South Saskatchewan Region
Status of Surface Water Quality

April 2015 – March 2016

Reporting on the Surface Water Quality Management Framework

Alberta Environment and Parks
Environmental Monitoring and Science Division

Jason Kerr, PhD; Natalie Kromrey, MSc; and Soroush Abbasi, MSc

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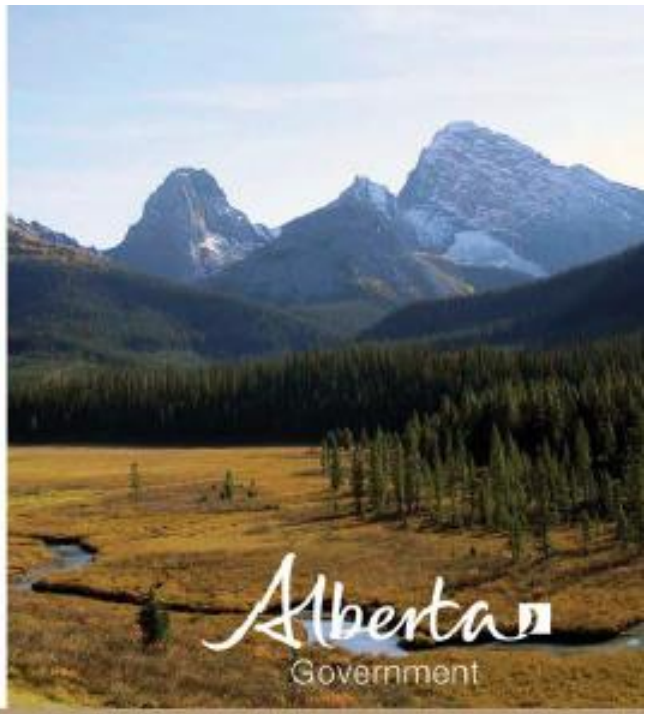

Status of Surface Water Quality, South Saskatchewan Region, Alberta for April 2015 – March 2016

Statistical analysis provided by Natalie Kromrey and Soroush Abbasi
Technical writing provided by Jason Kerr

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Any comments, questions, or suggestions regarding the content of this document may be directed to:

Environmental Monitoring and Science Division
Alberta Environment and Parks
10th Floor, 9888 Jasper Avenue NW
Edmonton, Alberta T5J 5C6

Tel: 780-229-7200
Toll Free: 1-844-323-6372
Fax: 780-702-0169
Email: EMSD-Info@gov.ab.ca
Media Inquiries: AEP.Mediainquiries@gov.ab.ca
Website: http://environmentalmonitoring.alberta.ca/

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About EMSD

The Environmental Monitoring and Science Division (EMSD) is responsible for monitoring, evaluating and reporting on key air, water, land and biodiversity indicators. The division's mandate is to provide open and transparent access to scientific data and information on the condition of Alberta's environment, including specific indicators as well as cumulative effects, both provincially and in specific locations.

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- Based on sound science and evidence.
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- That respects and incorporates community and Traditional Ecological Knowledge (TEK) from First Nations and Métis people.

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Executive Summary

Background

This report was prepared by the Environmental Monitoring and Science Division (EMSD) to fulfill reporting requirements mandated by the South Saskatchewan Region Surface Water Quality Management Framework which supports the South Saskatchewan Regional Plan (SSRP). The triggers and limits reported against in this document are established in the South Saskatchewan Region Surface Water Quality Management Framework. Reporting requirements for the SSRP are determined by the Government of Alberta and EMSD has a responsibility for monitoring, evaluation and reporting under the Environmental Management Frameworks, including the Surface Water Quality Management Framework. This is a report that communicates whether water quality triggers or limits were exceeded in 2015 – 2016.

Methodology

All statistical methods used in this report are described in the South Saskatchewan Region Surface Water Quality Management Framework: Statistical Methods Final Report (2011).

The Surface Water Quality Management Framework includes 15 primary indicators and 6 secondary indicators. In 2015–2016 (April 1–March 31), these water quality indicators were measured monthly at nine water quality monitoring stations. Using methodology described in the South Saskatchewan Region (SSR) Surface Water Quality Management Framework (SWQMF), the resulting data for the 15 primary indicators were compared to the historic record (1999–2009) to determine if median and 90th percentile concentrations deviated in an undesirable direction from the historic median or peak trigger values. Those values that deviated from historic triggers in an undesirable direction were statistically assessed for changes in the central tendency or peak concentration. In addition, the 2015–2016 data were compared to water quality limits as defined in the SSR SWQMF. 2015–2016 data for each primary indicator at each station were compared to trigger values and limits for both the open water (April–October) and winter (November-March) seasons. Finally, median values for each of the 6 secondary indicators, for each season, were calculated and compared to existing Alberta surface water quality guidelines.

2015–2016 (April 1–March 31) Results

A significant exceedance of median trigger values occurred for:

- Total nitrogen at the Bow River (Cochrane) station during the winter season
- Total nitrogen at the Bow River (Ronalane) station during the winter and open water seasons
- Nitrate at the Bow River (Ronalane) station during the winter and open water seasons
- The sodium adsorption ratio at the Oldman River (Hwy 3 in Lethbridge) station during the winter and open water seasons

There were no significant exceedances of peak trigger values for any indicator at any station. As defined in the SSRP SWQMF, total dissolved solids at Milk River Hwy 880 exceeded water quality limits in 2015-16. The secondary indicator selenium exceeded the Alberta surface water quality guideline for the protection of freshwater aquatic life at the Old Man River (Hwy 36) station during the winter.

South Saskatchewan Regional Plan

The South Saskatchewan Regional Plan (SSRP) applies to the South Saskatchewan Region, an area approximately 83,764 square kilometres in size located in southern Alberta (see the South Saskatchewan Regional Plan). The SSRP is a regional plan developed by the Government of Alberta under the Land Use Framework. The plan sets outcomes that describe what the Government of Alberta wants to accomplish at a regional level, and is given legislative authority under the *Alberta Land Stewardship Act*. EMSD is responsible for monitoring, assessing and reporting on the condition of the environment in the South Saskatchewan Region, while the Government of Alberta is responsible for management of activities and resources in response to environmental conditions.

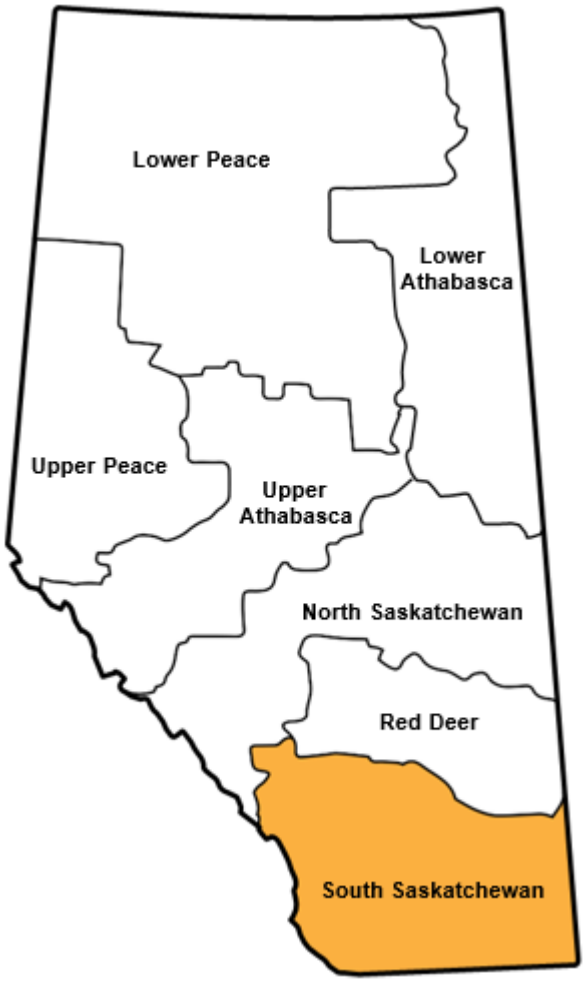

Figure 1: Land Use Frameworks in Alberta

Monitoring Stations

In this report, water quality in the South Saskatchewan Region is assessed based on data derived from monthly water quality sampling at nine Long-Term River Network (LTRN) stations within the South Saskatchewan Region (Fig 2). The nine LTRN stations are located within four major river systems:

- The Bow River – Bow River at Cochrane, Bow River at Carseland, Bow River at Cluny and Bow River at Ronalane
- The Milk River – Milk River at Hwy 880
- The Oldman River – Oldman River at Brocket, Old Man River at Hwy 3 in Lethbridge and Oldman River at Hwy 36
- The South Saskatchewan River – South Saskatchewan River at Medicine Hat-Hwy 1

Additional details on the four major river basins and the nine LTRN stations are given in the South Saskatchewan Region: Surface Water Quality Management Framework (SSR SWQMF).

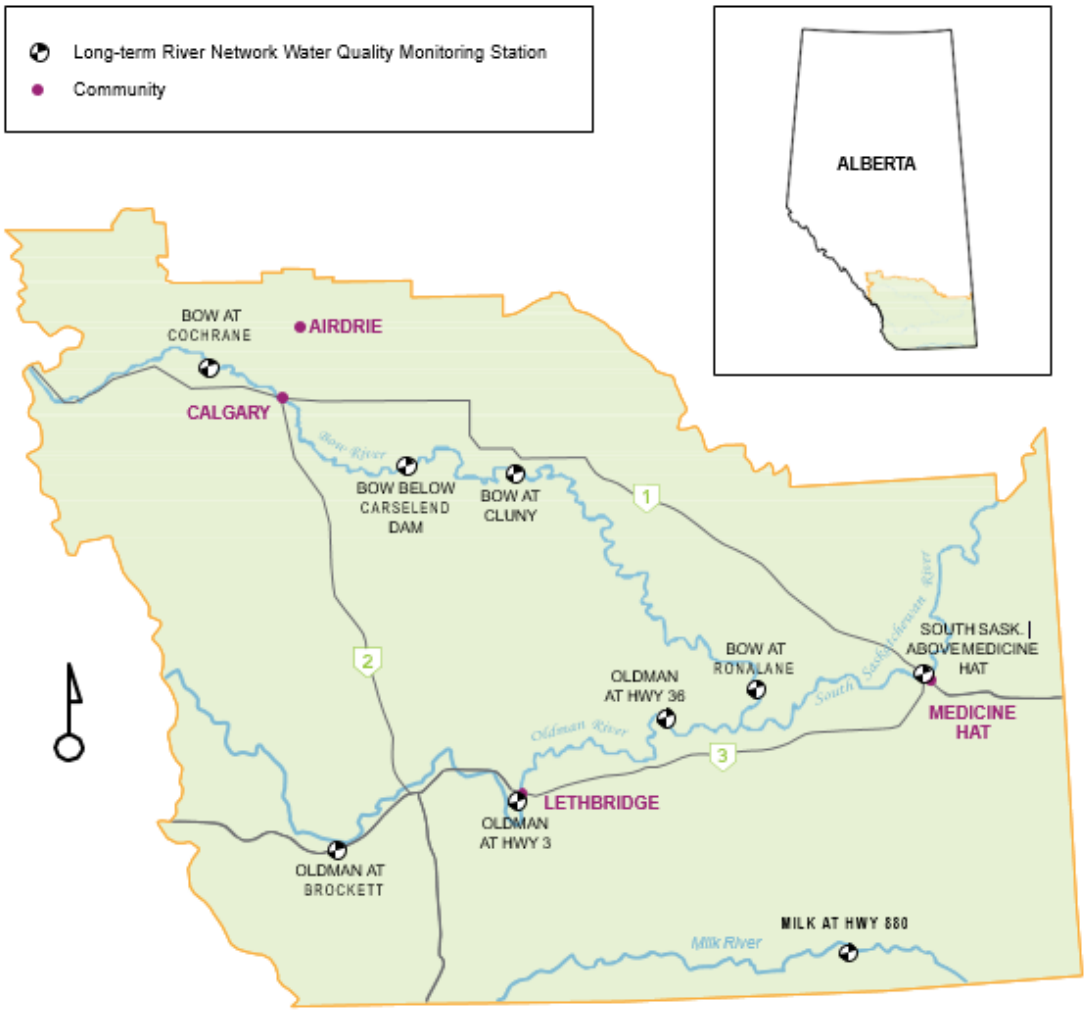

Figure 2: Location of water quality stations in the South Saskatchewan Region

Water Quality Indicators, Triggers and Limits

Water Quality Indicators

Twenty-one water quality parameters measured at the LTRN stations are indicators in the SSR SWQMF. Fifteen primary indicators (Table 1) and six secondary indicators (Table 2) were used to assess 2015–2016 water quality at the nine LTRN stations. Justification for indicator selection is given in the SSR SWQMF.

Table 1: List of primary indicators for the SSR: SWQMF

Total Ammonia	Specific Conductance
Chloride	Total Dissolved Solids
Nitrate	Total Organic Carbon
Total Nitrogen	Total Suspended Solids
Total Dissolved Phosphorus	Turbidity
Total Phosphorus	pH
Sulphate	*Escherichia coli*
Sodium Adsorption Ratio (SAR)	

Table 2: List of secondary indicators for the SSRP: SWQMF

Mercury	Dicamba
Selenium	Methylchlorophenoxyacetic acid (MCPA)
2,4-Dichlorophenoxyacetic acid (2,4-D)	Mecoprop (MCPP)

Water Quality Triggers

Median and 90th percentile values from the historic record (1999–2009[1]) are the "median triggers" and "peak triggers" in the SSR SWQMF. Exceedances in peak triggers reflect changes in the frequency of observed extreme values in relation to historic data while exceedances in median triggers are used to identify shifts in the central tendency of annual data relative to the historic record. Both are intended to act as early warning systems of potential changes in surface water quality and a signal to do statistical assessments. In this report, seasonal 2015–2016 medians and 90th percentiles were first compared with historic trigger values to determine if they deviated from the triggers in an undesirable direction. If an indicator deviated from its trigger value in an undesirable direction, a statistical assessment was then performed. A median trigger exceedance was defined as a significant shift in the central tendency (mean or median) of the 2015-16 data relative to the historic record. A peak trigger exceedance was reported when the frequency of observations in the 2015-16 data which exceeded the trigger value was higher than the expected frequency given no significant change.

[1] The historic data set for some indicators were based on shorter time series. See the SSR SWQMF for a description of the specific time period used for each indicator at each station

All statistical methods used in this report are described in the South Saskatchewan Region Surface Water Quality Management Framework: Statistical Methods Final Report (2011). Statistical assessments were performed using custom statistical software developed by GranDuke Geomatics[2] following the sequence of steps outlined in Figures 6 and 7 of the South Saskatchewan Region Surface Water Quality Management Framework: Statistical Methods Final Report (2011).

Water Quality Limits

Surface water quality limits were derived from the Canadian Council of Minister's for the Environment (CCME) and provincial water quality guidelines, for 9 of the 15 primary water quality indicators. Details of the specific water quality limits used for each indicator are given in the SSR SWQMF.

[2] *Now FarmersEdge (http://www.farmersedge.ca/)*

Statistically Significant Exceedances of Water Quality Triggers, 2015–2016

There were no exceedances of peak trigger values in 2015-16. There were however exceedances of median triggers at three stations. Table 3 compares median values from the 2015–2016 data with the historical record (1999–2009) for stations and indicators exhibiting a statistically significant deviation from median trigger values. Trigger exceedances that were statistically significant during 2015–2016 were observed at three stations for three primary indicators. Significant exceedances of median triggers were observed for total nitrogen in the winter at Bow River (Cochrane) and for the winter and open water seasons at Bow River (Ronalane). The median trigger value for nitrate was also significantly exceeded during the winter and open water seasons at Bow River (Ronalane). At Oldman River (Hwy 3 in Lethbridge) the median trigger value for the sodium adsorption ratio was significantly exceeded during the winter and open water seasons. There were no exceedances for any of the other stations or indicators. Summary statistics of 2015–2016 data for the remaining stations and indicators are shown in Appendix A.

Table 3: Median values for primary indicators exhibiting a statistically significant trigger exceedance (shaded in blue) in the South Saskatchewan Region during 2015–2016

STATION	INDICATOR	PERIOD	SEASON	MEDIAN	*n*
Bow River (Cochrane)	**Total Nitrogen (mg/L)**	1999-2009 (trigger)	open	0.18	70
			winter	0.17	50
		2015-16	open	0.12	7
			winter	0.24	5
Bow River (Ronalane)	**Total Nitrogen (mg/L)**	1999-2009 (trigger)	open	0.68	70
			winter	1.58	49
		2015-16	open	0.71	7
			winter	1.70	5
	Nitrate (mg/L)	1999-2009 (trigger)	open	0.302	69
			winter	1.190	49
		2015-16	open	0.350	7
			winter	1.300	5
Oldman River (Hwy 3 in Lethbridge)	**Sodium Adsorption Ratio**	1999-2009 (trigger)	open	0.42	70
			winter	0.46	50
		2015-16	open	0.51	7
			winter	0.50	5

Exceedances of Water Quality Limits, 2015–2016

Median values for 9 of the 15 primary indicators were compared to surface water quality limits described in the SSR SWQMF. Median total dissolved solids concentration at Milk River Hwy 880 exceeded the water quality limit during the winter season. There were no other exceedances of surface water quality limits as defined in the SSR SWQMF.

Secondary Indicators, 2015–2016

The median seasonal concentrations of secondary indicators at each site were compared to chronic guidelines where available. Total recoverable selenium concentration exceeded the Alberta surface water quality guideline for the protection of freshwater aquatic life (1 µg/L) at the Oldman River (Hwy 36) station during the winter (1.05 µg/L). There were no exceedances of established guidelines for other secondary indicators. Summary statistics for all secondary indicators are provided in Appendix A. Note that summary statistics shown for secondary indicators are for information purposes only as there are no triggers or limits assigned to these indicators.

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Appendix A. Descriptive Statistics for the Nine Long Term River Network Stations

Table A1: Median and 90th percentile values for primary indicators in the Oldman River (Brocket)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.010	0.060	91
		winter	0.010	0.039	52
	2015-16	open	0.025	0.025	7
		winter	0.025	0.025	5
Chloride (mg/L)	**1999-2009**	open	0.9	1.8	70
		winter	1.2	1.9	50
	2015-16	open	1.3	1.9	7
		winter	1.4	1.8	5
Nitrate (mg/L)	**1999-2009**	open	0.078	0.128	91
		winter	0.092	0.132	52
	2015-16	open	0.077	0.154	7
		winter	0.076	0.126	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.23	0.35	70
		winter	0.19	0.32	50
	2015-16	open	0.19	0.81	7
		winter	0.23	0.93	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.006	91
		winter	0.003	0.005	52
	2015-16	open	0.002	0.007	7
		winter	0.005	0.006	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.007	0.018	91
		winter	0.005	0.010	52
	2015-16	open	0.004	0.006	7
		winter	0.005	0.007	5
Sulphate (mg/L)	**1999-2009**	open	22.1	29.4	70
		winter	29.6	36.0	50
	2015-16	open	27	28	7
		winter	32	37.2	5
Sodium Adsorption Ratio	**1999-2009**	open	0.16	0.22	70
		winter	0.18	0.20	50
	2015-16	open	0.19	0.22	7
		winter	0.19	0.21	5

Table A1: Median and 90th percentile values for primary indicators in the Oldman River (Brocket) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	276	313	91
		winter	308	342	52
	2015-16	open	320	334	7
		winter	330	366	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	156	181	70
		winter	179	202	50
	2015-16	open	180	180	7
		winter	180	206	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.0	3.7	70
		winter	1.6	2.2	50
	2015-16	open	1.7	2.2	7
		winter	1.7	1.8	5
Total Suspended Solids (mg/L)	**1999-2009**	open	3	10	84
		winter	1	6	47
	2015-16	open	1	2	7
		winter	1	3	5
Turbidity (NTU)	**1999-2009**	open	4.5	18.8	91.0
		winter	2.3	8.5	52.0
	2015-16	open	1.7	3.0	7
		winter	1.8	3.4	5
pH	**1999-2009**	open	8.26	8.35	91
		winter	8.26	8.34	52
	2015-16	open	8.28	8.50	7
		winter	8.40	8.45	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	3	14	70
		winter	2	27	49
	2015-16	open	1	10	7
		winter	1	182	5

Table A2: Median and 90th percentile values for secondary indicators in the Oldman River (Brocket)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0025	0.0032	39
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0068	39
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0025	39
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	39
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	1.40	18
		winter	0.33	0.62	8
	2015-16	open	0.72	0.84	7
		winter	0.38	0.52	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.52	0.76	14
		winter	0.73	0.85	7
	2015-16	open	0.50	0.53	7
		winter	0.52	0.59	5

Table A3: Median and 90th percentile values for primary indicators in the Oldman River (Hwy 3 in Lethbridge)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.020	0.070	94
		winter	0.020	0.059	52
	2015-16	open	0.025	0.025	7
		winter	0.025	0.052	5
Chloride (mg/L)	**1999-2009**	open	1.5	3.2	70
		winter	2.1	3.0	50
	2015-16	open	2.3	3.2	7
		winter	3.0	23.6	5
Nitrate (mg/L)	**1999-2009**	open	0.023	0.138	94
		winter	0.219	0.348	52
	2015-16	open	0.085	0.278	7
		winter	0.25	0.354	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.25	0.64	72
		winter	0.40	0.59	50
	2015-16	open	0.24	0.61	7
		winter	0.51	0.56	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.009	93
		winter	0.003	0.006	52
	2015-16	open	0.004	0.006	7
		winter	0.006	0.007	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.012	0.151	94
		winter	0.008	0.022	52
	2015-16	open	0.009	0.046	7
		winter	0.006	0.010	5
Sulphate (mg/L)	**1999-2009**	open	35.8	52.1	70
		winter	45.0	58.0	50
	2015-16	open	44	61.4	7
		winter	59	69.2	5
Sodium Adsorption Ratio	**1999-2009**	open	0.42	0.59	70
		winter	0.46	0.60	50
	2015-16	open	0.51	0.63	7
		winter	0.50	0.61	5

Table A3: Median and 90th percentile values for primary indicators in the Oldman River (Hwy 3 in Lethbridge) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	323	397	91
		winter	358	437	52
	2015-16	open	370	424	7
		winter	430	446	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	182	224	69
		winter	217	256	50
	2015-16	open	210	242	7
		winter	250	274	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.4	3.9	70
		winter	1.7	2.5	50
	2015-16	open	2.2	2.6	7
		winter	1.6	2.1	5
Total Suspended Solids (mg/L)	**1999-2009**	open	9	189	93
		winter	7	34	52
	2015-16	open	6	68	7
		winter	4	9	5
Turbidity (NTU)	**1999-2009**	open	10.0	153.0	91
		winter	6.3	27.5	52
	2015-16	open	4.8	35	7
		winter	3.6	6.86	5
pH	**1999-2009**	open	8.34	8.57	91
		winter	8.20	8.28	52
	2015-16	open	8.37	8.47	7
		winter	8.24	8.37	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	13	71	72
		winter	2	13	48
	2015-16	open	29	121	7
		winter	6	24	5

Table A4: Median and 90th percentile values for secondary indicators in the Oldman River (Hwy 3 in Lethbridge)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0060	0.0310	46
		winter	0.0025	0.0025	4
	2015-16	open	0.011	0.0692	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	46
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0100	46
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0057	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0028	46
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	2.06	18
		winter	0.30	1.35	8
	2015-16	open	1.26	4.00	7
		winter	0.68	0.81	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.61	0.85	14
		winter	0.90	1.20	7
	2015-16	open	0.61	0.79	7
		winter	0.68	1.08	5

Table A5: Median and 90th percentile values for primary indicators in the Oldman River (Hwy 36)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.020	0.110	91
		winter	0.030	0.134	57
	2015-16	open	0.025	0.025	7
		winter	0.051	0.089	5
Chloride (mg/L)	**1999-2009**	open	4.0	6.1	70
		winter	6.0	8.1	50
	2015-16	open	3.7	4.8	7
		winter	5.8	7.5	5
Nitrate (mg/L)	**1999-2009**	open	0.006	0.140	91
		winter	0.317	0.495	57
	2015-16	open	0.040	0.228	7
		winter	0.370	0.496	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.31	0.75	70
		winter	0.59	0.96	55
	2015-16	open	0.29	0.60	7
		winter	0.94	1.40	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.010	91
		winter	0.003	0.007	57
	2015-16	open	0.006	0.015	7
		winter	0.008	0.011	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.015	0.173	91
		winter	0.009	0.019	57
	2015-16	open	0.014	0.051	7
		winter	0.010	0.011	5
Sulphate (mg/L)	**1999-2009**	open	44.8	61.4	70
		winter	58.1	77.4	50
	2015-16	open	56	62.4	7
		winter	70	85.6	5
Sodium Adsorption Ratio	**1999-2009**	open	0.56	0.78	70
		winter	0.65	0.80	50
	2015-16	open	0.63	0.71	7
		winter	0.73	0.85	5

Table A5: Median and 90th percentile values for primary indicators in the Oldman River (Hwy 36) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	357	425	91
		winter	414	502	52
	2015-16	open	410	448	7
		winter	490	496	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	200	243	70
		winter	246	296	50
	2015-16	open	220	248	7
		winter	290	296	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.9	4.4	70
		winter	2.2	3.0	55
	2015-16	open	2.2	2.5	6
		winter	2.2	2.9	5
Total Suspended Solids (mg/L)	**1999-2009**	open	11	200	90
		winter	3	17	57
	2015-16	open	8	74	7
		winter	3	11	5
Turbidity (NTU)	**1999-2009**	open	9.9	180.0	91
		winter	4.9	19.9	52
	2015-16	open	7.1	32.2	7
		winter	4.0	5.6	5
pH	**1999-2009**	open	8.37	8.52	91
		winter	8.21	8.33	57
	2015-16	open	8.47	8.55	7
		winter	8.31	8.37	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	14	151	70
		winter	3	17	53
	2015-16	open	23	380	7
		winter	1	9	5

Table A6: Median and 90th percentile values for secondary indicators in the Oldman River (Hwy 36)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0135	0.0802	44
		winter	0.0025	0.0025	4
	2015-16	open	0.0105	0.0281	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0117	44
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0184	44
		winter	0.0025	0.0025	4
	2015-16	open	0.0043	0.0067	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0070	44
		winter	0.0025	0.0025	4
	2015-16	open	0.0025	0.0025	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.43	2.37	18
		winter	0.80	1.73	8
	2015-16	open	1.46	4.61	7
		winter	0.76	0.81	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.59	1.00	14
		winter	1.12	1.25	7
	2015-16	open	0.65	0.73	7
		winter	1.05	1.06	5

Table A7: Median and 90th percentile values for primary indicators in the South Saskatchewan River (Medicine Hat-Hwy 1)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.020	0.060	70
		winter	0.090	0.253	48
	2015-16	open	0.025	0.025	7
		winter	0.058	0.122	5
Chloride (mg/L)	**1999-2009**	open	6.4	9.8	70
		winter	12.6	19.9	48
	2015-16	open	9.0	10.8	7
		winter	16.0	17.0	5
Nitrate (mg/L)	**1999-2009**	open	0.103	0.497	69
		winter	1.015	1.258	48
	2015-16	open	0.087	0.486	7
		winter	0.960	1.160	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.55	1.01	70
		winter	1.33	1.72	48
	2015-16	open	0.50	1.31	7
		winter	1.30	1.36	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.004	0.009	70
		winter	0.004	0.010	48
	2015-16	open	0.005	0.011	7
		winter	0.008	0.014	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.023	0.098	70
		winter	0.011	0.042	48
	2015-16	open	0.016	0.032	7
		winter	0.022	0.032	5
Sulphate (mg/L)	**1999-2009**	open	56.5	76.9	70
		winter	62.4	77.6	48
	2015-16	open	66	75.8	7
		winter	73	85.4	5
Sodium Adsorption Ratio	**1999-2009**	open	0.60	0.79	70
		winter	0.59	0.88	48
	2015-16	open	0.67	0.77	7
		winter	0.68	0.89	5

Table A7: Median and 90th percentile values for primary indicators in the South Saskatchewan River (Medicine Hat-Hwy 1) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	369	436	68
		winter	462	519	48
	2015-16	open	430	454	7
		winter	490	516	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	221	252	70
		winter	268	316	48
	2015-16	open	240	260	7
		winter	280	300	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.7	4.0	34
		winter	1.7	3.0	13
	2015-16	open	2.6	2.9	7
		winter	1.7	2.9	5
Total Suspended Solids (mg/L)	**1999-2009**	open	19	105	70
		winter	5	32	48
	2015-16	open	15	45	7
		winter	4	34	5
Turbidity (NTU)	**1999-2009**	open	16.4	80.5	70
		winter	4.0	28.3	48
	2015-16	open	7.4	18.8	7
		winter	3.9	16.3	5
pH	**1999-2009**	open	8.32	8.47	70
		winter	8.14	8.27	48
	2015-16	open	8.48	8.54	7
		winter	8.27	8.29	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	13	99	68
		winter	1	7	48
	2015-16	open	20	38	7
		winter	2	9	5

Table A8: Median and 90th percentile values for secondary indicators in the South Saskatchewan River (Medicine Hat-Hwy 1)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0245	0.1049	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0200	0.0466	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0170	44
		winter	0.0025	0.0025	3
	2015-16	open	0.00725	0.0148	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0168	44
		winter	0.0025	0.0025	3
	2015-16	open	0.00375	0.0057	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0132	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0113	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.55	2.61	18
		winter	0.30	0.41	5
	2015-16	open	1.73	2.80	7
		winter	0.68	2.44	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.57	0.85	14
		winter	1.00	1.07	4
	2015-16	open	0.42	0.71	7
		winter	0.83	1.02	5

Table A9: Median and 90th percentile values for primary indicators in the Bow River (Cochrane)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.005	0.041	70
		winter	0.008	0.025	50
	2015-16	open	0.025	0.087	7
		winter	0.025	0.025	5
Chloride (mg/L)	**1999-2009**	open	1.9	2.9	70
		winter	2.0	2.6	50
	2015-16	open	2.5	3.1	7
		winter	2.5	2.8	5
Nitrate (mg/L)	**1999-2009**	open	0.074	0.108	69
		winter	0.109	0.130	50
	2015-16	open	0.11	0.12	7
		winter	0.16	0.204	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.18	0.40	70
		winter	0.17	0.23	50
	2015-16	open	0.12	0.17	7
		winter	0.24	0.38	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.002	0.004	35
		winter	0.002	0.004	25
	2015-16	open	0.002	0.022	7
		winter	0.008	0.026	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.005	0.009	35
		winter	0.003	0.006	25
	2015-16	open	0.003	0.004	7
		winter	0.003	0.005	5
Sulphate (mg/L)	**1999-2009**	open	33.6	40.4	70
		winter	42.2	45.8	50
	2015-16	open	34	45.4	7
		winter	46	46.6	5
Sodium Adsorption Ratio	**1999-2009**	open	0.07	0.12	70
		winter	0.07	0.10	50
	2015-16	open	0.09	0.09	7
		winter	0.07	0.08	5

Table A9: Median and 90th percentile values for primary indicators in the Bow River (Cochrane) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	289	317	70
		winter	330	349	50
	2015-16	open	290	334	7
		winter	340	346	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	165	190	70
		winter	190	200	50
	2015-16	open	160	194	7
		winter	190	206	5
Total Organic Carbon (mg/L)	**1999-2009**	open	1.0	1.6	34
		winter	0.8	0.9	14
	2015-16	open	0.7	0.8	7
		winter	0.6	0.7	5
Total Suspended Solids (mg/L)	**1999-2009**	open	2	8	70
		winter	1	2	50
	2015-16	open	1	1	7
		winter	1	1	5
Turbidity (NTU)	**1999-2009**	open	1.8	10.1	70
		winter	0.8	1.7	50
	2015-16	open	0.8	1.9	7
		winter	0.7	0.7	5
pH	**1999-2009**	open	8.23	8.38	70
		winter	8.17	8.30	50
	2015-16	open	8.33	8.39	7
		winter	8.23	8.30	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	2	13	70
		winter	1	2	49
	2015-16	open	2	11	7
		winter	1	5	5

Table A10: Median and 90th percentile values for secondary indicators in Bow River (Cochrane)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0025	0.0025	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0025	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0025	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0025	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	0.92	22
		winter	0.34	0.50	10
	2015-16	open	0.28	0.44	7
		winter	0.21	0.28	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.50	0.59	18
		winter	0.61	0.80	9
	2015-16	open	0.34	0.59	7
		winter	0.50	0.64	5

Table A11: Median and 90th percentile values for primary indicators in the Bow River (Carseland)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.045	0.160	70
		winter	0.250	0.472	50
	2015-16	open	0.025	0.025	7
		winter	0.12	0.176	5
Chloride (mg/L)	**1999-2009**	open	7.6	13.1	70
		winter	12.7	20.4	50
	2015-16	open	13	16	7
		winter	18	19.8	5
Nitrate (mg/L)	**1999-2009**	open	0.601	0.990	69
		winter	1.130	1.403	50
	2015-16	open	0.72	1.066	7
		winter	1.1	1.36	5
Total Nitrogen (mg/L)	**1999-2009**	open	1.02	1.72	70
		winter	1.68	2.17	50
	2015-16	open	1	1.3	7
		winter	1.4	2.18	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.007	0.016	35
		winter	0.017	0.028	25
	2015-16	open	0.007	0.011	7
		winter	0.011	0.038	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.021	0.083	35
		winter	0.030	0.062	25
	2015-16	open	0.013	0.021	7
		winter	0.024	0.049	5
Sulphate (mg/L)	**1999-2009**	open	42.9	51.5	70
		winter	53.9	58.0	50
	2015-16	open	50	59	7
		winter	60	63.6	5
Sodium Adsorption Ratio	**1999-2009**	open	0.30	0.45	70
		winter	0.39	0.58	50
	2015-16	open	0.38	0.47	7
		winter	0.46	0.50	5

Table A11: Median and 90th percentile values for primary indicators in the Bow River (Carseland) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	346	398	69
		winter	422	443	50
	2015-16	open	410	436	7
		winter	450	460	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	201	232	70
		winter	246	260	50
	2015-16	open	230	248	7
		winter	250	266	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.0	3.6	34
		winter	1.5	1.9	14
	2015-16	open	1.8	2.1	6
		winter	1.2	1.6	5
Total Suspended Solids (mg/L)	**1999-2009**	open	6	64	70
		winter	5	14	50
	2015-16	open	3	5	7
		winter	3	10	5
Turbidity (NTU)	**1999-2009**	open	4.0	48.4	70
		winter	2.6	9.3	50
	2015-16	open	1.6	2.2	7
		winter	2.0	4.1	5
pH	**1999-2009**	open	8.20	8.39	70
		winter	8.06	8.20	50
	2015-16	open	8.45	8.59	7
		winter	8.17	8.26	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	28	144	67
		winter	10	25	47
	2015-16	open	17	69	7
		winter	3	14	5

Table A12: Median and 90th percentile values for secondary indicators in Bow River (Carseland)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0075	0.0260	44
		winter	0.0025	0.0025	3
	2015-16	open	0.017	0.0526	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0071	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0141	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0050	0.0167	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0140	0.0244	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	4.81	22
		winter	0.35	0.69	10
	2015-16	open	0.90	1.09	7
		winter	0.68	1.09	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.59	0.88	18
		winter	0.83	0.98	9
	2015-16	open	0.37	0.60	7
		winter	0.76	0.83	5

Table A13: Median and 90th percentile values for primary indicators in the Bow River (Cluny)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.025	0.120	71
		winter	0.195	0.372	48
	2015-16	open	0.025	0.0386	7
		winter	0.051	0.152	5
Chloride (mg/L)	**1999-2009**	open	8.0	13.0	71
		winter	13.0	20.9	43
	2015-16	open	12	14.4	7
		winter	21	24.2	5
Nitrate (mg/L)	**1999-2009**	open	0.520	0.837	59
		winter	1.195	1.455	40
	2015-16	open	0.55	0.764	7
		winter	1.3	1.4	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.94	1.52	71
		winter	1.68	2.07	48
	2015-16	open	0.79	1.04	7
		winter	1.8	1.96	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.005	0.014	35
		winter	0.012	0.020	22
	2015-16	open	0.004	0.007	7
		winter	0.011	0.018	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.017	0.128	35
		winter	0.017	0.025	22
	2015-16	open	0.009	0.017	7
		winter	0.020	0.024	5
Sulphate (mg/L)	**1999-2009**	open	47.9	58.1	48
		winter	57.2	63.1	32
	2015-16	open	52	61	7
		winter	65	68.6	5
Sodium Adsorption Ratio	**1999-2009**	open	0.35	0.58	48
		winter	0.42	0.72	32
	2015-16	open	0.44	0.52	7
		winter	0.56	0.62	5

Table A13: Median and 90th percentile values for primary indicators in the Bow River (Cluny) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	360	425	47
		winter	441	490	32
	2015-16	open	400	430	7
		winter	460	500	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	211	245	48
		winter	257	290	32
	2015-16	open	220	246	7
		winter	270	286	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.2	4.3	23
		winter	1.3	1.8	16
	2015-16	open	1.9	2.2	6
		winter	1.6	1.6	5
Total Suspended Solids (mg/L)	**1999-2009**	open	11	80	71
		winter	4	9	48
	2015-16	open	7	9	7
		winter	10	14	5
Turbidity (NTU)	**1999-2009**	open	8.5	62.7	48
		winter	2.8	7.1	32
	2015-16	open	2.8	4.0	7
		winter	3.3	3.8	5
pH	**1999-2009**	open	8.30	8.46	48
		winter	8.00	8.23	37
	2015-16	open	8.50	8.60	7
		winter	8.18	8.35	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	8	56	67
		winter	1	6	48
	2015-16	open	6	29	7
		winter	1	3	5

Table A14: Median and 90th percentile values for secondary indicators in the Bow River (Cluny)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0065	0.0384	32
		winter	0.0025	0.0025	3
	2015-16	open	0.0165	0.0317	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	32
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.00635	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0097	32
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0057	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0055	0.0209	32
		winter	0.0025	0.0025	3
	2015-16	open	0.0125	0.0213	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	2.53	17
		winter	0.30	0.37	5
	2015-16	open	1.06	1.24	7
		winter	0.68	1.38	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.70	0.93	10
		winter	0.79	0.82	4
	2015-16	open	0.46	0.51	7
		winter	0.74	0.81	5

Table A15: Median and 90th percentile values for primary indicators in the Bow River (Ronalane)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.020	0.081	70
		winter	0.130	0.292	49
	2015-16	open	0.025	0.043	7
		winter	0.088	0.174	5
Chloride (mg/L)	**1999-2009**	open	8.4	12.0	70
		winter	13.0	19.7	49
	2015-16	open	14.0	18.0	7
		winter	17.0	20.0	5
Nitrate (mg/L)	**1999-2009**	open	0.302	0.747	69
		winter	1.190	1.440	49
	2015-16	open	0.350	0.842	7
		winter	1.300	1.460	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.68	1.26	70
		winter	1.58	1.91	49
	2015-16	open	0.71	1.14	7
		winter	1.7	2.52	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.005	0.010	35
		winter	0.005	0.017	24
	2015-16	open	0.004	0.005	7
		winter	0.009	0.020	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.025	0.138	35
		winter	0.012	0.027	24
	2015-16	open	0.014	0.025	7
		winter	0.025	0.114	5
Sulphate (mg/L)	**1999-2009**	open	62.2	78.2	70
		winter	60.9	70.5	49
	2015-16	open	76	84.6	7
		winter	72	77.8	5
Sodium Adsorption Ratio	**1999-2009**	open	0.55	0.80	70
		winter	0.48	0.67	49
	2015-16	open	0.72	0.81	7
		winter	0.54	0.69	5

Table A15: Median and 90th percentile values for primary indicators in the Bow River (Ronalane) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	386	431	70
		winter	448	499	49
	2015-16	open	430	490	7
		winter	470	492	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	228	260	70
		winter	263	291	49
	2015-16	open	240	280	7
		winter	280	286	5
Total Organic Carbon (mg/L)	**1999-2009**	open	3.0	4.8	34
		winter	1.5	2.5	14
	2015-16	open	2.7	3.2	7
		winter	1.7	2.4	5
Total Suspended Solids (mg/L)	**1999-2009**	open	12	72	70
		winter	6	18	49
	2015-16	open	11	32	7
		winter	10	170	5
Turbidity (NTU)	**1999-2009**	open	10.4	73.3	70
		winter	3.8	17.4	49
	2015-16	open	5.9	11.2	7
		winter	5.4	66.8	5
pH	**1999-2009**	open	8.32	8.58	70
		winter	8.06	8.30	49
	2015-16	open	8.42	8.58	7
		winter	8.21	8.30	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	14	77	69
		winter	1	6	49
	2015-16	open	16	421	7
		winter	2	11	5

Table A16: Median and 90th percentile values for secondary indicators in the Bow River (Ronalane)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0325	0.1443	44
		winter	0.0025	0.0025	3
	2015-16	open	0.027	0.041	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0095	0.0354	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0053	0.0241	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0629	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0025	0.0043	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0055	0.0160	44
		winter	0.0025	0.0025	3
	2015-16	open	0.0075	0.0143	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.90	4.24	18
		winter	0.30	0.51	6
	2015-16	open	1.33	2.35	7
		winter	1.04	7.64	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.69	0.94	14
		winter	0.83	1.00	5
	2015-16	open	0.44	0.68	7
		winter	0.70	1.04	5

Table A17: Median and 90th percentile values for primary indicators in the Milk River (Hwy 880)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Total Ammonia (mg/L)	**1999-2009**	open	0.025	0.070	81
		winter	0.040	0.130	31
	2015-16	open	0.025	0.025	7
		winter	0.025	0.057	5
Chloride (mg/L)	**1999-2009**	open	1.3	6.2	81
		winter	8.0	14.3	31
	2015-16	open	2.1	6.8	7
		winter	6.7	8.8	5
Nitrate (mg/L)	**1999-2009**	open	0.031	0.123	81
		winter	0.382	0.807	31
	2015-16	open	0.018	0.065	7
		winter	0.590	0.630	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.32	0.59	78
		winter	0.82	1.22	31
	2015-16	open	0.25	0.61	7
		winter	0.89	1.46	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.006	81
		winter	0.003	0.010	31
	2015-16	open	0.005	0.006	7
		winter	0.008	0.009	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.079	0.193	81
		winter	0.007	0.039	31
	2015-16	open	0.057	0.158	7
		winter	0.011	0.014	5
Sulphate (mg/L)	**1999-2009**	open	22.3	170.0	81
		winter	197.0	316.0	31
	2015-16	open	29	166	7
		winter	160	204	5
Sodium Adsorption Ratio	**1999-2009**	open	0.43	2.26	81
		winter	2.54	3.80	31
	2015-16	open	0.58	2.48	7
		winter	2.03	2.46	5

Table A17: Median and 90th percentile values for primary indicators in the Milk River (Hwy 880) (continued)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Specific Conductance (µS/cm)	**1999-2009**	open	248	733	81
		winter	916	1380	31
	2015-16	open	290	776	7
		winter	830	1112	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	140	488	81
		winter	606	900	31
	2015-16	open	160	476	7
		winter	510	676	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.1	4.2	39
		winter	3.7	4.8	26
	2015-16	open	2.3	2.4	7
		winter	3	3.32	5
Total Suspended Solids (mg/L)	**1999-2009**	open	107	304	81
		winter	3	12	31
	2015-16	open	77	262	7
		winter	9	14	5
Turbidity (NTU)	**1999-2009**	open	60.0	170.0	81
		winter	3.7	17.5	31
	2015-16	open	27.0	94.4	7
		winter	2.7	10.5	5
pH	**1999-2009**	open	8.23	8.43	81
		winter	8.30	8.41	31
	2015-16	open	8.34	8.55	7
		winter	8.39	8.48	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	57	230	79
		winter	1	9	30
	2015-16	open	80	184	7
		winter	6	21	5

Table A18: Median and 90th percentile values for secondary indicators in the Milk River (Hwy 880)

INDICATOR	TIME PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
2,4-D (µg/L)	**1999-2009**	open	0.0025	0.0114	24
		winter			0
	2015-16	open	0.0025	0.0057	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0025	24
		winter			0
	2015-16	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0030	24
		winter			0
	2015-16	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	24
		winter			0
	2015-16	open	0.0025	0.0025	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	2.15	9.50	18
		winter	0.30	0.70	6
	2015-16	open	3.55	10.31	7
		winter	0.71	1.47	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.35	0.89	14
		winter	1.20	1.51	5
	2015-16	open	0.21	0.39	7
		winter	0.67	0.76	5