastropoda	Valvatidae	Valvata piscinalis											

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0014E	BI0015A	BI0015B	BI0015C	BI0015D	BI0015E	BI0016A	BI0016B	BI0016C	BI0017A
					Station:	S305	S302	S302	S302	S302	S302	S303	S303	S303	OT-7
					Date:	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/12/00	08/14/00
					Replicate:	REP5	REP1	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP1
Arthropoda	Arachnida	Hydrachnida	Limnesiidae	Limnesia											
		Trombidiformes		Gammarus											
	Crustacea	Amphipoda	Gammaridae	Gammarus fasciatus		4									25
				Gammarus pseudolimnaeus							1				
		Isopoda	Asellidae	Caecidotea											
	Insecta	Podocopa	Elmidae	Dubiraphia		8	1	3	1	1	2				8
		Coleoptera		Stenelmis				1							
		Diptera	Chironomidae	Chironomini-tribe											
				Chironomus		20			5						1
				Chironomus cf. Riparius		24			3	5	3				
				Chironomus crassicaudaus									1		
				Chironomus decorus grp		16	9	20		3	27		1		
				Chironomus plumosus		4	31		20	31		2			
				Chironomus species A			3		3	6			1		
				Cladopelma		4									
				Cladotanytarsus											
				Cricotopus sylvestris											
				Cryptochironomus											1
				Dicrotendipes											
				Dicrotendipes modestus					1						
				Endochironomus											
				Glyptotendipes											
				Harnischia											
				Labrundinia											
				Microtendipes pedellus											
				Nanocladius distinctus				1							
				Parachironomus											
				Paratanytarsus											
				Polypedilum halterale											
				Procladius											
				Procladius species A					1	1					
				Procladius-Holotanypus											
				Psectrocladius											
				Tanytarsus											
		Trichoptera	Psychodidae												
			Tipulidae												
			Leptoceridae												
				Oecetis											2

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No: BI0017B BI0017C BI0017D BI0017E BI0018A BI0018B BI0018C BI0018D BI0018E BI0019A									
					Station: OT-7 OT-7 OT-7 OT-7 OT-6 OT-6 OT-6 OT-6 OT-6 S344									
					Date: 08/14/00 08/14/00 08/14/00 08/14/00 08/09/00 08/09/00 08/09/00 08/09/00 08/09/00 08/10/00									
					Replicate: REP2 REP3 REP4 REP5 REP1 REP2 REP3 REP4 REP5 REP1									
Coelenterata	Hydrozoa	Hydroida	Hydrodae	Hydra americana										8
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Duguesia tigrina		2	1			4	2	12	2	64
Nematoda										20		12		4
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera						4	6		5	
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata										8
				Helobdella stagnalis										
			Piscicolidae	Myzobdella lugubris								4		
	Oligochaeta													
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus										
		Tubificida	Naididae	Dero digitata						12	6		1	16
				Nais bretscheri										
				Nais communis										
				Ophidonais serpentina										
				Stylaria lacustris										
				Uncinaxis uncinata						8				16
				Vejdovskyella intermedia										
			Tubificidae	Aulodrilus americanus		32	23	13	11	192	96	312	33	320
				Aulodrilus limnobius		8	2	2						232
				Aulodrilus pigueti		6	1	2	1	24	16	16	2	32
				Branchiura sowerbyi						12	6			16
				Ilyodrilus templetoni		2	5	3				12	3	
				Limnodrilus cervix			1	1	1		2			
				Limnodrilus cervix variant										56
				Limnodrilus claparedeianus										
				Limnodrilus hoffmeisteri		6	7		3	8	12	40	2	16
				Limnodrilus profundicola										96
				Limnodrilus udekemianus										
				Potamothrix bavaricus							2	8	2	
				Potamothrix moldaviensis			1	1		4	2	16	2	16
				Quistadrilus multisetosus										
				Tubifex tubifex										
				Manayunkia speciosa										
Mollusca	Polychaeta	Sabellida	Sabellidae	Dreissena polymorpha		240	12	2		784	46	76	15	1,770
	Bivalvia	Heterodonta	Dreissenidae	Pisidium		52	50	25	5	24	16	20		8
			Sphaeriidae	Pisidium casertanum										
	Gastropoda													
		Basommatophora	Physidae	Physa gyrina										
		Mesogastropoda	Valvatidae	Valvata piscinalis										

Appendix D1. (cont.)

Phylum	Class	Order	Family	Genus/Species	Sample No:	BI0017B	BI0017C	BI0017D	BI0017E	BI0018A	BI0018B	BI0018C	BI0018D	BI0018E	BI0019A
					Station:	OT-7	OT-7	OT-7	OT-7	OT-6	OT-6	OT-6	OT-6	OT-6	S344
					Date:	08/14/00	08/14/00	08/14/00	08/14/00	08/09/00	08/09/00	08/09/00	08/09/00	08/09/00	08/10/00
					Replicate:	REP2	REP3	REP4	REP5	REP1	REP2	REP3	REP4	REP5	REP1
Arthropoda	Arachnida	Hydrachnida	Limnesiidae	Limnesia		2									
		Trombidiformes		Gammarus					1	24	14	12	42	12	
	Crustacea	Amphipoda	Gammaridae	Gammarus fasciatus		112	69	4		116	66	68	148	56	
				Gammarus pseudolimnaeus											
	Insecta	Isopoda	Asellidae	Caecidotea			1			8	2	4		4	
		Podocopa				20		2		288	182	316		60	1
		Coleoptera	Elmidae	Dubiraphia											
				Stenelmis											
		Diptera	Chironomidae	Chironomini-tribe											
				Chironomus			1								3
				Chironomus cf. Riparius											7
				Chironomus crassicaudaus											
				Chironomus decorus grp											15
				Chironomus plumosus											
				Chironomus species A											
				Cladopelma								4			
				Cladotanytarsus											
				Cricotopus sylvestris						4					
				Cryptochironomus				1		4	4	12	2	4	
				Dicrotendipes											
				Dicrotendipes modestus											
				Endochironomus											
				Glyptotendipes					1						
				Harnischia		2				4					
				Labrundinia											
				Microtendipes pedellus								4			
				Nanocladius distinctus											
				Parachironomus											
				Paratanytarsus											
				Polypedilum halterale											
				Procladius											
				Procladius species A		6	1	1					1		
				Procladius-Holotanypus		4				4		4	1		
				Psectrocladius											
				Tanytarsus		8				84	32	104	1	24	
		Trichoptera	Psychodidae												
			Tipulidae												
			Leptoceridae									4			
				Oecetis		2	2						1		

Appendix D1. (cont.)

					Sample No:	BI0019B	BI0019C	BI0019D	BI0019E
					Station:	S344	S344	S344	S344
					Date:	08/10/00	08/10/00	08/10/00	08/10/00
Phylum	Class	Order	Family	Genus/Species	Replicate:	REP2	REP3	REP4	REP5
Coelenterata	Hydrozoa	Hydroida	Hydrodæ	Hydra americana					
Platyhelmenthes	Turbellaria	Seriata	Planariidae	Dugesia tigrina					
Nematoda									
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella buccera			1		
		Rhynchobdellida	Glossiphoniidae	Helobdella elongata					
				Helobdella stagnalis					
			Piscicolidae	Myzobdella lugubris					
	Oligochaeta								
		Lumbriculida	Lumbriculidae	Stylodrilus heringianus					
		Tubificida	Naididae	Dero digitata					
				Nais bretscheri					
				Nais communis					
				Ophidonais serpentina					
				Stylaria lacustris					
				Uncinais uncinata					
				Vejdovskyella intermedia					
			Tubificidae			14	156	228	256
				Aulodrilus americanus					
				Aulodrilus limnobius					
				Aulodrilus pigueti					
				Branchiura sowerbyi					
				Ilyodrilus templetoni					
				Limnodrilus cervix		3	4	36	32
				Limnodrilus cervix variant					
				Limnodrilus claparedeianus					
				Limnodrilus hoffmeisteri		2	88	38	152
				Limnodrilus profundicola					
				Limnodrilus udekemianus					
				Potamothrix bavaricus					
				Potamothrix moldaviensis					
				Quistadrilus multisetosus					
				Tubifex tubifex					
Mollusca	Polychaeta	Sabellida	Sabellidae	Manayunkia speciosa					
	Bivalvia	Heterodonta	Dreissenidae	Dreissena polymorpha					
			Sphaeriidae	Pisidium			1	5	
				Pisidium casertanum			1		4
	Gastropoda								
		Basommatophora	Physidae	Physa gyrina					
		Mesogastropoda	Valvatidae	Valvata piscinalis					

Appendix D1. (cont.)

					Sample No:	BI0019B	BI0019C	BI0019D	BI0019E
					Station:	S344	S344	S344	S344
					Date:	08/10/00	08/10/00	08/10/00	08/10/00
Phylum	Class	Order	Family	Genus/Species	Replicate:	REP2	REP3	REP4	REP5
Arthropoda	Arachnida	Hydrachnida							
		TrombidIfformes	Limnesiidae	Limnesia					
	Crustacea	Amphipoda	Gammaridae	Gammarus					
				Gammarus fasciatus		1			
				Gammarus pseudolimnaeus					
		Isopoda	Asellidae	Caecidotea					
		Podocopa					3		
	Insecta	Coleoptera	Elmidae	Dubiraphia					
				Stenelmis					
		Diptera	Chironomidae	Chironomini-tribe				1	
	Chironomus					6	2	8	
	Chironomus cf. Riparius					9		4	
	Chironomus crassicaudaus								
	Chironomus decorus grp				9	4	18	36	
	Chironomus plumosus								
	Chironomus species A						9		
	Cladopelma								
	Cladotanytarsus								
	Cricotopus sylvestris							1	
	Cryptochironomus								
	Dicrotendipes								
	Dicrotendipes modestus								
	Endochironomus								
	Glyptotendipes								
	Harnischia								
	Labrundinia								
	Microtendipes pedellus								
	Nanocladius distinctus								
	Parachironomus								
	Paratanytarsus								
	Polypedilum halterale								
	Procladius								
	Procladius species A					1		10	
Procladius-Holotanypus									
Psectrocladius									
Tanytarsus									
			Psychodidae			1			
			Tipulidae						
	Trichoptera	Leptoceridae							
			Oecetis						

Appendix D2

QA/QC Evaluation of Onondaga Lake 2000 Benthic Macroinvertebrate Data

**QA/QC EVALUATION OF ONONDAGA LAKE
2000 BENTHIC MACROINVERTEBRATE DATA**

(Modified from Exponent, 2001c)

Introduction

This report documents the results of the quality assurance and quality control (QA/QC) review of the data generated on benthic macroinvertebrate assemblages that were collected in 2000 from 15 stations at Onondaga Lake and from two stations at Otisco Lake (reference area). These evaluations were conducted by Aquatic Resources Center in College Grove, Tennessee, and Ichthyological Associates, Inc., in Lansing, New York. The quality assurance review was conducted by Exponent to ensure that the evaluation of the benthic macroinvertebrate assemblages was consistent with the specifications of the statement of work and that the data are acceptable for use in future stages of the study.

The quality assurance review consisted of an evaluation of the following major elements of the benthic macroinvertebrate evaluations:

- **Field Methods** – Were the major specifications of the field sampling procedures followed, as described in the work plan (Exponent, 2000)?
- **Laboratory Methods** – Were the major specifications of the laboratory testing procedures followed, as described in the work plan (Exponent, 2000) and the statement of work submitted to the taxonomic laboratory?
- **Sorting Efficiency** – Was each sample sorted with an efficiency of 95 percent?
- **Taxonomic Accuracy** – Were taxonomic identifications conducted by experienced taxonomists, using the appropriate literature and a reference collection?

The following section of this report presents the results of the QA/QC evaluation for the toxicity tests. QA/QC considerations are then summarized, and conclusions are presented in the final section.

Quality Assurance and Quality Control Evaluation**Field Methods**

From July 28 to August 14, 2000, 15 samples of benthic macroinvertebrate assemblages were collected from Onondaga Lake and two samples of benthic macroinvertebrate assemblages were collected at Otisco Lake (i.e., reference area). Sampling was conducted according to the procedures and plans described in the work plan (Exponent, 2000). Up to five replicate samples were collected at each station. Maximum sediment penetration depths ranged from 13 to 15 cm below the sediment surface. Each grab sample, consisting of sediment and the overlying water, was strained through a sieve (600 μm) to isolate benthic

organisms. Retained material from each grab was transferred to an appropriate sample and preserved in the field with 10 percent formalin, and stained with rose bengal (125 mg/L).

Laboratory Methods

The analytical methods for the benthic macroinvertebrate samples were based on the specifications presented in the work plan (Exponent, 2000) and the laboratory statement of work. The laboratory methods are discussed in the following sections.

Sample Handling

Samples received by the laboratory remained in the 10-percent formalin solution for a minimum of 24 hours, to allow proper fixation. The maximum fixation period was 10 days, to reduce the risk of decalcifying mollusks. After fixation, the samples were washed (i.e., rescreened) with a sieve that has mesh opening of ≤ 0.3 mm, and preserved in a 95-percent solution of ethyl alcohol. For long-term crustacean storage, glycerine was substituted for some of the water. An appropriate alcohol-glycerine solution for long-term storage (70 percent alcohol, 25 percent water, and 5 percent glycerine) was used by the laboratory.

Washed samples were stored in an upright position at a cool temperature and away from direct sunlight. Samples were stored in a secure place, where containers were not susceptible to breakage, and samples were checked periodically to ensure that adequate levels of preservative are maintained.

Sorting

Samples were sorted by placing a small amount of the sample into a glass or plastic dish and using a pair of jeweler's forceps to sort through the sample in a systematic manner, removing each organism. This entire process was done while viewing the sample through a 10X dissecting microscope or a magnifying lamp.

Each sample was sorted by only one person. Organisms were sorted into major taxonomic groups (e.g., Amphipoda, Chironomidae, Oligochaeta). Based on New York State Department of Environmental Conservation (NYSDEC) protocols (NYSDEC, 1996), each sample that contained large numbers of benthic organisms was divided into quarters. Quartered subsamples were sorted in their entirety. Once 250 organisms were sorted, no more quarters were sorted. Each vial containing a major taxonomic group had a label listing the survey name, sample number, and date sampled.

Taxonomic Identifications and Counts

After sorting was completed, organisms were identified to the lowest taxonomic level possible, with the target being species level. Chironomidae were subsampled per 100 individuals, and oligochaetes were subsampled per 50 individuals. All other taxa were identified in their entirety (NYSDEC 1996). All taxonomic identifications were made by qualified taxonomists. For incomplete specimens, only the anterior or posterior end was enumerated, depending upon the taxon. All identifications were made using binocular-dissecting or compound microscopes. At least two pieces of literature were used for each species

identification. Moreover, each species identification was verified by a taxonomic expert or checked against a reference specimen from a verified reference collection.

After completing taxonomic identifications, all organisms were placed in vials containing 70 percent ethyl alcohol, 25 percent water, and 5 percent glycerine. These vials were sealed. Each vial was labeled with the following information: survey name, sample number, and date of collection. Any specimens removed from the sample jar and placed in the project reference collection were noted (i.e., species, number of individuals removed). Each taxonomist recorded initial identifications and counts on sample data sheets. Any pertinent notes and comments on the organisms in each sample were added to the sample data sheets.

QA/QC Procedures

At least three individuals of each taxon were placed in a vial with 70 percent ethyl alcohol, 25 percent water, and 5 percent glycerine and stored in a permanent project-reference collection. To reduce evaporation of alcohol, the lids of vials were sealed with electrical tape. The species (or other taxonomic designation) was written on the label on each vial. Reference specimens were archived alphabetically within major taxonomic groups.

At least 25 percent of one replicate from each sample was re-sorted for QA/QC purposes. Re-sorting is the examination of a sample or subsample that has been sorted once and is considered free of organisms. The re-sorted sediment aliquot was a representative subsample of the total sediment sample. Re-sorting was conducted using a dissection microscope capable of magnification to 25X. A partial re-sorting of every sample ensures that gross sorting errors are detected. Re-sorting was conducted by an individual other than the one who sorted the original sample. Each 25 percent sample aliquot was checked for removal of ≥ 95 percent of total organisms. Thus, each sample elicited a decision concerning a possible re-sort.

Sorting Efficiency

A sample-sorting efficiency of 95 percent (of the total number of individuals in each sample) was required for this study. That is, no more than 5 percent of the organisms in a given sample could be missed by the original sorter. Similarly, identifications by each taxonomist were expected to be accurate for at least 95 percent of the total number of species. The percent error in the laboratory's sample-sorting efficiency for this study ranged from 0 to 4.6 percent, with an average sample-sorting efficiency of 98.1 percent.

Taxonomic Accuracy

All organisms were identified to the lowest possible taxon, to species level whenever possible. In cases where the identity of a species was uncertain, a species number sufficed (e.g., *Chironomus* sp. #1, *Chironomus* sp. #2). Data for each replicate sample were reported as numbers of individuals per sample for each species (or lowest identifiable taxon).

Only one problem was encountered during the taxonomic determinations. The oligochaetes in Samples B1000A to E (Sample B1000, replicates 1 to 5) were in poor condition. These samples were initially sorted by Ichthyological Associates and then re-sorted by Aquatic Resources, and the extra handling of these samples could have contributed to their generally poorer condition. Despite their condition, it was still possible to identify the oligochaetes in these samples.

Summary of Quality Assurance and Quality Control Considerations

Based on sorting efficiency and taxonomic accuracy, all of the results of the benthic macroinvertebrate evaluations are determined to be acceptable for use.

References

Exponent. 2000. Onondaga Lake RI/FS: Supplemental data Phase 2A work plan and dredged material disposal area addendum. Prepared for Honeywell, East Syracuse, NY. Exponent, Environmental Group, Bellevue, WA.

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