

Appendix D

Fullarton Dam Area Fish and Benthic Records

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Fish Resources

Records are presented for sampling conducted above and in Fullarton Pond, and in Neil Drain downstream of the dam. With the exception of one sample in the pond where minnow traps were employed, backpack electrofishers were utilized to provide representative samples. All fish were identified to species and released at the sampling site. In some cases photo vouchers were taken.

Fish diversity upstream of Fullarton Pond (Neil Drain)

Species	Status – Global	Can	Ont.	Thames	Thames Distribution	Times Sampled
Brook Stickleback	G5		S5	Abundant	Throughout	4
Creek Chub	G5		S5	Abundant	Throughout	1
Fathead Minnow	G5		S5	Common	Throughout	1
Green Sunfish	G5		S4	Uncommon	Widespread	2
Iowa Darter	G5		S5	Uncommon	Widespread	1
Least Darter	G5		S4	Uncommon	Throughout	1
Mottled Sculpin	G5		S5	Uncommon	Localized	4
Northern Redbelly Dace	G5		S5	Common	Throughout	4
White Sucker	G5		S5	Abundant	Throughout	3

Fish diversity downstream of Fullarton Dam (Neil Drain)

Species	Status – Global	Can	Ont.	Thames	Thames Distribution	Times Sampled
Black Bullhead	G5		S4	Uncommon	Throughout	2
Blacknose Dace	G5		S5	Abundant	Throughout	6
Blacknose Shiner	G4		S5	Rare	Localized	3
Bluegill	G5		S5	Uncommon	Widespread	1
Bluntnose Minnow	G5		S5	Abundant	Throughout	2
Brook Stickleback	G5		S5	Abundant	Throughout	2
Central Mudminnow	G5		S5	Uncommon	Throughout	1
Central Stoneroller	G5		S4	Abundant	Throughout	6
Common Carp	G5		SNA	Common	Throughout	1
Common Shiner	G5		S5	Abundant	Throughout	3
Creek Chub	G5		S5	Abundant	Throughout	6
Fantail Darter	G5		S4	Abundant	Throughout	2
Fathead Minnow	G5		S5	Common	Throughout	5
Golden Shiner	G5		S5	Uncommon	Widespread	4
Green Sunfish	G5		S4	Uncommon	Widespread	6
Greenside Darter	G5		S4	Abundant	Throughout	6
Hornyhead Chub	G5		S4	Common	Throughout	3
Iowa Darter	G5		S5	Uncommon	Widespread	4
Johnny Darter	G5		S5	Abundant	Throughout	3
Largemouth Bass	G5		S5	Common	Throughout	5
Least Darter	G5		S4	Uncommon	Throughout	1
Mottled Sculpin	G5		S5	Uncommon	localized	2
Northern Hog Sucker	G5		S4	Common	Throughout	2
Northern Pike	G5		S5	Uncommon	Throughout	1
Northern Redbelly Dace	G5		S5	Common	Throughout	2
Northern Sunfish	G5		S3	Uncommon	Throughout	6
Pumpkinseed	G5		S5	Common	Throughout	5
Rainbow Darter	G5		S4	Uncommon	Throughout	5
Rock Bass	G5		S5	Abundant	Throughout	6
Rosyface Shiner	G5		S4	Common	Throughout	1
Smallmouth Bass	G5		S5	Common	Throughout	3
Striped Shiner	G5		S4	Common	Throughout	2
White Sucker	G5		S5	Abundant	Throughout	6
Yellow Bullhead	G5		S4	Uncommon	Localized	1

Fish diversity in Fullarton Pond

Species	Status - Global	Can	Ont.	Thames	Thames Distribution	Times Sampled
Brook Stickleback	G5		S5	Abundant	Throughout	2
Golden Shiner	G5		S5	Uncommon	Widespread	1
Green Sunfish	G5		S4	Uncommon	Widespread	2
Least Darter	G5		S4	Uncommon	Throughout	1
Northern Redbelly Dace	G5		S5	Common	Throughout	1
Northern Sunfish	G5		S3	Uncommon	Throughout	1
Pumpkinseed	G5		S5	Common	Throughout	1

Fullarton Dam area fish sampling records								
Species	Common Name	Scientific Name	COSEWIC	SARA	ESA 2007	SRank	Abundance	Distribution
Neil Drain Upstream of Fullarton Pond (1995-2015)								
Neil Drain, Road 163a (upstream of Fullarton Pond)			UTM x: 482738		UTM y: 4802225		11/7/1995	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Green Sunfish		<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Mottled Sculpin		<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Redbelly Dace		<i>Phoxinus eos</i>				S5	Common	Throughout
White Sucker		<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Neil Drain, Road 163a (upstream of Fullarton Pond)			UTM x: 482738		UTM y: 4802225		8/22/2008	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Creek Chub		<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Green Sunfish		<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Mottled Sculpin		<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Redbelly Dace		<i>Phoxinus eos</i>				S5	Common	Throughout
White Sucker		<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Neil Drain, Road 163a (upstream of Fullarton Pond)			UTM x: 482738		UTM y: 4802225		6/3/2015	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Iowa Darter		<i>Etheostoma exile</i>				S5	Uncommon	Widespread
Least Darter		<i>Etheostoma microperca</i>				S4	Uncommon	Throughout
Mottled Sculpin		<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Redbelly Dace		<i>Phoxinus eos</i>				S5	Common	Throughout
White Sucker		<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Neil Drain, Road 163a (upstream of Fullarton Pond)			UTM x: 482738		UTM y: 4802225		10/23/2015	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Fathead Minnow		<i>Pimephales promelas</i>				S5	Common	Throughout
Mottled Sculpin		<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Redbelly Dace		<i>Phoxinus eos</i>				S5	Common	Throughout
Fullarton Pond (2015)								
Fullarton CA			UTM x: 482863		UTM y: 4802336		10/23/2015	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Green Sunfish		<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Least Darter		<i>Etheostoma microperca</i>				S4	Uncommon	Throughout
Fullarton CA			UTM x: 482863		UTM y: 4802336		11/4/2015	
Brook Stickleback		<i>Culaea inconstans</i>				S5	Abundant	Throughout
Golden Shiner		<i>Notemigonus crysoleucas</i>				S5	Uncommon	Widespread
Green Sunfish		<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Northern Redbelly Dace		<i>Phoxinus eos</i>				S5	Common	Throughout
Northern Sunfish		<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed		<i>Lepomis gibbosus</i>				S5	Common	Throughout

Species (Common Name)	Scientific Name	COSEWIC	SARA	ESA 2007	SRank	Abundance	Distribution
Neil Drain Downstream of Fullarton Pond (2002 – 2015)							
Downstream of Fullarton Pond		UTM x: 482913		UTM y:	4802387		11/28/2002
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Bluntnose Minnow	<i>Pimephales notatus</i>				S5	Abundant	Throughout
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Common Shiner	<i>Luxilus comutus</i>				S5	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Fathead Minnow	<i>Pimephales promelas</i>				S5	Common	Throughout
Golden Shiner	<i>Notemigonus crysoleucas</i>				S5	Uncommon	Widespread
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Johnny Darter	<i>Etheostoma nigrum</i>				S5	Abundant	Throughout
Least Darter	<i>Etheostoma microperca</i>				S4	Uncommon	Throughout
Northern Hog Sucker	<i>Hypentelium nigricans</i>				S4	Common	Throughout
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed	<i>Lepomis gibbosus</i>				S5	Common	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
Smallmouth Bass	<i>Micropterus dolomieu</i>				S5	Common	Throughout
Striped Shiner	<i>Luxilus chrysocephalus</i>				S4	Common	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Downstream of Fullarton Pond		UTM x: 482913		UTM y:	4802387		8/27/2009
Black Bullhead	<i>Ameiurus melas</i>				S4	Uncommon	Throughout
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Blacknose Shiner	<i>Notropis neterolepis</i>				S5	Rare	Localized
Bluntnose Minnow	<i>Pimephales notatus</i>				S5	Abundant	Throughout
Brook Stickleback	<i>Culaea inconstans</i>				S5	Abundant	Throughout
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Common Carp	<i>Cyprinus carpio</i>				SNA	Common	Throughout
Common Shiner	<i>Luxilus comutus</i>				S5	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Fantail Darter	<i>Etheostoma flabellare</i>				S4	Abundant	Throughout
Fathead Minnow	<i>Pimephales promelas</i>				S5	Common	Throughout
Golden Shiner	<i>Notemigonus crysoleucas</i>				S5	Uncommon	Widespread
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Hornyhead Chub	<i>Nocomis biguttatus</i>				S4	Common	Throughout
Iowa Darter	<i>Etheostoma exile</i>				S5	Uncommon	Widespread
Johnny Darter	<i>Etheostoma nigrum</i>				S5	Abundant	Throughout
Northern Hog Sucker	<i>Hypentelium nigricans</i>				S4	Common	Throughout
Northern Redbelly Dace	<i>Phoxinus eos</i>				S5	Common	Throughout
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed	<i>Lepomis gibbosus</i>				S5	Common	Throughout
Rainbow Darter	<i>Etheostoma caeruleum</i>				S4	Uncommon	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
Smallmouth Bass	<i>Micropterus dolomieu</i>				S5	Common	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout

Species (Common Name)	Scientific Name	COSEWIC	SARA	ESA 2007	SRANK	Abundance	Distribution
Downstream of Fullarton Pond		UTM x: 482913		UTM y: 4802387		8/15/2013	
Black Bullhead	<i>Ameiurus melas</i>				S4	Uncommon	Throughout
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Bluegill	<i>Lepomis macrochirus</i>				S5	Uncommon	Widespread
Central Mudminnow	<i>Umbra limi</i>				S5	Uncommon	Throughout
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Northern Pike	<i>Esox Lucius</i>				S5	Uncommon	Throughout
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed	<i>Lepomis gibbosus</i>				S5	Common	Throughout
Rainbow Darter	<i>Etheostoma caeruleum</i>				S4	Uncommon	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Downstream of Fullarton Pond		UTM x: 482913		UTM y: 4802387		6/3/2015	
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Blacknose Shiner	<i>Notropis heterolepis</i>				S5	Rare	Localized
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Common Shiner	<i>Luxilus cornutus</i>				S5	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Fathead Minnow	<i>Pimpephales promelas</i>				S5	Common	Throughout
Golden Shiner	<i>Notemigonus crysoleucas</i>				S5	Uncommon	Widespread
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Hornyhead Chub	<i>Nocomis biguttatus</i>				S4	Common	Throughout
Iowa Darter	<i>Etheostoma exile</i>				S5	Uncommon	Widespread
Mottled Sculpin	<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Rainbow Darter	<i>Etheostoma caeruleum</i>				S4	Uncommon	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
Rosyface Shiner	<i>Notropis rubellus</i>				S4	Common	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Downstream of Fullarton Pond		UTM x: 482913		UTM y: 4802387		10/5/2015	
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Blacknose Shiner	<i>Notropis heterolepis</i>				S5	Rare	Localized
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Fantail Darter	<i>Etheostoma flabellare</i>				S4	Abundant	Throughout
Fathead Minnow	<i>Pimpephales promelas</i>				S5	Common	Throughout
Golden Shiner	<i>Notemigonus crysoleucas</i>				S5	Uncommon	Widespread
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Hornyhead Chub	<i>Nocomis biguttatus</i>				S4	Common	Throughout
Iowa Darter	<i>Etheostoma exile</i>				S5	Uncommon	Widespread
Largemouth Bass	<i>Micropterus salmoides</i>				S5	Common	Throughout
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed	<i>Lepomis gibbosus</i>				S5	Common	Throughout

Species (Common Name)	Scientific Name	COSEWIC	SARA	ESA 2007	SRANK	Abundance	Distribution
Rainbow Darter	<i>Etheostoma caeruleum</i>				S4	Uncommon	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
Smallmouth Bass	<i>Micropterus dolomieu</i>				S5	Common	Throughout
Striped Shiner	<i>Luxilus chrysocephalus</i>				S4	Common	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Downstream of Fullarton Pond			UTM x: 482913	UTM y: 4802387			10/23/2015
Blacknose Dace	<i>Rhinichthys atratulus</i>				S5	Abundant	Throughout
Brook Stickleback	<i>Culaea inconstans</i>				S5	Abundant	Throughout
Central Stoneroller	<i>Campostoma anomalum</i>				S4	Abundant	Throughout
Creek Chub	<i>Semotilus atromaculatus</i>				S5	Abundant	Throughout
Fathead Minnow	<i>Pimephales promelas</i>				S5	Common	Throughout
Green Sunfish	<i>Lepomis cyanellus</i>				S4	Uncommon	Widespread
Greenside Darter	<i>Etheostoma blennioides</i>				S4	Abundant	Throughout
Iowa Darter	<i>Etheostoma exile</i>				S5	Uncommon	Widespread
Johnny Darter	<i>Etheostoma nigrum</i>				S5	Abundant	Throughout
Mottled Sculpin	<i>Cottus bairdi</i>				S5	Uncommon	Localized
Northern Redbelly Dace	<i>Phoxinus eos</i>				S5	Common	Throughout
Northern Sunfish	<i>Lepomis peltastes</i>				S3	Uncommon	Throughout
Pumpkinseed	<i>Lepomis gibbosus</i>				S5	Common	Throughout
Rainbow Darter	<i>Etheostoma caeruleum</i>				S4	Uncommon	Throughout
Rock Bass	<i>Ambloplites rupestris</i>				S5	Abundant	Throughout
Smallmouth Bass	<i>Micropterus dolomieu</i>				S5	Common	Throughout
White Sucker	<i>Catostomus commersoni</i>				S5	Abundant	Throughout
Yellow Bullhead	<i>Ameiurus natalis</i>				S4	Uncommon	Localized

COSEWIC Status: The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses species for their consideration for legal protection and recovery (or management) under the Species at Risk Act (SARA).

Extinct: A wildlife species that no longer exists.

Extirpated: A wildlife species no longer existing in the wild in Canada, but exists elsewhere.

Endangered: A wildlife species facing imminent extirpation or extinction.

Threatened: A wildlife species likely to become endangered if limiting factors are not reversed.

Special Concern: A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Not at Risk: A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

Data Deficient: A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

Reference: www.cosewic.gc.ca (current to November 2011)

SARA Status: The federal at risk designation for species under the Species at Risk Act (SARA)

Reference: www.sararegistry.gc.ca (current to December 2011)

ESA 2007 / SARO Status: Species at Risk in Ontario (SARO) are designated by the Ontario Ministry of Natural Resources (OMNR) in accordance with the provincial Endangered Species Act (ESA) through the Committee on the Status of Species at Risk in Ontario (COSSARO).

Extirpated: A native species that no longer exists in the wild in Ontario but still occurs elsewhere.

Endangered: A native species facing imminent extinction or extirpation in Ontario.

Threatened: A native species that is at risk of becoming endangered in Ontario.

Special Concern: A native species that is sensitive to human activities or natural events which may cause it to become endangered or threatened.

Reference: www.ontario.ca/speciesatrisk (current to January 2012)

Provincial Rank (SRANK): Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are assigned to consider only those factors within the political boundaries of Ontario.

SX Presumed Extirpated: Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH Possibly Extirpated (Historical): Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

S1 Critically Imperiled: Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 Imperiled: Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable: Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure: Common, widespread, and abundant in the nation or state/province.

SNR Unranked: Nation or state/province conservation status not yet assessed.

SU Unrankable: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNA Not Applicable: A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# Range Rank: A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Reference: <http://nhic.mnr.gov.on.ca/MNR/nhic/nhic.cfm> (current to March 2012)

Abundance: Refers to the relative abundance of the species found within the waters of the Upper Thames River watershed based on sampling results. Some species may be underrepresented as they are difficult to capture with commonly used sampling methods.

Abundant: Occurred in >25% of the sampling records

Common: Occurred in 10-25% of the samples

Uncommon: Occurred in <10% of the samples

Distribution: Based on the number of Upper Thames Watershed Report Card subwatersheds in which a species has been recorded.

Throughout: Recorded in >20 subwatersheds

Widespread: Recorded in 10-20 subwatersheds

Localized: Recorded in <10 subwatersheds

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Benthic Resources

Benthic invertebrates are organisms that live on the bottom or in the sediment of a water body. Because they are diverse, generally sedentary, and responsive to environmental alterations, benthic invertebrates are often sampled to study water quality (Jones, N.E. 2011).

To determine water quality, a value from 0 to 10, called a biotic index, is assigned to benthic invertebrate taxa. This value indicates their sensitivity and tolerance to pollution. Lower numbers indicate pollution sensitivity and high numbers indicate tolerance. A weighted average of the biotic index and the number of invertebrates in each taxa in the sample gives a value called a Family Biotic Index (FBI). The water quality ranges for the FBI values can be seen in the following table:

FBI Value	Water Quality
< 4.25	Excellent
4.25 – 5.00	Good
5.00 – 5.75	Fair
5.75 – 6.50	Fairly Poor
6.50 – 7.25	Poor
> 7.25	Very Poor

Sampling was conducted using a traveling kick and sweep method, and samples handled and analyzed using methods consistent with Provincial (OBBN) and Federal (CABIN) protocols. Samples were preserved in the field, randomly subsampled in the lab and identified to the Family taxonomic level. Resulting data was entered into, and analyzed, using an MS Access database.

Fullarton Dam area benthic water quality sampling summary

DATE FBI QUALITY

Neil Drain upstream of Fullarton dam

Perth Road 163A South of Fullarton

Site code:	GL20	UTM X Coordinate:	482738	UTM Y Coordinate:	4802225		
					7/2/1998	5.79	Fairly Poor
					5/19/2015	5.95	Fairly Poor
					9/24/2015	5.80	Fairly Poor
					5/5/2016	6.10	Fairly Poor
					9/21/2016	5.84	Fairly Poor

Neil Drain downstream of Fullarton dam

Site code:	GL23	UTM X Coordinate:	482913	UTM Y Coordinate:	4802387		
					5/19/2015	6.27	Fairly Poor
					9/24/2015	5.84	Fairly Poor
					5/5/2016	6.17	Fairly Poor
					9/21/2016	6.09	Fairly Poor

Biotic indices are values assigned to benthic invertebrate taxa indicating their pollution sensitivity and tolerance on a scale from 0 to 10. Lower numbers indicate pollution sensitivity and high numbers tolerance. The Family Biotic Index (FBI) is the weighted average of the biotic index and number of bugs in each taxa in the sample. The water quality ranges for the FBI values are as follows: < 4.25 = Excellent; 4.25 - 5.00 = Good; 5.00 - 5.75 = Fair; 5.75 - 6.50 = Fairly Poor; 6.50 - 7.25 = Poor; and > 7.25 = Very Poor.

Fullarton Dam area Benthic Sampling Data

Neil Drain

Perth Road 163A South of Fullarton

Site code: GL20

UTM X: 482738

UTM Y: 4802225

Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
Sampled – 7/2/1998	REP: 1			
<i>Ceratopogonidae</i>	Biting Midge	L	6	6
<i>Chironomidae</i>	Midge	L	19	6
<i>Chironomidae</i>	Midge	P	1	6
<i>Elmidae</i>	Riffle Beetle	L	2	5
<i>Lymnaeidae</i>	Pond Snail	A	2	6
<i>Nematoda</i>	Thread Worm	A	6	5
<i>Oligochaeta</i>	Aquatic Worm	A	1	8
<i>Pisidiidae</i>	Fingernail Clam	A	17	6
<i>Tabanidae</i>	Horse Fly	L	7	5
	Stream Health = Fairly Poor		Family Biotic Index =	5.79
Sampled - 5/19/2015	REP: 1			
<i>Acariformes</i>	Water Mite	A	66	6
<i>Asellidae</i>	Sow Bug	A	4	8
<i>Caenidae</i>	Crawling Mayfly	N	1	6
<i>Chironomidae</i>	Midge	P	2	6
<i>Chironomidae</i>	Midge	L	171	6
<i>Corixidae</i>	Water Boatmen	A	10	5
<i>Elmidae</i>	Riffle Beetle	L	21	5
<i>Elmidae</i>	Riffle Beetle	A	3	5
<i>Ephydriidae</i>	Shore Fly	L	1	7
<i>Hyalellidae</i>	Sideswimmer	A	2	8
<i>Lepidostomatidae</i>	Lepistomatid Caddisfly	L	4	1
<i>Nematoda</i>	Thread Worm	A	3	5
<i>Oligochaeta</i>	Aquatic Worm	A	15	8
<i>Perlodidae</i>	Stonefly	N	1	2
<i>Physidae</i>	Pouch Snail	A	1	8
<i>Pisidiidae</i>	Fingernail Clam	A	5	6
<i>Tabanidae</i>	Horse Fly	L	2	5
<i>Valvatidae</i>	Round-mouthed Snail	A	1	8
<i>Veliidae</i>	Ripple Bug	A	1	-1
	Stream Health = Fairly Poor		Family Biotic Index =	5.95
Sampled - 9/24/2015	REP: 1			
<i>Acariformes</i>	Water Mite	A	73	6
<i>Asellidae</i>	Sow Bug	A	6	8
<i>Chironomidae</i>	Midge	L	17	6
<i>Corixidae</i>	Water Boatmen	A	118	5
<i>Elmidae</i>	Riffle Beetle	L	20	5
<i>Elmidae</i>	Riffle Beetle	A	1	5
<i>Gammaridae</i>	Sideswimmer	A	1	6
<i>Hydropsychidae</i>	Net-spinning Caddisfly	L	3	5
<i>Lymnaeidae</i>	Pond Snail	A	4	6
<i>Nematoda</i>	Thread Worm	A	1	5
<i>Oligochaeta</i>	Aquatic Worm	A	34	8
<i>Philopotamidae</i>	Finger-net Caddisfly	L	1	4
<i>Pisidiidae</i>	Fingernail Clam	A	10	6
<i>Planorbidae</i>	Orb Snail	A	5	6
<i>Tabanidae</i>	Horse Fly	A	13	5
<i>Valvatidae</i>	Round-mouthed Snail	A	7	8
	Stream Health = Fairly Poor		Family Biotic Index =	5.80

Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
Sampled 5/5/2016	Rep : 1			
Acariformes	Water Mite	A	28	6
Asellidae	Sow Bug	A	2	8
Baetidae	Small Mayfly	N	1	6
Ceratopogonidae	Biting Midge	L	1	6
Chironomidae	Midge	P	5	6
Chironomidae	Midge	L	194	6
Corixidae	Water Boatman	A	6	5
Elmidae	Riffle Beetle	L	9	5
Lepidostomatidae	Lepistomatid Caddisfly	L	3	1
Limnephilidae	Northern Caddisfly	L	2	4
Lymnaeidae	Pond Snail	A	1	6
Nematoda	Thread Worm	A	4	5
Oligochaeta	Aquatic Worm	A	31	8
Perlodidae	Stonefly	N	1	2
Pisidiidae	Fingernail Clam	A	4	6
Planorbidae	Orb Snail	A	2	6
Tabanidae	Horse Fly	A	2	5
Valvatidae	Round-mouthed Snail	A	4	8
	Stream Health = Fairly Poor		Family Biotic Index = 6.10	
Sampled 9/21/2016	Rep : 1			
Acariformes	Water Mite	A	18	6
Aeshnidae	Dragonfly	N	1	5
Asellidae	Sow Bug	A	8	8
Ceratopogonidae	Biting Midge	L	1	6
Chironomidae	Midge	P	1	6
Chironomidae	Midge	L	20	6
Corixidae	Water Boatman	A	75	5
Elmidae	Riffle Beetle	L	28	5
Elmidae	Riffle Beetle	A	6	5
Haliplidae	Crawling Water Beetle	A	1	5
Hyalellidae	Sideswimmer	A	1	8
Leptoceridae	Long-horned Caddisfly	L	1	4
Limnephilidae	Northern Caddisfly	L	1	4
Lymnaeidae	Pond Snail	A	26	6
Oligochaeta	Aquatic Worm	A	6	8
Pisidiidae	Fingernail Clam	A	9	6
Planorbidae	Orb Snail	A	74	6
Valvatidae	Round-mouthed Snail	A	12	8
	Stream Health = Fairly Poor		Family Biotic Index = 5.84	

Neil Drain**Below Fullarton Pond**

Site code: GL23

UTM X: 482913

UTM Y: 4802387

Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
Sampled – 5/19/2015	REP: 1			
<i>Asellidae</i>	Sow Bug	A	71	8
<i>Ceratopogonidae</i>	Biting Midge	L	9	6
<i>Chironomidae</i>	Midge	L	160	6
<i>Chironomidae</i>	Midge	P	4	6
<i>Elmidae</i>	Riffle Beetle	A	9	5
<i>Elmidae</i>	Riffle Beetle	L	89	5
<i>Empididae</i>	Dance Fly	L	4	6
<i>Empididae</i>	Dance Fly	P	2	6
<i>Helicopsychidae</i>	Snail-case Caddisfly	L	1	3
<i>Hydropsychidae</i>	Net-spinning Caddisfly	L	3	5
<i>Leptoceridae</i>	Long-horned Caddisfly	L	2	4
<i>Nematoda</i>	Thread Worm	A	10	5
<i>Oligochaeta</i>	Aquatic Worm	A	55	8
<i>Perlodidae</i>	Stonefly	N	1	2
<i>Pisidiidae</i>	Fingernail Clam	A	12	6
<i>Simuliidae</i>	Black Fly	L	8	5
<i>Tipulidae</i>	Crane Fly	L	1	4
<i>Turbellaria</i>	Flatworm	A	5	6
	Stream Health = Fairly Poor		Family Biotic Index = 6.27	
Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
Sampled – 9/24/2015	REP: 1			
<i>Acariformes</i>	Water Mite	A	2	6
<i>Asellidae</i>	Sow Bug	A	21	8
<i>Caenidae</i>	Crawling Mayfly	N	3	6
<i>Calopterygidae</i>	Broad-winged Damselfly	N	6	6
<i>Ceratopogonidae</i>	Biting Midge	L	5	6
<i>Chironomidae</i>	Midge	P	4	6
<i>Chironomidae</i>	Midge	L	69	6
<i>Coenagrionidae</i>	Narrow-winged Damselfly	N	6	8
<i>Elmidae</i>	Riffle Beetle	A	2	5
<i>Elmidae</i>	Riffle Beetle	L	30	5
<i>Empididae</i>	Dance Fly	L	7	6
<i>Erpobdellidae</i>	Leech	A	1	8
<i>Helicopsychidae</i>	Snail-case Caddisfly	L	7	3
<i>Hyaellidae</i>	Sideswimmer	A	8	8
<i>Hydropsychidae</i>	Net-spinning Caddisfly	L	71	5
<i>Leptoceridae</i>	Long-horned Caddisfly	L	5	4
<i>Oligochaeta</i>	Aquatic Worm	A	23	8
<i>Philopotamidae</i>	Finger-net Caddisfly	L	16	4

Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
<i>Pisidiidae</i>	Fingernail Clam	A	1	6
<i>Planorbidae</i>	Orb Snail	A	1	6
<i>Scirtidae</i>	Marsh Beetle	L	1	5
<i>Simuliidae</i>	Black Fly	L	1	5
<i>Turbellaria</i>	Flatworm	A	17	6
	Stream Health = Fairly Poor		Family Biotic Index = 5.84	
Sampled – 5/5/2016	REP: 1			
Acariformes	Water Mite	A	4	6
Asellidae	Sow Bug	A	3	8
Ceratopogonidae	Biting Midge	L	1	6
Chironomidae	Midge	L	149	6
Chironomidae	Midge	P	9	6
Elmidae	Riffle Beetle	A	7	5
Elmidae	Riffle Beetle	L	39	5
Empididae	Dance Fly	L	4	6
Helicopsychidae	Snail-case Caddisfly	L	6	3
Hydropsychidae	Net-spinning Caddisfly	L	6	5
Leptoceridae	Long-horned Caddisfly	L	3	4
Nematoda	Thread Worm	A	2	5
Oligochaeta	Aquatic Worm	A	63	8
<i>Pisidiidae</i>	Fingernail Clam	A	6	6
<i>Planorbidae</i>	Orb Snail	A	2	6
Tipulidae	Crane Fly	L	1	4
	Stream Health = Fairly Poor		Family Biotic Index = 6.17	
Sampled – 9/21/2016				
Acariformes	Water Mite	A	4	6
Asellidae	Sow Bug	A	3	8
Brachycentridae	Brachycentrid Caddisfly	L	1	2
Caenidae	Crawling Mayfly	N	15	6
Calopterygidae	Broad-winged Damselfly	N	2	6
Chironomidae	Midge	P	1	6
Chironomidae	Midge	L	31	6
Dryopidae	Long-toed Water Beetle	L	1	5
Dytiscidae	Predacious Diving Beetle	L	1	5
Elmidae	Riffle Beetle	L	103	5
Elmidae	Riffle Beetle	A	5	5
Helicopsychidae	Snail-case Caddisfly	L	1	3
Hyaellidae	Sideswimmer	A	7	8
Hydropsychidae	Net-spinning Caddisfly	L	14	5
Leptoceridae	Long-horned Caddisfly	L	1	4
Oligochaeta	Aquatic Worm	A	63	8
<i>Pisidiidae</i>	Fingernail Clam	A	38	6
<i>Planorbidae</i>	Orb Snail	A	2	6

Taxonomic Name	Common Name	Life Stage	# in Subsample	Biotic Index
Simuliidae	Black Fly	L	1	5
Turbellaria	Flatworm	A	3	6
Valvatidae	Round-mouthed Snail	A	1	8
Stream Health = Fairly Poor			Family Biotic Index = 6.09	

Benthic Samples were obtained using a Rapid Bioassessment Protocol developed by the United States Environmental Protection Agency and modified by Dr. Robert Bailey of the University of Western Ontario Zoology Department. A representative section of stream is selected, incorporating a riffle if present and sampled by moving upstream along a diagonal transect, dislodging and capturing invertebrates with a .5 mm mesh "D"- frame net. Samples are preserved in the field and analyzed in the lab to randomly select a 100 bug subsample which is identified to the Family taxonomic level.

The biotic index is a value assigned to benthic invertebrate taxa indicating their pollution sensitivity and tolerance on a scale from 0 to 10. Lower numbers indicate pollution sensitivity and high numbers tolerance. A value of -1 indicates that no biotic index value has been assigned to these taxa.

The Family Biotic Index is the weighted average of the biotic index and number of bugs in each taxa in the sample. The water quality ranges for the FBI values are as follows: < 4.25 = Excellent; 4.25 - 5.00 = Good; 5.00 - 5.75 = Fair; 5.75 - 6.50 = Fairly Poor; 6.50 - 7.25 = Poor; and > 7.25 = Very Poor.

Report prepared - Tuesday, January 10, 2017