South Saskatchewan Region
Status of Surface Water Quality

April 2016 – March 2017

Reporting on the Surface Water Quality Management Framework

Alberta Environment and Parks
Environmental Monitoring and Science Division

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Status of Surface Water Quality, South Saskatchewan Region, Alberta for April 2016 – March 2017

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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.

EMSD provides provincial environmental monitoring, evaluation and reporting:

- Based on sound science and evidence.
- Presented in a timely, open and transparent manner.
- That respects and incorporates community and Traditional Ecological Knowledge (TEK) from First Nations and Métis people.

This includes providing the information necessary to understand cumulative effects, and to inform the public, policy makers, regulators, planners, researchers, communities, and industry.

The role of environmental monitoring and science is to provide proactive, objective reporting of scientific data and information on the condition of Alberta's environment, including:

- Baseline environmental monitoring.
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- Data evaluation and management.
- On-going condition of environment reporting in all regions of Alberta.
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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). 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 2016 – 2017.

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 six secondary indicators. In 2016–2017 (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 2016–2017 data were compared to water quality limits as defined in the SSR SWQMF. 2016–2017 data for each primary indicator at each station were compared to historic data 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.

2016–2017 (April 1–March 31) Results

A significant exceedance of the following trigger values occurred:

- The peak sulphate trigger at Bow River (Carseland) during the open water and winter seasons
- The median total dissolved solids trigger at Bow River (Cluny) during the open water and winter seasons
- The peak sulphate trigger at Bow River (Cochrane) during the open water and winter seasons

As defined in the SSR SWQMF, total dissolved solids at Milk River Hwy 880 exceeded water quality limits during the 2016-17 winter season.

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.

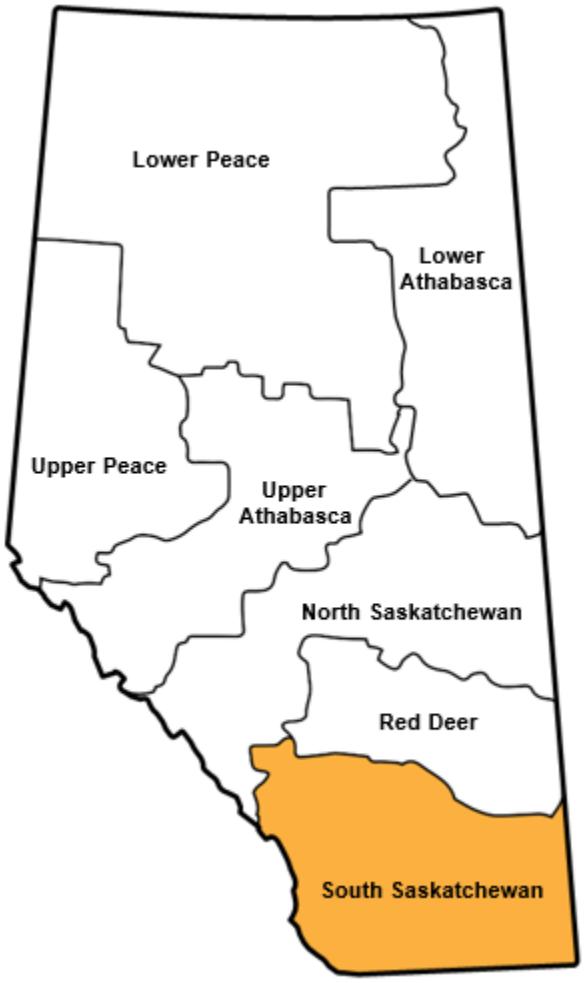

Figure 1: Land Use Frameworks in Alberta

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).

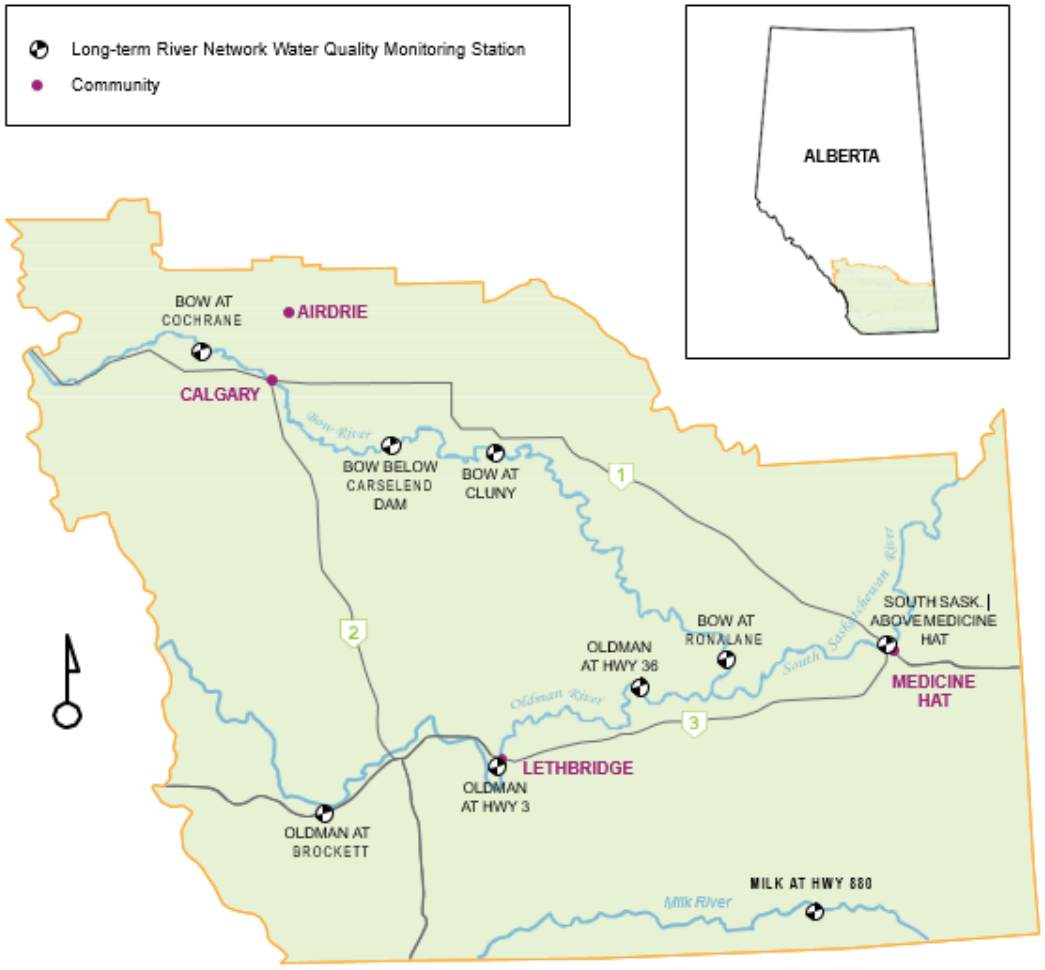

Figure 2: Location of water quality stations in the South Saskatchewan Region

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 2016–2017 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 of 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 2016–2017 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 2016-17 data relative to the historic record. A peak trigger exceedance was reported when the frequency of observations in the 2016-17 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, 2016–2017

Table 3 compares median and 90th percentile values from the 2016-17 data with the historical record (1999-2009) at stations where significant median or peak trigger exceedances occurred. Trigger exceedances during 2016–2017 were observed at three stations for two primary indicators. A significant exceedance of the median trigger value was observed for total dissolved solids at Bow River (Cluny) during both the open and winter seasons. Significant exceedances of peak trigger values were observed for sulphate at the Bow River (Carseland) and Bow River (Cochrane) stations during both the open water and winter seasons. There were no exceedances for any of the other stations or indicators. Summary statistics of 2016–2017 data for the remaining stations and indicators are shown in Appendix A.

Table 3: Median and 90th percentile values for primary indicators exhibiting a statistically significant trigger exceedance (shaded in blue) in the South Saskatchewan Region during 2016–2017

STATION	INDICATOR	PERIOD	SEASON	MEDIAN	90TH PERCENTILE	*n*
Bow River (Carseland)	**Sulphate (mg/L)**	1999-2009 (trigger)	open	42.9	51.5	70
			winter	53.9	58.0	50
		2016-17	open	55.0	60.0	7
			winter	66.0	73.0	5
Bow River (Cluny)	**Total Dissolved Solids (mg/L)**	1999-2009 (trigger)	open	211	245	48
			winter	257	290	32
		2016-17	open	220	234	7
			winter	300	312	5
Bow River (Cochrane)	**Sulphate (mg/L)**	1999-2009 (trigger)	open	33.6	40.4	70
			winter	42.2	45.8	50
		2016-17	open	38.0	45.0	7
			winter	49.0	51.2	5

Exceedances of Water Quality Limits, 2016–2017

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, 2016–2017

The median seasonal concentrations of secondary indicators at each site were compared to chronic guidelines where available. Median concentrations did not exceed chronic guideline values at any of the sites. 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
	2016-17	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
	2016-17	open	1.3	1.6	7
		winter	1.8	2.0	5
Nitrate (mg/L)	**1999-2009**	open	0.078	0.128	91
		winter	0.092	0.132	52
	2016-17	open	0.052	0.079	7
		winter	0.1	0.134	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.23	0.35	70
		winter	0.19	0.32	50
	2016-17	open	0.16	0.302	7
		winter	0.14	0.384	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.006	91
		winter	0.003	0.005	52
	2016-17	open	0.007	0.008	7
		winter	0.002	0.003	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.007	0.018	91
		winter	0.005	0.010	52
	2016-17	open	0.005	0.006	7
		winter	0.005	0.006	5
Sulphate (mg/L)	**1999-2009**	open	22.1	29.4	70
		winter	29.6	36.0	50
	2016-17	open	25.0	30.0	7
		winter	34.0	36.8	5
Sodium Adsorption Ratio	**1999-2009**	open	0.16	0.22	70
		winter	0.18	0.20	50
	2016-17	open	0.18	0.23	7
		winter	0.16	0.18	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
	2016-17	open	280	334	7
		winter	350	350	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	156	181	70
		winter	179	202	50
	2016-17	open	160	188	7
		winter	180	190	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.0	3.7	70
		winter	1.6	2.2	50
	2016-17	open	1.4	1.6	7
		winter	1.4	2.0	5
Total Suspended Solids (mg/L)	**1999-2009**	open	3	10	84
		winter	1	6	47
	2016-17	open	1	2	7
		winter	1	1	5
Turbidity (NTU)	**1999-2009**	open	4.5	18.8	91
		winter	2.3	8.5	52
	2016-17	open	1.7	2.7	7
		winter	1.6	2.8	5
pH	**1999-2009**	open	8.26	8.35	91
		winter	8.26	8.34	52
	2016-17	open	8.28	8.43	7
		winter	8.33	8.34	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	3	14	70
		winter	2	27	49
	2016-17	open	3	8	7
		winter	27	83	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
	2016-17	open	0.0025	0.0106	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0068	39
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0025	39
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0099	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	39
		winter	0.0025	0.0025	4
	2016-17	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
	2016-17	open	0.62	0.82	7
		winter	0.49	0.62	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.52	0.76	14
		winter	0.73	0.85	7
	2016-17	open	0.38	0.52	7
		winter	0.66	0.75	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
	2016-17	open	0.025	0.025	7
		winter	0.053	0.123	5
Chloride (mg/L)	**1999-2009**	open	1.5	3.2	70
		winter	2.1	3.0	50
	2016-17	open	2.1	2.7	7
		winter	2.9	8.9	5
Nitrate (mg/L)	**1999-2009**	open	0.023	0.138	94
		winter	0.219	0.348	52
	2016-17	open	0.027	0.050	7
		winter	0.240	0.266	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.25	0.64	72
		winter	0.40	0.59	50
	2016-17	open	0.21	0.44	7
		winter	0.36	1.08	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.009	93
		winter	0.003	0.006	52
	2016-17	open	0.007	0.008	7
		winter	0.004	0.093	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.012	0.151	94
		winter	0.008	0.022	52
	2016-17	open	0.010	0.024	7
		winter	0.022	0.141	5
Sulphate (mg/L)	**1999-2009**	open	35.8	52.1	70
		winter	45.0	58.0	50
	2016-17	open	42.0	49.6	7
		winter	46.0	56.0	5
Sodium Adsorption Ratio	**1999-2009**	open	0.42	0.59	70
		winter	0.46	0.60	50
	2016-17	open	0.48	0.60	7
		winter	0.43	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
	2016-17	open	330	384	7
		winter	370	404	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	182	224	69
		winter	217	256	50
	2016-17	open	190	208	7
		winter	200	232	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.4	3.9	70
		winter	1.7	2.5	50
	2016-17	open	1.6	2.2	7
		winter	1.2	2.9	5
Total Suspended Solids (mg/L)	**1999-2009**	open	9	189	93
		winter	7	34	52
	2016-17	open	11	26	7
		winter	59	112	5
Turbidity (NTU)	**1999-2009**	open	10.0	153.0	91
		winter	6.3	27.5	52
	2016-17	open	8.7	14.0	7
		winter	30.0	59.6	5
pH	**1999-2009**	open	8.34	8.57	91
		winter	8.20	8.28	52
	2016-17	open	8.40	8.43	7
		winter	8.18	8.20	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	13	71	72
		winter	2	13	48
	2016-17	open	37	64	7
		winter	12	126	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
	2016-17	open	0.0145	0.0185	4
		winter			
Dicamba (µg/L)	1999-2009	open	0.0025	0.0100	46
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	1999-2009	open	0.0025	0.0100	46
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0057	4
		winter			
Mecoprop (µg/L)	1999-2009	open	0.0025	0.0028	46
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0064	4
		winter			
Total Mercury (ng/L)	1999-2009	open	0.30	2.06	18
		winter	0.30	1.35	8
	2016-17	open	1.75	3.24	7
		winter	2.02	7.85	5
Total Recoverable Selenium (µg/L)	1999-2009	open	0.61	0.85	14
		winter	0.90	1.20	7
	2016-17	open	0.60	0.77	7
		winter	0.76	0.85	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
	2016-17	open	0.025	0.025	7
		winter	0.063	0.111	5
Chloride (mg/L)	**1999-2009**	open	4.0	6.1	70
		winter	6.0	8.1	50
	2016-17	open	3.6	5.8	7
		winter	4.7	8.4	5
Nitrate (mg/L)	**1999-2009**	open	0.006	0.140	91
		winter	0.317	0.495	57
	2016-17	open	0.036	0.066	7
		winter	0.290	0.384	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.31	0.75	70
		winter	0.59	0.96	55
	2016-17	open	0.27	0.35	7
		winter	0.60	0.69	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.010	91
		winter	0.003	0.007	57
	2016-17	open	0.008	0.009	7
		winter	0.004	0.008	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.015	0.173	91
		winter	0.009	0.019	57
	2016-17	open	0.019	0.029	7
		winter	0.015	0.027	5
Sulphate (mg/L)	**1999-2009**	open	44.8	61.4	70
		winter	58.1	77.4	50
	2016-17	open	51.0	70.4	7
		winter	48.0	64.0	5
Sodium Adsorption Ratio	**1999-2009**	open	0.56	0.78	70
		winter	0.65	0.80	50
	2016-17	open	0.54	0.74	7
		winter	0.54	0.65	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
	2016-17	open	350	420	7
		winter	390	446	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	200	243	70
		winter	246	296	50
	2016-17	open	210	240	7
		winter	230	246	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.9	4.4	70
		winter	2.2	3.0	55
	2016-17	open	2.1	2.6	7
		winter	1.6	1.7	5
Total Suspended Solids (mg/L)	**1999-2009**	open	11	200	90
		winter	3	17	57
	2016-17	open	21	23	7
		winter	9	67	5
Turbidity (NTU)	**1999-2009**	open	9.9	180.0	91
		winter	4.9	19.9	52
	2016-17	open	11.0	15.0	7
		winter	8.6	28.4	5
pH	**1999-2009**	open	8.37	8.52	91
		winter	8.21	8.33	57
	2016-17	open	8.41	8.50	7
		winter	8.21	8.28	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	14	151	70
		winter	3	17	53
	2016-17	open	12	50	7
		winter	7	43	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
	2016-17	open	0.0655	0.0858	4
		winter			
Dicamba (µg/L)	1999-2009	open	0.0025	0.0117	44
		winter	0.0025	0.0025	4
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	1999-2009	open	0.0025	0.0184	44
		winter	0.0025	0.0025	4
	2016-17	open	0.0095	0.0155	4
		winter			
Mecoprop (µg/L)	1999-2009	open	0.0025	0.0070	44
		winter	0.0025	0.0025	4
	2016-17	open	0.0065	0.0238	4
		winter			
Total Mercury (ng/L)	1999-2009	open	0.43	2.37	18
		winter	0.80	1.73	8
	2016-17	open	1.40	2.01	7
		winter	1.03	2.56	5
Total Recoverable Selenium (µg/L)	1999-2009	open	0.59	1.00	14
		winter	1.12	1.25	7
	2016-17	open	0.54	0.84	7
		winter	0.64	1.00	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
	2016-17	open	0.025	0.056	7
		winter	0.025	0.220	5
Chloride (mg/L)	**1999-2009**	open	6.4	9.8	70
		winter	12.6	19.9	48
	2016-17	open	10.0	12.0	7
		winter	13.0	18.2	5
Nitrate (mg/L)	**1999-2009**	open	0.103	0.497	69
		winter	1.015	1.258	48
	2016-17	open	0.120	0.524	7
		winter	0.890	1.260	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.55	1.01	70
		winter	1.33	1.72	48
	2016-17	open	0.49	0.82	7
		winter	1.40	2.10	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.004	0.009	70
		winter	0.004	0.010	48
	2016-17	open	0.009	0.010	7
		winter	0.005	0.024	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.023	0.098	70
		winter	0.011	0.042	48
	2016-17	open	0.016	0.026	7
		winter	0.014	0.228	5
Sulphate (mg/L)	**1999-2009**	open	56.5	76.9	70
		winter	62.4	77.6	48
	2016-17	open	67.0	83.0	7
		winter	66.0	86.2	5
Sodium Adsorption Ratio	**1999-2009**	open	0.60	0.79	70
		winter	0.59	0.88	48
	2016-17	open	0.63	0.80	7
		winter	0.61	0.76	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
	2016-17	open	400	444	7
		winter	480	538	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	221	252	70
		winter	268	316	48
	2016-17	open	230	252	7
		winter	280	310	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.7	4.0	34
		winter	1.7	3.0	13
	2016-17	open	2.5	2.8	7
		winter	1.4	5.7	5
Total Suspended Solids (mg/L)	**1999-2009**	open	19	105	70
		winter	5	32	48
	2016-17	open	15	43	7
		winter	6	377	5
Turbidity (NTU)	**1999-2009**	open	16.4	80.5	70
		winter	4.0	28.3	48
	2016-17	open	7.4	14.6	7
		winter	4.5	546.8	5
pH	**1999-2009**	open	8.32	8.47	70
		winter	8.14	8.27	48
	2016-17	open	8.40	8.52	7
		winter	8.14	8.24	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	13	99	68
		winter	1	7	48
	2016-17	open	14	24	7
		winter	3	53	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
	2016-17	open	0.024	0.0858	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0170	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0071	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0168	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0132	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0218	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.55	2.61	18
		winter	0.30	0.41	5
	2016-17	open	1.75	3.05	7
		winter	0.73	6.28	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.57	0.85	14
		winter	1.00	1.07	4
	2016-17	open	0.63	0.71	7
		winter	0.78	1.01	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
	2016-17	open	0.025	0.025	7
		winter	0.025	0.025	5
Chloride (mg/L)	**1999-2009**	open	1.9	2.9	70
		winter	2.0	2.6	50
	2016-17	open	2.2	3.0	7
		winter	2.3	4.0	5
Nitrate (mg/L)	**1999-2009**	open	0.074	0.108	69
		winter	0.109	0.130	50
	2016-17	open	0.092	0.118	7
		winter	0.15	0.176	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.18	0.40	70
		winter	0.17	0.23	50
	2016-17	open	0.16	0.23	7
		winter	0.21	0.24	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.002	0.004	35
		winter	0.002	0.004	25
	2016-17	open	0.004	0.008	7
		winter	0.002	0.006	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.005	0.009	35
		winter	0.003	0.006	25
	2016-17	open	0.002	0.006	7
		winter	0.002	0.005	5
Sulphate (mg/L)	**1999-2009**	open	33.6	40.4	70
		winter	42.2	45.8	50
	2016-17	open	38.0	45.0	7
		winter	49.0	51.2	5
Sodium Adsorption Ratio	**1999-2009**	open	0.07	0.12	70
		winter	0.07	0.10	50
	2016-17	open	0.06	0.22	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
	2016-17	open	290	330	7
		winter	360	360	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	165	190	70
		winter	190	200	50
	2016-17	open	160	180	7
		winter	200	200	5
Total Organic Carbon (mg/L)	**1999-2009**	open	1.0	1.6	34
		winter	0.8	0.9	14
	2016-17	open	0.8	1.0	7
		winter	0.3	0.6	5
Total Suspended Solids (mg/L)	**1999-2009**	open	2	8	70
		winter	1	2	50
	2016-17	open	1	4	7
		winter	1	1	5
Turbidity (NTU)	**1999-2009**	open	1.8	10.1	70
		winter	0.8	1.7	50
	2016-17	open	1.1	3.4	7
		winter	0.5	0.7	5
pH	**1999-2009**	open	8.23	8.38	70
		winter	8.17	8.30	50
	2016-17	open	8.30	8.35	7
		winter	8.21	8.31	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	2	13	70
		winter	1	2	49
	2016-17	open	1	5	7
		winter	1	360	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
	2016-17	open	0.0025	0.0176	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0025	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0078	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	0.92	22
		winter	0.34	0.50	10
	2016-17	open	0.40	0.85	7
		winter	0.29	0.34	4
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.50	0.59	18
		winter	0.61	0.80	9
	2016-17	open	0.40	0.59	7
		winter	0.53	0.61	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
	2016-17	open	0.025	0.184	7
		winter	0.17	0.292	5
Chloride (mg/L)	**1999-2009**	open	7.6	13.1	70
		winter	12.7	20.4	50
	2016-17	open	13.0	14.0	7
		winter	22.0	23.0	5
Nitrate (mg/L)	**1999-2009**	open	0.601	0.990	69
		winter	1.130	1.403	50
	2016-17	open	0.810	1.068	7
		winter	1.200	1.520	5
Total Nitrogen (mg/L)	**1999-2009**	open	1.02	1.72	70
		winter	1.68	2.17	50
	2016-17	open	1.20	1.30	7
		winter	1.70	2.04	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.007	0.016	35
		winter	0.017	0.028	25
	2016-17	open	0.010	0.016	7
		winter	0.016	0.027	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.021	0.083	35
		winter	0.030	0.062	25
	2016-17	open	0.015	0.036	7
		winter	0.030	0.052	5
Sulphate (mg/L)	**1999-2009**	open	42.9	51.5	70
		winter	53.9	58.0	50
	2016-17	open	55.0	60.0	7
		winter	66.0	73.0	5
Sodium Adsorption Ratio	**1999-2009**	open	0.30	0.45	70
		winter	0.39	0.58	50
	2016-17	open	0.38	0.44	7
		winter	0.50	0.54	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
	2016-17	open	410	420	7
		winter	500	538	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	201	232	70
		winter	246	260	50
	2016-17	open	220	234	7
		winter	290	306	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.0	3.6	34
		winter	1.5	1.9	14
	2016-17	open	1.8	2.0	7
		winter	1.5	1.8	5
Total Suspended Solids (mg/L)	**1999-2009**	open	6	64	70
		winter	5	14	50
	2016-17	open	3	10	7
		winter	4	15	5
Turbidity (NTU)	**1999-2009**	open	4.0	48.4	70
		winter	2.6	9.3	50
	2016-17	open	1.6	3.9	7
		winter	2.8	5.2	5
pH	**1999-2009**	open	8.20	8.39	70
		winter	8.06	8.20	50
	2016-17	open	8.33	8.43	7
		winter	8.11	8.18	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	28	144	67
		winter	10	25	47
	2016-17	open	4	98	7
		winter	7	15	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
	2016-17	open	0.0110	0.0619	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0100	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0071	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0050	0.0167	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0110	0.0340	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.30	4.81	22
		winter	0.35	0.69	10
	2016-17	open	0.64	1.46	7
		winter	0.84	5.33	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.59	0.88	18
		winter	0.83	0.98	9
	2016-17	open	0.58	0.69	7
		winter	0.72	0.89	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
	2016-17	open	0.025	0.055	7
		winter	0.150	0.246	5
Chloride (mg/L)	**1999-2009**	open	8.0	13.0	71
		winter	13.0	20.9	43
	2016-17	open	12.0	13.4	7
		winter	20.0	27.2	5
Nitrate (mg/L)	**1999-2009**	open	0.520	0.837	59
		winter	1.195	1.455	40
	2016-17	open	0.670	0.880	7
		winter	1.400	1.780	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.94	1.52	71
		winter	1.68	2.07	48
	2016-17	open	0.83	1.38	7
		winter	1.80	2.26	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.005	0.014	35
		winter	0.012	0.020	22
	2016-17	open	0.010	0.013	7
		winter	0.017	0.020	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.017	0.128	35
		winter	0.017	0.025	22
	2016-17	open	0.010	0.015	7
		winter	0.024	0.051	5
Sulphate (mg/L)	**1999-2009**	open	47.9	58.1	48
		winter	57.2	63.1	32
	2016-17	open	58.0	61.8	7
		winter	71.0	78.0	5
Sodium Adsorption Ratio	**1999-2009**	open	0.35	0.58	48
		winter	0.42	0.72	32
	2016-17	open	0.40	0.47	7
		winter	0.53	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
	2016-17	open	370	414	7
		winter	510	550	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	211	245	48
		winter	257	290	32
	2016-17	open	220	234	7
		winter	300	312	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.2	4.3	23
		winter	1.3	1.8	16
	2016-17	open	1.7	2.0	7
		winter	1.4	1.8	5
Total Suspended Solids (mg/L)	**1999-2009**	open	11	80	71
		winter	4	9	48
	2016-17	open	6	8	7
		winter	7	15	5
Turbidity (NTU)	**1999-2009**	open	8.5	62.7	48
		winter	2.8	7.1	32
	2016-17	open	2.4	4.3	7
		winter	2.7	5.2	5
pH	**1999-2009**	open	8.30	8.46	48
		winter	8.00	8.23	37
	2016-17	open	8.40	8.53	7
		winter	8.11	8.26	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	8	56	67
		winter	1	6	48
	2016-17	open	7	23	7
		winter	3	5	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
	2016-17	open	0.00825	0.0266	4
		winter			
Dicamba (µg/L)	1999-2009	open	0.0025	0.0100	32
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	1999-2009	open	0.0025	0.0097	32
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	1999-2009	open	0.0055	0.0209	32
		winter	0.0025	0.0025	3
	2016-17	open	0.0090	0.0201	4
		winter			
Total Mercury (ng/L)	1999-2009	open	0.30	2.53	17
		winter	0.30	0.37	5
	2016-17	open	0.95	1.37	7
		winter	0.64	2.57	5
Total Recoverable Selenium (µg/L)	1999-2009	open	0.70	0.93	10
		winter	0.79	0.82	4
	2016-17	open	0.56	0.71	7
		winter	0.80	0.88	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
	2016-17	open	0.025	0.025	7
		winter	0.099	0.354	5
Chloride (mg/L)	**1999-2009**	open	8.4	12.0	70
		winter	13.0	19.7	49
	2016-17	open	14.0	17.0	7
		winter	20.0	49.8	5
Nitrate (mg/L)	**1999-2009**	open	0.302	0.747	69
		winter	1.190	1.440	49
	2016-17	open	0.091	0.820	7
		winter	1.400	1.520	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.68	1.26	70
		winter	1.58	1.91	49
	2016-17	open	0.41	1.14	7
		winter	2.00	2.10	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.005	0.010	35
		winter	0.005	0.017	24
	2016-17	open	0.007	0.010	7
		winter	0.008	0.028	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.025	0.138	35
		winter	0.012	0.027	24
	2016-17	open	0.010	0.020	7
		winter	0.015	0.110	5
Sulphate (mg/L)	**1999-2009**	open	62.2	78.2	70
		winter	60.9	70.5	49
	2016-17	open	73.0	84.6	7
		winter	75.0	85.4	5
Sodium Adsorption Ratio	**1999-2009**	open	0.55	0.80	70
		winter	0.48	0.67	49
	2016-17	open	0.65	0.73	7
		winter	0.53	1.21	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
	2016-17	open	420	454	7
		winter	560	570	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	228	260	70
		winter	263	291	49
	2016-17	open	250	264	7
		winter	310	338	5
Total Organic Carbon (mg/L)	**1999-2009**	open	3.0	4.8	34
		winter	1.5	2.5	14
	2016-17	open	2.4	3.1	7
		winter	1.6	4.0	5
Total Suspended Solids (mg/L)	**1999-2009**	open	12	72	70
		winter	6	18	49
	2016-17	open	7	29	7
		winter	3	102	5
Turbidity (NTU)	**1999-2009**	open	10.4	73.3	70
		winter	3.8	17.4	49
	2016-17	open	2.2	9.6	7
		winter	3.3	51.2	5
pH	**1999-2009**	open	8.32	8.58	70
		winter	8.06	8.30	49
	2016-17	open	8.50	8.61	7
		winter	8.11	8.21	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	14	77	69
		winter	1	6	49
	2016-17	open	6	78	7
		winter	3	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
	2016-17	open	0.0260	0.0771	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0095	0.0354	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0260	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0629	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0025	0.0057	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0055	0.0160	44
		winter	0.0025	0.0025	3
	2016-17	open	0.0070	0.0325	4
		winter			
Total Mercury (ng/L)	**1999-2009**	open	0.90	4.24	18
		winter	0.30	0.51	6
	2016-17	open	1.28	2.18	7
		winter	0.78	4.83	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.69	0.94	14
		winter	0.83	1.00	5
	2016-17	open	0.61	0.69	7
		winter	0.87	0.94	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
	2016-17	open	0.025	0.054	7
		winter	0.072	0.133	5
Chloride (mg/L)	**1999-2009**	open	1.3	6.2	81
		winter	8.0	14.3	31
	2016-17	open	1.4	4.2	7
		winter	9.1	13.6	5
Nitrate (mg/L)	**1999-2009**	open	0.031	0.123	81
		winter	0.382	0.807	31
	2016-17	open	0.031	0.058	7
		winter	0.300	0.618	5
Total Nitrogen (mg/L)	**1999-2009**	open	0.32	0.59	78
		winter	0.82	1.22	31
	2016-17	open	0.32	0.43	7
		winter	0.63	1.90	5
Total Dissolved Phosphorus (mg/L)	**1999-2009**	open	0.003	0.006	81
		winter	0.003	0.010	31
	2016-17	open	0.008	0.023	7
		winter	0.004	0.097	5
Total Phosphorus (mg/L)	**1999-2009**	open	0.079	0.193	81
		winter	0.007	0.039	31
	2016-17	open	0.059	0.114	7
		winter	0.009	0.204	5
Sulphate (mg/L)	**1999-2009**	open	22.3	170.0	81
		winter	197.0	316.0	31
	2016-17	open	22.0	107.8	7
		winter	180.0	344.0	5
Sodium Adsorption Ratio	**1999-2009**	open	0.43	2.26	81
		winter	2.54	3.80	31
	2016-17	open	0.42	1.65	7
		winter	2.89	3.60	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
	2016-17	open	240	540	7
		winter	840	1360	5
Total Dissolved Solids (mg/L)	**1999-2009**	open	140	488	81
		winter	606	900	31
	2016-17	open	130	320	7
		winter	510	910	5
Total Organic Carbon (mg/L)	**1999-2009**	open	2.1	4.2	39
		winter	3.7	4.8	26
	2016-17	open	1.3	2.2	7
		winter	4.3	13.2	5
Total Suspended Solids (mg/L)	**1999-2009**	open	107	304	81
		winter	3	12	31
	2016-17	open	95	178	7
		winter	6	181	5
Turbidity (NTU)	**1999-2009**	open	60.0	170.0	81
		winter	3.7	17.5	31
	2016-17	open	33.0	67.0	7
		winter	5.1	46.4	5
pH	**1999-2009**	open	8.23	8.43	81
		winter	8.30	8.41	31
	2016-17	open	8.21	8.40	7
		winter	8.32	8.43	5
Escherichia coli (cfu/100ml)	**1999-2009**	open	57	230	79
		winter	1	9	30
	2016-17	open	45	164	7
		winter	2	5	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
	2016-17	open	0.00375	0.012	4
		winter			
Dicamba (µg/L)	**1999-2009**	open	0.0025	0.0025	24
		winter			0
	2016-17	open	0.0025	0.0025	4
		winter			
MCPA (µg/L)	**1999-2009**	open	0.0025	0.0030	24
		winter			0
	2016-17	open	0.0025	0.0025	4
		winter			
Mecoprop (µg/L)	**1999-2009**	open	0.0025	0.0025	24
		winter			0
	2016-17	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
	2016-17	open	3.91	7.30	7
		winter	0.97	7.41	5
Total Recoverable Selenium (µg/L)	**1999-2009**	open	0.35	0.89	14
		winter	1.20	1.51	5
	2016-17	open	0.21	0.59	7
		winter	0.90	1.71	5