

**Cataraqui Source Protection Area
Assessment Report - Appendix 'C-2'
(June 2011)**

Table 1. Summary of longterm status, annual sample numbers and exceedences per CRCA waterbody as determined by Lake Partner Program records for Total phosphorus 1996 through 2001 (where Oligotrophic indicates Total Phosphorus concentration of <0.01 mg/L (IPWQO) or 0.004 - <0.01 mg/L (CWQG), Mesotrophic indicates Total Phosphorus concentration of 0.01 - <0.02 mg/L (IPWQO, CWQG), Meso-eutrophic indicates Total Phosphorus concentration of 0.02 - <0.035 mg/L (CWQG), and Eutrophic indicates a Total Phosphorus concentration of greater than or equal to 0.02 mg/L (IPWQO) or 0.035 - <0.1 mg/L).

Lake Name (Watershed)	Lake#	Lat	Long	Longterm Trophic Status		Number of Records						Total #	Number of Exceedences						Total #
				IPWQO	CWQG	2002	2003	2004	2005	2006	2007	Records	2002	2003	2004	2005	2006	2007	Records
GOULD LAKE (Millhaven Creek)	6343	442822	763448	Oligotrophic	Oligotrophic	0	0	0	2	0	0	2	0	0	0	0	0	0	0
						0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
NORTH OTTER LAKE (Great Cataraqui River)	7101	443034	763343	Mesotrophic	Mesotrophic	3	1	0	0	1	0	5	0	0	0	0	0	0	0
						60%	20%	0%	0%	20%	0%	100%	0%	0%	0%	0%	0%	0%	0%
CANOE LAKE (Great Cataraqui River)	729	443451	763310	Oligotrophic	Oligotrophic	0	0	0	1	0	0	1	0	0	0	0	0	0	0
						0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
KNOWLTON LAKE (Great Cataraqui River)	6436	442711	763649	Oligotrophic	Oligotrophic	5	1	1	3	1	1	12	0	0	0	0	0	0	0
						42%	8%	8%	25%	8%	8%	100%	0%	0%	0%	0%	0%	0%	0%
DESERT LAKE (Great Cataraqui River)	6266	443259	763459	Oligotrophic	Oligotrophic	13	12	2	6	2	2	37	1	0	0	0	1	0	2
						35%	32%	5%	16%	5%	5%	100%	8%	0%	0%	0%	50%	0%	5%
DEVIL LAKE (Great Cataraqui River)	1170	443529	762759	Oligotrophic	Oligotrophic	7	2	4	6	21	21	61	0	0	0	0	0	0	0
						11%	3%	7%	10%	34%	34%	100%	0%	0%	0%	0%	0%	0%	0%
BUCK LAKE (Great Cataraqui River)	6186	443240	762605	Mesotrophic	Mesotrophic	12	7	6	8	1	2	34	1	0	0	0	0	0	1
						35%	21%	18%	24%	3%	6%	100%	8%	0%	0%	0%	0%	0%	3%
GARTER LAKE (Great Cataraqui River)	6332	443640	763250	Eutrophic	Eutrophic	0	0	1	0	0	0	1	0	0	1	0	0	0	1
						0%	0%	100%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	100%
BENSON LAKE (Great Cataraqui River)	7252	443523	762112	Mesotrophic	Mesotrophic	0	5	5	4	3	6	23	0	0	0	0	0	4	4
						0%	22%	22%	17%	13%	26%	100%	0%	0%	0%	0%	0%	67%	17%
NEWBORO LAKE (Great Cataraqui River)	3458	443702	761827	Mesotrophic	Mesotrophic	3	4	2	1	1	1	12	1	2	0	0	0	0	3
						25%	33%	17%	8%	8%	8%	100%	33%	50%	0%	0%	0%	0%	25%
INDIAN LAKE (Great Cataraqui River)	6393	443537	761945	Mesotrophic	Mesotrophic	6	6	6	6	6	6	36	1	0	0	0	0	0	1
						17%	17%	17%	17%	17%	17%	100%	17%	0%	0%	0%	0%	0%	3%
LOUGHBOROUGH LAKE (Great Cataraqui River)	6512	442520	762816	Mesotrophic	Mesotrophic	17	14	7	7	8	11	64	2	1	2	0	0	1	6
						27%	22%	11%	11%	13%	17%	100%	12%	7%	29%	0%	0%	9%	9%
OPINICON LAKE (Great Cataraqui River)	4169	443318	761941	Mesotrophic	Mesotrophic	6	3	12	10	12	14	57	3	0	1	0	0	4	8
						11%	5%	21%	18%	21%	25%	100%	50%	0%	8%	0%	0%	29%	14%
SAND LAKE (Great Cataraqui River)	7011	443403	761541	Mesotrophic	Mesotrophic	6	6	6	6	6	6	36	0	0	0	1	0	0	1
						17%	17%	17%	17%	17%	17%	100%	0%	0%	0%	17%	0%	0%	3%
TROY LAKE (Great Cataraqui River)	7025	443116	761552	Eutrophic	Meso-eutrophic	7	3	5	5	4	6	30	6	0	3	4	2	5	20
						23%	10%	17%	17%	13%	20%	100%	86%	0%	60%	80%	50%	83%	67%
WHITEFISH LAKE (Great Cataraqui River)	6632	443134	761324	Mesotrophic	Mesotrophic	0	0	9	15	18	18	60	0	0	2	2	1	1	6
						0%	0%	15%	25%	30%	30%	100%	0%	0%	22%	13%	6%	6%	10%
DOG LAKE (Great Cataraqui River)	1217	442339	762153	Eutrophic	Meso-eutrophic	2	8	18	17	15	11	71	1	8	16	16	14	11	55
						3%	11%	25%	24%	21%	15%	100%	50%	100%	89%	94%	93%	100%	77%
UPPER BEVERLEY LAKE (Gananoque River)	7027	443642	760655	Mesotrophic	Mesotrophic	3	4	3	5	10	5	30	1	3	1	2	2	1	10
						10%	13%	10%	17%	33%	17%	100%	33%	75%	33%	40%	20%	20%	33%

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Table 2-1. Groundwater Quality at PGMN Well W200, W222 and W278 from 2003 to 2008 for select parameters.

	indicates guideline exceedance
	indicates exceedance for sodium restricted diets (20 mg/L)

Parameter	Guideline			Units	Well ID and Test Dates														
					W 200					W 222					W 278				
					13-Aug-03	3-Nov-04	19-Oct-06	11-Oct-07	28-Oct-08	26-Sep-03	16-Nov-04	26-Oct-06	12-Oct-07	31-Oct-08	14-Aug-03	4-Nov-04	13-Oct-06	11-Oct-07	27-Oct-08
Alkalinity	ODWS	OG	30-500	mg/L	267.00	264.50	296.00	240.00	278.00	189.00	188.50	192.00	172.00	192.00	289.00	284.50	272.00	276.00	289.00
Ammonia				mg/L	0.05	0.03	<0.05	<0.05		0.05	0.03	0.07	0.14		0.05	0.04	<0.05	0.05	
Bicarbonate	1				325.74	322.69	296.00	240.00		230.58	229.97	192.00	172.00		352.58	347.09	272.00	276.00	
Calcium				mg/L	65.60	60.65		63.40	72.00	48.60	51.20	52.90	51.70	50.40	66.20	66.10		65.40	65.00
Carbonate							<3	<3				<3	<3				<3	<3	
Chloride	ODWS	AO	250	mg/L	18.70	9.10	8.00	11.00	9.20	0.90	1.70	1.00	1.00	1.00	1.40	1.25	1.00	2.00	1.20
Conductivity			800	uS/cm	590.00	528.50		468.00	534.00	409.00	374.50		413.00	407.00	556.00	515.00		539.00	528.00
Dissolved Inorganic Carbon				mg/L	63.20	60.45		11.80	69.60	41.50	42.70		6.30	47.00	67.70	58.70		0.90	73.30
Dissolved Organic Carbon	ODWS	AO	5	mg/L	2.30	1.25		3.40	2.80	0.40	0.70		10.10	0.60	1.40	1.00		4.70	1.10
Hardness	ODWS	OG	80-100	mg/L	267.00	237.35	300.00	252.00	279.00	183.00	193.15	197.00	196.00	192.00	285.00	282.15	294.00	283.00	281.00
Langeliers Index				-	0.80	0.45				0.64	0.70				0.89	0.60			
Iron	ODWS	AO	0.3	mg/L	0.00	0.03	<0.005	0.01	0.01	0.15	0.11	0.10	0.10	0.09	0.45	0.07	<0.005	0.50	0.60
Magnesium				mg/L	25.10	20.80		22.70	24.20	15.00	15.85	15.80	16.20	16.10	29.00	28.40		29.00	28.80
Manganese	ODWS	AO	50	ug/L	0.00	5.00	2.00	1.00	4.15	44.50	42.00	43.00	45.00	48.00	85.90	51.00	67.00	74.00	80.90
Nitrate	ODWS	MAC	10	mg/L	2.91	1.50	0.50	1.50		0.05	0.40	<0.1	<0.1		0.05	0.40	<0.1	<0.1	
N-nitrite	ODWS	MAC	1	mg/L	0.01	0.20	<0.1	<0.1	<0.001	0.01	0.20	<0.1	<0.1	0.01	0.01	0.20	<0.1	<0.1	0.01
Organic-N	ODWS	0.15	OG	mg/L	0.20	0.18			0.01	0.04	0.04			0.00	0.06	0.08			
pH	ODWS	OG	6.5-8.5	-	7.97	7.69		7.14	8.01	8.06	8.15		7.29	8.20	8.01	7.77		6.96	8.04
Phosphate				mg/L	0.02	<0.05			<0.02	0.02	<0.05			0.02	0.02	<0.05			<0.02
Potassium				mg/L	7.35	5.95	7.30	5.80	5.94	1.10	1.00	1.10	1.10		4.85	3.70	4.00	4.10	4.02
Reactive Silicate		AO	0.05	mg/L	2.54					5.58					2.86				
Sodium	ODWS	AO (a)	20, 200	mg/L	13.40	7.60	8.00	6.30	7.58	9.00	8.80	8.80	8.30	8.78	1.40	1.05	1.10	1.10	1.12
Sulphate	ODWS	AO	500	mg/L	18.40	11.35	8.00	10.00	9.90	29.10	24.70	24.00	26.00	30.50	21.50	18.20	18.00	18.00	23.60
Total Dissolved Solids	ODWS	AO	500	mg/L	384.00	274.50		281.00	347.00	266.00	216.00		208.00	258.00	361.00	289.50		286.00	
Total Kjeldahl Nitrogen				mg/L	0.25	0.21		0.20	<0.24	0.09	0.07		<0.1		0.11	0.12		0.20	

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Table 2-2. Groundwater Quality at PGMN Well W279, W334 and W365 from 2003 to 2008 for select parameters.

	indicates guideline exceedance
	indicates exceedance for sodium restricted diets (20 mg/L)

Parameter	Guideline			Units	Well ID and Test Dates													
					W 279					W 334					W 365			
					15-Apr-03	3-Nov-04	19-Oct-06	11-Oct-07	28-Oct-08	29-Sep-03	4-Nov-04	12-Oct-06	11-Oct-07	27-Oct-08	25-Sep-03	9-Nov-04	10-Oct-06	9-Oct-07
Alkalinity	ODWS	OG	30-500	mg/L	283.00	1.00	252.00	256.00	274.00	210.00	234.00	248.00	248.00	241.00	377.00	385.50	368.00	352.00
Ammonia				mg/L	0.05	0.04	0.08	0.09		0.05	0.03	<0.05	<0.05		0.35	0.35	0.37	0.33
Bicarbonate	1				345.26	1.22	252.00	256.00		256.20	285.48	248.00	248.00		459.94	470.31	368.00	352.00
Calcium				mg/L	108.00	99.45		93.40	86.30	53.40	60.60		63.80	57.00	97.20	124.00	121.00	118.00
Carbonate							<3	<3				<3	<3				<3	<3
Chloride	ODWS	AO	250	mg/L	65.10	65.10	49.00	50.00	44.40	3.90	3.20	3.00	2.00	1.10	290.00	306.00	264.00	285.00
Conductivity			800	uS/cm	948.00	914.50		861.00	817.00	409.00	461.00		473.00	441.00	1750.00	1570.50		1520.00
Dissolved Inorganic Carbon				mg/L	63.90	59.50		4.30	68.60	49.10	52.80		<5	59.80	72.20	83.20		1.80
Dissolved Organic Carbon	ODWS	AO	5	mg/L	1.30	0.60		4.80	1.30	0.20	0.85		0.60	0.60	0.60	0.85		2.50
Hardness	ODWS	OG	80-100	mg/L	443.00	397.40	400.00	376.00	359.00	216.00	234.85	257.00	247.00	224.00	568.00	625.70	612.00	590.00
Langeliers Index				-	1.10	0.70				0.90	0.85				0.89	0.60		
Iron	ODWS	AO	0.3	mg/L	1.98	1.65	1.17	1.13	1.15	0.00	0.03	0.11	0.01	0.01	0.91	0.38	0.57	0.40
Magnesium				mg/L	41.80	36.20		34.60	34.90	20.10	20.25		21.20	19.60	78.90	76.40	75.20	71.40
Manganese	ODWS	AO	50	ug/L	60.30	56.00	47.00	45.00	46.20	0.36	5.00	<1	<1	<1	28.50	9.00	2.40	8.00
Nitrate	ODWS	MAC	10	mg/L	0.05	0.40	<0.1	<0.1		2.36	2.20	0.90	0.80		0.05	0.40	<0.1	<0.1
N-nitrite	ODWS	MAC	1	mg/L	0.01	0.20	<0.1	<0.1	<0.005	0.01	0.20	<0.1	<0.1	<0.005	0.01	0.20	<0.1	<0.1
Organic-N	ODWS	0.15	OG	mg/L	0.10	0.10				0.14	0.05				0.12	0.01		
pH	ODWS	OG	6.5-8.5	-	8.11	7.72		7.04	8.03	8.23	8.14		6.95	8.09	7.86	7.42		6.84
Phosphate				mg/L	0.02	<0.05			<0.02	0.02	<0.05			<0.02	0.02	<0.05		
Potassium				mg/L	4.05	3.50	3.70	3.70	3.46	1.50	1.30	1.50	1.40	1.46	8.95	8.65	8.30	8.50
Reactive Silicate		AO	0.05	mg/L	5.06				5.18	9.02					8.06			
Sodium	ODWS	AO (a)	20, 200	mg/L	36.20	33.70	36.80	34.00	31.80	5.00	4.75	5.00	4.70	4.62	95.40	89.30	92.50	96.00
Sulphate	ODWS	AO	500	mg/L	157.00	143.00	120.00	132.00	124.00	11.90	10.30	9.00	8.00	11.60	73.90	58.30	61.00	59.00
Total Dissolved Solids	ODWS	AO	500	mg/L	667.00	540.00		517.00	555.00	285.00	240.50		253.00	287.00	1220.00	894.50		914.00
Total Kjeldahl Nitrogen				mg/L	0.15	0.14		0.70	<0.09	0.19	0.08		0.10	<0.05	0.47	0.36		0.20

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Table 2-3. Groundwater Quality at PGMN Well W383 from 2003 to 2008 for select parameters.

	indicates guideline exceedance
	indicates exceedance for sodium restricted diets (20 mg/L)

Parameter	Guideline			Units	Well ID and Test Dates			
					W 383			
					7-Oct-03	8-Nov-04	10-Oct-06	9-Oct-07
Alkalinity	ODWS	OG	30-500	mg/L	205.00	219.50	280.00	196.00
Ammonia				mg/L	0.12	0.08	0.05	0.05
Bicarbonate	1				250.10	267.79	280.00	196.00
Calcium				mg/L	39.00	39.20	37.50	37.90
Carbonate							<3	<3
Chloride	ODWS	AO	250	mg/L	11.30	10.75	11.00	11.00
Conductivity			800	uS/cm	400.00	395.50		389.00
Dissolved Inorganic Carbon				mg/L	50.50	47.40		4.70
Dissolved Organic Carbon	ODWS	AO	5	mg/L	0.50	0.55		1.80
Hardness	ODWS	OG	80-100	mg/L	214.00	202.65	201.00	203.00
Langeliers Index				-	0.93	0.50		
Iron	ODWS	AO	0.3	mg/L	0.11	0.08	0.03	0.26
Magnesium				mg/L	28.40	25.40	26.10	26.20
Manganese	ODWS	AO	50	ug/L	6.74	7.00	3.00	5.00
Nitrate	ODWS	MAC	10	mg/L	0.05	0.40	<0.1	<0.1
N-nitrite	ODWS	MAC	1	mg/L	0.01	0.20	<0.1	<0.1
Organic-N	ODWS	0.15	OG	mg/L	0.07	0.05		
pH	ODWS	OG	6.5-8.5	-	8.41	7.98		7.21
Phosphate				mg/L	0.02	<0.05		
Potassium				mg/L	3.05	2.65	2.70	2.80
Reactive Silicate		AO	0.05	mg/L	18.50			
Sodium	ODWS	AO (a)	20, 200	mg/L	8.20	7.40	7.70	8.10
Sulphate	ODWS	AO	500	mg/L	8.00	7.80	6.00	6.00
Total Dissolved Solids	ODWS	AO	500	mg/L	260.00	225.00		233.00
Total Kjeldahl Nitrogen				mg/L	0.19	0.13		0.10

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Table 3. Area and per cent natural vegetative cover by watershed in the CSPA.

Watershed	Area (km ²)	Wetlands (km ²)	Per cent Wetlands	Riparian Corridors (km ²)	Per cent Riparian Corridors
Bay of Quinte	420.4	16.6	3.9	34.8	8.3
Millhaven Creek	178.4	15.8	8.8	14.2	7.9
Collins Creek	169.1	11.3	6.7	10.3	6.1
Amherst Island	66.4	6.7	10.1	5.1	7.6
Little Cataraqui Creek	64.0	4.3	6.6	4.0	6.2
Buells and Butler Creeks	53.3	10.8	20.2	3.7	7.0
Great Cataraqui	945.9	76.2	8.1	97.5	10.3
Frontenac Islands	169.9	9.5	5.6	13.2	7.8
Gananoque River	929.3	115.0	12.4	99.1	10.7
Lyn and Jones Creek	213.7	18.2	8.5	23.2	10.8
St. Lawrence River Drainage	278.2	14.3	5.1	32.9	11.8
Lake Ontario Drainage	71.7	2.3	3.2	3.5	4.9
Total	3560.5	300.9	8.5	341.4	9.6

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Table 4. Aquatic Benthic Macroinvertebrate Overall Aggregate Assessment Summary

Watershed	Stream Name	Location Description	PWQMN Stn	Easting	Northing	Hillsenhoff Biological Index Value								Average	Category
						Aug-2003	May-2004	Aug-2004	Oct-2004	May-2007	Oct-2007	May-2008	Oct-2008		
Bay of Quinte	Platts Creek	Highway 25	-	340724	4886524	-	-	-	-	7.09	-	-	-	7.09	Poor
Bay of Quinte	Little Creek	County Road 9	-	345766	4895997	-	-	-	-	-	-	5.64	6.7	6.17	Fairly Poor
Bay of Quinte	Loyst Creek	Highway 8	-	341188	4884417	-	-	-	-	6.36	6.84	-	-	6.6	Poor
Bay of Quinte	Wilton (Thorpe) Creek	Simmons Road	-	359247	4907207	-	-	-	-	5.89	6.83	-	-	6.36	Fairly Poor
Bay of Quinte	Wilton Creek		-	365359	4915251	-	-	-	-	-	-	-	-	-	-
Bay of Quinte	Wilton Creek	County Rd 2, Morven	17003700302	352343	4900108	-	6.3	-	5.96	-	-	-	-	6.13	Fairly Poor
Bay of Quinte	Spring Creek	County Road 2	-	350135	4900522	-	-	-	-	-	-	-	-	-	-
Millhaven Creek	Millhaven Creek	Gould Lake	-	374284	4924737	-	6.26	-	-	-	-	-	-	6.26	Fairly Poor
Millhaven Creek	Millhaven Creek	Syd below dam	-	372957	4918997	7.13	6.74	6.74	-	-	-	-	-	6.87	Poor
Millhaven Creek	Millhaven Creek	Church Street (Sydenham)	-	372538	4918395	-	6.86	-	-	-	-	-	-	6.86	Poor
Millhaven Creek	Millhaven Creek	Highway 5 (Sydenham)	-	372483	4918328	6.96	7.03	-	-	-	-	-	-	7.00	Poor
Millhaven Creek	Millhaven Creek	County Rd 6, upstrm Odessa	06018000502	363023	4904979	-	6.54	-	6.61	-	-	-	-	6.58	Poor
Millhaven Creek	Millhaven Creek	Rock outcrop	-	362727	4904442	6.13	5.82	-	-	-	-	-	-	5.98	Fairly Poor
Millhaven Creek	Millhaven Creek	Highway 2	-	362579	4904093	-	6.13	-	-	-	-	-	-	6.13	Fairly Poor
Millhaven Creek	Millhaven Creek	Babcock	-	362837	4903553	6.88	6.08	5.88	-	-	-	-	-	6.28	Fairly Poor
Millhaven Creek	Millhaven Creek	Lucas Rd, dwnstrm Odessa	06018000402	362147	4902366	6.38	5.04	-	5.65	-	-	-	-	5.69	Fair
Millhaven Creek	Millhaven Creek	Wing Road	-	361247	4900202	5.85	6.72	-	-	-	-	-	-	6.29	Fairly Poor
Millhaven Creek	Millhaven Creek	Hoggles br	-	359991	4898925	5.87	5.26	-	-	-	-	-	-	5.57	Fair
Millhaven Creek	Millhaven Creek	County Rd 4	-	359517	4898495	6.69	7.14	-	-	-	-	-	-	6.92	Poor
Millhaven Creek	Millhaven Creek	Ham Road	-	357791	4897195	-	6.78	5.96	-	-	-	-	-	6.37	Fairly Poor
Millhaven Creek	Millhaven Creek	Doyle Road	-	359012	4896753	5.65	5.79	-	-	-	-	-	-	5.72	Fair
Millhaven Creek	Millhaven Creek	County Road 4, behind works garage	-	360483	4895883	-	-	-	-	6.7	6.18	-	-	6.44	Fairly Poor
Millhaven Creek	Millhaven Creek	Lucas Rd, dwnstrm Odessa	-	362136	4902401	-	-	-	-	-	-	-	-	-	-
Collins Creek	Collins Creek	Woodbine Rd, N of Collins Bay	06018300202	371261	4901619	-	7.65	-	7.75	-	-	-	-	7.70	Very Poor
Collins Creek	Collins Creek	Taylor Kidd Boulevard	-	370964	4900938	-	-	-	-	6.99	6.84	--	--	6.92	Poor
Collins Creek	Collins Creek	North side of Princess Street at Collins PSW	-	371425	4902478	-	-	-	-	-	-	2.57	7.05	4.81	Good
Collins Creek	Glenvale Creek	County Road 2 at Westbrook road	-	370328	4902612	-	-	-	-	-	-	-	-	-	-
Little Cataraqui Creek	Little Cataraqui Creek (East branch)	North of Binnington Court	-	377863	4903341	-	-	-	-	-	-	-	-	-	-
Little Cataraqui Creek	Little Cataraqui Creek (West branch)	Days Road	-	374534	4898861	-	-	-	-	7.53	7.74	-	-	7.64	Very Poor
Little Cataraqui Creek	Little Cataraqui Creek	Culvert at Perth Rd, 2.5km N of Hwy 401	12000200502	380211	4905321	-	6.61	-	6.58	-	-	-	-	6.60	Poor
Little Cataraqui Creek	Little Cataraqui Creek	CA reservoir outlet dam	12000200802	378397	4903850	-	6.66	-	6.42	-	-	-	-	6.54	Poor
Little Cataraqui Creek	Little Cataraqui Creek	Princess St, SE of Cataraqui	12000200402	377474	4901014	-	6.53	-	6.1	-	-	-	-	6.32	Fairly Poor
Little Cataraqui Creek	Little Cataraqui Creek	Days Road	-	374528	4898858	-	-	-	-	-	-	-	-	-	-
Amherst Island	Amherst Creek	Third Concession Road	-	362881	4888047	-	-	-	-	7.34	-	-	-	7.34	Very Poor
Cataraqui River	Cataraqui River	Dam at Kingston Mills Rd, Kingston Mills	12000400202	385037	4905513	-	6.29	-	6.13	-	-	-	-	6.21	Fairly Poor
Cataraqui River	Paddy's Creek	Devil Lake Road	-	378181	4937737	-	-	-	-	5.88	6.14	-	-	6.01	Fairly Poor
Cataraqui River	Bear Creek	Washburn Road	-	387331	4914244	-	-	-	-	6.4	-	-	-	6.40	Fairly Poor
Cataraqui River	North Shore Creek	North Shore Road	-	385272	4922193	-	-	-	-	-	-	7.73	7.09	7.41	Very Poor
Gananoque River	Gananoque River	County Rd 32, 3km N of Hwy 401, Maple Grove	12001700402	405215	4912887	-	6.72	-	6.75	-	-	-	-	6.74	Poor
Gananoque River	Gananoque River	Trestle, Canadian Steel, Gananoque	12001700102	406964	4909021	-	6.19	-	6.22	-	-	-	-	6.21	Fairly Poor
Gananoque River	Cooligan Creek	Harlem Road	-	410826	4947408	-	-	-	-	6.63	6.26	-	-	6.45	Fairly Poor
Gananoque River	Sucker Creek	Airport Road	-	402047	4918232	-	-	-	-	6.61	6.43	-	-	6.52	Poor

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Table 4. Aquatic Benthic Macroinvertebrate Overall Aggregate Assessment Summary (continued).

Watershed	Stream Name	Location Description	PWQMN Stn	Easting	Northing	Hillsenhoff Biological Index Value								Average	Category
						Aug-2003	May-2004	Aug-2004	Oct-2004	May-2007	Oct-2007	May-2008	Oct-2008		
Gananoque River	Sucker Creek	Highway 15	-	400297	4944584	-	-	-	-	-	-	-	-	-	-
Gananoque River	Higley Creek	Router Road	-	416402	4928723	-	-	-	-	-	-	-	-	-	-
Gananoque River	Fosters Creek	Slack Bay Road	-	419893	4936829	-	-	-	-	-	-	5.38	5.59	5.49	Fair
Gananoque River	Wiltse Creek	Charleston Road	-	424 352	4940805	-	-	-	-	-	-	-	-	-	-
Lyn and Jones Creek	Lyn Creek	Hallecks Road	-	437885	4935972	-	-	-	-	-	-	6.45	5.66	6.06	Fairly Poor
Lyn and Jones Creek	Lyn Creek	County Rd 2, 1km W of Sherwood Springs	12003100102	436016	4930513	-	6.06	-	5.8	-	-	-	-	5.93	Fairly Poor
Lyn and Jones Creek	Lyn Creek	County Rd 2	-	436004	4930505	-	-	-	-	-	-	-	-	-	-
Lyn and Jones Creek	Golden Creek	Killkenny Road	-	439272	4939904	-	-	-	-	6.95	7.06	-	-	7.01	Poor
Lyn and Jones Creek	Golden Creek	New Dublin Road	-	437185	4942033	-	-	-	-	-	-	-	-	-	-
St. Lawrence River	LaRue Creek	Quabbin Hill Road	-	423261	4922778	-	-	-	-	7.6	7.29	-	-	7.45	Very Poor
St. Lawrence River	Grants Creek	Lyn Rd, County Rd 46, W of Brockville	12003300102	442132	4936288	-	6.24	-	6.32	--	--	-	-	6.28	Fairly Poor
Buells and Butler's Creek	Buells Creek	Front Avenue West	-	445022	4938404	-	-	-	-	6.58	6.4	-	-	6.49	Fairly Poor
Buells and Butler's Creek	Butlers Creek	Butlers	12003400102	445141	4937149	-	7.11	-	6.33	-	-	-	-	6.72	Poor
Buells and Butler's Creek	Butlers Creek	RR2, Brockville	-	445 756	4943247	-	-	-	-	-	-	-	-	-	-

The sites are order from east to west and from upstream to downstream within each watercourse.

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Table 5. Species at Risk in the Cataraqui area, as reported (MNR, 2008)

Species	Latin name	Classification	Habitat preference	Man-made Threats	Listed By	Reference
Birds						
Henslow's sparrow	<i>Ammodramus henslowii</i>	Endangered (SARA), Endangered (MNR)	Open fields, pastures and wet meadows.	Conversion of grass- or pasture lands to cropland or wetland drainage.	SARA, MRN	WCR, 2008
King rail	<i>Rallus elegans</i>	Endangered (SARA), Endangered (MNR)	Marches without cattails	Cattail abundance and wetland drainage.	SARA, MNR	WCR, 2008
Northern Bobwhite	<i>Colinus virginianus</i>	Endangered (SARA), Endangered (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	WCR, 2008
Loggerhead shrike	<i>Lanius ludovicianus migrans</i>	Endangered (SARA), Endangered (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	WCR, 2008
Least bittern	<i>Ixobrychus exilis</i>	Threatened (SARA), Threatened (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	WCR, 2008
Yellow breasted chat	<i>Icteria virens virens</i>	Special concern (SARA), Special concern (MNR)	Dense thickets in forest openings and riparian areas.	Reforestation and human development.	SARA, MNR	WCR, 2008
Barn owl	<i>Tyto alba</i>	Endangered (SARA), Endangered (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	ROM, 2008a; WCR, 2008
Red shouldered hawk	<i>Buteo lineatus</i>	Formerly Special Concern (MRN)	Interior forest and woodlots.	Forest clearing. *Species was delisted in March 2007*	MNR (formerly)	ROM, 2007; WCR, 2008
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	Threatened (SARA); Special Concern (MNR)	Open woodlands and woodland edges, especially oak savannahs and riparian forests.	Habitat loss resulting from forestry and agriculture. Competition with European starling. Removal of dead trees (nest sites).	SARA, MNR	ROM, 2008b; WCR, 2008
Cerulean warbler	<i>Dendroica cerulea</i>	Special Concern (SARA), Special Concern (MNR)	Forest interior, requiring large, undisturbed tracts of mature, semi-open deciduous forest.	Habitat loss resulting from forest fragmentation and degradation. Nest parasitism by brown-headed cowbird (<i>Molothrus alter</i>), which is intensified in degraded forest habitat.	SARA, MNR	ROM, 2005a; WCR, 2008
Louisiana waterthrush	<i>Seiurus motacilla</i>	Special Concern (SARA), Special Concern (MNR)	Steep forested ravines with fast flowing streams.	Forest clearing.	SARA, MNR	ROM, 2005b; WCR, 2008
Black tern	<i>Chlidonias niger</i>	Not at Risk (SARA), Special Concern (MNR)	Shallow marshes and cattail stands.	Wetland drainage and alteration, water pollution and human disturbance at nesting colonies.	MNR	ROM, 2006
Fish						
Pugnose shiner	<i>Notropis anogenus</i>	Endangered (SARA), Endangered (MNR)	Marshy bays of lakes and ponds, slow-moving streams where the water is clear.	Conversion of grass- or pasture lands to cropland or wetland drainage.	SARA, MRN	ROM, 2008c; WCR, 2008
Grass pickerel	<i>Esox americanus</i>	Special Concern (SARA), Special Concern (MNR)	Steep forested ravines with fast flowing streams.	Forest clearing.	SARA, MNR	WCR, 2008
Bigmouth buffalo	<i>Ictiobus cyprinellus</i>	Not at Risk (SARA), Special Concern (MNR)	Steep forested ravines with fast flowing streams.	Forest clearing.	MNR	WCR, 2008
Mammals						
Grey fox	<i>Urocyon cinereoargenteus</i>	Threatened (SARA), Threatened (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	WCR, 2008

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Table 5. Species at Risk in the Cataraqui area, as reported (MNR, 2008) (continued).

Species	Latin name	Classification	Habitat preference	Man-made Threats	Listed By	Reference
Plants						
Purple Twayblade	<i>Liparis liliifolia</i>	Endangered (SARA), Endangered (MNR)	Open, successional mixed wood and hardwood habitats.	Habitat loss from development; Natural succession.	MNR	ROM, 2008d; WCR, 2008
Eastern prairie orchid	<i>Platanthera leucophaea</i>	Endangered (SARA), Endangered (MNR)	Open fields.	Conversion of grass- or pasture lands to cropland or wetland drainage.	SARA, MRN	ROM, 2008e; WCR, 2008
Blunt lobed woodsia	<i>Woodsia obtusa</i>	Threatened (SARA), Endangered (MNR)	Open fields.	Conversion of grass- or pasture lands to cropland or wetland drainage.	SARA, MRN	ROM, 2008f; WCR, 2008
White wood aster	<i>Eurybia divaricata</i>	Threatened (SARA), Threatened (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	ROM, 2008g; WCR, 2008
Broad beech fern	<i>Phegopteris hexagonoptera</i>	Not at Risk (SARA) Special Concern (MNR)	Deciduous forests.	Forest clearing.	MNR	ROM, 2005d
Reptiles and Amphibians						
Stinkpot (Musk) turtle	<i>Sternotherus odoratus</i>	Threatened (SARA), Threatened (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	WCR, 2008
Blanding's turtle	<i>Emydoidea blandingii</i>	Threatened (SARA), Threatened (MNR)	Grasslands or croplands with bushy cover.	Intensive agriculture, pesticides, predatory mammals, including domestic animals.	SARA, MNR	ROM, 2008h; WCR, 2008
Northern map turtle	<i>Graptemys geographica</i>	Special Concern (SARA), Special Concern (MNR)	Steep forested ravines with fast flowing streams.	Forest clearing.	SARA, MNR	ROM, 2005c; WCR, 2008

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Table 6. Population and Population density by Dissemination Area in the CSPA.

Municipal Jurisdiction	Total Population (persons)	Area (km²)	Population Density (people per square kilometer)
Town of Greater Napanee	9,556	223	43
Loyalist Township	15,062	337	45
Stone Mills*	969	72	13
City of Kingston	117,207	475	247
Township of South Frontenac	21,492	767	28
Howe Island (Frontenac Islands)	1,862	37	51
Wolfe Island (Frontenac Islands)	1,862	133	14
Leeds and the Thousand Islands	10,495	637	16
Gananoque	5,285	9	609
Leeds and the Thousand Islands + Gananoque**	(15,780)	(646)	(24)
Rideau Lakes	10,231	431	24
Athens	4,659	141	33
Front of Yonge	2,803	130	22
Elizabeth-town Kitley	12,072	196	62
City of Brockville	21,957	20	1,089
Augusta*	1,602	27	60
ETK, Brockville & Augusta**	(35,631)	(243)	(147)
Cataraqui Source Protection Area Municipalities	237,114	3633	65

* The municipality is only partly contained within the CSPA. To calculate population and population density, any Dissemination Areas (DA) that is in whole or in part within the boundaries of the CSPA was included. The area given for the municipalities of Stone Mills and Augusta is that of the DAs that fall (whole or in part) within the Municipal Boundaries, within the CSPA.

** Municipalities were combined to make them comparable to similar districts within the CSPA

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Table 7. Area of impervious surface by vulnerable area in the Cataraqui Source Protection Area.

DWS Name	Zone	Area (km ²)			
		0 - 0.9	1 - 7.9	8 - 79.9	80+
Cana	WHPA A	0.00	0.00	0.91	0.00
	WHPA B	0.09	0.00	0.91	0.00
	WHPA C	0.09	0.00	0.00	0.00
	WHPA D	0.13	0.00	0.00	0.00
	WHPA E	0.00	0.00	0.07	0.00
Lansdowne	WHPA A W1	0.03	0.00	0.00	0.00
	WHPA A W2	0.03	0.00	0.00	0.00
	WHPA B	0.23	0.00	0.00	0.00
	WHPA C	0.20	0.00	0.02	0.00
	WHPA D	0.43	0.00	0.28	0.00
	WHPA E	0.02	0.00	0.00	0.00
Miller Manor	WHPA A	0.00	0.03	0.00	0.00
	WHPA B	0.00	0.02	0.00	0.00
	WHPA C	0.00	0.08	0.00	0.00
	WHPA D	0.00	0.47	0.00	0.00
Westport	WHPA D	-	-	-	-
Brockville	IPZ 1	0.13	0.21	0.07	0.00
	IPZ 2	0.62	1.43	0.43	0.00
James King	IPZ 1	0.63	0.00	0.00	0.00
	IPZ 2	0.88	0.33	0.67	0.00
Kingston Central	IPZ 1	0.01	0.00	0.12	0.01
	IPZ 2	0.50	0.19	1.26	0.34
Point Pleasant	IPZ 1	0.04	0.00	0.28	0.00
	IPZ 2	1.30	0.00	0.54	0.00
Fairfield	IPZ 1	0.20	0.00	0.05	0.00
	IPZ 2	0.72	1.36	0.95	0.00
Bath	IPZ 1	0.00	0.29	0.05	0.00
	IPZ 2	6.06	1.40	2.42	0.00
AL Dafoe	IPZ 1	0.06	0.18	0.00	0.00
	IPZ 2	0.08	0.29	0.00	0.00
Sandhurst Shores	IPZ 1	0.00	0.25	0.00	0.00
	IPZ 2	0.61	1.18	0.00	0.00
Picton	IPZ 3b	92.82	39.25	0.05	0.00
Sydenham	IPZ 1	1.23	6.45	0.00	0.00
	IPZ 2	0.42	0.00	0.00	0.00
HVA		2763.00	1064.00	202.00	21.00
SGRA		2447.00	959.00	185.00	13.00

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Table 8. Per cent managed lands and livestock density in the vulnerable areas of the Cataraqui Source Protection Area.

Drinking Water System	Zone	Per cent Managed Lands	Potential for nutrient application to be causing contamination of drinking water sources	Livestock Density (NU/Acre)	Threshold to evaluate the risk of over-application of ASM
Cana	WHPA A	19.2	Low	-	-
	WHPA B	16.0	Low	-	-
	WHPA C	14.4	Low	-	-
	WHPA D	20.2	Low	-	-
	WHPA E	51.1	Moderate	-	-
Lansdowne	WHPA A (Well 1)	0	Low	-	-
	WHPA A (Well 2)	49.0	Moderate	94.1	High
	WHPA B	32.0	Low	19.9	High
	WHPA C	49.6	Moderate	13.8	High
	WHPA D	37.0	Low	4.9	High
	WHPA E	62.1	Moderate	-	-
Miller Manor	WHPA A	56.3	Moderate	51.4	High
	WHPA B	56.6	Moderate	47.7	High
	WHPA C	88.5	Significant	15.1	High
	WHPA D	46.4	Moderate	13.4	High
Brockville	IPZ 1	39.0	Low	-	-
	IPZ 2	28.3	Low	-	-
James W. King	IPZ 1	4.6	Low	-	-
	IPZ 2	20.7	Low	12.2	High
Kingston Central	IPZ 1	5.4	Low	-	-
	IPZ 2	18.7	Low	-	-
Point Pleasant	IPZ 1	7.9	Low	-	-
	IPZ 2	32.2	Low	-	-
Fairfield	IPZ 1	40.0	Low	-	-
	IPZ 2	10.2	Low	25.1	High
Bath	IPZ 1	31.6	Low	-	-
	IPZ 2	26.5	Low	0.6	Moderate
AL Dafoe	IPZ 1	8.2	Low	46.2	High
	IPZ 2	6.5	Low	20.6	High
Sandhurst Shores	IPZ 1	35.7	Low	0.8	Moderate
	IPZ 2	34.1	Low	0.7	Moderate
Sydenham	IPZ 1	7.1	Low	-	High
	IPZ 2	36.7	Low	4.5	High
HVAs		36.7	Low	0.2	High
SGRAs		19.2	Low	0.1	High

WHPA = Wellhead Protection Area
 IPZ = Intake Protection Zone
 HVA = Highly Vulnerable

NU = Nutrient Units
 ASM = Agricultural Source Material