WWF-CANADA

Watershed Report

South Saskatchewan River Watershed

July 2020

SOUTH SASKATCHEWAN RIVER HEALTH ASSESSMENT

CONTENTS

WWF-Canada Freshwater Health Assessment for the South Saskatchewan River Basin

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

SUMMARY

OVERALL RIVER HEALTH SCORING

			Sub-Basin				*Basin*
	Indicator		**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Overall River Health	*Hydrology*	***Hydrology Health Category***	Good	Fair	Good	Fair	Fair
		Hydrology Score	4	3	4	3	3
	Water Quality	***Water Quality Health Category***	Good	Very Good	Fair	Good	Good
		Water Quality Health Score	4	5	3	4	4
	Benthic Macro-Invertebrates	***Benthic Health Category***	Data deficient	Very Good	Data deficient	Data deficient	Data deficient
		Benthic Health Score	0	5	0	0	0
	Fish	***Fish Health Category***	Good	Good	Good	Good	Good
		Fish Health Score	4	4	4	4	4
	Total Score		12	17	11	11	11
	Total Available Score		15	20	15	15	15
	Percentage of Maximum Score		80.0%	85.0%	73.3%	73.3%	73.3%
	Overall Health Category		**Good**	**Very Good**	**Good**	**Good**	**Good**

OVERALL DATA SUFFICIENCY SCORING

			Sub-Basin				*Basin*
	Indicator		**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Overall Data Sufficiency	*Hydrology*	Data Sufficiency Category	Partially Sufficient	Moderately Sufficient	Partially Sufficient	Moderately Sufficient	Moderately Sufficient
		Data Sufficiency Score	1	2	1	2	2
	Water Quality	Data Sufficiency Category	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient
		Data Sufficiency Score	1	1	1	1	1
	Benthic Macro-Invertebrates	Data Sufficiency Category	Insufficient	Partially Sufficient	Insufficient	Insufficient	Insufficient
		Data Sufficiency Score	0	1	0	0	0
	Fish	Data Sufficiency Category	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient
		Data Sufficiency Score	1	1	1	1	1
	Total Score		3	5	3	4	4
	Total Available Score		12	12	12	12	12
	Percentage of Maximum Score		25.0%	41.7%	25.0%	33.3%	33.3%
	Overall Data Sufficiency Category		**Partially Sufficient**	**Partially Sufficient**	**Partially Sufficient**	**Partially Sufficient**	Partially Sufficient

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HYDROLOGY

OVERALL HYDROLOGY RIVER HEALTH SCORING

	Indicator			Sub-Basin				*Basin*
				05A - Upper South Saskatchewan	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Hydrology	**Long-Term Trends in Monthly Flow**	Average percentage change in median monthly flow, measured as the relative change in median monthly flow per year, reported as an average across studied stations and weighted by the median annual flow per station.	*Period of Study*	1902-2018	1908-2018	1911-2018	1908-2018	1910-2018
			Number of Stations	9	9	3	2	23
			Value	0.34	0.3	0.44	0.96	0.39
			Health Category	**Good**	**Good**	**Good**	**Good**	**Good**
			Health Score	4	4	4	4	4
	Recent-Term Trends in Monthly Flow	Average percentage change in median monthly flow, measured as the relative change in median monthly flow per year, reported as an average across studied stations and weighted by the median annual flow per station.	*Period of Study*	1997-2018	1999-2018	1989-2018	1980-2018	1980-2018
			Number of Stations	53	19	39	13	124
			Value	0.36	0.62	0.09	0.36	0.31
			Health Category	**Good**	**Good**	**Very Good**	**Good**	**Good**
			Health Score	4	4	5	4	4
	Long-Term Trends in Annual Flow	Average percentage change in median annual flow, reported as an average across studied stations and weighted by the median annual flow per station.	*Period of Study*	1911-2018	1914-2018	1913-2018	1910-2018	1910-2018
			Number of Stations	4	2	3	1	10
			Value	0.03	0.08	0.00	0.00	0.03
			Health Category	**Very Good**	**Very Good**	**Very Good**	**Very Good**	**Very Good**
			Health Score	5	5	5	5	5
	Pre- vs. Post-Dam or Recent vs. Historical Analsis of Monthly Flow	Percentage of total months, for all stations analyzed, with significantly different variance in monthly flow pre- vs. post-dam operation or for historical vs. Recent time periods in undammed systems.	*Period of Study*	Various	Various	Various	Various	Various
			Number of Stations	9	7	4	2	22
			Value	81.9%	73.1%	80.5%	91.6%	79.7%
			Health Category	**Very Poor**	**Very Poor**	**Very Poor**	**Very Poor**	**Very Poor**
			Health Score	1	1	1	1	1
		Percentage change in median monthly flow pre-and post-dam or for historical vs. Recent time periods in undammed systems, averaged across studied stations by mean annual flow.	*Period of Study*	Various	Various	Various	Various	Various
			Number of Stations	5	2	3	1	11
			Value	25%	33%	38%	131%	39%
			Health Category	**Good**	**Fair**	**Fair**	**Very Poor**	**Fair**
			Health Score	4	3	3	1	3
	Hydrology Score		*Total Score*	18	17	18	15	17
			Maximum Available Score	25	25	25	25	25
			Percentage of Maximum Score	72.0%	68.0%	72.0%	60.0%	68.0%
			Hydrology Health Category	**Good**	**Fair**	**Good**	**Fair**	**Fair**
			Hydrology Score	4	3	4	3	3

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HYDROLOGY DATA SUFFICIENCY

Data Sufficiency Indicator	Sub-Basin				Basin
	05A - Upper South Saskatchewan	05B - Bow River	05C - Red Deer	05H - Lower South Saskatchewan	
Total number of sub-sub-basins	10	13	10	8	41
Total number of dams (>10m)	21	16	11	9	57
Year of earliest dam operation	1948	1911	1948	1929	1911
Year of earliest available continuous flow monitoring	1902	1908	1911	1908	1910
Number of monitoring stations available for earliest, continuous flow monitoring	1	2	1	1	5
Number of sub-sub-basins with monitoring stations	1	2	1	1	5
Number of monitoring stations on river downstream of dams	0	0	0	0	0
Data Sufficiency Category	Insufficient	Partially Sufficient	Insufficient	Insufficient	Partially Sufficient
Year of long-term continuous flow monitoring	1911	1911	1960	1955	1950
Number of monitoring stations available for continuous flow monitoring analysis	15	15	10	4	44
Number of sub-sub-basins with monitoring stations	6	8	5	3	22
Number of monitoring stations on river downstream of dams	1	1	0	1	0
Data Sufficiency Category	Partially Sufficient	Moderately Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient
Year of widespread, continuous flow monitoring	1997	1999	1989	1980	1984
Number of monitoring stations available for continuous flow monitoring analysis	53	19	39	13	124
Number of sub-sub-basins with monitoring stations	8	13	9	7	37
Number of monitoring stations on river downstream of dams	2	1	0	1	4
Data Sufficiency Category	Partially Sufficient	Moderately Sufficient	Partially Sufficient	Moderately Sufficient	Moderately Sufficient
Overall Data Sufficiency Category	Partially Sufficient	Moderately Sufficient	Partially Sufficient	Moderately Sufficient	Moderately Sufficient
Data Sufficiency Score	1	2	1	2	2

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MAP. RESULTS OF A SERIES OF TREND ANALYSES OF MEDIAN MONTHLY FLOW IN THE SOUTH SASKATCHEWAN RIVER BASIN.

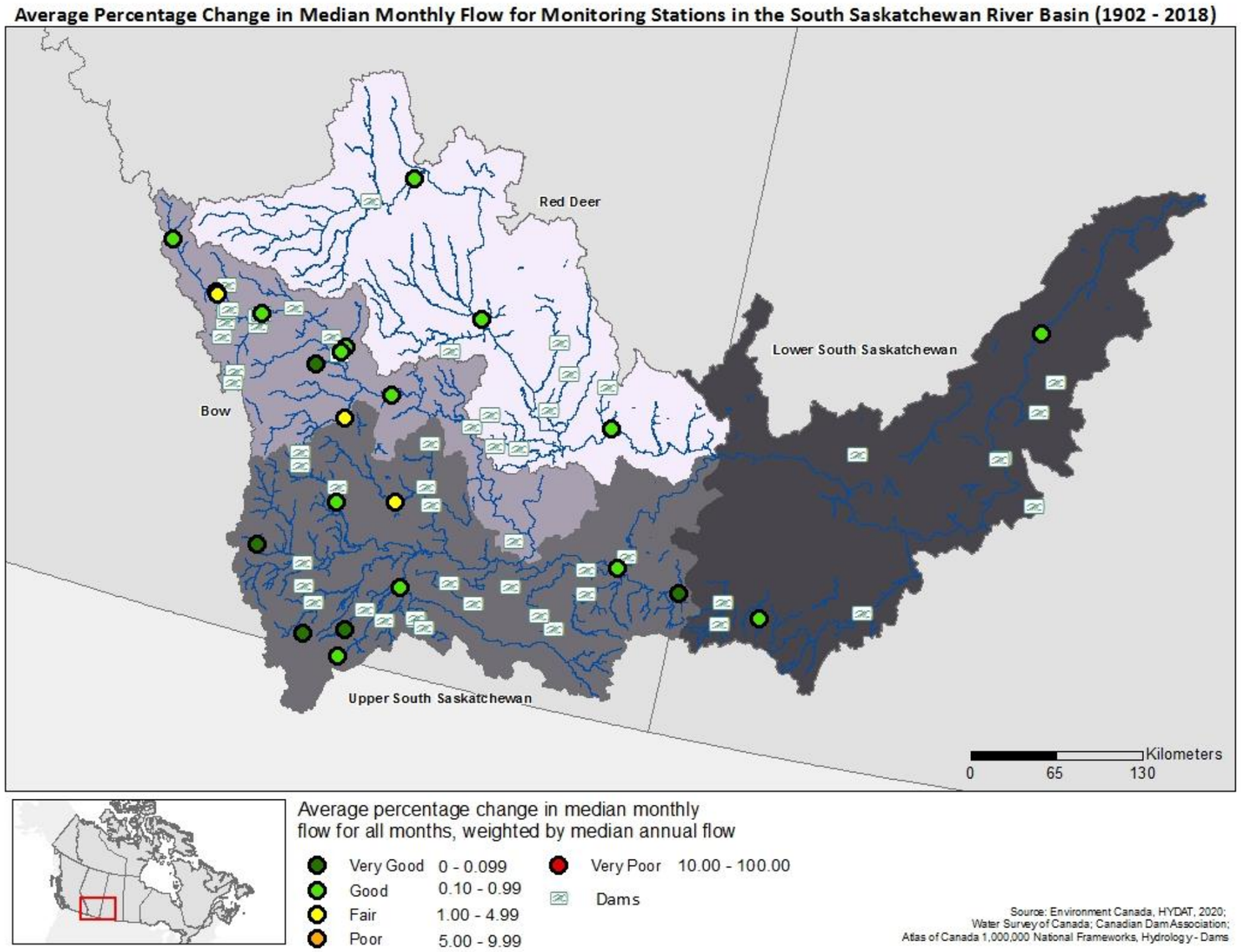

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TABLE. RESULTS OF LONG-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE UPPER-SOUTH SASKATCHEWAN RIVER SUB-BASIN.

	05A - Upper South Saskatchewan															
	05AA008				05AB021				05AC003				05AD005			
	Start Year for Analysis		1910		Start Year for Analysis		1908		Start Year for Analysis		1918		Start Year for Analysis		1911	
	Median Annual Flow (m^3/s)		2.7		Median Annual Flow (m^3/s)		1.3		Median Annual Flow (m^3/s)		1.2		Median Annual Flow (m^3/s)		4.0	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.60	1.4		0.01	0.00 ***	0.5	1.07	0.02	0.00 ***	0.61	3.48	0.00	0.87	1.8	
February	0.00	0.78	1.3		0.01	0.00 **	0.7	0.89	0.02	0.00 ***	0.73	2.21	0.00	0.20	1.7	
March	0.00	0.37	1.5		0.01	0.05	1.2		0.01	0.03 *	1.59	0.57	0.00	0.19	2.0	
April	-0.01	0.14	3.6		-0.03	0.01 **	3.2	0.94	0.00	0.70	2.05		0.00	0.75	5.1	
May	-0.06	0.02 *	13.6	0.44	-0.07	0.00 **	6.6	1.02	0.02	0.00 ***	1.91	0.93	-0.03	0.23	20.0	
June	-0.04	0.13	14.4		-0.02	0.51	8.7		0.03	0.00 ***	2.36	1.40	-0.01	0.70	29.0	
July	-0.02	0.07	6.9		0.02	0.18	4.1		0.03	0.00 ***	1.86	1.52	-0.03	0.13	15.6	
August	-0.01	0.07	3.6		0.02	0.01 **	1.8	0.96	0.03	0.00 ***	1.46	2.03	-0.02	0.01 *	6.7	0.31
September	-0.01	0.12	2.8		0.01	0.07	1.7		0.02	0.00 ***	1.43	1.66	-0.02	0.01 **	4.4	0.36
October	0.00	0.31	2.6		0.00	0.58	1.4		0.01	0.00 ***	1.22	1.17	-0.01	0.10	4.5	
November	0.00	0.48	2.2		0.00	0.29	0.9		0.01	0.00 ***	0.93	1.31	0.00	0.84	3.6	
December	0.00	0.20	1.6		0.00	0.06	0.6		0.02	0.00 ***	0.71	2.42	0.00	0.60	2.4	
Average for all months, for each station	-0.01		4.64	0.04	0.00		2.62	0.41	0.02		1.41	1.56	-0.01		8.05	0.06

	05AE002				05AE006				05AE027				05AH001			
	Start Year for Analysis		1909		Start Year for Analysis		1911		Start Year for Analysis		1902		Start Year for Analysis		1911	
	Median Annual Flow (m^3/s)		0.7		Median Annual Flow (m^3/s)		6.9		Median Annual Flow (m^3/s)		10.7		Median Annual Flow (m^3/s)		0.00	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.94	0.3		-0.01	0.31	4.2		0.00	0.49	4.2		0.00	0.25	0.0	
February	0.00	0.62	0.3		-0.01	0.40	4.2		-0.01	0.07	4.2		0.00	0.02 *	0.1	0.00
March	0.00	0.81	0.8		-0.02	0.11	7.0		-0.01	0.30	5.1		0.00	0.74	0.1	
April	-0.01	0.15	2.2		-0.11	0.00 ***	12.1	0.89	-0.03	0.09	11.9		0.00	0.00 ***	0.2	0.37
May	-0.01	0.12	4.7		-0.34	0.00 ***	27.1	1.25	-0.16	0.00 ***	43.2	0.37	0.00	0.08	0.1	
June	0.00	0.81	4.4		-0.42	0.00 ***	47.4	0.90	-0.29	0.00 **	69.9	0.42	0.00	0.33	0.0	
July	0.00	0.33	1.6		-0.02	0.52	18.1		-0.11	0.00 **	35.5	0.32	0.00	0.92	0.0	
August	0.00	0.06	0.6		0.05	0.00 **	7.8	0.58	-0.06	0.00 ***	16.0	0.40	0.00	0.95	0.0	
September	0.00	0.18	0.7		0.04	0.00 ***	8.0	0.49	-0.05	0.00 ***	12.8	0.41	0.00	0.51	0.0	
October	0.00	0.78	0.7		0.01	0.60	9.2		-0.05	0.00 ***	11.7	0.44	0.00	0.79	0.0	
November	0.00	0.82	0.5		-0.04	0.01 **	9.0	0.43	-0.02	0.14	9.4		0.00	0.75	0.0	
December	0.00	0.70	0.3		-0.01	0.15	5.3		-0.01	0.05 *	5.5	0.20	-	-	-	
Average for all months, for each station	0.00		1.43	0.00	-0.07		13.27	0.38	-0.07		19.10	0.21	0.00		0.05	0.03

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	05AJ001				
	Start Year for Analysis			1911	
	Median Annual Flow (m^3/s)			115.7	
Month	Theil-Sen Slope	Mann-Kendall p-value		Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.24	0.00	***	72.1	0.33
February	0.35	0.00	***	77.2	0.45
March	0.36	0.00	***	102.4	0.35
April	-0.56	0.01	**	159.9	0.35
May	-2.28	0.00	***	286.4	0.80
June	-2.72	0.00	**	553.5	0.49
July	-2.25	0.00	***	297.2	0.76
August	-0.78	0.00	**	144.9	0.54
September	-0.18	0.33		115.1	
October	0.03	0.84		110.7	
November	0.13	0.31		100.5	
December	0.17	0.03	*	75.4	0.23
Average for all months, for each station	-0.63			174.61	0.36
Average percentage change in median monthly flow for all months, weighted by median annual flow				0.34	

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

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TABLE. RESULTS OF LONG-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE BOW RIVER SUB-BASIN.

	05B - Bow River															
	05BA001				05BB001				05BC001				05BE004			
	Start Year for Analysis		1910		Start Year for Analysis		1909		Start Year for Analysis		1910		Start Year for Analysis		1923	
	Median Annual Flow (m^3/s)		9.8		Median Annual Flow (m^3/s)		18.1		Median Annual Flow (m^3/s)		4.4		Median Annual Flow (m^3/s)		54.9	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.86	1.7		0.01	0.03 *	9.0	0.09	-0.03	0.00 ***	2.5	1.29	0.43	0.00 ***	46.9	0.91
February	0.00	0.88	1.5		0.01	0.03 *	8.2	0.09	-0.03	0.00 ***	2.3	1.22	0.40	0.00 ***	45.2	0.88
March	0.00	0.57	1.4		0.01	0.00 ***	7.7	0.14	-0.03	0.00 ***	2.5	1.13	0.42	0.00 ***	42.9	0.98
April	0.02	0.03 *	2.5	0.73	0.00	0.93	9.9		-0.03	0.00 ***	2.9	1.01	0.33	0.00 ***	41.9	0.79
May	0.03	0.27	9.6		-0.10	0.08	42.2		-0.12	0.00 ***	8.2	1.42	-0.11	0.45	80.5	
June	-0.03	0.67	27.7		-0.11	0.27	122.0		-0.39	0.00 ***	21.1	1.83	-0.82	0.01 **	193.4	0.42
July	-0.10	0.01 **	29.9	0.35	-0.24	0.00 **	103.0	0.23	-0.30	0.00 ***	16.6	1.82	-0.79	0.00 ***	157.5	0.50
August	-0.11	0.00 **	22.3	0.49	-0.18	0.00 ***	64.0	0.28	-0.19	0.00 ***	10.3	1.84	-0.38	0.00 ***	104.6	0.36
September	-0.01	0.76	10.4		-0.07	0.00 **	37.4	0.18	-0.13	0.00 ***	7.2	1.73	-0.13	0.06	73.0	
October	0.00	0.69	5.1		-0.01	0.59	23.2		-0.08	0.00 ***	5.0	1.63	0.18	0.00 ***	54.7	0.34
November	0.01	0.11	3.0		0.01	0.53	14.4		-0.05	0.00 ***	3.6	1.49	0.29	0.00 ***	48.8	0.59
December	-0.01	0.16	2.2		0.01	0.06	10.5		-0.04	0.00 ***	2.8	1.44	0.36	0.00 ***	47.4	0.77
Average for all months, for each station	-0.02		9.78	0.13	-0.06		37.64	0.08	-0.12		7.10	1.49	0.02		78.07	0.54

	05BH004				05BJ001				05BK001				05BL015			
	Start Year for Analysis		1911		Start Year for Analysis		1908		Start Year for Analysis		1908		Start Year for Analysis		1910	
	Median Annual Flow (m^3/s)		63.2		Median Annual Flow (m^3/s)		4.3		Median Annual Flow (m^3/s)		0.5		Median Annual Flow (m^3/s)		0.4	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.28	0.00 ***	47.5	0.60	-0.01	0.00 ***	2.1	0.65	0.00	0.54	0.1		0.01	0.00 ***	0.4	1.78
February	0.30	0.00 ***	46.9	0.65	-0.02	0.00 ***	2.2	0.71	0.00	0.73	0.1		0.01	0.00 ***	0.4	1.68
March	0.30	0.00 ***	46.5	0.65	-0.02	0.00 ***	2.3	0.75	0.00	0.49	0.3		0.01	0.00 ***	0.3	2.27
April	0.22	0.00 ***	55.3	0.39	-0.03	0.00 ***	4.4	0.74	-0.01	0.16	1.2		0.01	0.00 ***	0.3	2.17
May	0.03	0.71	89.8		-0.05	0.02 *	11.4	0.42	0.00	0.77	1.5		0.01	0.00 ***	0.9	1.63
June	-0.90	0.00 ***	215.3	0.42	-0.05	0.11	23.2		0.00	0.52	1.8		0.02	0.00 ***	1.1	1.41
July	-0.83	0.00 ***	181.0	0.46	-0.07	0.00 ***	12.4	0.54	0.00	0.99	1.1		0.02	0.00 ***	1.0	1.83
August	-0.48	0.00 ***	119.9	0.40	-0.05	0.00 ***	7.3	0.70	0.00	0.95	0.4		0.01	0.00 ***	0.8	1.41
September	-0.20	0.00 ***	85.5	0.23	-0.04	0.00 ***	6.3	0.66	0.00	0.56	0.4		0.01	0.00 ***	0.6	1.41
October	0.01	0.85	63.1		-0.03	0.00 ***	5.3	0.60	0.00	0.80	0.4		0.01	0.00 ***	0.5	1.20
November	0.15	0.00 ***	52.3	0.28	-0.02	0.00 ***	3.9	0.47	0.00	0.14	0.3		0.01	0.00 ***	0.4	1.84
December	0.25	0.00 ***	47.7	0.53	-0.02	0.00 ***	2.6	0.67	0.00	0.58	0.1		0.01	0.00 ***	0.4	1.69
Average for all months, for each station	-0.07		87.58	0.38	-0.03		6.95	0.58	0.00		0.64	0.00	0.01		0.60	1.69

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	05BM002			
	Start Year for Analysis		1910	
	Median Annual Flow (m^3/s)		102.6	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	4.84	0.33	62.0	
February	5.22	0.23	60.3	
March	0.19	0.40	79.8	
April	0.04	0.72	75.9	
May	-0.87	0.02 *	123.7	0.70
June	-0.72	0.44	261.1	
July	-1.00	0.04 *	171.3	0.58
August	-0.50	0.07	106.9	
September	-0.22	0.23	79.3	
October	-0.10	0.61	77.8	
November	0.10	0.79	72.5	
December	-0.95	0.63	63.7	
Average for all months, for each station	0.50		102.86	0.11
Average percentage change in median monthly flow for all months, weighted by median annual flow			0.30	

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

TABLE. RESULTS OF LONG-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE RED DEER RIVER SUB-BASIN.

	05C - Red Deer River											
	05CC002				05CE001				05CK001			
	Start Year for Analysis		1912		Start Year for Analysis		1915		Start Year for Analysis		1911	
	Median Annual Flow (m^3/s)		28.0		Median Annual Flow (m^3/s)		35.1		Median Annual Flow (m^3/s)		0.01	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.11	0.00 ***	11.4	0.93	0.18	0.00 ***	12.8	1.38	-	-	-	
February	0.12	0.00 ***	11.5	1.00	0.19	0.00 ***	13.2	1.47	0.00	0.13	0.01	
March	0.14	0.00 ***	15.4	0.90	0.24	0.00 ***	25.7	0.93	0.00	0.11	0.01	
April	0.10	0.21	49.9		-0.11	0.60	83.0		0.00	0.00 **	0.13	0.14
May	-0.20	0.05 *	69.0	0.29	-0.18	0.23	73.0		0.00	0.00 **	0.04	0.29
June	-0.33	0.07	109.6		-0.40	0.21	115.6		0.00	0.04 *	0.01	0.79
July	-0.18	0.15	86.6		-0.10	0.60	91.0		0.00	0.03 *	0.01	0.63
August	-0.15	0.02 *	54.3	0.28	-0.11	0.33	54.7		0.00	0.01 *	0.01	1.38
September	-0.06	0.19	42.7		0.08	0.37	41.5		0.00	0.00 **	0.01	1.36
October	-0.01	0.86	30.7		0.08	0.13	31.4		0.00	0.00 **	0.01	1.22
November	0.06	0.03 *	18.6	0.31	0.16	0.00 ***	18.1	0.85	0.00	0.00 **	0.01	2.93
December	0.10	0.00 ***	12.4	0.77	0.16	0.00 ***	13.3	1.24	-	-	-	
Average for all months, for each station	-0.03		42.67	0.37	0.02		47.78	0.49	0.00		0.02	0.87
Average percentage change in median monthly flow for all months, weighted by median annual flow								0.44				

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

TABLE. RESULTS OF LONG-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE LOWER-SOUTH SASKATCHEWAN RIVER SUB-BASIN.

	05H - Lower South Saskatchewan							
	05HA003				05HG001			
	Start Year for Analysis		1908		Start Year for Analysis		1911	
	Median Annual Flow (m^3/s)		0.19		Median Annual Flow (m^3/s)		181.3	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.48	0.1		2.46	0.00 ***	169.8	1.45
February	0.00	0.01 **	0.3	0.88	2.47	0.00 ***	162.5	1.52
March	0.00	0.02 *	0.5	0.82	1.53	0.00 ***	146.0	1.05
April	-0.01	0.01 **	1.0	0.62	-1.91	0.00 ***	243.2	0.79
May	0.00	0.48	0.6		-2.67	0.00 ***	292.5	0.91
June	0.00	0.29	0.3		-6.86	0.00 ***	519.6	1.32
July	0.00	0.91	0.1		-4.46	0.00 ***	413.7	1.08
August	0.00	0.66	0.1		-1.67	0.00 ***	217.7	0.77
September	0.00	0.99	0.1		-0.84	0.00 **	183.8	0.45
October	0.00	0.80	0.1		0.14	0.62	170.3	
November	0.00	0.51	0.2		1.46	0.00 ***	163.7	0.89
December	NA	NA	0.1		2.04	0.00 ***	158.6	1.28
Average for all months, for each station	0.00		0.30	0.21	-0.69		236.79	0.96
Average percentage change in median monthly flow for all months, weighted by median annual flow						0.96		

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

MAP. RESULTS OF A SERIES OF TREND ANALYSES OF MEDIAN MONTHLY FLOW IN THE SOUTH SASKATCHEWAN RIVER BASIN FOR THE PERIOD >1980 TO 2018.

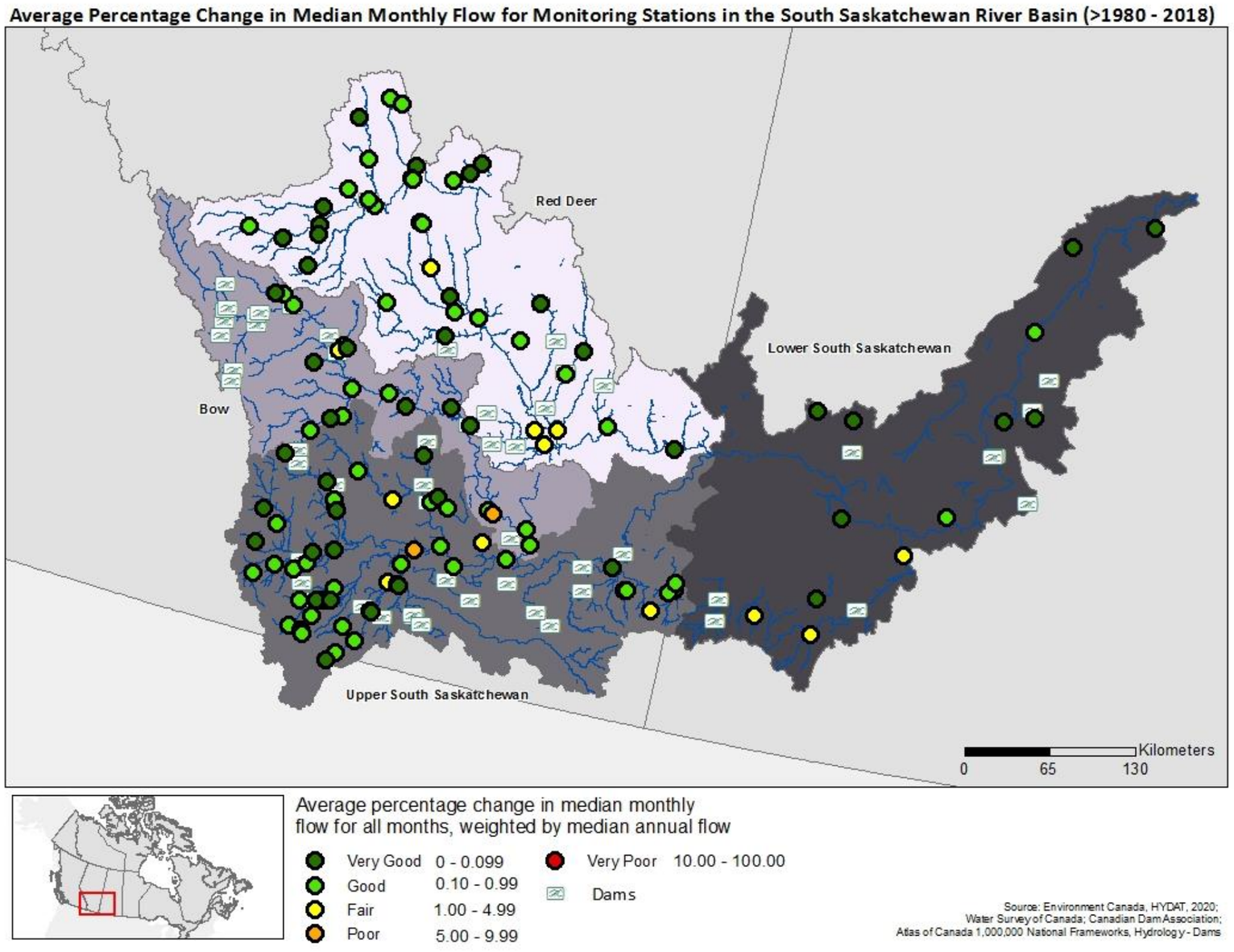

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TABLE. RESULTS OF RECENT-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE UPPER-SOUTH SASKATCHEWANRIVER SUB-BASIN.

	05A - Upper South Saskatchewan																	
	05AA004					05AA008				05AA022				05AA024				
	Start Year for Analysis			1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		
	Median Annual Flow (m^3/s)			0.5		Median Annual Flow (m^3/s)		2.5		Median Annual Flow (m^3/s)		5.2		Median Annual Flow (m^3/s)		20.0		
Month	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-	-		0.02	0.13	1.5		0.08	0.03 *	3.1	2.75	0.10	0.17	9.4	
February	-0.02	0.08		0.3		0.02	0.15	1.4		0.04	0.24	2.8		0.03	0.38	9.6	
March	0.00	0.59		0.3		0.02	0.13	1.6		0.08	0.07	4.4		0.02	0.76	10.4	
April	0.02	0.22		0.8		0.11	0.05 *	3.2	3.25	0.38	0.14	10.8		0.24	0.24	20.4	
May	0.06	0.08		2.4		0.48	0.05 *	12.1	3.97	0.92	0.16	43.6		2.34	0.09	71.8	
June	-0.05	0.41		3.5		-0.08	0.76	14.0		-0.54	0.45	52.4		-0.16	0.95	111.7	
July	-0.01	0.69		0.7		-0.03	0.71	6.1		-0.08	0.69	15.8		0.39	0.40	54.1	
August	0.00	0.69		0.3		-0.01	0.82	3.2		0.00	0.98	5.9		0.17	0.67	37.4	
September	0.01	0.09		0.3		0.01	0.78	2.7		0.04	0.41	4.7		-0.20	0.47	31.1	
October	0.01	0.01 *		0.4	3.77	0.04	0.11	2.6		0.07	0.19	5.9		0.24	0.04 *	16.7	1.43
November	0.04	NA		0.2		0.04	0.26	2.3		0.12	0.07	6.1		0.33	0.09	16.7	
December	-	-	-	-		0.03	0.23	1.7		0.10	0.10	3.8		0.04	0.63	10.2	
Average for all months, for each station	0.01			0.92	0.42	0.05		4.37	0.60	0.10		13.26	0.23	0.29		33.30	0.12

	05AA027					05AA028				05AA030				05AA909				
	Start Year for Analysis			1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		
	Median Annual Flow (m^3/s)			1.4		Median Annual Flow (m^3/s)		4.2		Median Annual Flow (m^3/s)		0.6		Median Annual Flow (m^3/s)		0.3		
Month	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-	-		-	- -	-		-	- -	-		-	- -	-	
February	-	-	-	-		0.04	0.24	1.7		-	- -	-		-	- -	-	
March	0.05	0.59		1.4		0.05	0.02 *	1.8	2.70	-0.01	0.47	0.4		0.01	0.77	0.2	
April	0.04	0.35		1.6		0.06	0.40	4.4		0.01	0.10	0.5		0.00	0.72	0.3	
May	0.19	0.16		8.6		0.40	0.13	22.4		0.05	0.11	1.3		0.01	0.27	0.5	
June	-0.12	0.53		7.9		-0.47	0.37	33.7		-0.02	0.45	1.6		0.01	0.67	1.2	
July	0.00	0.67		1.9		-0.07	0.50	9.6		0.00	0.80	0.8		0.01	0.24	0.4	
August	0.00	0.93		0.9		-0.01	0.74	3.7		0.00	0.46	0.6		0.00	0.48	0.2	
September	0.00	0.57		0.8		0.00	0.93	2.7		0.00	0.43	0.6		0.00	0.21	0.2	
October	0.01	0.24		0.9		0.02	0.57	3.1		0.00	0.46	0.5		0.00	0.02 *	0.2	2.35
November	0.30	NA		0.9		-0.03	1.00	3.5		0.00	0.40	0.5		-0.01	NA	0.2	
December	-	-	-	-		-	- -	-		-0.01	0.08	0.4		-	- -	-	
Average for all months, for each station	0.05			2.76	0.00	0.00		8.65	0.27	0.00		0.72	0.00	0.00		0.37	0.29

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	05AB005					05AB013					05AB019					05AB021				
	Start Year for Analysis			1997		Start Year for Analysis			1997		Start Year for Analysis			1997		Start Year for Analysis			1997	
	Median Annual Flow (m^3/s)			0.6		Median Annual Flow (m^3/s)			0.2		Median Annual Flow (m^3/s)			10.3		Median Annual Flow (m^3/s)			1.5	
Month	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-	-		-	-	-	-		-	-	-	-		0.02	0.09		0.7	
February	-0.01	0.63		0.2		-0.02	1.00		0.2		-	-	-	-		0.01	0.57		0.7	
March	0.01	0.07		0.3		0.00	0.18		0.1		0.00	NaN		0.0		0.04	0.09		1.3	
April	0.01	0.11		0.5		0.01	0.22		0.2		0.00	1.00		0.6		0.12	0.02	*	2.2	5.25
May	0.03	0.05	*	1.0	3.21	0.01	0.07		0.3		-0.20	0.52		11.4		0.13	0.02	*	3.6	3.52
June	-0.02	0.83		3.1		0.00	0.83		1.2		0.44	0.21		15.1		0.03	0.79		10.6	
July	0.04	0.38		1.8		0.00	0.72		0.6		0.02	0.98		26.6		0.14	0.05		4.8	
August	0.02	0.33		0.7		0.00	0.57		0.2		0.08	0.71		15.7		0.07	0.04	*	2.6	2.85
September	0.01	0.38		0.6		0.00	0.45		0.2		-0.33	0.06		11.5		0.07	0.12		2.8	
October	0.01	0.26		0.4		0.00	0.20		0.1		0.00	0.43		0.1		0.03	0.16		1.7	
November	0.00	0.82		0.2		0.00	1.00		0.1		0.00	NaN		0.0		0.01	0.83		1.1	
December	-	-	-	-		-	-	-	-		-	-	-	-		0.02	0.16		0.8	
Average for all months, for each station	0.01			0.89	0.32	0.00			0.32	0.00	0.00			8.99	0.00	0.06			2.75	0.97

	05AB029					05AB040					05AB041					05AC003				
	Start Year for Analysis			1997		Start Year for Analysis			1997		Start Year for Analysis			1997		Start Year for Analysis			1997	
	Median Annual Flow (m^3/s)			0.10		Median Annual Flow (m^3/s)			0.29		Median Annual Flow (m^3/s)			1.9		Median Annual Flow (m^3/s)			1.6	
Month	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall	p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-	-		-	-	-	-		-	-	-	-		0.07	0.00	**	1.1	6.21
February	0.00	0.33		0.0		0.00	NA		0.1		NA	NA		0.8		0.05	0.01	**	1.1	4.76
March	0.00	0.26		0.1		0.00	0.59		0.1		0.01	0.35		0.9		0.05	0.03	*	1.5	3.19
April	0.00	0.16		0.1		0.00	0.65		0.2		0.03	0.63		2.2		0.03	0.34		2.2	
May	0.01	0.17		0.2		0.01	0.49		1.0		0.16	0.09		4.6		0.03	0.30		2.5	
June	0.00	0.83		0.5		-0.01	0.49		1.8		0.01	0.95		11.3		0.00	1.00		4.2	
July	0.00	0.98		0.3		0.00	0.63		0.5		0.08	0.55		3.7		0.06	0.13		2.9	
August	0.00	0.74		0.1		0.00	0.93		0.3		0.02	0.69		1.9		0.07	0.11		2.5	
September	0.00	0.48		0.1		0.00	0.45		0.3		0.02	0.26		2.0		0.01	0.76		2.3	
October	0.00	0.53		0.1		0.00	0.25		0.2		0.02	0.36		1.4		0.05	0.14		1.8	
November	0.00	0.33		0.0		0.01	NA		0.2		0.01	NA		0.8		0.03	0.06		1.3	
December	-	-	-	-		-	-	-	-		-	-	-	-		0.05	0.04	*	1.1	4.46
Average for all months, for each station	0.00			0.15	0.00	0.00			0.46	0.00	0.04			2.95	0.00	0.04			2.03	1.55

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	05AC012				05AC017				05AC023				05AC030			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		1.5		Median Annual Flow (m^3/s)		3.4		Median Annual Flow (m^3/s)		2.8		Median Annual Flow (m^3/s)		0.03	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.02	0.08	0.7		-	- -	-		-	- -	-		0.00	0.72	0.0	
February	0.01	0.23	0.8		-	- -	-		NA	NA	-		0.00	0.05	0.0	
March	0.02	0.23	0.8		0.00	NaN	0.0		-	-	-		0.01	0.07	0.2	
April	0.04	0.01 **	1.2	3.01	0.00	NaN	0.0		0.06	0.33	0.9		0.00	0.65	0.2	
May	0.05	0.01 **	1.7	3.17	-0.13	0.29	3.8		0.08	0.00 **	1.5	3.63	0.00	0.12	0.1	
June	0.07	0.26	3.1		0.01	0.98	5.1		0.06	0.40	2.4		0.00	0.90	0.1	
July	0.04	0.43	2.2		-0.02	0.98	8.7		0.07	0.25	4.3		0.00	0.67	0.0	
August	0.05	0.04 *	1.8	2.54	0.00	0.98	4.7		0.11	0.01 **	3.3	1.97	0.00	0.86	0.0	
September	0.03	0.34	2.0		-0.04	0.49	3.5		0.07	0.13	3.2		0.00	0.94	0.0	
October	0.02	0.28	1.4		0.00	NaN	0.0		0.01	0.57	3.3		0.00	0.57	0.0	
November	0.00	0.63	0.8		0.00	NaN	0.0		0.01	1.00	1.7		NA	NA	0.0	
December	0.00	0.82	0.8		-	- -	-		-	- -	-		-	- -	-	
Average for all months, for each station	0.03		1.45	0.73	-0.02		2.87	0.00	0.06		2.58	0.70	0.00		0.07	0.00

	05AC031				05AC902				05AD003				05AD005			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		1.12		Median Annual Flow (m^3/s)		12.5		Median Annual Flow (m^3/s)		6.4		Median Annual Flow (m^3/s)		3.7	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	- -	-		-	- -	-		0.05	0.36	3.8		0.00	0.90	1.9	
February	-0.80	NA	0.4		-	-	-		0.02	0.63	3.4		0.02	0.31	1.6	
March	0.02	0.11	0.5		0.00	NaN	0.0		0.09	0.13	4.0		-0.01	0.72	2.1	
April	0.03	0.07	0.9		0.00	NaN	0.0		0.07	0.72	8.7		0.02	0.92	4.7	
May	0.04	0.02 *	1.7	2.50	0.01	0.93	10.3		0.52	0.40	39.0		0.40	0.21	18.1	
June	0.01	0.61	2.7		-0.06	0.88	15.2		-0.14	0.92	67.7		-0.17	0.80	30.4	
July	0.01	0.74	1.9		-0.80	0.02 *	30.6	2.63	0.01	0.95	28.6		0.00	1.00	14.6	
August	0.00	0.79	1.2		-0.27	0.16	16.5		0.06	0.82	9.3		0.02	0.87	5.8	
September	0.00	0.98	1.0		-0.06	0.76	12.3		0.02	0.87	5.7		-0.02	0.77	3.7	
October	0.01	0.57	0.4		0.00	0.56	0.5		0.00	1.00	6.1		0.03	0.58	3.9	
November	0.00	0.75	0.1		-	- -	-		0.20	0.09	7.5		0.02	0.67	3.6	
December	-	- -	-		-	-	-		0.14	0.03 *	4.9	2.93	0.02	0.48	2.4	
Average for all months, for each station	-0.07		1.08	0.28	-0.15		10.68	0.44	0.09		15.72	0.24	0.03		7.72	0.00

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	05AD007				05AD010				05AD013				05AD017			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		33.8		Median Annual Flow (m^3/s)		1.0		Median Annual Flow (m^3/s)		0.63		Median Annual Flow (m^3/s)		0.39	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.19	0.31	19.6		0.01	0.05	0.6		-	- -	-		-	- -	-	
February	0.12	0.48	21.8		0.01	0.18	0.4		-	-	-		-	-	-	
March	0.66	0.09	31.8		0.01	0.21	0.6		0.00	NaN	0.0		0.00	0.37	0.0	
April	1.41	0.04 *	49.9	2.83	0.05	0.07	1.4		0.00	NaN	0.0		0.00	0.03 *	0.0	0.00
May	4.40	0.05 *	105.3	4.18	0.28	0.03 *	6.5	4.31	0.00	0.45	0.5		-0.03	0.01 *	0.6	4.91
June	-1.76	0.82	230.2		-0.04	0.82	10.4		0.04	0.39	1.6		-0.01	0.76	0.7	
July	0.35	0.78	71.6		0.02	0.56	2.9		0.04	0.31	3.4		0.02	0.37	1.6	
August	0.08	0.96	41.7		0.02	0.50	1.4		-0.03	0.05 *	1.8	1.65	-0.01	0.37	1.4	
September	0.12	0.71	39.8		0.02	0.16	1.1		-0.03	0.11	1.1		0.00	0.80	0.6	
October	0.31	0.57	39.9		0.04	0.01 *	1.2	3.66	0.00	0.96	0.0		0.00	0.00 **	0.1	0.00
November	0.30	0.40	37.9		0.03	0.11	1.0		0.00	NaN	0.0		0.00	0.00 **	0.0	0.00
December	-0.06	0.89	23.3		0.03	0.10	0.7		-	- -	-		0.00	NaN	0.0	
Average for all months, for each station	0.51		59.41	0.58	0.04		2.37	0.66	0.00		0.93	0.28	0.00		0.51	0.55

	05AD021				05AD027				05AD028				05AD035			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		13.6		Median Annual Flow (m^3/s)		11.8		Median Annual Flow (m^3/s)		5.2		Median Annual Flow (m^3/s)		0.05	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	- -	-		-	- -	-		0.06	0.48	4.6		-	- -	-	
February	0.00	NaN	0.0		0.00	NaN	0.0		0.03	0.42	4.4		-0.05	1.00	0.3	
March	0.00	NaN	0.0		0.00	NaN	0.0		0.12	0.09	4.9		0.00	0.25	0.1	
April	0.00	0.24	4.9		0.00	0.77	3.2		0.09	0.42	7.7		0.00	0.01 *	0.1	4.12
May	-0.29	0.83	35.8		-0.35	0.40	24.5		0.31	0.13	12.8		0.00	0.00 **	0.1	3.54
June	-0.63	0.41	46.6		-0.15	0.67	33.2		0.22	0.92	44.1		0.01	0.08	0.2	
July	-0.43	0.17	31.2		-0.43	0.11	25.5		0.19	0.36	12.4		0.00	0.09	0.0	
August	0.27	0.10	15.8		0.24	0.11	14.1		0.16	0.03 *	5.5	2.86	0.00	0.08	0.0	
September	0.25	0.13	12.5		0.33	0.00 **	12.0	0.00	0.09	0.14	5.0		0.00	0.02 *	0.0	3.43
October	0.00	0.62	0.8		0.00	0.17	0.7		0.24	0.02 *	6.5	3.60	0.00	0.36	0.1	
November	0.00	NaN	0.0		0.00	NaN	0.0		0.34	0.04 *	8.5	3.99	0.00	NA	0.0	
December	-	- -	-		-	- -	-		0.14	0.14	6.0		-	- -	-	
Average for all months, for each station	-0.08		14.77	0.00	-0.04		11.33	0.00	0.17		10.20	0.87	0.00		0.11	1.23

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	05AD037				05AD041				05AE002				05AE005			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		0.40		Median Annual Flow (m^3/s)		2.8		Median Annual Flow (m^3/s)		0.57		Median Annual Flow (m^3/s)		0.13	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		0.02	0.49	1.8		0.01	0.04 *	0.3	3.86	-	-	-	
February	-	-	-		0.01	0.57	1.7		0.00	1.00	0.3		-0.03	0.33	0.1	
March	-	-	-		0.05	0.08	2.6		0.00	0.97	0.7		0.00	0.67	0.2	
April	0.01	0.75	0.2		0.05	0.57	3.9		0.02	0.38	1.5		0.01	0.06	0.3	
May	-0.03	0.00 ***	0.4	9.82	0.06	0.38	6.8		0.08	0.14	3.5		0.01	0.05 *	0.4	2.36
June	-0.04	0.00 ***	0.4	9.90	-0.11	0.74	19.3		0.01	0.97	4.8		0.00	0.63	0.4	
July	-0.05	0.00 ***	0.5	10.88	-0.02	0.67	5.3		0.02	0.67	1.6		0.00	0.50	0.1	
August	-0.05	0.00 ***	0.4	11.75	0.02	0.45	3.3		0.01	0.50	0.6		0.00	0.27	0.1	
September	-0.05	0.00 ***	0.4	11.59	0.02	0.59	2.7		0.01	0.48	0.6		0.00	0.87	0.1	
October	0.00	0.17	0.1		0.11	0.12	4.1		0.01	0.21	0.5		0.00	0.47	0.1	
November	0.00	NaN	0.0		0.10	0.10	4.1		0.01	0.42	0.4		-0.02	0.33	0.0	
December	-	- -	-		0.02	0.57	2.4		0.01	0.44	0.3		-	-	-	
Average for all months, for each station	-0.03		0.30	7.70	0.03		4.84	0.00	0.02		1.25	0.32	0.00		0.18	0.24

	05AE006				05AE016				05AE021				05AE026			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		6.0		Median Annual Flow (m^3/s)		0.6		Median Annual Flow (m^3/s)		0.6		Median Annual Flow (m^3/s)		31.6	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.09	0.06	4.0		-	- -	-		-	-	-		-	-	-	
February	0.04	0.25	4.5		-	-	-		-	-	-		-	-	-	
March	0.16	0.04 *	5.9	2.65	-	-	-		0.00	NaN	0.0		0.00	NaN	0.0	
April	0.20	0.05 *	7.9	2.51	0.02	0.33	0.3		0.00	NaN	0.0		0.00	0.38	0.8	
May	0.22	0.03 *	13.8	1.57	0.00	0.82	0.5		0.00	0.48	0.4		0.23	0.74	39.7	
June	0.32	0.65	40.6		-0.01	0.65	0.9		0.00	0.50	0.7		0.72	0.34	46.6	
July	0.17	0.38	17.0		0.00	1.00	0.7		-0.01	0.89	1.5		-0.80	0.31	56.5	
August	0.13	0.03 *	7.7	1.73	-0.01	0.45	0.7		-0.02	0.14	1.0		-0.39	0.32	43.3	
September	0.05	0.49	8.2		0.00	0.69	0.5		0.00	0.78	0.7		0.32	0.69	34.2	
October	0.12	0.14	9.1		0.01	0.54	0.6		0.00	0.16	0.0		0.00	0.02 *	2.3	0.00
November	0.03	0.74	7.7		0.00	0.54	0.3		0.00	NaN	0.0		0.00	NaN	0.0	
December	0.04	0.41	6.0		NA	NA	0.1		-	-	-		NA	NA	0.0	
Average for all months, for each station	0.13		11.04	0.71	0.00		0.51	0.00	0.00		0.48	0.00	0.01		22.33	0.00

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	05AE027				05AE029				05AG003				05AG006			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		9.1		Median Annual Flow (m^3/s)		11.3		Median Annual Flow (m^3/s)		0.7		Median Annual Flow (m^3/s)		39.4	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.06	0.26	4.1		-	-	-		-	- -	-		0.38	0.03 *	22.4	1.69
February	0.08	0.18	4.0		0.00	NaN	0.0		-	- -	-		0.26	0.40	24.0	
March	0.17	0.03 *	5.4	3.21	0.00	0.81	1.4		-	-	-		0.66	0.21	33.1	
April	0.45	0.08	11.0		-0.06	0.57	9.2		0.08	0.63	1.0		1.79	0.04 *	53.2	3.37
May	1.07	0.09	37.8		-0.24	0.07	13.6		0.00	0.78	0.4		4.80	0.03 *	105.5	4.55
June	0.26	0.65	63.3		-0.03	0.28	14.9		-0.02	0.11	0.8		-2.14	0.82	243.1	
July	-0.17	0.32	32.5		-0.02	0.33	15.0		-0.04	0.01 *	0.7	5.18	0.30	0.96	81.9	
August	-0.11	0.50	12.7		-0.01	0.67	15.5		-0.03	0.05 *	0.8	3.93	0.15	0.61	50.2	
September	-0.10	0.40	9.2		-0.12	0.18	7.6		-0.03	0.20	1.0		0.20	0.78	49.0	
October	-0.01	0.96	9.3		0.00	0.82	0.0		0.00	0.69	0.5		0.57	0.28	44.9	
November	0.28	0.09	10.1		0.00	NaN	0.0		NA	NA	0.2		0.32	0.32	38.8	
December	0.14	0.16	5.8		-	-	-		-	-	-		0.03	0.91	24.3	
Average for all months, for each station	0.18		17.11	0.27	-0.05		7.72	0.00	-0.01		0.68	1.30	0.61		64.18	0.80

	05AG026				05AH001				05AH002				05AH005			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		0.03		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.04		Median Annual Flow (m^3/s)		0.9	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		0.00	0.80	0.0		0.00	1.00	0.1		0.00	0.48	0.0	
February	-	-	-		0.00	0.67	0.0		0.00	0.31	0.0		0.00	0.10	0.0	
March	-	-	-		0.00	0.14	0.1		0.01	0.01 *	0.2	4.88	0.00	0.43	0.3	
April	0.00	0.33	0.00		0.00	0.01 **	0.1	1.04	0.01	0.00 **	0.4	3.33	0.00	0.63	1.0	
May	0.00	0.03 *	0.02	1.60	0.00	0.31	0.1		0.00	0.08	0.5		0.02	0.54	1.0	
June	0.00	0.07	0.03		0.00	0.76	0.0		0.00	0.35	0.3		0.00	0.80	1.3	
July	0.00	0.02 *	0.04	0.51	0.00	0.42	0.0		0.00	0.54	0.1		0.00	0.73	1.2	
August	0.00	0.16	0.04		0.00	0.75	0.0		0.00	0.23	0.0		0.00	0.78	1.1	
September	0.00	0.10	0.04		0.00	0.30	0.0		0.00	0.19	0.0		0.00	0.96	1.1	
October	0.00	0.02 *	0.00	4.37	0.00	0.21	0.0		0.00	0.06	0.0		0.00	0.59	0.3	
November	0.00	1.00	0.00		-0.01	0.54	0.0		-0.31	NA	0.2		-0.05	NA	0.1	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.02	0.81	0.00		0.03	0.09	-0.03		0.16	0.82	0.00		0.68	0.00

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

	05AH037				05AH043				05AH044				05AH050			
	Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997		Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		0.01		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.04	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.51	0.1		0.00	1.00	0.0		0.00	1.00	0.1		0.00	0.13	0.1	
February	0.00	0.45	0.0		0.00	0.33	0.0		0.00	0.82	0.0		0.00	0.69	0.1	
March	0.00	0.16	0.1		0.00	0.01 **	0.0	8.38	0.00	0.26	0.1		0.00	0.14	0.4	
April	0.01	0.00 **	0.3	1.93	0.00	0.00 ***	0.0	2.39	0.00	0.03 *	0.0	2.85	0.01	0.01 *	0.5	1.48
May	0.00	0.06	0.2		0.00	0.35	0.0		0.00	0.63	0.0		0.00	0.19	0.5	
June	0.00	0.28	0.1		0.00	0.59	0.0		0.00	0.39	0.0		0.00	0.93	0.6	
July	0.00	0.88	0.0		0.00	0.47	0.0		0.00	0.42	0.0		0.00	1.00	0.2	
August	0.00	0.57	0.0		0.00	0.68	0.0		0.00	0.75	0.0		0.00	0.69	0.0	
September	0.00	0.29	0.0		0.00	0.28	0.0		0.00	NaN	0.0		0.00	0.23	0.0	
October	0.00	0.29	0.0		0.00	0.45	0.0		0.00	NaN	0.0		0.00	0.06	0.0	
November	-	-	-		0.00	NA	0.0		-	-	-		-	-	-	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.07	0.19	0.00		0.01	1.20	0.00		0.02	0.36	0.00		0.25	0.15

	05AJ001			
	Start Year for Analysis		1997	
	Median Annual Flow (m^3/s)		104.0	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.32	0.78	78.7	
February	-0.05	0.91	85.5	
March	-0.36	0.76	106.4	
April	4.73	0.06	131.2	
May	8.21	0.01 **	176.2	4.66
June	-7.90	0.61	507.0	
July	-1.41	0.80	201.3	
August	1.59	0.50	118.1	
September	0.91	0.55	119.8	
October	2.57	0.11	119.2	
November	0.20	0.61	105.2	
December	-0.19	0.87	80.7	
Average for all months, for each station	0.72		152.45	0.39
Average percentage change in median monthly flow for all months, weighted by median annual flow			0.36	

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

TABLE. RESULTS OF RECENT-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE BOW RIVER SUB-BASIN.

	05B - Bow River															
	05BE999				05BG006				05BG010				05BH004			
	Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999	
	Median Annual Flow (m^3/s)		66.6		Median Annual Flow (m^3/s)		1.3		Median Annual Flow (m^3/s)		3.0		Median Annual Flow (m^3/s)		63.9	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-0.50	0.16	57.7		0.02	0.01 *	0.5	4.57	0.03	0.09	2.3		0.17	0.46	53.1	
February	-0.60	0.03 *	58.3	1.03	0.01	0.03 *	0.4	2.98	0.02	0.15	2.0		0.11	0.56	54.7	
March	0.05	0.74	57.6		0.00	0.72	0.5		0.02	0.17	1.8		0.31	0.31	54.5	
April	0.58	0.05 *	62.5	0.93	-0.02	0.10	0.9		0.01	0.63	1.8		0.96	0.04 *	60.3	1.58
May	2.18	0.02 *	93.6	2.33	0.06	0.30	3.0		0.02	0.38	2.1		2.97	0.00 **	88.3	3.36
June	2.78	0.35	194.5		0.08	0.65	6.8		0.15	0.42	5.0		2.83	0.36	186.6	
July	-0.91	0.63	161.0		-0.02	0.75	3.7		0.10	0.38	5.1		-0.84	0.56	151.9	
August	-0.56	0.41	104.3		0.01	0.82	2.4		0.07	0.18	4.9		-0.74	0.52	99.0	
September	-0.50	0.20	81.0		-0.01	0.87	2.3		0.05	0.26	4.6		-0.63	0.18	77.0	
October	-0.29	0.59	66.3		0.02	0.58	1.6		0.05	0.22	3.9		-0.48	0.36	63.3	
November	-0.68	0.04 *	60.2	1.13	0.00	0.82	0.9		0.03	0.23	3.4		-0.57	0.16	57.8	
December	-1.13	0.01 *	58.3	1.94	0.01	0.50	0.6		0.03	0.46	2.9		-1.00	0.06	54.8	
Average for all months, for each station	0.03		87.95	0.61	0.01		1.98	0.63	0.05		3.33	0.00	0.26		83.43	0.41

	05BJ001				05BK001				05BL007				05BL015			
	Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999	
	Median Annual Flow (m^3/s)		3.7		Median Annual Flow (m^3/s)		0.5		Median Annual Flow (m^3/s)		4.6		Median Annual Flow (m^3/s)		0.8	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.04	0.01 *	2.1	2.14	-	-	-		-	-	-		0.01	0.09	0.7	
February	0.05	0.00 **	2.0	2.55	NA	NA	0.0		0.00	1.00	0.1		0.01	0.14	0.6	
March	0.06	0.00 ***	2.1	2.89	0.00	0.54	0.3		0.01	0.31	0.4		0.01	0.19	0.7	
April	0.07	0.35	3.7		0.01	0.54	1.0		0.05	0.01 **	0.8	6.30	0.01	0.21	0.7	
May	0.49	0.01 **	9.6	5.08	0.02	0.21	1.6		0.03	0.11	1.2		0.02	0.72	2.5	
June	0.03	0.92	24.8		-0.01	0.97	2.4		0.00	0.90	2.1		0.04	0.46	2.5	
July	-0.14	0.54	10.0		0.02	0.19	0.8		0.01	0.72	0.6		0.03	0.50	1.9	
August	0.04	0.90	5.8		0.01	0.44	0.4		0.00	0.87	0.4		0.03	0.06	1.3	
September	0.09	0.35	5.3		0.00	0.92	0.4		0.00	0.67	0.4		0.04	0.06	1.1	
October	0.16	0.16	5.0		0.00	0.72	0.4		0.01	0.52	0.4		0.03	0.00 **	0.8	3.52
November	-0.02	0.75	4.1		0.01	NA	0.4		0.00	0.59	0.2		0.01	0.21	0.7	
December	0.05	0.05 *	2.3	2.11	-	-	-		-	-	-		0.01	0.30	0.7	
Average for all months, for each station	0.08		6.41	1.23	0.01		0.78	0.00	0.01		0.67	0.63	0.02		1.17	0.29

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

	05BL024				05BL025				05BM002				05BM008			
	Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999	
	Median Annual Flow (m^3/s)		8.1		Median Annual Flow (m^3/s)		0.6		Median Annual Flow (m^3/s)		94.7		Median Annual Flow (m^3/s)		1.3	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.06	0.14	3.0		-	-	-		-	-	-		-	-	-	
February	0.07	0.10	2.6		-	-	-		-	-	-		NA	NA	0.0	
March	0.06	0.40	4.5		0.00	NaN	0.0		1.24	0.33	75.6		0.00	0.72	0.5	
April	0.30	0.10	10.9		0.00	0.22	0.0		1.49	0.03 *	76.0	1.96	0.01	0.35	1.4	
May	1.69	0.01 **	34.3	4.92	-0.03	0.11	0.9		5.86	0.00 ***	105.3	5.57	0.00	0.92	1.2	
June	-0.40	0.63	74.8		-0.02	0.58	1.0		-0.09	0.97	267.4		0.00	0.90	1.8	
July	-0.10	0.80	24.4		-0.02	0.42	1.0		-0.33	0.97	152.5		0.01	0.40	1.6	
August	0.03	0.92	12.7		-0.02	0.17	0.8		0.57	0.67	95.4		0.02	0.42	2.0	
September	-0.01	0.92	12.5		-0.01	0.50	0.6		0.86	0.58	82.2		0.00	0.87	1.6	
October	0.08	0.75	9.8		0.00	0.05	0.0		1.32	0.14	80.4		0.00	0.87	0.2	
November	0.11	0.35	6.0		NA	NA	0.0		-0.43	0.63	73.0		NA	NA	0.0	
December	0.01	0.63	3.7		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.16		16.60	0.41	-0.01		0.47	0.00	1.16		111.98	0.84	0.01		1.04	0.00

	05BM014				05BM015				05BM020				05BN002			
	Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999	
	Median Annual Flow (m^3/s)		0.07		Median Annual Flow (m^3/s)		6.4		Median Annual Flow (m^3/s)		20.2		Median Annual Flow (m^3/s)		2.2	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.61	0.0		-	-	-		-	-	-		-	-	-	
February	0.00	0.10	0.0		-	-	-		-	-	-		-	-	-	
March	0.00	0.65	0.4		-	-	-		NA	NA	0.0		-	-	-	
April	0.01	0.35	0.9		0.00	0.10	0.3		-0.33	0.26	12.9		0.08	0.33	0.5	
May	0.00	0.72	0.3		0.05	0.67	6.8		0.91	0.14	29.6		0.06	0.18	1.3	
June	0.00	0.58	0.3		-0.06	0.70	9.9		-0.12	0.95	36.7		-0.02	0.72	2.3	
July	0.00	0.72	0.1		-0.26	0.22	14.4		-0.99	0.26	55.7		-0.03	0.35	2.6	
August	0.00	0.87	0.1		-0.15	0.33	10.7		-0.12	0.63	30.8		-0.07	0.04 *	2.8	2.59
September	0.00	0.65	0.1		-0.16	0.21	7.5		-0.25	0.44	19.6		0.03	0.31	2.2	
October	0.00	0.47	0.1		0.00	NaN	0.0		0.00	0.64	4.0		0.00	0.92	1.6	
November	0.00	0.33	0.0		0.00	NaN	0.0		0.00	0.17	1.0		0.00	NA	0.1	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.20	0.00	-0.07		6.20	0.00	-0.11		21.14	0.00	0.01		1.67	0.32

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	05BN006				05BN008				05BN012			
	Start Year for Analysis		1999		Start Year for Analysis		1999		Start Year for Analysis		1999	
	Median Annual Flow (m^3/s)		1.2		Median Annual Flow (m^3/s)		0.1		Median Annual Flow (m^3/s)		66.0	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		0.40	0.58	55.4	
February	-	-	-		-	-	-		-0.18	0.50	59.3	
March	NA	NA	0.0		-	-	-		-0.45	0.16	71.0	
April	0.00	0.11	0.1		0.00	0.33	0.0		2.04	0.04 *	69.6	2.93
May	0.04	0.11	1.0		0.00	0.00 ***	0.1	5.04	5.07	0.01 *	75.1	6.75
June	-0.01	0.28	1.3		-0.01	0.00 ***	0.1	12.56	1.63	0.80	242.8	
July	-0.07	0.00 ***	1.9	3.69	-0.02	0.00 ***	0.1	16.46	0.01	1.00	108.7	
August	-0.05	0.02 *	1.5	2.99	-0.02	0.00 ***	0.1	16.32	0.66	0.60	70.7	
September	-0.02	0.19	1.2		-0.01	0.00 ***	0.1	15.15	0.54	0.82	70.0	
October	0.00	0.28	0.2		0.00	0.82	0.0		1.28	0.23	75.9	
November	NA	NA	0.0		NA	NA	0.0		-0.43	0.54	67.6	
December	-	-	-		-	-	-		-0.70	0.13	54.6	
Average for all months, for each station	-0.01		0.80	0.74	-0.01		0.06	9.36	0.82		85.04	0.81
Average percentage change in median monthly flow for all months, weighted by median annual flow			0.62									

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

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TABLE. RESULTS OF RECENT-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE RED DEER RIVER SUB-BASIN.

	05C - Red Deer															
	05CA002				05CA004				05CA009				05CA011			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		3.4		Median Annual Flow (m^3/s)		13.5		Median Annual Flow (m^3/s)		10.7		Median Annual Flow (m^3/s)		0.6	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		-0.01	0.85	5.4		-	-	-	
February	0.00	0.92	1.0		-	-	-		-0.02	0.45	5.3		NA	NA	0.2	
March	0.00	0.64	1.1		0.00	0.95	2.9		0.03	0.25	5.3		-0.01	0.30	0.5	
April	-0.05	0.10	3.0		0.01	0.45	3.1		-0.03	0.32	6.5		-0.01	0.42	1.3	
May	0.01	0.99	8.0		0.10	0.30	9.9		0.04	0.85	23.1		0.00	0.94	1.4	
June	-0.04	0.87	11.6		-0.05	0.90	30.8		0.51	0.45	67.4		-0.01	0.84	1.7	
July	-0.06	0.37	7.3		-0.08	0.48	27.1		-0.53	0.26	48.6		-0.02	0.13	1.1	
August	-0.06	0.34	4.9		-0.10	0.33	19.7		-0.33	0.10	32.8		0.00	0.60	0.7	
September	0.00	0.99	4.5		0.05	0.44	12.3		0.02	0.87	22.6		0.00	0.61	0.7	
October	0.02	0.55	2.9		0.10	0.01 **	7.6	1.30	0.15	0.18	15.0		0.00	0.41	0.5	
November	0.03	1.00	2.4		0.19	0.33	5.1		0.06	0.23	8.0		0.00	1.00	0.4	
December	-	-	-		-	-	-		0.02	0.74	6.2		-	-	-	
Average for all months, for each station	-0.01		4.67	0.00	0.02		13.16	0.14	-0.01		20.51	0.00	0.00		0.85	0.00

	05CA012				05CB001				05CB002				05CB004			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		2.2		Median Annual Flow (m^3/s)		2.2		Median Annual Flow (m^3/s)		1.34		Median Annual Flow (m^3/s)		1.7	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		0.02	0.05 *	0.6	2.62	-	-	-		0.01	0.26	1.1	
February	NA	NA	0.2		0.02	0.03 *	0.7	3.38	0.01	0.16	0.2		0.00	0.39	1.2	
March	-0.01	0.13	0.9		-0.02	0.72	2.2		0.00	0.34	0.5		-0.01	0.20	1.7	
April	-0.02	0.49	1.9		-0.07	0.43	7.3		-0.03	0.05	1.6		-0.02	0.52	3.4	
May	0.01	0.74	4.1		0.04	0.63	7.8		-0.03	0.46	3.2		-0.01	0.64	2.9	
June	0.06	0.62	6.7		0.06	0.67	12.2		0.00	0.96	5.4		-0.02	0.42	3.2	
July	-0.03	0.51	4.1		-0.03	0.75	7.0		-0.02	0.61	3.3		-0.04	0.04 *	2.6	1.43
August	-0.03	0.22	2.4		-0.05	0.42	4.2		-0.03	0.33	2.1		-0.03	0.05	2.2	
September	-0.01	0.62	2.3		-0.02	0.83	3.7		0.00	0.87	1.8		-0.01	0.13	2.1	
October	-0.01	0.55	1.5		0.01	0.87	2.8		0.00	0.84	1.2		-0.02	0.06	1.9	
November	-0.06	1.00	1.2		0.00	1.00	1.4		0.03	0.36	1.0		-0.01	0.29	1.5	
December	-	-	-		0.01	0.62	0.8		-	-	-		0.00	0.67	1.2	
Average for all months, for each station	-0.01		2.52	0.00	0.00		4.23	0.50	-0.01		2.03	0.00	-0.01		2.09	0.12

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	05CB007				05CC001				05CC002				05CC007			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		18.8		Median Annual Flow (m^3/s)		0.8		Median Annual Flow (m^3/s)		28.0		Median Annual Flow (m^3/s)		1.3	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.05	0.07	17.3		0.00	0.90	0.3		0.03	0.50	17.1		0.00	0.86	0.4	
February	0.05	0.01 **	17.4	0.30	0.00	0.69	0.3		0.05	0.25	17.3		0.00	0.18	0.4	
March	0.04	0.04 *	17.4	0.25	-0.02	0.18	1.2		-0.11	0.27	23.7		0.00	0.79	1.2	
April	0.00	0.99	27.6		-0.01	0.96	6.8		-0.31	0.64	55.0		0.01	0.97	10.8	
May	0.25	0.40	36.5		-0.03	0.48	2.7		-0.25	0.75	60.7		-0.02	0.76	5.6	
June	-0.12	0.66	51.5		-0.01	0.54	2.2		0.04	1.00	110.6		-0.02	0.64	5.9	
July	-0.42	0.26	53.7		-0.04	0.27	3.0		-1.22	0.08	82.7		-0.11	0.03 *	5.2	2.02
August	-0.64	0.05 *	37.5	1.71	-0.03	0.21	1.1		-0.89	0.06	47.5		-0.04	0.13	2.1	
September	-0.12	0.57	31.5		0.00	0.56	0.7		-0.17	0.52	39.2		0.01	0.75	1.7	
October	0.05	0.68	23.4		0.00	0.84	0.8		0.05	0.66	28.6		-0.01	0.43	1.5	
November	-0.04	0.38	18.1		-0.01	0.33	0.7		-0.08	0.28	20.8		-0.01	0.49	1.0	
December	-0.02	0.57	17.4		0.00	0.65	0.4		-0.07	0.18	17.7		0.00	0.72	0.5	
Average for all months, for each station	-0.08		29.10	0.19	-0.01		1.67	0.00	-0.24		43.42	0.00	-0.02		3.03	0.17

	05CC008				05CC009				05CC010				05CC011			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		0.3		Median Annual Flow (m^3/s)		0.30		Median Annual Flow (m^3/s)		0.1		Median Annual Flow (m^3/s)		0.1	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		-	-	-		-	-	-	
February	0.01	1.00	0.0		0.00	0.15	0.1		0.00	0.77	0.1		0.00	0.46	0.0	
March	-0.01	0.02 *	0.3	3.39	-0.01	0.03 *	0.2	2.70	0.00	0.22	0.1		0.00	0.49	0.3	
April	0.01	0.77	3.0		0.01	0.85	1.4		0.00	0.68	0.3		0.01	0.36	1.2	
May	-0.01	0.79	1.1		-0.01	0.43	0.6		0.00	0.93	0.2		0.01	0.36	0.5	
June	-0.01	0.49	0.8		0.00	0.87	0.5		0.00	0.72	0.2		0.00	0.32	0.5	
July	-0.01	0.38	0.8		0.00	0.93	0.6		0.00	0.07	0.2		0.00	0.30	0.4	
August	0.00	0.48	0.3		0.00	0.53	0.3		0.00	0.44	0.1		0.01	0.02 *	0.2	3.25
September	0.00	0.87	0.2		0.00	0.45	0.2		0.00	0.12	0.1		0.00	0.02 *	0.1	3.16
October	0.00	0.80	0.2		0.00	0.14	0.2		0.00	0.13	0.1		0.00	0.00 **	0.1	3.40
November	-0.02	1.00	0.5		-0.06	0.56	0.3		-0.01	0.38	0.1		0.00	0.09	0.0	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.71	0.34	-0.01		0.44	0.27	0.00		0.14	0.00	0.00		0.31	0.98

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

	05CE002				05CE005				05CE006				05CE007			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		0.2		Median Annual Flow (m^3/s)		2.0		Median Annual Flow (m^3/s)		0.09		Median Annual Flow (m^3/s)		0.1	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	NA	NA	0.0		-	-	-		-	-	-		-	-	-	
February	0.00	0.62	0.1		0.00	0.75	0.1		0.00	0.33	0.0		0.00	0.94	0.1	
March	0.00	0.85	1.0		0.00	0.99	1.4		0.00	0.35	0.2		0.00	1.00	0.7	
April	0.01	0.67	4.1		0.05	0.08	4.3		0.01	0.08	1.1		0.01	0.56	2.4	
May	0.02	0.05	1.0		0.03	0.07	2.5		0.01	0.02 *	0.4	2.80	0.01	0.07	0.6	
June	0.01	0.25	0.9		0.00	0.69	3.7		0.01	0.35	0.5		0.00	0.90	0.5	
July	0.00	0.69	0.4		0.00	1.00	2.8		0.00	0.66	0.2		0.00	0.54	0.2	
August	0.00	0.29	0.1		0.01	0.67	2.5		0.00	0.56	0.1		0.00	0.19	0.1	
September	0.00	0.03 *	0.1	2.31	-0.01	0.67	2.5		0.00	0.07	0.1		0.00	0.21	0.1	
October	0.00	0.01 **	0.1	3.24	0.01	0.20	0.8		0.00	0.04 *	0.1	3.30	0.00	0.11	0.1	
November	0.00	0.47	0.1		0.00	0.54	0.4		0.00	0.22	0.1		0.00	1.00	0.2	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.01		0.72	0.55	0.01		2.09	0.00	0.00		0.27	0.61	0.00		0.50	0.00

	05CE010				05CE011				05CE018				05CE020			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		0.02		Median Annual Flow (m^3/s)		0.01		Median Annual Flow (m^3/s)		0.03		Median Annual Flow (m^3/s)		0.02	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		-	-	-		-	-	-	
February	0.00	0.42	0.01		0.00	0.84	0.00		0.00	0.87	0.00		0.00	0.82	0.02	
March	0.00	0.85	0.03		0.00	0.45	0.03		0.00	0.58	0.08		-0.01	0.17	0.30	
April	0.00	0.11	0.13		0.00	0.00 **	0.07	3.25	0.01	0.16	0.46		0.01	0.07	0.83	
May	0.00	0.15	0.05		0.00	0.12	0.02		0.00	0.22	0.18		0.01	0.02 *	0.12	6.02
June	0.00	0.05 *	0.04	2.21	0.00	0.05 *	0.02	0.82	0.00	0.38	0.17		0.00	0.12	0.11	
July	0.00	0.07	0.03		0.00	0.03 *	0.01	0.84	0.00	0.27	0.08		0.00	0.77	0.73	
August	0.00	0.01 **	0.02	5.22	0.00	0.00 **	0.00	0.00	0.00	0.01 **	0.03	1.67	0.00	0.39	0.01	
September	0.00	0.02 *	0.02	3.92	0.00	0.01 *	0.00	1.44	0.00	0.14	0.02		0.00	0.46	0.01	
October	0.00	0.02 *	0.02	6.00	0.00	0.00 ***	0.00	5.71	0.00	0.07	0.03		0.00	0.05 *	0.00	0.00
November	0.00	0.90	0.02		0.00	0.68	0.01		0.00	0.72	0.04		0.00	0.66	0.00	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.04	1.73	0.00		0.02	1.21	0.00		0.11	0.17	0.00		0.22	0.60

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

	05CG004				05CG006				05CH007				05CH008			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		0.01		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.2		Median Annual Flow (m^3/s)		0.01	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		-	-	-		-	-	-	
February	0.00	0.85	0.00		0.00	0.77	0.00		0.00	0.61	0.02		0.00	0.85	0.03	
March	0.00	0.72	0.08		0.00	0.93	0.01		0.01	0.00 **	0.30	2.01	0.00	0.31	0.14	
April	0.00	0.18	0.14		0.00	0.00 **	0.16	0.42	0.01	0.03 *	1.01	0.88	0.00	0.38	0.72	
May	0.00	0.03 *	0.05	0.80	0.00	0.00 **	0.02	2.06	0.01	0.06	0.32		0.00	0.03 *	0.08	0.79
June	0.00	0.03 *	0.06	0.12	0.00	0.00 **	0.02	1.22	0.01	0.01 *	0.47	2.64	0.00	0.02 *	0.06	0.00
July	0.00	0.66	0.04		0.00	0.10	0.01		0.01	0.05 *	0.44	2.41	0.00	0.14	0.13	
August	0.00	0.55	0.02		0.00	0.01 *	0.00	0.00	0.01	0.06	0.48		0.00	0.17	0.03	
September	0.00	0.80	0.00		0.00	0.03 *	0.00	1.44	0.01	0.00 ***	0.28	4.85	0.00	0.05	0.00	
October	0.00	0.78	0.00		0.00	0.06	0.00		0.00	0.01 **	0.25	1.88	0.00	0.06	0.00	
November	0.00	1.00	0.00		0.00	1.00	0.00		0.00	0.63	0.07		0.00	NaN	0.00	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.04	0.09	0.00		0.02	0.51	0.01		0.36	1.47	0.00		0.12	0.08

	05CH011				05CJ006				05CJ012				05CK001			
	Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989		Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		0.2		Median Annual Flow (m^3/s)		1.7		Median Annual Flow (m^3/s)		2.6		Median Annual Flow (m^3/s)		0.01	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-		-	-	-		-	-	-		-	-	-	
February	0.00	0.85	0.00		-0.01	0.65	0.2		-	-	-		0.00	0.92	0.00	
March	0.00	0.85	0.10		0.00	0.56	0.3		NA	NA	0.6		0.00	0.05 *	0.02	1.06
April	0.00	0.17	0.83		0.01	0.06	0.5		0.02	0.60	0.8		0.00	0.01 **	0.10	0.13
May	0.00	0.74	0.30		-0.01	0.25	0.9		-0.04	0.08	1.9		0.00	0.08	0.01	
June	0.00	0.68	0.60		-0.05	0.00 **	1.8	2.97	-0.12	0.00 ***	2.9	4.10	0.00	0.00 **	0.00	3.26
July	0.01	0.51	0.97		-0.05	0.00 ***	1.8	2.86	-0.18	0.00 ***	3.5	5.02	0.00	0.01 *	0.01	1.17
August	0.02	0.01 **	0.72	3.03	-0.06	0.00 ***	2.0	2.95	-0.14	0.00 ***	3.1	4.55	0.00	0.00 **	0.00	3.74
September	0.00	0.00 **	0.18	1.47	-0.03	0.01 **	1.7	1.77	-0.06	0.00 ***	2.3	2.62	0.00	0.06	0.00	
October	0.00	0.10	0.16		-0.03	0.01 **	1.3	2.02	-0.05	0.05	1.4		0.00	0.09	0.00	
November	0.00	0.57	0.00		-0.05	0.48	0.8		0.04	0.33	0.4		0.00	1.00	0.00	
December	-	-	-		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.00		0.39	0.45	-0.03		1.13	1.26	-0.07		1.89	1.81	0.00		0.02	0.94

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

	05CK004			
	Start Year for Analysis		1989	
	Median Annual Flow (m^3/s)		36.9	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.05	0.39	15.6	
February	0.10	0.12	16.2	
March	0.00	1.00	32.6	
April	0.11	0.94	95.8	
May	0.32	0.72	74.5	
June	-0.14	0.97	128.4	
July	-1.30	0.07	104.3	
August	-1.08	0.07	60.4	
September	-0.37	0.34	48.7	
October	0.06	0.87	37.5	
November	0.04	0.83	23.9	
December	0.01	0.83	15.8	
Average for all months, for each station	-0.18		54.48	0.00
Average percentage change in median monthly flow for all months, weighted by median annual flow			0.09	

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

TABLE. RESULTS OF RECENT-TERM TREND ANALYSES FOR MEDIAN MONTHLY FLOW IN THE LOWER-SOUTH SASKATCHEWAN RIVER SUB-BASIN.

	05H - Lower South Saskatchewan															
	05HA003				05HA015				05HC003				05HC005			
	Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980	
	Median Annual Flow (m^3/s)		0.2		Median Annual Flow (m^3/s)		0.02		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.00	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.00	0.63	0.2		-	-	-		-	-	-		-	-	-	
February	0.00	0.42	0.2		0.00	0.62	0.01		0.00	0.29	0.01		0.00	0.74	0.08	
March	0.01	0.02 *	0.5	1.94	0.00	0.13	0.26		0.00	0.84	0.01		0.00	0.55	0.05	
April	0.01	0.00 **	0.6	2.02	0.00	0.22	0.23		0.00	0.39	0.03		0.00	0.05	0.06	
May	0.01	0.00 ***	0.5	2.52	0.00	0.09	0.07		0.00	0.44	0.00		0.00	0.96	0.00	
June	0.01	0.00 ***	0.4	2.88	0.00	0.04 *	0.09	0.00	0.00	0.03 *	0.00	0.00	0.00	0.97	0.00	
July	0.00	0.00 **	0.1	3.01	0.00	0.02 *	0.04	0.00	0.00	0.25	0.00		0.00	0.04 *	0.01	0.00
August	0.00	0.00 ***	0.1	3.37	0.00	0.07	0.02		0.00	0.04 *	0.00	0.00	0.00	0.07	0.00	
September	0.00	0.00 **	0.1	3.76	0.00	0.02 *	0.01	0.00	0.00	0.04 *	0.00	0.00	0.00	0.02 *	0.00	0.00
October	0.01	0.00 ***	0.2	4.37	0.00	0.00 **	0.03	0.00	0.00	0.10	0.00		0.00	0.01 *	0.01	0.00
November	0.01	0.00 **	0.2	4.15	0.00	0.18	0.08		0.00	NA	0.00		0.00	0.33	0.00	
December	NA	NA	0.1		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	0.01		0.26	2.34	0.00		0.08	0.00	0.00		0.01	0.00	0.00		0.02	0.00

	05HD036				05HD039				05HE001				05HF015			
	Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980	
	Median Annual Flow (m^3/s)		0.4		Median Annual Flow (m^3/s)		0.7		Median Annual Flow (m^3/s)		0.01		Median Annual Flow (m^3/s)		0.00	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.01	0.00 **	0.2	2.49	0.01	0.00 **	0.4	2.93	-	-	-		-	-	-	
February	0.01	0.07	0.5		0.01	0.06	0.6		0.00	0.67	0.01		0.00	NaN	0.00	
March	0.02	0.29	2.1		0.01	0.26	2.4		0.00	0.50	0.14		0.00	0.42	0.01	
April	0.03	0.03 *	2.6	1.11	0.05	0.00 **	3.5	1.38	0.00	0.04 *	0.24	0.45	0.00	0.76	0.03	
May	0.02	0.01 **	1.1	1.84	0.03	0.00 **	1.4	2.20	0.00	0.00 **	0.03	0.78	0.00	0.38	0.00	
June	0.02	0.00 **	0.7	2.19	0.02	0.00 ***	1.2	1.94	0.00	0.12	0.03		0.00	0.35	0.00	
July	0.01	0.03 *	0.4	1.83	0.01	0.24	0.8		0.00	0.00 **	0.01	0.00	0.00	0.64	0.00	
August	0.00	0.01 **	0.2	2.50	0.01	0.15	0.7		0.00	0.03 *	0.00	0.00	0.00	0.10	0.00	
September	0.01	0.00 **	0.2	4.30	0.01	0.01 *	0.6	1.53	0.00	0.50	0.00		0.00	0.10	0.00	
October	0.01	0.00 ***	0.4	3.31	0.01	0.00 **	0.9	1.53	0.00	0.09	0.00		0.00	0.03 *	0.00	0.00
November	0.01	0.00 ***	0.4	2.38	0.01	0.00 **	0.7	1.73	0.00	0.29	0.00		0.00	0.61	0.00	
December	0.01	0.00 ***	0.3	2.69	0.02	0.00 ***	0.5	3.21	-	-	-		-	-	-	
Average for all months, for each station	0.01		0.75	2.05	0.02		1.15	1.37	0.00		0.05	0.12	0.00		0.00	0.00

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	05HG001				05HG002				05HG021				05HH002			
	Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980		Start Year for Analysis		1980	
	Median Annual Flow (m^3/s)		183.3		Median Annual Flow (m^3/s)		0.01		Median Annual Flow (m^3/s)		0.00		Median Annual Flow (m^3/s)		0.00	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	0.03	0.99	263.5		-	-	-		-	-	-		-	-	-	
February	0.70	0.64	259.8		0.00	0.56	0.05		0.00	0.18	0.00		NA	NA	0.18	
March	1.98	0.11	192.1		0.00	0.63	0.16		0.00	0.44	0.02		0.00	0.02 *	0.01	0.00
April	1.25	0.16	141.7		0.00	0.08	0.37		0.00	0.17	0.02		0.00	0.17	0.13	
May	3.67	0.00 **	183.7	2.00	0.00	0.06	0.02		0.00	0.01 **	0.00	0.00	0.00	0.00 **	0.02	0.00
June	5.95	0.01 *	263.0	2.26	0.00	0.30	0.01		0.00	0.02 *	0.00	0.00	0.00	0.00 **	0.02	0.00
July	2.08	0.07	239.3		0.00	0.15	0.05		0.00	0.16	0.01		0.00	0.02 *	0.00	0.00
August	1.06	0.10	161.1		0.00	0.34	0.03		0.00	0.42	0.00		0.00	NaN	0.00	
September	0.72	0.45	147.2		0.00	0.06	0.01		0.00	0.06	0.00		0.00	0.28	0.00	
October	0.67	0.73	175.0		0.00	0.04 *	0.01	0.00	0.00	0.12	0.00		0.00	0.64	0.00	
November	0.42	0.73	217.3		0.00	NaN	0.00		0.00	NaN	0.00		0.00	0.72	0.00	
December	0.38	0.53	232.2		-	-	-		-	-	-		-	-	-	
Average for all months, for each station	1.58		206.31	0.36	0.00		0.07	0.00	0.00		0.01	0.00	0.00		0.04	0.00

	05HH003			
	Start Year for Analysis		1980	
	Median Annual Flow (m^3/s)		0.01	
Month	Theil-Sen Slope	Mann-Kendall p-value	Average Median Monthly Flow	Average Percentage Change in Median Monthly Flow*
January	-	-	-	
February	-	-	-	
March	0.00	0.06	0.0	
April	0.00	0.56	0.4	
May	0.00	0.00 **	0.1	0.55
June	0.00	0.01 **	0.1	0.00
July	0.00	0.01 **	0.1	0.00
August	0.00	0.08	0.0	
September	0.00	0.25	0.0	
October	0.00	0.43	0.0	
November	0.00	0.24	0.0	
December	-	-	-	
Average for all months, for each station	0.00		0.08	0.06
Average percentage change in median monthly flow for all months, weighted by median annual flow			0.36	

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. RESULTS OF LINEAR REGRESSION ANALYSES FOR LONG-TERM TREND ANALYSIS OF MEDIAN ANNUAL FLOW IN THE SOUTH SASKATCHEWAN RIVER, BY SUB-BASIN.

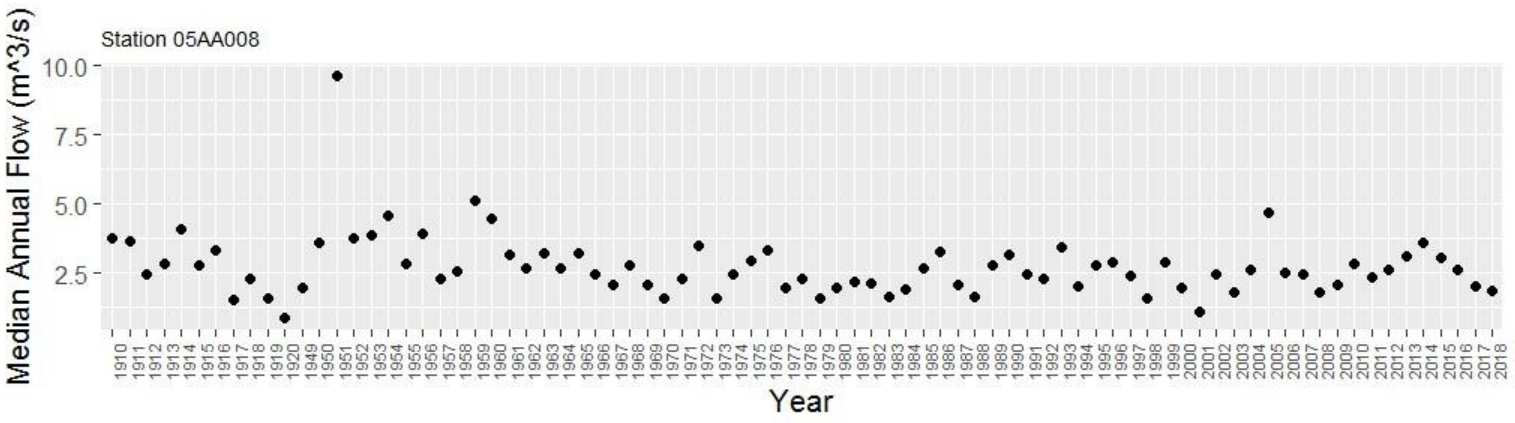
Sub-Basin	Station	Start Year	Intercept	Intercept Standard Error	Intercept T-Test Statistic	Intercept T-Test p-value	Slope	Slope Standard Error	Slope T-Test Statistic	Slope T-Test p-value		Adjusted R-Squared	F-Test Static	F-Test p-value	
05A - Upper-South Saskatchewan	05AA008	1910	15.483	7.553	2.050	0.043	-0.006	0.004	-1.668	0.098		0.016	2.783	0.098	
	05AB021	1908	-1.737	7.909	-0.220	0.827	0.002	0.004	0.376	0.708		-0.008	0.141	0.708	
	05AC003	1918	-18.109	3.512	-5.156	0.000	0.010	0.002	5.477	0.000	***	0.225	29.999	0.000	***
	05AD005	1911	16.941	7.942	2.133	0.035	-0.007	0.004	-1.626	0.107		0.015	2.643	0.107	
	05AE002	1909	11.351	4.357	2.605	0.010	-0.005	0.002	-2.433	0.017	*	0.043	5.922	0.017	*
	05AE006	1911	115.675	32.854	3.521	0.001	-0.055	0.017	-3.309	0.001	**	0.085	10.952	0.001	**
	05AE027	1902	88.439	21.298	4.152	0.000	-0.040	0.011	-3.653	0.000	***	0.096	13.342	0.000	***
	05AH001	1911	0.072	0.071	1.018	0.311	0.000	0.000	-0.984	0.327		0.000	0.968	0.327	
	05AJ001	1911	1224.391	347.475	3.524	0.001	-0.563	0.177	-3.183	0.002	**	0.079	10.128	0.002	**
05B - Bow River	05BA001	1910	-228.690	29.521	-7.747	0.000	0.120	0.015	8.034	0.000	***	0.370	64.549	0.000	***
	05BB001	1909	145.011	45.048	3.219	0.002	-0.064	0.023	-2.808	0.006	**	0.059	7.882	0.006	**
	05BC001	1910	158.462	11.748	13.489	0.000	-0.078	0.006	-13.110	0.000	***	0.613	171.875	0.000	***
	05BE004	1923	-385.380	54.644	-7.053	0.000	0.223	0.028	8.018	0.000	***	0.405	64.288	0.000	***
	05BH004	1911	-149.580	74.111	-2.018	0.046	0.108	0.038	2.871	0.005	**	0.063	8.244	0.005	**
	05BJ001	1908	87.870	12.032	7.303	0.000	-0.043	0.006	-6.944	0.000	***	0.300	48.214	0.000	***
	05BK001	1908	16.592	3.353	4.948	0.000	-0.008	0.002	-4.795	0.000	***	0.167	22.995	0.000	***
	05BL015	1910	-10.379	1.617	-6.419	0.000	0.006	0.001	6.684	0.000	***	0.288	44.679	0.000	***
	05BM002	1910	1496.385	223.746	6.688	0.000	-0.704	0.113	-6.221	0.000	***	0.259	38.705	0.000	***
05C - Red Deer River	05CC002	1912	209.837	66.628	3.149	0.002	-0.092	0.034	-2.726	0.008	**	0.057	7.429	0.008	**
	05CE001	1915	549.605	144.178	3.812	0.000	-0.261	0.073	-3.552	0.001	***	0.101	12.619	0.001	***
	05CK001	1911	0.423	0.041	10.339	0.000	0.000	0.000	-10.165	0.000	***	0.489	103.325	0.000	***
05H - Lower-South Saskatchewan	05HA003	1908	-0.517	0.743	-0.696	0.488	0.000	0.000	0.949	0.345		-0.001	0.900	0.345	
	05HG001	1911	169.243	524.900	0.322	0.748	0.006	0.267	0.023	0.982		-0.009	0.001	0.982	

TABLE. RESULTS OF MANN-KENDALL NON-PARAMETRIC LONG-TERM TREND ANALYSIS OF MEDIAN ANNUAL FLOW IN THE SOUTH SASKATCHEWAN RIVER, BY SUB-BASIN.

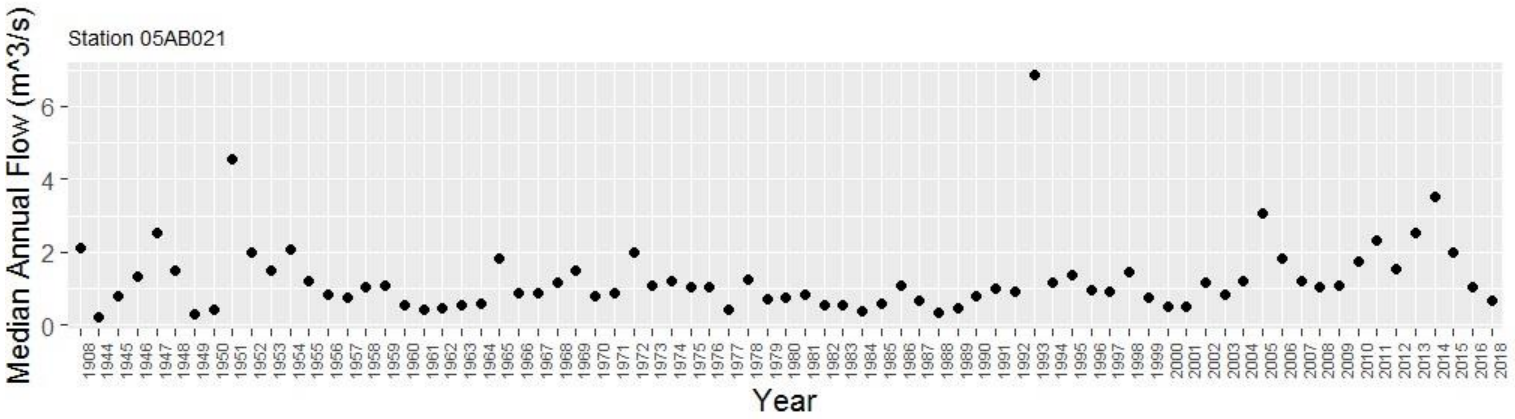
Sub-Basin	Station	Start Year	Theil -Sen Slope	Mann-Kendall Test Statistic	Mann-Kendall Test p-value		Median Annual Flow (m^3/s)	Average Percentage Change in Median Annual Flow	Weighted Averaged Between Stations
05A - Upper-South Saskatchewan	05AA008	1910	0.001	196	0.610		2.73	0.00	0.03
	05AB021	1908	0.001	264	0.503		1.26	0.00	
	05AC003	1918	0.005	794	0.020	*	1.19	0.44	
	05AD005	1911	-0.006	-565	0.134		4.04	0.00	
	05AE002	1909	0.001	561	0.148		0.69	0.00	
	05AE006	1911	-0.023	-641	0.089		6.92	0.00	
	05AE027	1902	-0.032	-1283	0.003	**	10.65	0.30	
	05AH001	1911	0.000	-69	0.672		0.00	0.00	
	05AJ001	1911	-0.130	-423	0.263		115.70	0.00	
05B - Bow River	05BA001	1910	0.006	433	0.258		9.76	0.00	0.08
	05BB001	1909	-0.004	-166	0.670		18.14	0.00	
	05BC001	1910	-0.061	-2204	0.000	***	4.36	1.40	
	05BE004	1923	0.047	297	0.334		54.90	0.00	
	05BH004	1911	0.090	897	0.017	*	63.22	0.14	
	05BJ001	1908	-0.037	-2197	0.000	***	4.33	0.85	
	05BK001	1908	-0.001	-324	0.410		0.51	0.00	
	05BL015	1910	0.007	2632	0.000	***	0.42	1.64	
	05BM002	1910	-0.162	-654	0.087		102.62	0.00	
05C - Red Deer River	05CC002	1912	-0.018	-235	0.529		27.98	0.00	0.00
	05CE001	1915	0.000	-36	0.922		35.13	0.00	
	05CK001	1911	0.000	-779	0.037	*	0.01	0.22	
05H - Lower-South Saskatchewan	05HA003	1908	0.000	416	0.284		0.19	0.00	
	05HG001	1911	0.273	444	0.240		181.29	0.00	0.00

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

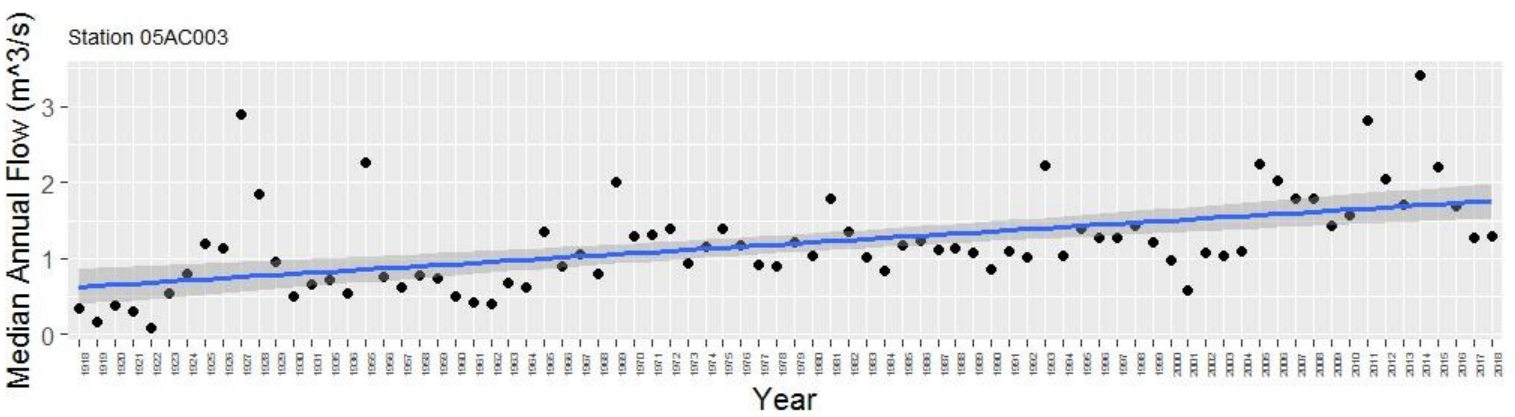
FIGURE. TIME-SERIES OF LONG-TERM TRENDS IN MEDIAN ANNUAL FLOW FOR THE UPPER-SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.



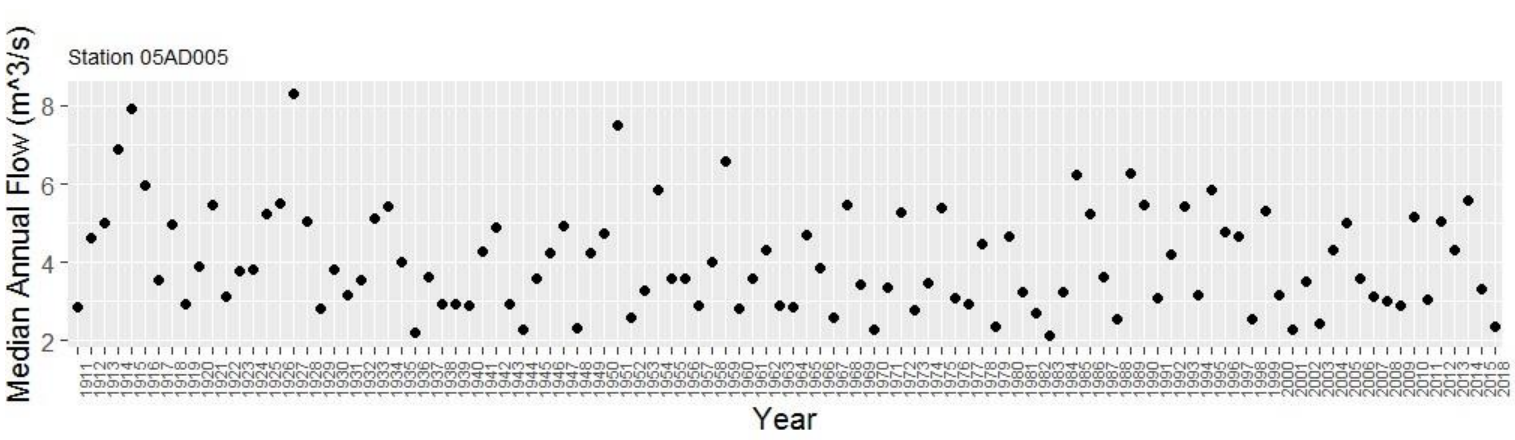
Intercept = 15.483 ; Intercept STE = 7.5532 ; Intercept T-Statistic 2.0499 ; Intercept p-value = 0.042823
Slope = -0.0064098 ; Slope STE = 0.0038423 ; Slope T-Statistic -1.6682 ; Slope p-value = 0.098195
F-Statistic: 2.783 ; p-value: 0.09819
Theil-Sen Slope = 0.001266 ; Mann-Kendal Score = 196 ; Mann-Kendall p-value = 0.60953



Intercept = -1.7368 ; Intercept STE = 7.9091 ; Intercept T-Statistic -0.2196 ; Intercept p-value = 0.82659
Slope = 0.0015077 ; Slope STE = 0.0040083 ; Slope T-Statistic 0.37615 ; Slope p-value = 0.70754
F-Statistic: 0.14149 ; p-value: 0.7075
Theil-Sen Slope = 0.001 ; Mann-Kendal Score = 264 ; Mann-Kendall p-value = 0.50263



Intercept = -18.109 ; Intercept STE = 3.512 ; Intercept T-Statistic -5.1563 ; Intercept p-value = 1.2924e-06
Slope = 0.0097837 ; Slope STE = 0.0017863 ; Slope T-Statistic 5.4771 ; Slope p-value = 3.2845e-07
F-Statistic: 29.999 ; p-value: 3.285e-07
Theil-Sen Slope = 0.005286 ; Mann-Kendal Score = 794 ; Mann-Kendall p-value = 0.01995



Intercept = 16.941 ; Intercept STE = 7.9425 ; Intercept T-Statistic 2.1329 ; Intercept p-value = 0.035239
Slope = -0.0065783 ; Slope STE = 0.0040465 ; Slope T-Statistic -1.6257 ; Slope p-value = 0.10699
F-Statistic: 2.6429 ; p-value: 0.107
Theil-Sen Slope = -0.005917 ; Mann-Kendal Score = -565 ; Mann-Kendall p-value = 0.13426

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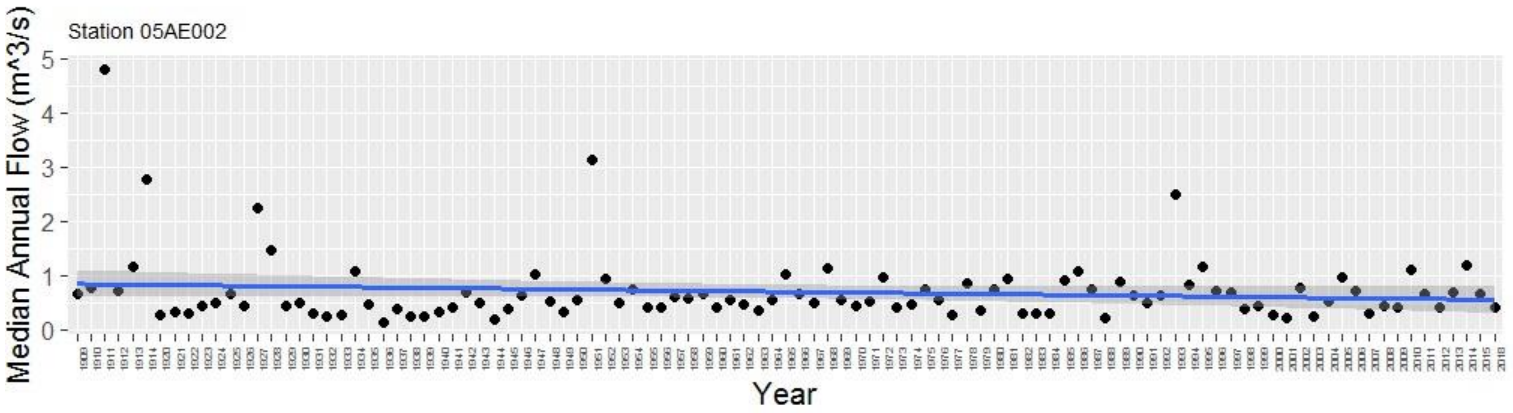
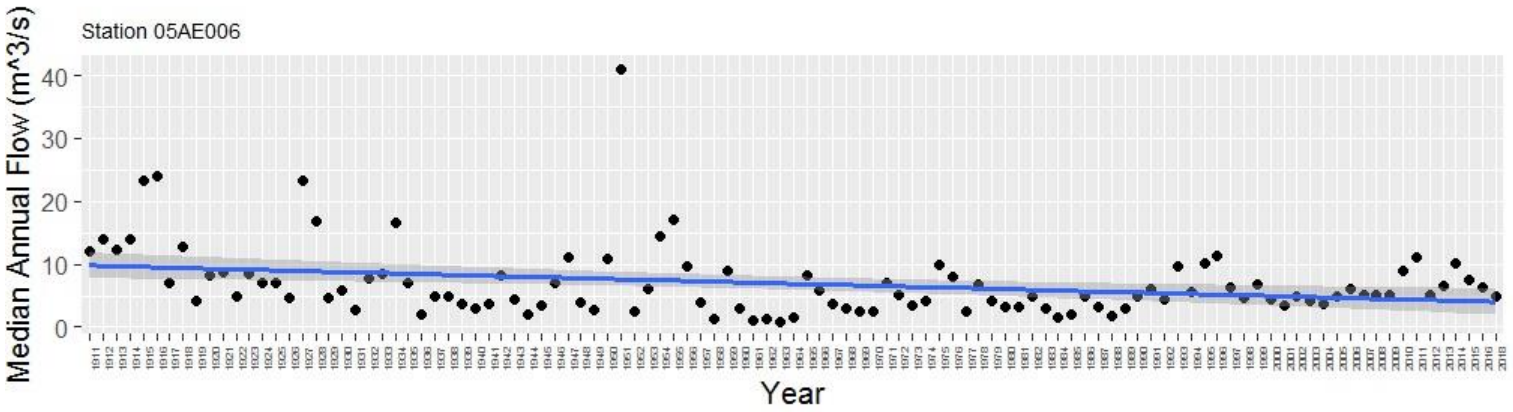
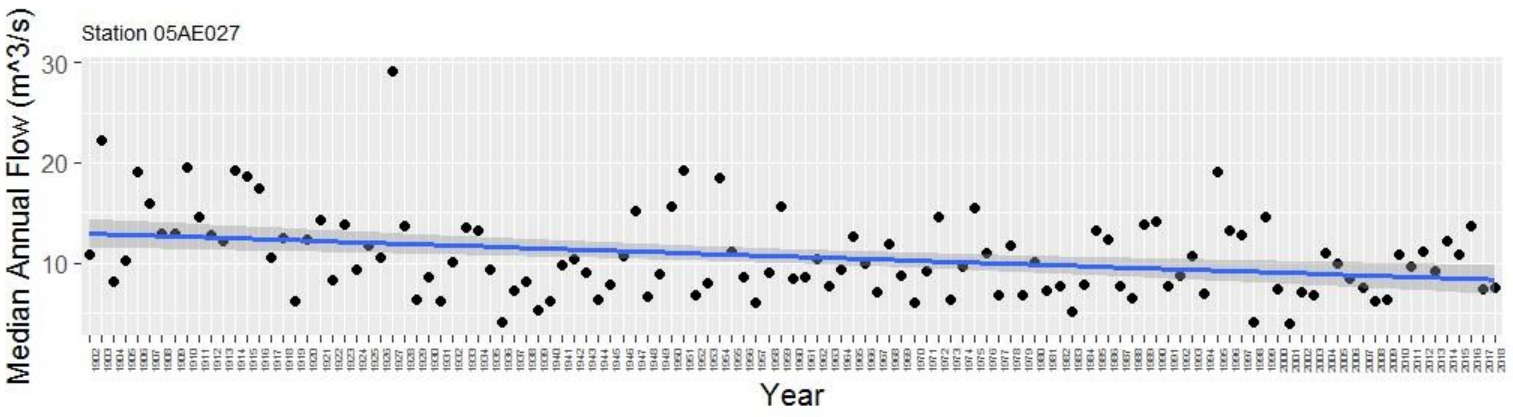


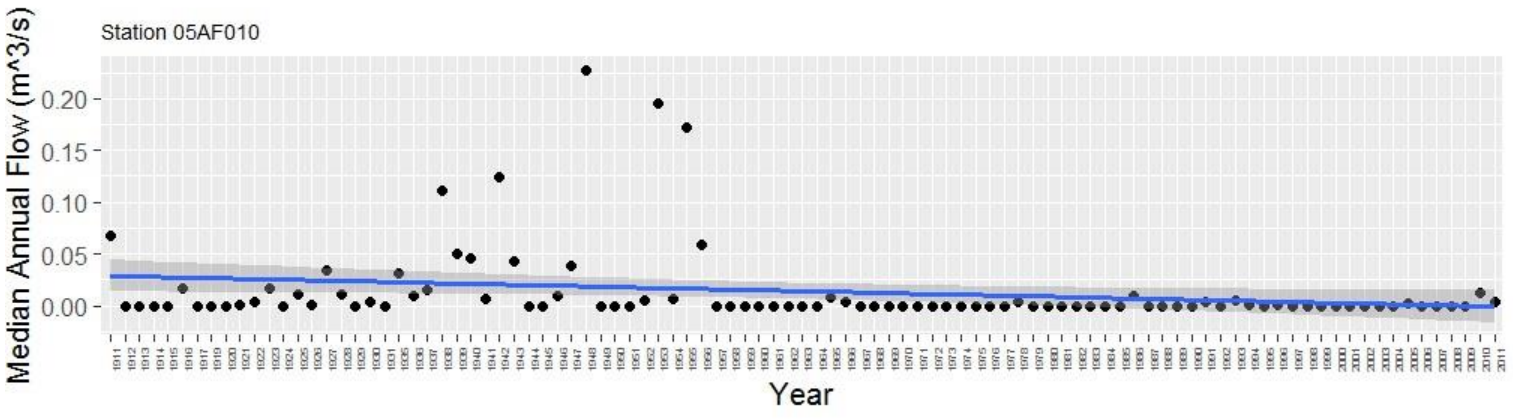
Intercept = 11.351 ; Intercept STE = 4.3568 ; Intercept T-Statistic 2.6052 ; Intercept p-value = 0.010475
Slope = -0.0054046 ; Slope STE = 0.002221 ; Slope T-Statistic -2.4334 ; Slope p-value = 0.016598
F-Statistic: 5.9215 ; p-value: 0.0166
Theil-Sen Slope = 0.001481 ; Mann-Kendal Score = 561 ; Mann-Kendall p-value = 0.14801



Intercept = 115.67 ; Intercept STE = 32.854 ; Intercept T-Statistic 3.5209 ; Intercept p-value = 0.00063549
Slope = -0.055366 ; Slope STE = 0.01673 ; Slope T-Statistic -3.3094 ; Slope p-value = 0.0012783
F-Statistic: 10.952 ; p-value: 0.001278
Theil-Sen Slope = -0.02292 ; Mann-Kendal Score = -641 ; Mann-Kendall p-value = 0.089297



Intercept = 88.439 ; Intercept STE = 21.298 ; Intercept T-Statistic 4.1524 ; Intercept p-value = 6.345e-05
Slope = -0.039686 ; Slope STE = 0.010865 ; Slope T-Statistic -3.6526 ; Slope p-value = 0.00039226
F-Statistic: 13.342 ; p-value: 0.0003923
Theil-Sen Slope = -0.0322 ; Mann-Kendal Score = -1283 ; Mann-Kendall p-value = 0.0025266



Intercept = 0.52607 ; Intercept STE = 0.24901 ; Intercept T-Statistic 2.1127 ; Intercept p-value = 0.037145
Slope = -0.00026111 ; Slope STE = 0.00012701 ; Slope T-Statistic -2.0558 ; Slope p-value = 0.04243
F-Statistic: 4.2265 ; p-value: 0.04243
Theil-Sen Slope = 0 ; Mann-Kendal Score = -891 ; Mann-Kendall p-value = 0.0028553

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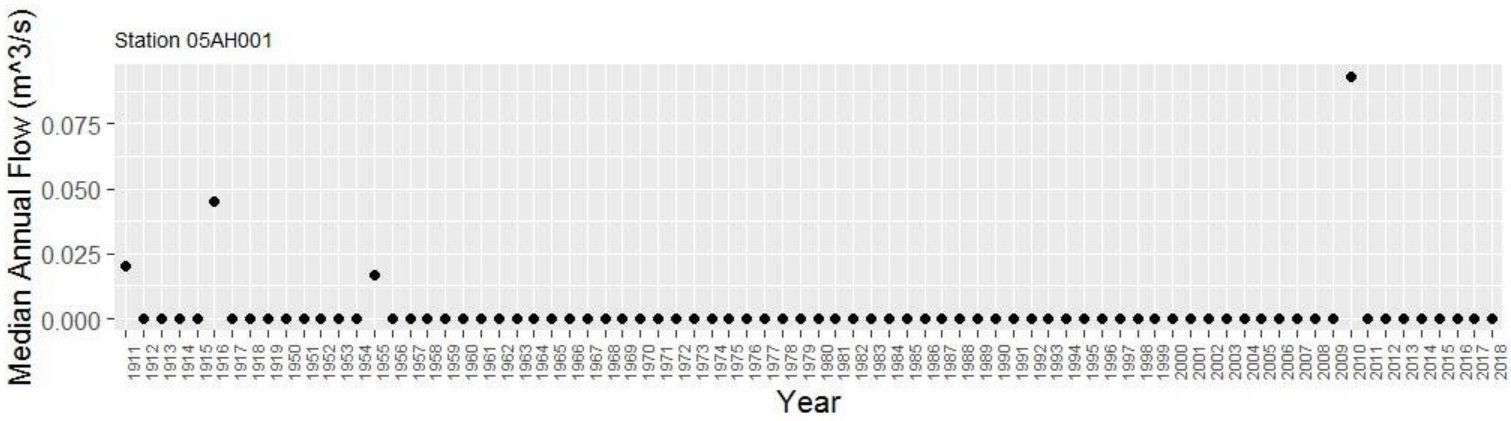
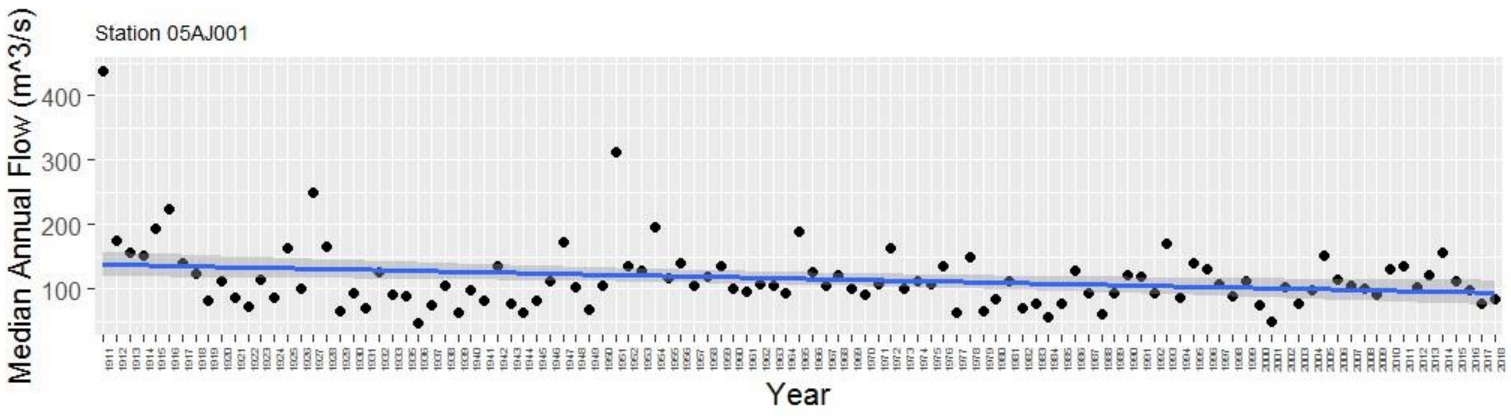
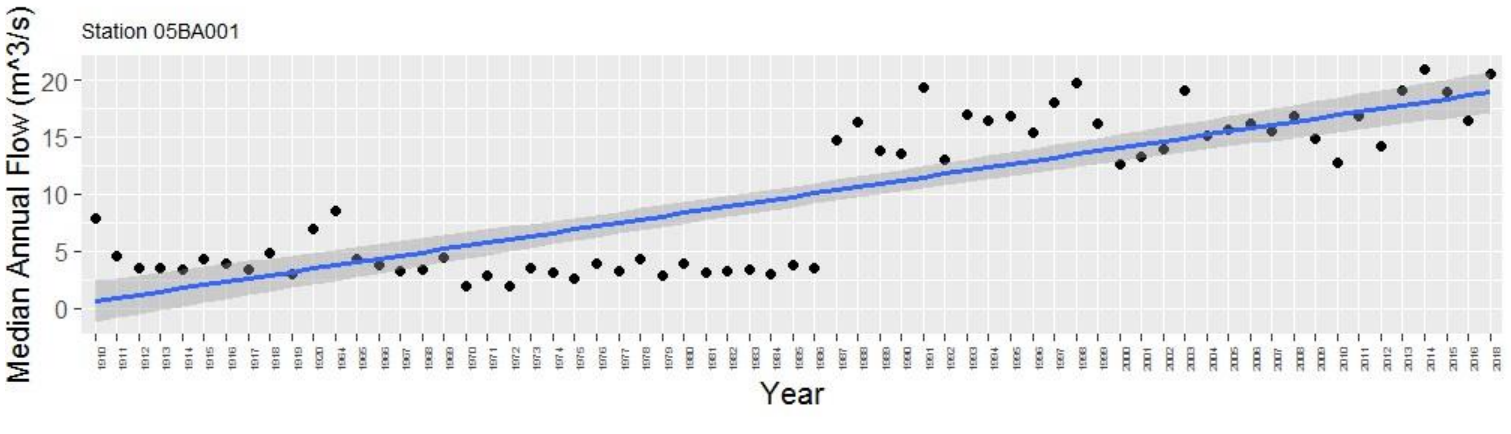


Intercept = 0.071842 ; Intercept STE = 0.070598 ; Intercept T-Statistic 1.0176 ; Intercept p-value = 0.31118
Slope = -3.5299e-05 ; Slope STE = 3.5872e-05 ; Slope T-Statistic -0.98402 ; Slope p-value = 0.32734
F-Statistic: 0.9683 ; p-value: 0.3273
Theil-Sen Slope = 0 ; Mann-Kendal Score = -69 ; Mann-Kendall p-value = 0.67161

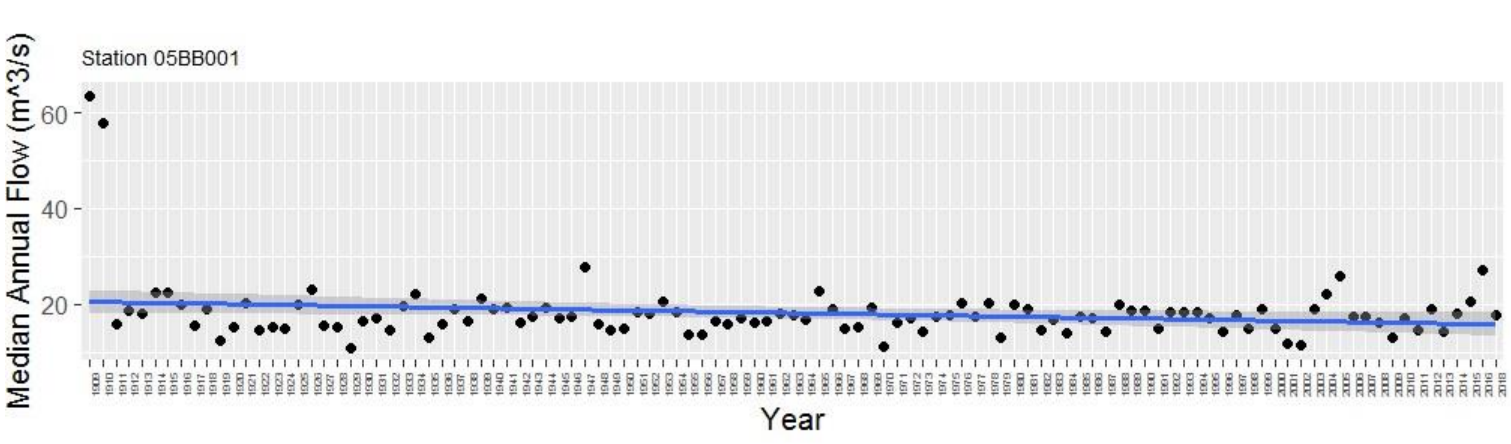


Intercept = 1224.4 ; Intercept STE = 347.48 ; Intercept T-Statistic 3.5237 ; Intercept p-value = 0.00062952
Slope = -0.5629 ; Slope STE = 0.17687 ; Slope T-Statistic -3.1825 ; Slope p-value = 0.0019163
F-Statistic: 10.128 ; p-value: 0.001916
Theil-Sen Slope = -0.1302 ; Mann-Kendal Score = -423 ; Mann-Kendall p-value = 0.26252

FIGURE. TIME-SERIES OF LONG-TERM TRENDS IN MEDIAN ANNUAL FLOW FOR THE BOW RIVER SUB-BASIN, BY STATION.



Intercept = -228.69 ; Intercept STE = 29.521 ; Intercept T-Statistic -7.7466 ; Intercept p-value = 5.7135e-12
Slope = 0.12025 ; Slope STE = 0.014968 ; Slope T-Statistic 8.0342 ; Slope p-value = 1.3317e-12
F-Statistic: 64.549 ; p-value: 1.332e-12
Theil-Sen Slope = 0.006177 ; Mann-Kendal Score = 433 ; Mann-Kendall p-value = 0.25786



Intercept = 145.01 ; Intercept STE = 45.048 ; Intercept T-Statistic 3.2191 ; Intercept p-value = 0.0016988
Slope = -0.064435 ; Slope STE = 0.022951 ; Slope T-Statistic -2.8075 ; Slope p-value = 0.0059256
F-Statistic: 7.8821 ; p-value: 0.005926
Theil-Sen Slope = -0.003704 ; Mann-Kendal Score = -166 ; Mann-Kendall p-value = 0.6699

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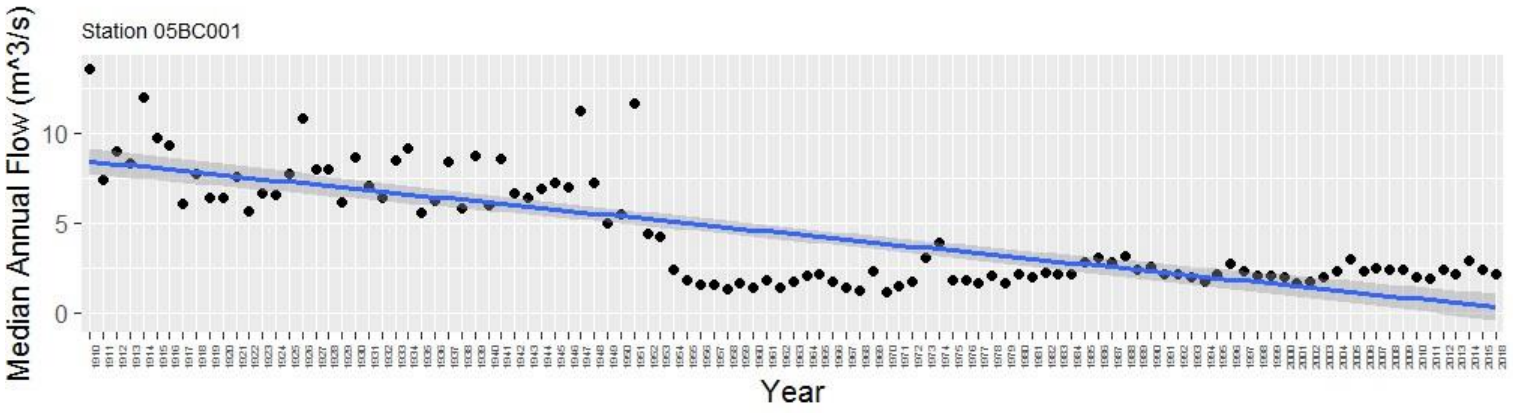
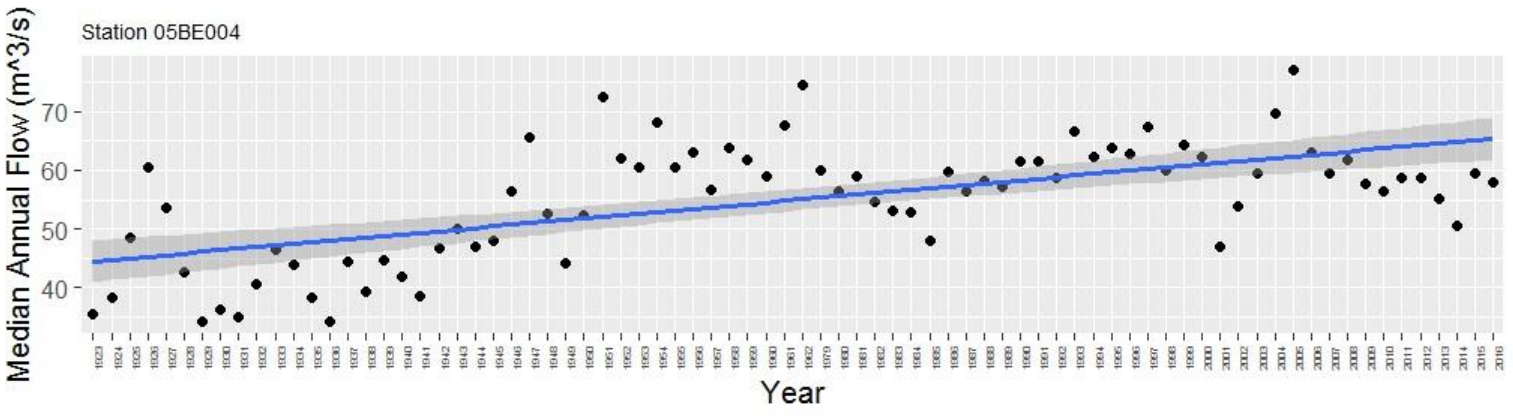
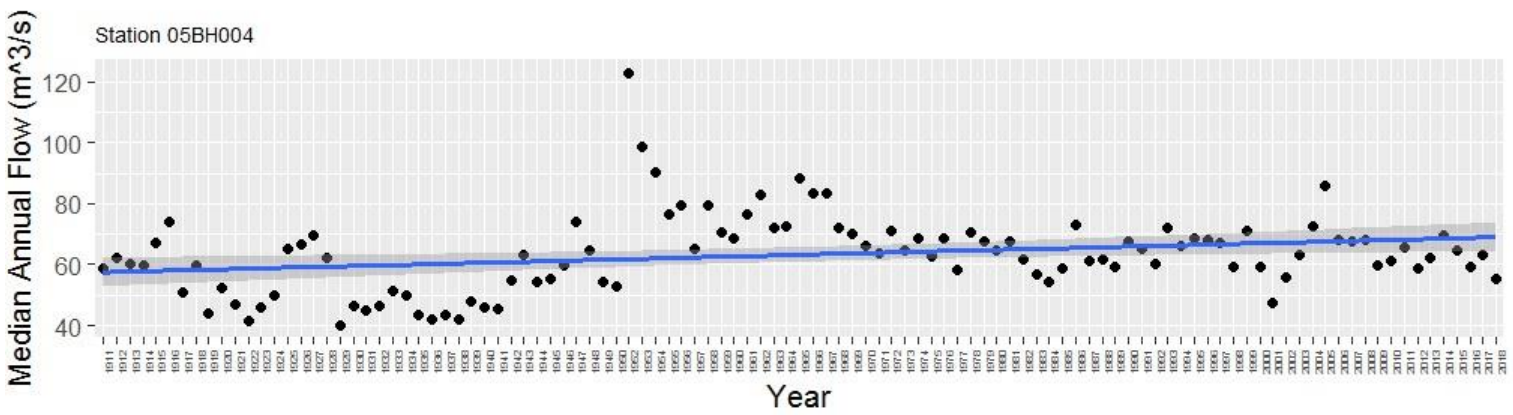


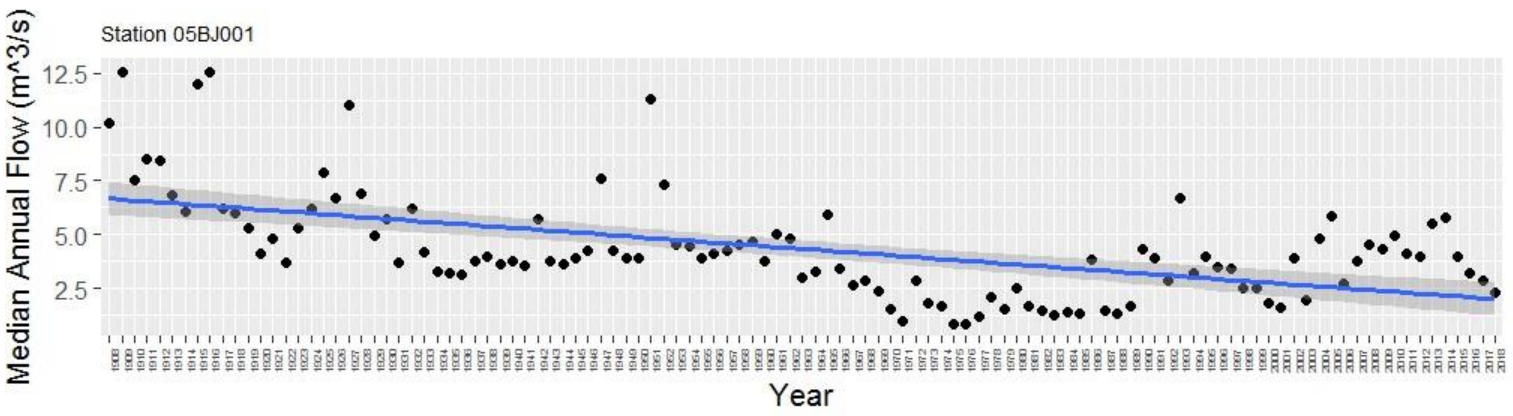
Intercept = 158.46 ; Intercept STE = 11.748 ; Intercept T-Statistic 13.489 ; Intercept p-value = 7.9898e-25
Slope = -0.078486 ; Slope STE = 0.0059867 ; Slope T-Statistic -13.11 ; Slope p-value = 5.3893e-24
F-Statistic: 171.87 ; p-value: 5.389e-24
Theil-Sen Slope = -0.06111 ; Mann-Kendal Score = -2204 ; Mann-Kendall p-value = 7.9784e-09



Intercept = -385.38 ; Intercept STE = 54.644 ; Intercept T-Statistic -7.0525 ; Intercept p-value = 3.1908e-10
Slope = 0.2232 ; Slope STE = 0.027838 ; Slope T-Statistic 8.018 ; Slope p-value = 3.3041e-12
F-Statistic: 64.288 ; p-value: 3.304e-12
Theil-Sen Slope = 0.04722 ; Mann-Kendal Score = 297 ; Mann-Kendall p-value = 0.33353



Intercept = -149.58 ; Intercept STE = 74.111 ; Intercept T-Statistic -2.0183 ; Intercept p-value = 0.046084
Slope = 0.10832 ; Slope STE = 0.037728 ; Slope T-Statistic 2.8712 ; Slope p-value = 0.0049389
F-Statistic: 8.2437 ; p-value: 0.004939
Theil-Sen Slope = 0.09036 ; Mann-Kendal Score = 897 ; Mann-Kendall p-value = 0.017364



Intercept = 87.87 ; Intercept STE = 12.032 ; Intercept T-Statistic 7.3028 ; Intercept p-value = 4.8886e-11
Slope = -0.042556 ; Slope STE = 0.0061288 ; Slope T-Statistic -6.9436 ; Slope p-value = 2.8933e-10
F-Statistic: 48.214 ; p-value: 2.893e-10
Theil-Sen Slope = -0.03674 ; Mann-Kendal Score = -2197 ; Mann-Kendall p-value = 2.1869e-08

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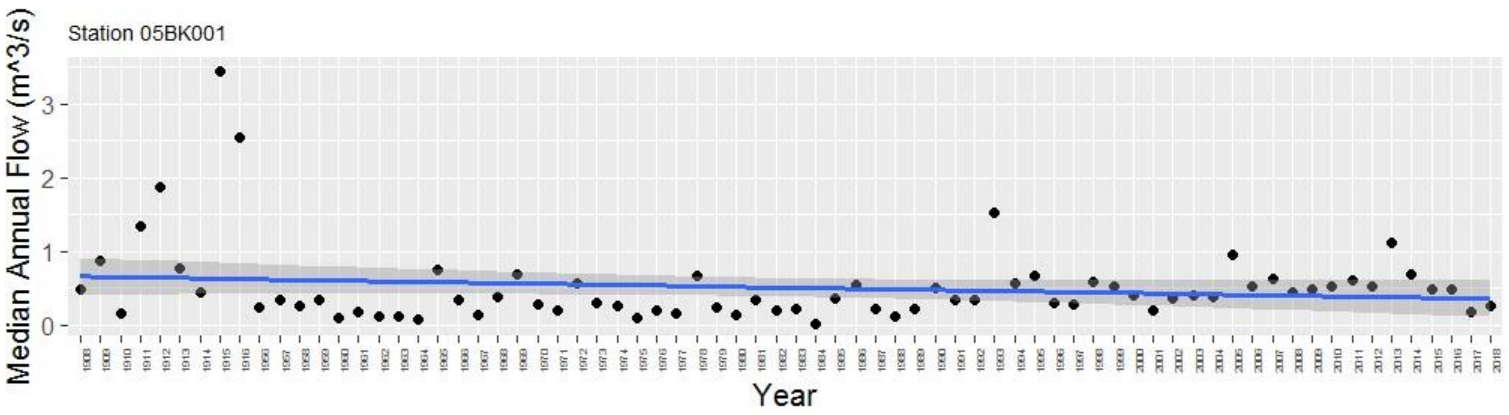
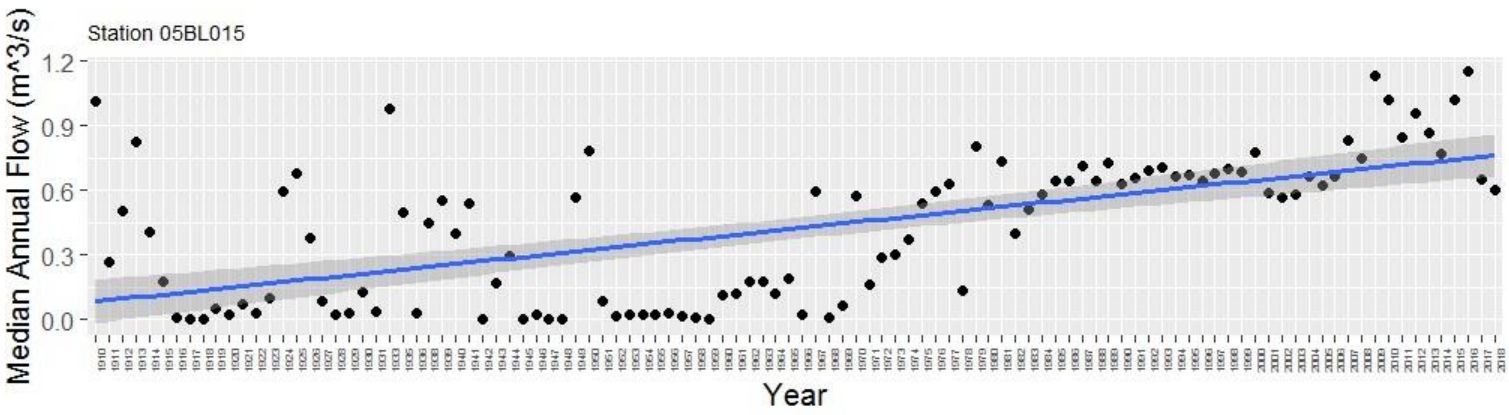
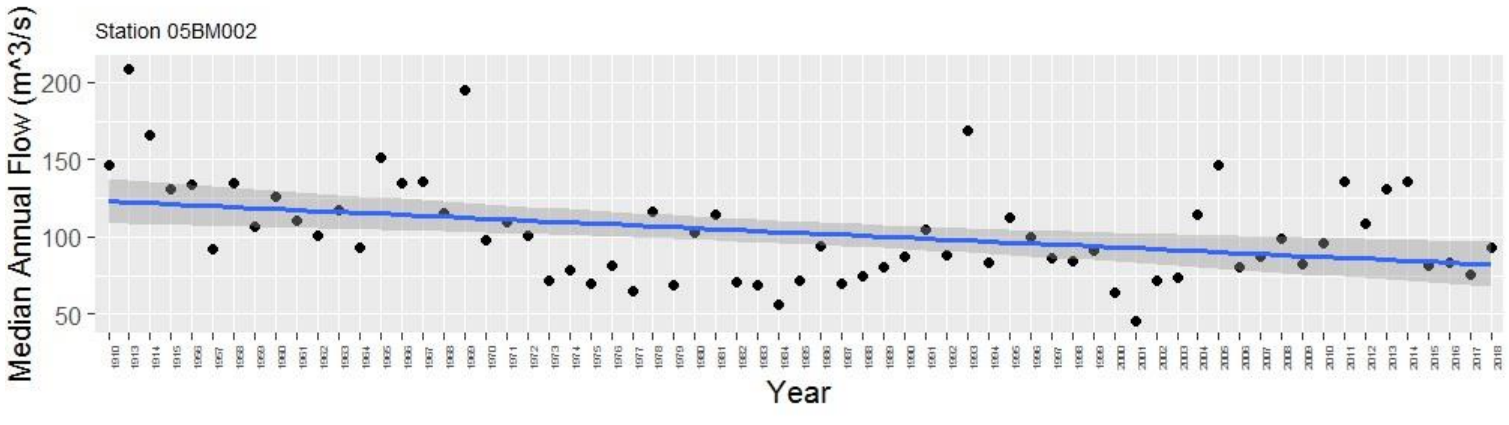


Intercept = 16.592 ; Intercept STE = 3.353 ; Intercept T-Statistic 4.9483 ; Intercept p-value = 2.7417e-06
Slope = -0.0081591 ; Slope STE = 0.0017015 ; Slope T-Statistic -4.7953 ; Slope p-value = 5.1785e-06
F-Statistic: 22.995 ; p-value: 5.178e-06
Theil-Sen Slope = -0.0005667 ; Mann-Kendal Score = -324 ; Mann-Kendall p-value = 0.41032

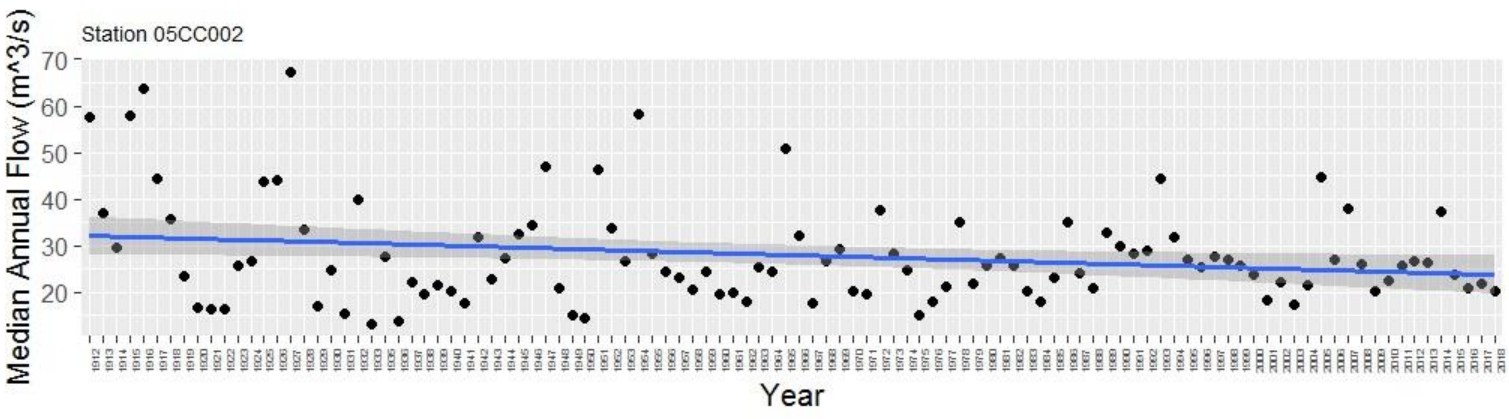


Intercept = -10.379 ; Intercept STE = 1.6168 ; Intercept T-Statistic -6.4193 ; Intercept p-value = 3.8452e-09
Slope = 0.0055037 ; Slope STE = 0.00082339 ; Slope T-Statistic 6.6842 ; Slope p-value = 1.0842e-09
F-Statistic: 44.679 ; p-value: 1.084e-09
Theil-Sen Slope = 0.006915 ; Mann-Kendal Score = 2632 ; Mann-Kendall p-value = 5.5589e-12



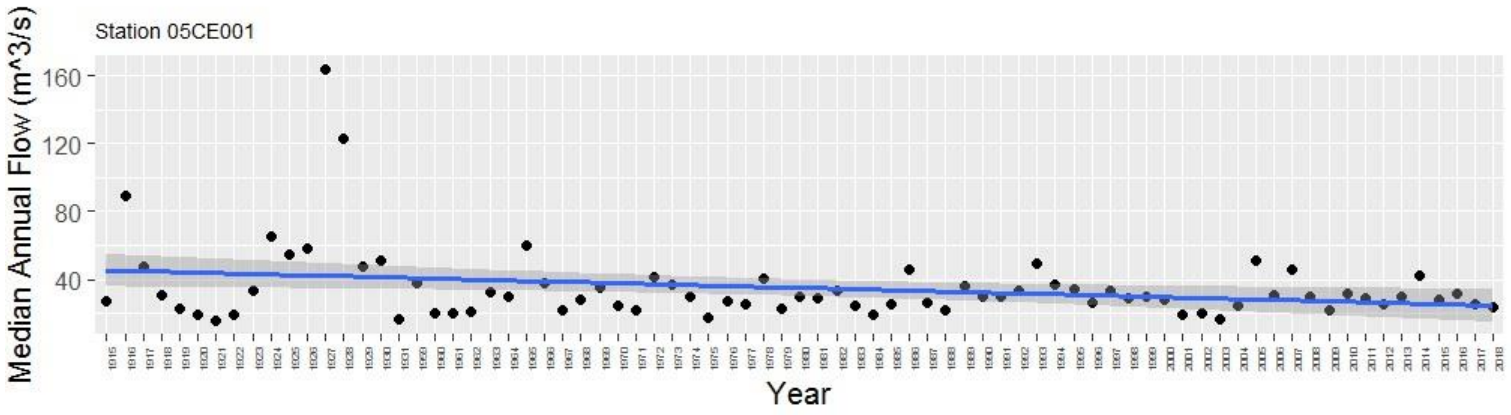
Intercept = 1496.4 ; Intercept STE = 223.75 ; Intercept T-Statistic 6.6879 ; Intercept p-value = 1.0653e-09
Slope = -0.70397 ; Slope STE = 0.11315 ; Slope T-Statistic -6.2213 ; Slope p-value = 9.7694e-09
F-Statistic: 38.705 ; p-value: 9.769e-09
Theil-Sen Slope = -0.1616 ; Mann-Kendal Score = -654 ; Mann-Kendall p-value = 0.087225

FIGURE. TIME-SERIES OF LONG-TERM TRENDS IN MEDIAN ANNUAL FLOW FOR THE RED DEER RIVER SUB-BASIN, BY STATION.

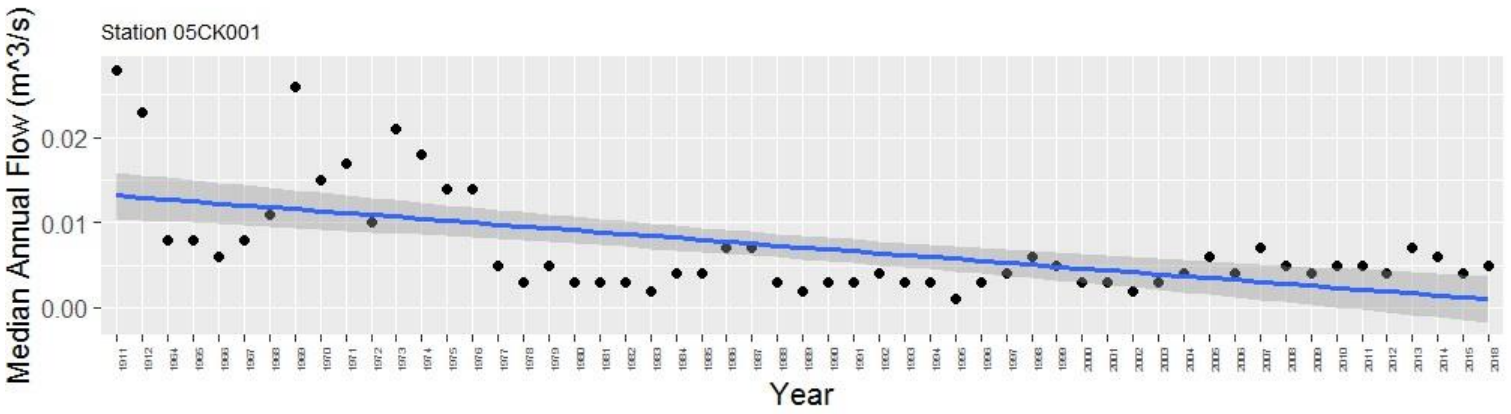


Intercept = 209.84 ; Intercept STE = 66.628 ; Intercept T-Statistic 3.1494 ; Intercept p-value = 0.0021311
Slope = -0.092417 ; Slope STE = 0.033907 ; Slope T-Statistic -2.7256 ; Slope p-value = 0.0075211
F-Statistic: 7.429 ; p-value: 0.007521
Theil-Sen Slope = -0.01786 ; Mann-Kendal Score = -235 ; Mann-Kendall p-value = 0.52874

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

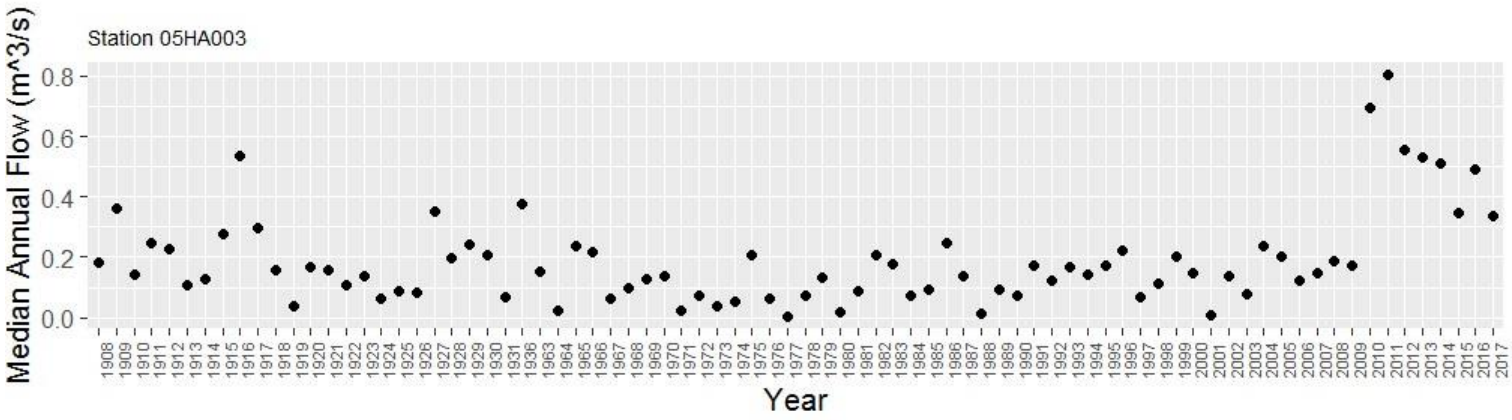


Intercept = 549.6 ; Intercept STE = 144.18 ; Intercept T-Statistic 3.812 ; Intercept p-value = 0.00023612
Slope = -0.26065 ; Slope STE = 0.073375 ; Slope T-Statistic -3.5523 ; Slope p-value = 0.00057984
F-Statistic: 12.619 ; p-value: 0.0005798
Theil-Sen Slope = 0 ; Mann-Kendal Score = -36 ; Mann-Kendall p-value = 0.92168



Intercept = 0.42315 ; Intercept STE = 0.040929 ; Intercept T-Statistic 10.339 ; Intercept p-value = 9.6154e-18
Slope = -0.0002094 ; Slope STE = 2.0601e-05 ; Slope T-Statistic -10.165 ; Slope p-value = 2.3726e-17
F-Statistic: 103.33 ; p-value: 2.373e-17
Theil-Sen Slope = -1.587e-05 ; Mann-Kendal Score = -779 ; Mann-Kendall p-value = 0.036747

FIGURE. TIME-SERIES OF LONG-TERM TRENDS IN MEDIAN ANNUAL FLOW FOR THE LOWER-SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.



Intercept = -0.51712 ; Intercept STE = 0.7431 ; Intercept T-Statistic -0.6959 ; Intercept p-value = 0.48799
Slope = 0.00036014 ; Slope STE = 0.00037963 ; Slope T-Statistic 0.94867 ; Slope p-value = 0.3449
F-Statistic: 0.89998 ; p-value: 0.3449
Theil-Sen Slope = 0.0003367 ; Mann-Kendal Score = 416 ; Mann-Kendall p-value = 0.28365

Intercept = 169.24 ; Intercept STE = 524.9 ; Intercept T-Statistic 0.32243 ; Intercept p-value = 0.74776
Slope = 0.0061331 ; Slope STE = 0.26716 ; Slope T-Statistic 0.022957 ; Slope p-value = 0.98173
F-Statistic: 0.00052701 ; p-value: 0.9817
Theil-Sen Slope = 0.2727 ; Mann-Kendal Score = 444 ; Mann-Kendall p-value = 0.23951

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. NON-PARAMETRIC COMPARISON OF VARIANCE FOR POST-OPERATION OF DAMS VS. PRE-DAMS MONTHLY FLOW IN THE SOUTH SASKATCHEWAN RIVER BASIN.

			Pre-Oldman River Dam (1966-1990)			Post Oldman River Dam (1990-2018)			Fligner-Killeen		Mann-Whitney				
Sub-Basin	**Station**	**Month**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05A - Upper-South Saskatchewan	**05AA024**	January	23	6.63	2.52	27	8.7	1.93	29.30	0.00 ***	166172.5	0.00 ***	31.2	38	20
		February	23	6.9	2.67	28	8.6	1.61	42.54	0.00 ***	160013	0.00 ***	24.6		
		March	24	9.17	4.34	28	8.71	2.51	72.61	0.00 ***	306417	0.93			
		April	24	23.6	18.68	28	19.4	13.49	24.29	0.00 ***	339955.5	0.00 ***	17.8		
		May	24	106	62.64	28	61.3	42.92	26.90	0.00 ***	439669.5	0.00 ***	42.2		
		June	24	111.5	62.94	27	96.75	71.39	5.78	0.02 *	329364	0.00 ***	13.2		
		July	24	40.15	25.28	27	53.7	16.75	14.50	0.00 ***	212122	0.00 ***	33.7		
		August	24	17.9	8.45	27	36.3	10.82	28.02	0.00 ***	89167	0.00 ***	102.8		
		September	24	13.9	5.34	27	27	7.86	57.82	0.00 ***	71219	0.00 ***	94.2		
		October	24	12.3	3.67	27	18.1	9.19	112.73	0.00 ***	201489	0.00 ***	47.2		
		November	24	9.68	3.65	27	13	5.75	58.22	0.00 ***	182929.5	0.00 ***	34.3		
		December	24	7.65	2.54	27	8.8	2.03	9.23	0.00 **	213918.5	0.00 ***	15.0		

			Pre-Chain Lakes South Dam (1908-1965)			Post Chain Lakes South Dam, Post Pine Coulee Dam (1965-1998)			Post Pine Coulee Dam (1998-2018)			Fligner-Killeen		Mann-Whitney				Fligner-Killeen		Mann-Whitney				
Sub-Basin	**Station**	**Month**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**		**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change Post Pine Coulee Dam and Pre-Chain Lakes South Dam, in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05A - Upper-South Saskatchewan	05AB021	January	21	0.28	0.25	33	0.51	0.38	20	0.57	0.31	39.32	0.00 ***	303469	0.00	***	1.89	0.2	265838	0.00 ***	99.6	54.36	1.5
		February	21	0.32	0.34	33	0.64	0.36	20	0.64	0.28	0.03	0.87	270639	0.00	***	34.98	0.0 ***	262080	0.88			
		March	21	0.74	0.80	33	0.95	0.65	20	1.13	0.74	18.40	0.00 ***	437769	0.00	***	0.00	1.0	296009.5	0.02 *	53.5		
		April	21	3.48	2.98	33	1.99	1.64	20	1.44	1.14	132.36	0.00 ***	675766.5	0.00	***	46.52	0.0 ***	351546	0.00 ***	58.8		
		May	21	7.76	6.81	33	4.05	4.88	20	1.93	1.74	25.00	0.00 ***	725136	0.00	***	111.15	0.0 ***	383861	0.00 ***	75.2		
		June	21	6.15	5.01	33	5.27	5.95	20	5.14	5.59	13.42	0.00 ***	554260	0.00	***	38.23	0.0 ***	272458	0.01 **	16.4		
		July	21	2.38	2.71	33	1.69	1.93	20	3.05	1.68	7.03	0.01 **	531305	0.81		0.24	0.6	195852.5	0.00 ***	28.2		
		August	22	0.96	1.02	33	1.02	0.98	20	2.28	1.01	18.82	0.00 ***	458320	0.00	***	2.20	0.1	148688.5	0.00 ***	138.2		
		September	22	1.03	0.90	33	0.71	0.54	20	1.75	1.27	0.47	0.49	475993.5	0.00	***	161.91	0.0 ***	139425	0.00 ***	69.4		
		October	22	0.94	0.64	33	0.80	0.50	20	1.26	0.96	0.93	0.34	538771.5	0.24		81.34	0.0 ***	220983.5	0.00 ***	34.0		
		November	21	0.65	0.51	33	0.68	0.34	20	0.83	0.62	5.30	0.02 *	440891.5	0.00	***	85.50	0.0 ***	252870	0.00 ***	27.8		
		December	21	0.40	0.33	33	0.52	0.27	20	0.60	0.35	11.42	0.00 ***	421036	0.00	***	48.40	0.0 ***	249931.5	0.00 ***	51.1		

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

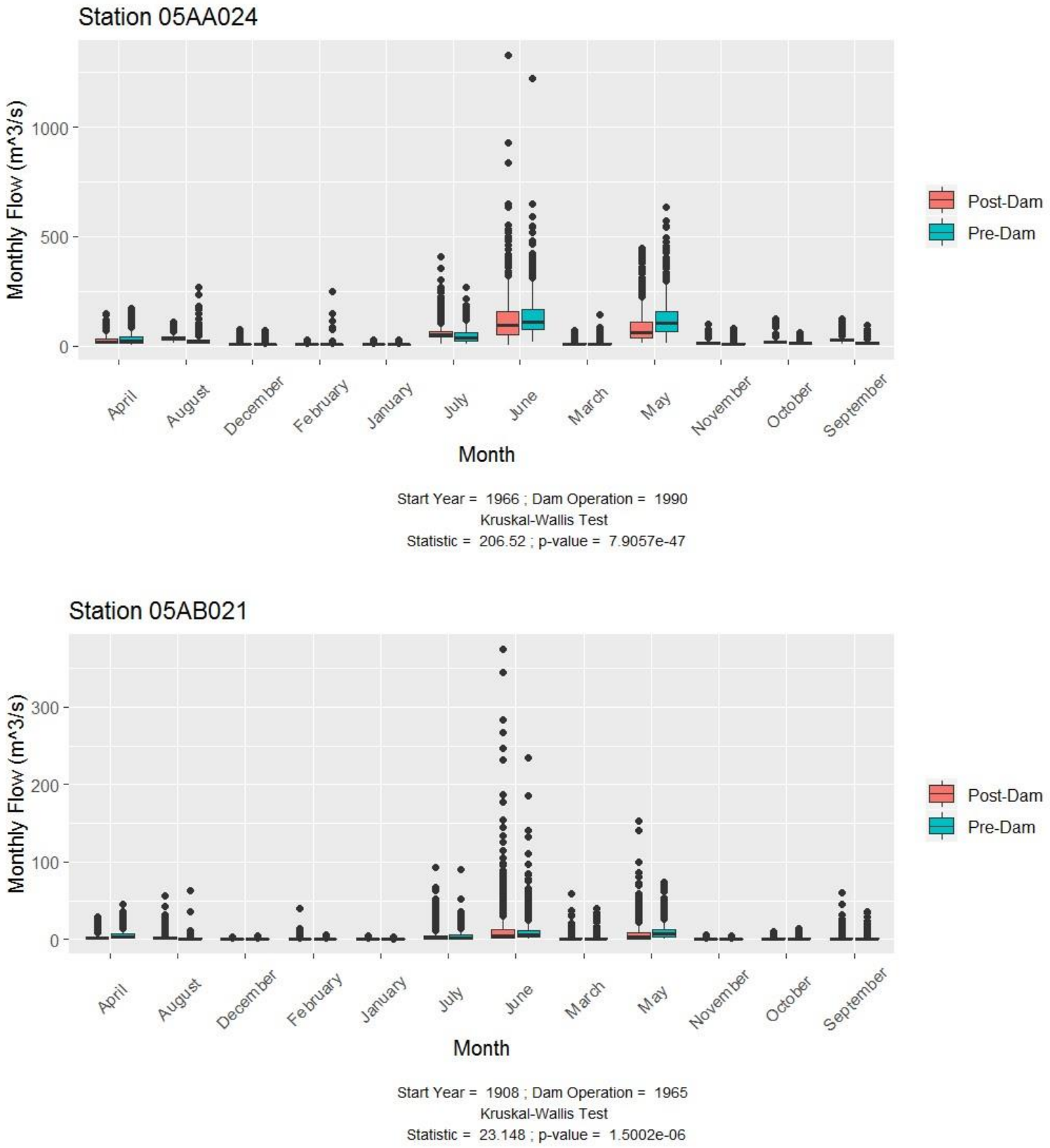
			Pre-Bearspaw Dam (1911-1954)			Post Bearspaw Dam (1954-2018)			Fligner-Killeen		Mann-Whitney				
Sub-Basin	**Station**	**Month**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05B - Bow River	**05BH004**	January	40	32.6	10.82	65	55.7	12.01	0.68	0.41	194699.5	0.00 ***	70.9	36	63.9
		February	40	30.3	8.45	65	55.5	9.19	10.63	0.00 **	96600.5	0.00 ***	83.2		
		March	40	31.1	10.97	65	54.1	10.08	4.28	0.04 *	193002.5	0.00 ***	74.0		
		April	41	41.9	16.01	65	58.4	13.64	6.94	0.01 **	538465	0.00 ***	39.4		
		May	42	81.6	49.52	65	87.5	37.81	85.54	0.00 ***	1176076	0.00 ***	7.2		
		June	42	233	108.23	65	185	80.06	134.71	0.00 ***	1600272.5	0.00 ***	20.6		
		July	42	190.5	73.39	65	153	57.82	132.96	0.00 ***	1765572	0.00 ***	19.7		
		August	42	128	44.03	65	104	27.58	137.64	0.00 ***	1796971	0.00 ***	18.8		
		September	42	87.2	23.43	65	79	19.57	41.86	0.00 ***	1468969.5	0.00 ***	9.4		
		October	41	59.5	19.42	65	62.4	13.64	74.27	0.00 ***	1123868	0.00 ***	4.9		
		November	41	44.7	13.34	65	55.5	11.71	14.86	0.00 ***	633184.5	0.00 ***	24.2		
		December	40	34.8	13.79	65	54	12.75	1.24	0.26	378794.5	0.00 ***	55.2		

			Pre-Gardiner Dam (1911-1968)			Post Gardiner Dam (1968-2018)			Fligner-Killeen		Mann-Whitney				
Sub-Basin	**Station**	**Month**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05H - Lower-South Saskatchewan	**05HG001**	January	56	62.45	26.61	46	283	80.06	685.62	0.00 ***	50640	0.00 ***	353.2	131	183
		February	56	65.7	25.43	46	277	71.91	610.27	0.00 ***	37823.5	0.00 ***	321.6		
		March	56	83.15	34.77	48	215	105.26	366.50	0.00 ***	455357	0.00 ***	158.6		
		April	56	283	206.08	51	132.5	77.76	636.45	0.00 ***	2056458.5	0.00 ***	53.2		
		May	57	351	214.98	51	117	89.10	338.62	0.00 ***	2299359.5	0.00 ***	66.7		
		June	57	688	352.86	51	176	179.39	302.23	0.00 ***	2320499.5	0.00 ***	74.4		
		July	57	501	306.90	51	156	148.56	212.66	0.00 ***	2299350.5	0.00 ***	68.9		
		August	57	232	130.47	51	130	99.33	98.11	0.00 ***	2058544	0.00 ***	44.0		
		September	57	163	84.51	51	127	83.03	28.76	0.00 ***	1688995.5	0.00 ***	22.1		
		October	57	131	68.20	51	165	84.51	0.02	0.88	1179011	0.00 ***	26.0		
		November	57	96.3	57.08	51	226	60.79	1.76	0.18	404460	0.00 ***	134.7		
		December	57	70.8	31.88	51	244	50.41	123.75	0.00 ***	87155.5	0.00 ***	244.6		

* Percentage change in median monthly flow is only calculated for months with a statistically significant trend over time. For months without a significant trend, a value of zero is assigned for calculation of the overall station score.

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FIGURE. ANALYSIS OF VARIANCE IN MONTHLY FLOW FOR THE PERIOD POST-OPERATION OF DAMS VS. PRE-DAMS IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY STATION.



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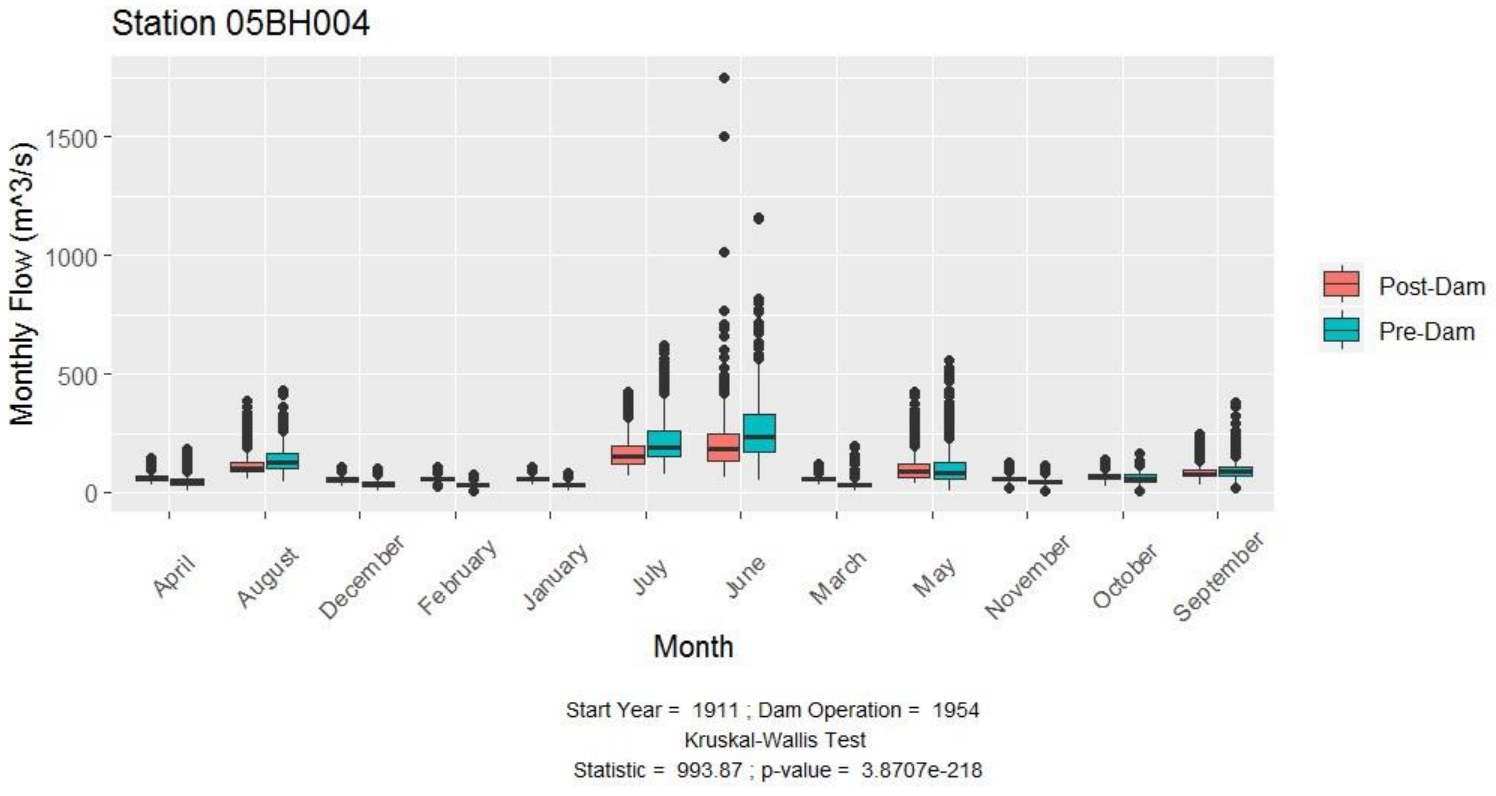
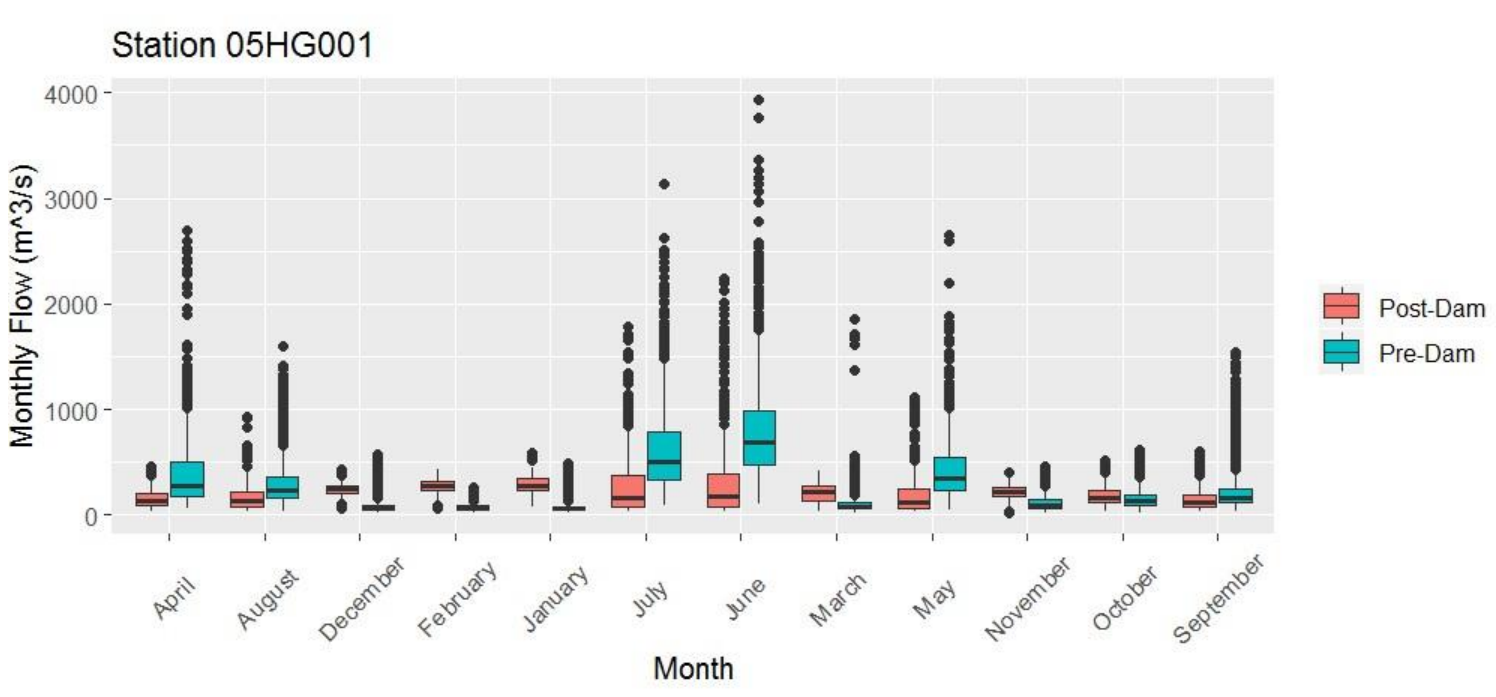


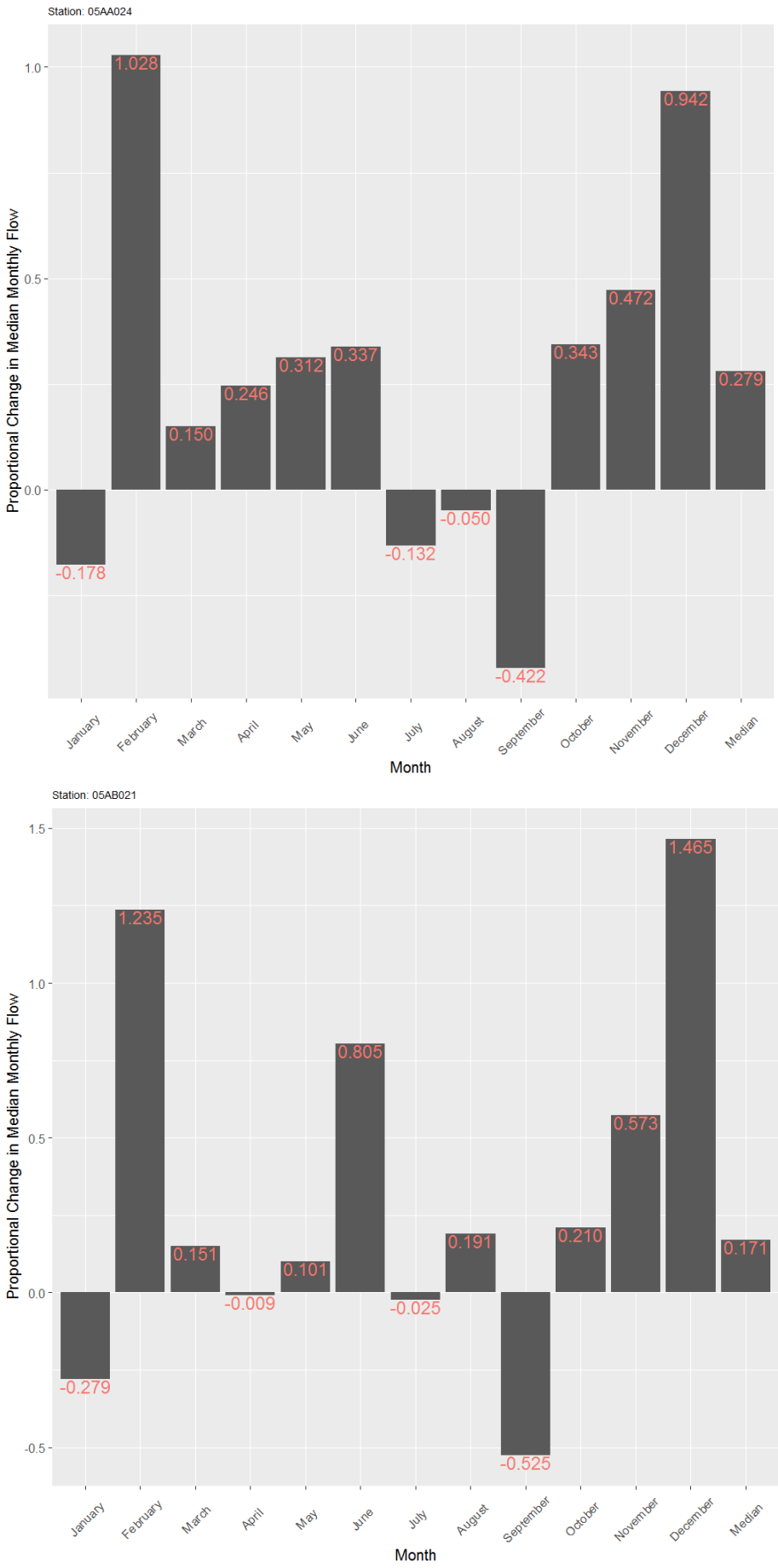
Start Year = 1911 ; Dam Operation = 1954
Kruskal-Wallis Test
Statistic = 993.87 ; p-value = 3.8707e-218

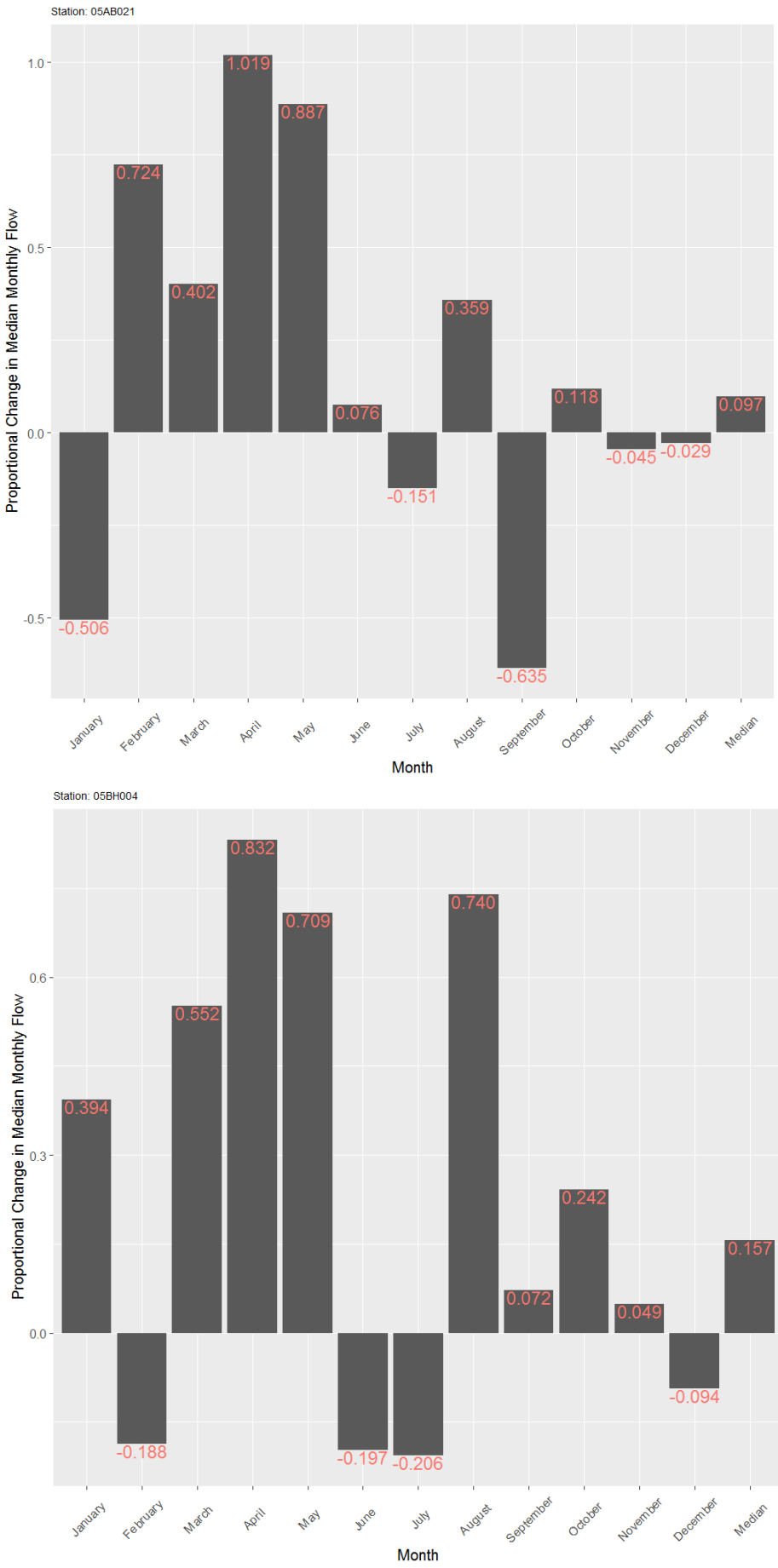


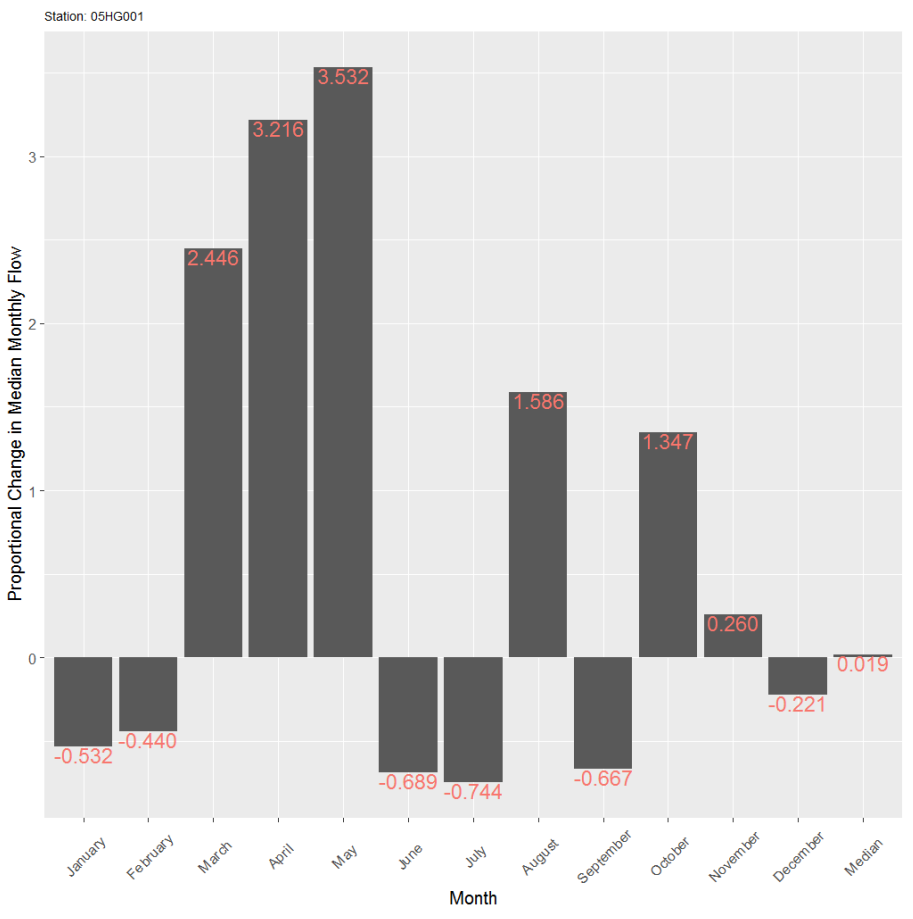
Start Year = 1911 ; Dam Operation = 1968
Kruskal-Wallis Test
Statistic = 54.328 ; p-value = 1.6966e-13

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FIGURE. PERCENTAGE CHANGE IN MEDIAN MONTHLY FLOW FOR THE PERIOD POST-OPERATION OF DAMS VS. PRE-DAMS IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY STATION.







Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. NON-PARAMETRIC COMPARISON OF VARIANCE FOR RECENT VS. HISTORICAL MONTHLY FLOW IN THE UPPER-SOUTH SASKATCHEWAN RIVER SUB-BASIN.

		Historic				Recent				Fligner-Killeen Test		Mann-Whitney Test					
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)	**Weighted average (%) across sub-watershed**
05AA008	January	1911	24	1.325	0.27	1979	40	1.36	0.43	51.55	0.00 ***	439339.5	0.08		9	2.7	24.60
	February	1911	25	1.27	0.19	1979	40	1.23	0.34	134.98	0.00 ***	395625	0.27				
	March	1911	38	1.3	0.30	1979	40	1.35	0.49	125.01	0.00 ***	695258.5	0.04 *	3.8			
	April	1911	38	2.72	1.94	1979	40	3.05	2.25	3.63	0.06	712358.5	0.08				
	May	1911	39	14.2	7.64	1979	40	10.50	6.23	20.94	0.00 ***	924489.5	0.00 ***	26.1			
	June	1911	39	14.4	6.97	1979	40	12.00	5.93	16.70	0.00 ***	862402	0.00 ***	16.7			
	July	1910	40	7.48	3.23	1979	40	5.92	2.57	35.60	0.00 ***	934903.5	0.00 ***	20.9			
	August	1910	40	3.74	1.26	1979	40	3.13	1.10	18.55	0.00 ***	973136	0.00 ***	16.3			
	September	1910	40	2.69	0.76	1979	40	2.36	0.70	2.44	0.12	902501.5	0.00 ***	12.3			
	October	1910	40	2.33	0.74	1979	40	2.21	0.74	4.79	0.03 *	858988.5	0.00 ***	5.2			
	November	1911	26	1.87	0.58	1979	40	1.85	0.73	54.81	0.00 ***	419007.5	0.18				
	December	1911	24	1.47	0.34	1979	40	1.56	0.60	78.05	0.00 ***	417199.5	0.00 ***	6.1			
05AD005	January	1912	52	1.73	0.62	1964	53	1.66	0.55	2.35	0.13	1357999.5	0.21		6	4	
	February	1912	52	1.64	0.67	1964	53	1.55	0.61	17.89	0.00 ***	1208047.5	0.00 ***	5.5			
	March	1912	52	1.67	0.55	1964	53	1.76	0.86	124.81	0.00 ***	1212997.5	0.00 ***	5.4			
	April	1912	52	4.265	3.14	1964	53	4.51	3.31	0.03	0.86	1210739.5	0.25				
	May	1912	52	20.25	11.93	1964	53	18.80	12.01	0.03	0.87	1409116.5	0.00 **	7.2			
	June	1912	52	27.8	12.45	1964	53	27.00	13.12	13.47	0.00 ***	1250415	0.69				
	July	1912	52	14.3	6.82	1964	53	13.90	8.30	11.20	0.00 ***	1407882.5	0.00 **	2.8			
	August	1912	52	6.94	3.06	1964	53	5.96	3.54	21.02	0.00 ***	1544146	0.00 ***	14.1			
	September	1912	52	4.22	1.81	1964	53	3.61	2.10	5.24	0.02 *	1467231	0.00 ***	14.6			
	October	1912	52	4.08	2.31	1964	53	3.62	1.91	40.42	0.00 ***	1538233.5	0.00 ***	11.3			
	November	1911	53	3.23	1.56	1964	53	3.17	1.48	3.90	0.05 *	1260408	0.89				
	December	1911	53	2.29	0.93	1964	53	2.01	0.79	3.41	0.06	1483088	0.00 ***	12.2			

		Historic				Recent				Fligner-Killeen Test		Mann-Whitney Test				
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05AE002	January	1913	47	0.23	0.15	1967	50	0.24	0.20	31.70	0.00 ***	1127833.5	0.96		13	0.7
	February	1913	47	0.31	0.26	1967	50	0.24	0.19	62.47	0.00 ***	1039717.5	0.00 ***	22.5		
	March	1913	48	0.59	0.53	1967	50	0.58	0.53	0.98	0.32	1170524.5	0.17			
	April	1910	49	2.12	1.73	1967	50	1.75	1.40	59.63	0.00 ***	1233172.5	0.00 ***	17.3		
	May	1910	50	4.62	3.23	1967	50	3.37	2.36	24.43	0.00 ***	1389710	0.00 ***	27.1		
	June	1909	51	3.62	2.76	1967	50	3.25	2.40	3.77	0.05	1180059	0.03 *	10.2		
	July	1909	51	1.15	0.99	1967	50	1.26	0.96	0.00	1.00	1129593.5	0.00 **	9.6		
	August	1909	52	0.38	0.35	1967	50	0.56	0.42	19.54	0.00 ***	989434.5	0.00 ***	46.5		
	September	1909	52	0.37	0.22	1967	50	0.44	0.31	38.10	0.00 ***	994947.5	0.00 ***	21.3		
	October	1909	52	0.43	0.25	1967	50	0.44	0.28	1.36	0.24	1207985.5	0.27			
	November	1909	50	0.35	0.21	1967	50	0.36	0.25	9.73	0.00 **	1092685	0.92			
	December	1912	48	0.26	0.18	1967	50	0.26	0.20	3.55	0.06	1213610.5	0.01 *	1.7		
05AE006	January	1912	52	3.94	3.02	1965	53	3.29	2.05	89.80	0.00 ***	1429124.5	0.00 ***	16.5	58	6.9
	February	1912	52	3.79	2.68	1965	53	3.40	1.96	76.53	0.00 ***	1186794.5	0.00 ***	10.3		
	March	1912	53	5.66	3.84	1965	53	4.00	3.04	33.57	0.00 ***	1564009	0.00 ***	29.3		
	April	1912	53	13.50	13.14	1965	53	4.62	3.49	240.96	0.00 ***	1729707.5	0.00 ***	65.8		
	May	1912	53	33.40	31.58	1965	53	8.25	9.36	108.64	0.00 ***	1739723.5	0.00 ***	75.3		
	June	1912	53	51.30	51.59	1965	53	20.70	26.29	33.49	0.00 ***	1561940	0.00 ***	59.6		
	July	1912	53	11.20	14.74	1965	53	7.41	5.77	217.17	0.00 ***	1375549.5	0.34			
	August	1912	53	2.24	2.56	1965	53	5.79	3.02	18.75	0.00 ***	853695.5	0.00 ***	158.5		
	September	1912	53	1.73	1.63	1965	53	5.28	3.26	31.10	0.00 ***	737999.5	0.00 ***	204.9		
	October	1911	53	5.18	6.09	1965	53	5.77	4.20	151.68	0.00 ***	1172410.5	0.00 ***	11.4		
	November	1911	54	7.90	5.98	1965	53	4.75	3.15	149.28	0.00 ***	1630547.5	0.00 ***	39.9		
	December	1911	54	4.93	3.80	1965	53	3.57	2.42	78.79	0.00 ***	1613783	0.00 ***	27.6		

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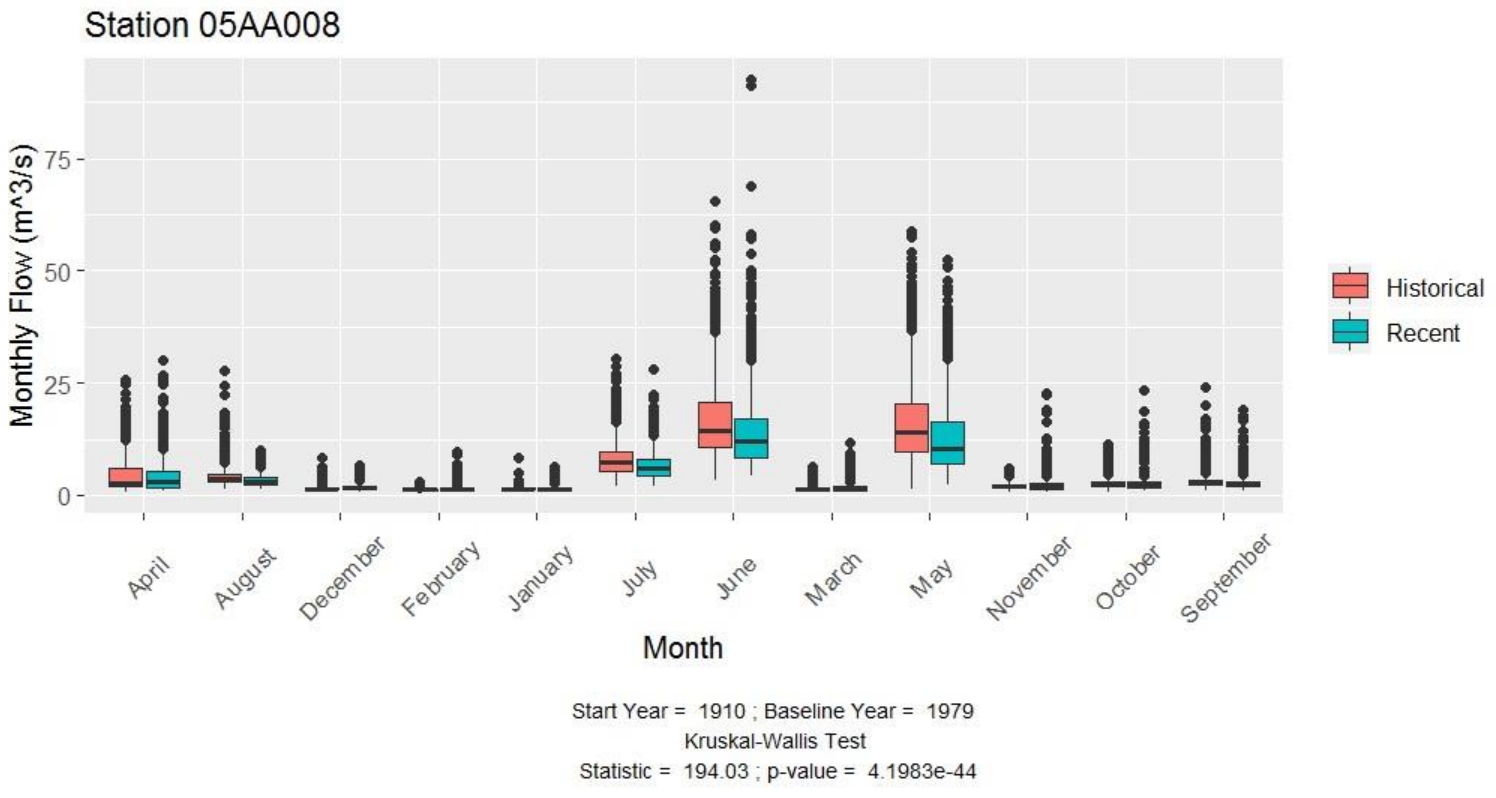
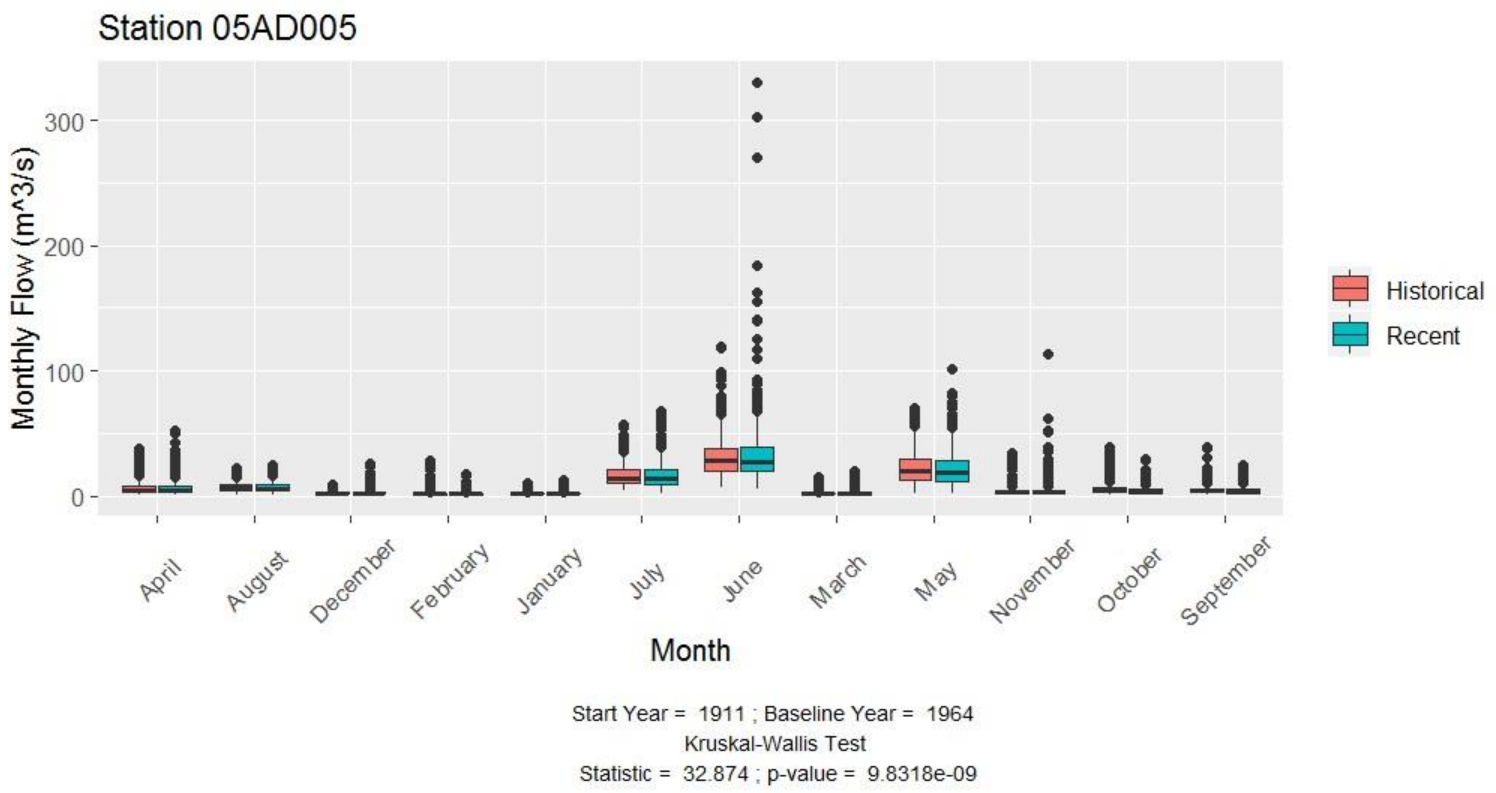
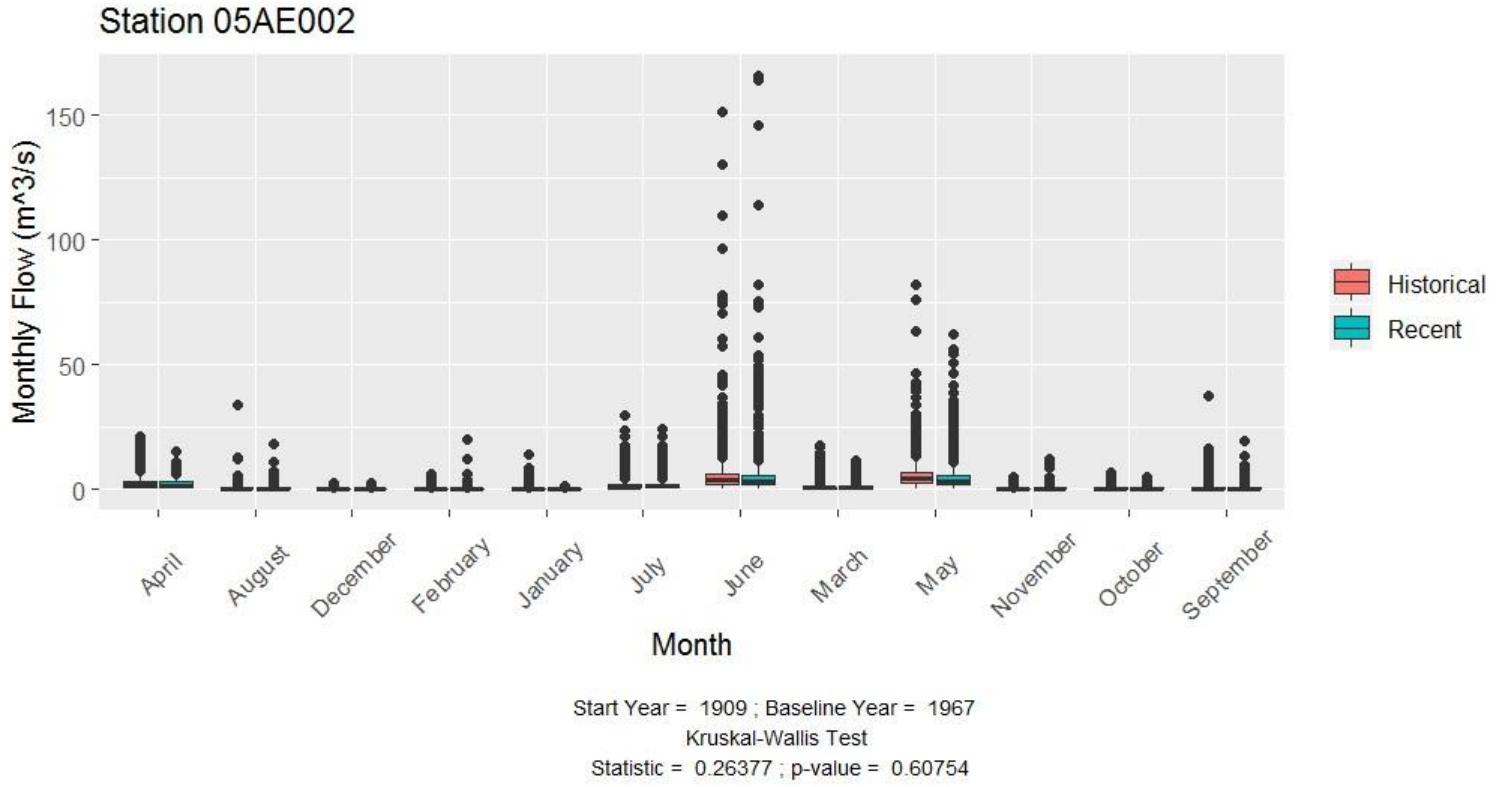
		Historic				Recent				Fligner-Killeen Test		Mann-Whitney Test				
Station	Month	Start Year	Number of Years of Sampling	Median Monthly Flow (m^3/s)	Median Absolute Deviation in Monthly Flow (m^3/s)	Benchmark Year	Number of Years of Sampling	Median Monthly Flow (m^3/s)	Median Absolute Deviation in Monthly Flow (m^3/s)	Test Statistic	p-value	Test Statistic	p-value	Magnitude of Change in Monthly Flow (%)	Average Change Across Months (%)*	Median Annual Flow (m^3/s)
05AE027	January	1903	58	4.25	1.76	1961	58	3.54	1.47	19.59	0.00 ***	1822048	0.00 ***	16.7	18	10.7
	February	1903	58	3.94	1.60	1961	58	3.42	1.42	4.40	0.04 *	1475483.5	0.00 ***	13.3		
	March	1903	58	4.25	1.81	1961	58	3.96	1.98	8.51	0.00 **	1778763	0.00 ***	6.8		
	April	1903	58	10.95	8.09	1961	58	9.93	7.52	22.08	0.00 ***	1706120	0.00 ***	9.4		
	May	1903	58	45.30	25.50	1961	58	35.40	21.05	37.11	0.00 ***	1973941	0.00 ***	21.9		
	June	1903	58	69.40	37.36	1961	58	54.40	29.36	30.88	0.00 ***	1814927.5	0.00 ***	21.6		
	July	1903	58	33.70	20.31	1961	58	26.30	13.05	91.34	0.00 ***	1870302.5	0.00 ***	22.0		
	August	1903	58	15.70	7.12	1961	58	13.60	5.04	129.32	0.00 ***	1992759.5	0.00 ***	13.4		
	September	1902	59	12.10	5.34	1961	58	9.57	4.51	35.08	0.00 ***	1923563	0.00 ***	20.9		
	October	1902	59	11.00	6.52	1961	58	8.38	4.92	97.32	0.00 ***	2070485	0.00 ***	23.8		
	November	1902	59	8.50	4.89	1961	58	6.80	3.99	11.06	0.00 ***	1767418.5	0.00 ***	20.0		
	December	1902	59	5.58	2.43	1961	58	4.25	1.88	7.65	0.01 **	1982944.5	0.00 ***	23.8		
05AH001	February	1916	14	0.00	0.00	1980	38	0.00	0.00	62.82	0.00 ***	132704.5	0.00 ***	0.0	11	0.0
	March	1911	36	0.00	0.00	1980	39	0.00	0.00	49.28	0.00 ***	753361.5	0.00 ***	0.0		
	April	1911	38	0.10	0.14	1980	39	0.00	0.00	654.63	0.00 ***	954769	0.00 ***	100.0		
	May	1911	39	0.00	0.00	1980	39	0.00	0.00	67.79	0.00 ***	852235	0.00 ***	0.0		
	June	1911	39	0.00	0.00	1980	39	0.00	0.00	2.31	0.13	711627	0.02 *	0.0		
	July	1911	39	0.00	0.00	1980	39	0.00	0.00	0.03	0.86	731765.5	0.92			
	August	1911	39	0.00	0.00	1980	39	0.00	0.00	0.88	0.35	725427	0.31			
	September	1911	39	0.00	0.00	1980	39	0.00	0.00	0.54	0.46	679438.5	0.35			
	October	1911	39	0.00	0.00	1980	39	0.00	0.00	7.48	0.01 **	713726	0.01 **	0.0		
05AJ001	January	1912	51	62.00	22.24	1966	53	75.10	21.94	6.68	0.01 **	949941	0.00 ***	21.1	22	116
	February	1912	51	62.30	23.57	1966	53	82.90	20.31	34.45	0.00 ***	656022.5	0.00 ***	33.1		
	March	1912	52	86.40	39.88	1966	53	102.00	33.36	12.94	0.00 ***	961128	0.00 ***	18.1		
	April	1912	53	166.50	86.73	1966	53	123.00	65.83	75.76	0.00 ***	1632647	0.00 ***	26.1		
	May	1912	53	326.00	222.39	1966	53	191.00	173.46	21.79	0.00 ***	1833430	0.00 ***	41.4		
	June	1911	54	589.00	302.45	1966	53	446.50	354.34	6.26	0.01 *	1623931.5	0.00 ***	24.2		
	July	1911	54	318.50	237.96	1966	53	191.00	174.65	97.22	0.00 ***	1848907	0.00 ***	40.0		
	August	1911	54	145.00	99.93	1966	53	105.00	69.68	181.34	0.00 ***	1730295.5	0.00 ***	27.6		
	September	1912	53	98.50	66.72	1966	53	92.30	56.64	49.79	0.00 ***	1375233.5	0.00 ***	6.3		
	October	1912	52	100.00	67.16	1966	53	104.00	54.26	83.54	0.00 ***	1379940.5	0.04 *	4.0		
	November	1911	53	88.90	41.66	1966	53	96.25	32.25	29.23	0.00 ***	1203270.5	0.02 *	8.3		
	December	1911	52	68.80	24.76	1966	53	75.00	26.69	1.91	0.17	1205181.5	0.00 ***	9.0		

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

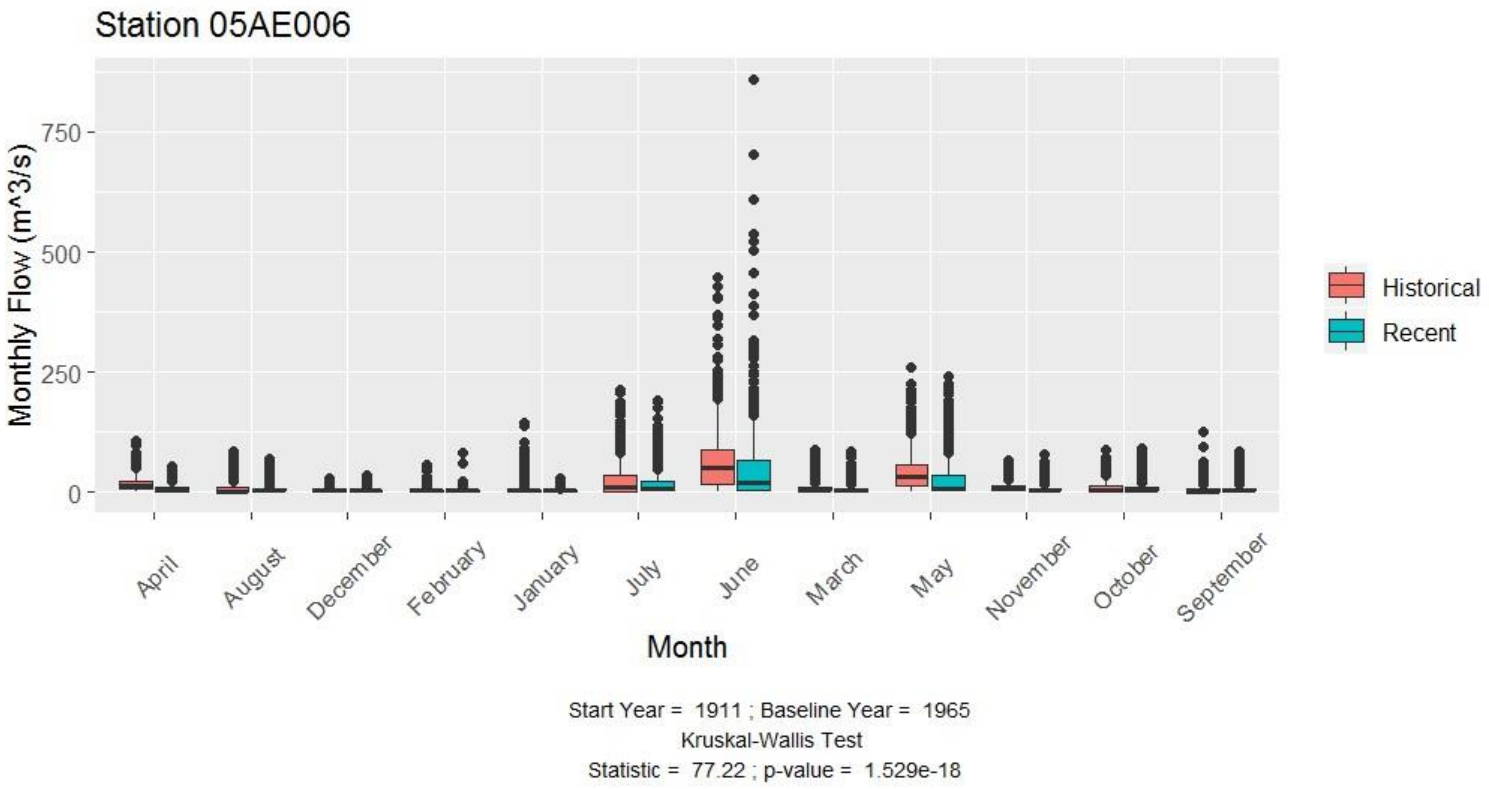
FIGURE. ANALYSIS OF VARIANCE IN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1945- VARIOUS) TIME PERIODS IN THE UPPER-SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.



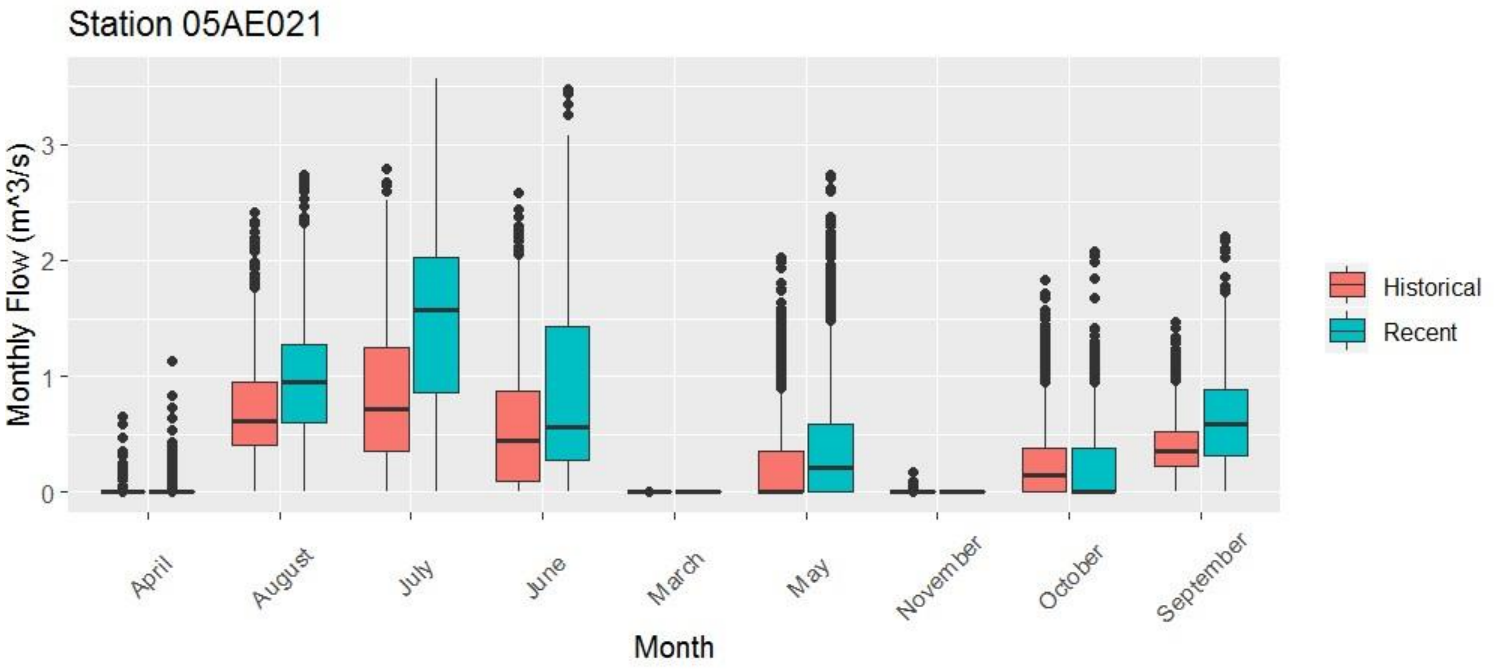




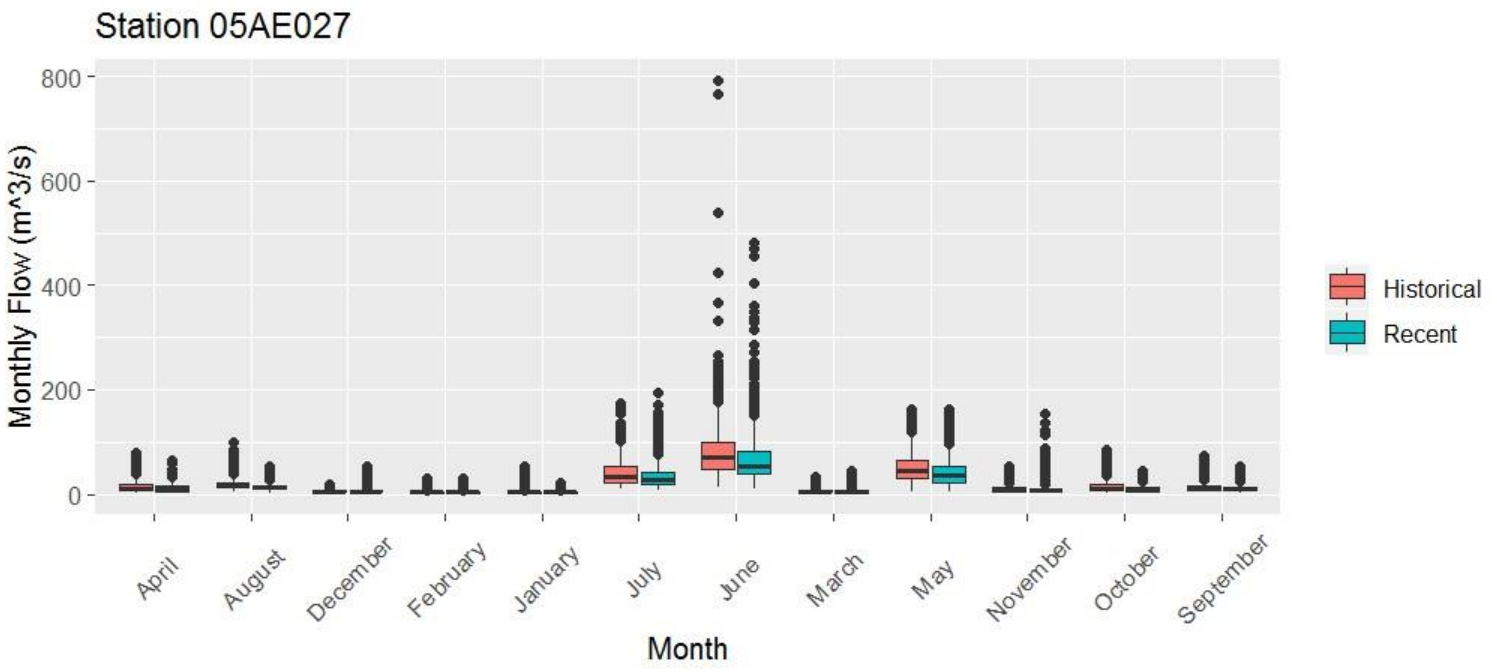
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.



Start Year = 1911 ; Baseline Year = 1965
Kruskal-Wallis Test
Statistic = 77.22 ; p-value = 1.529e-18

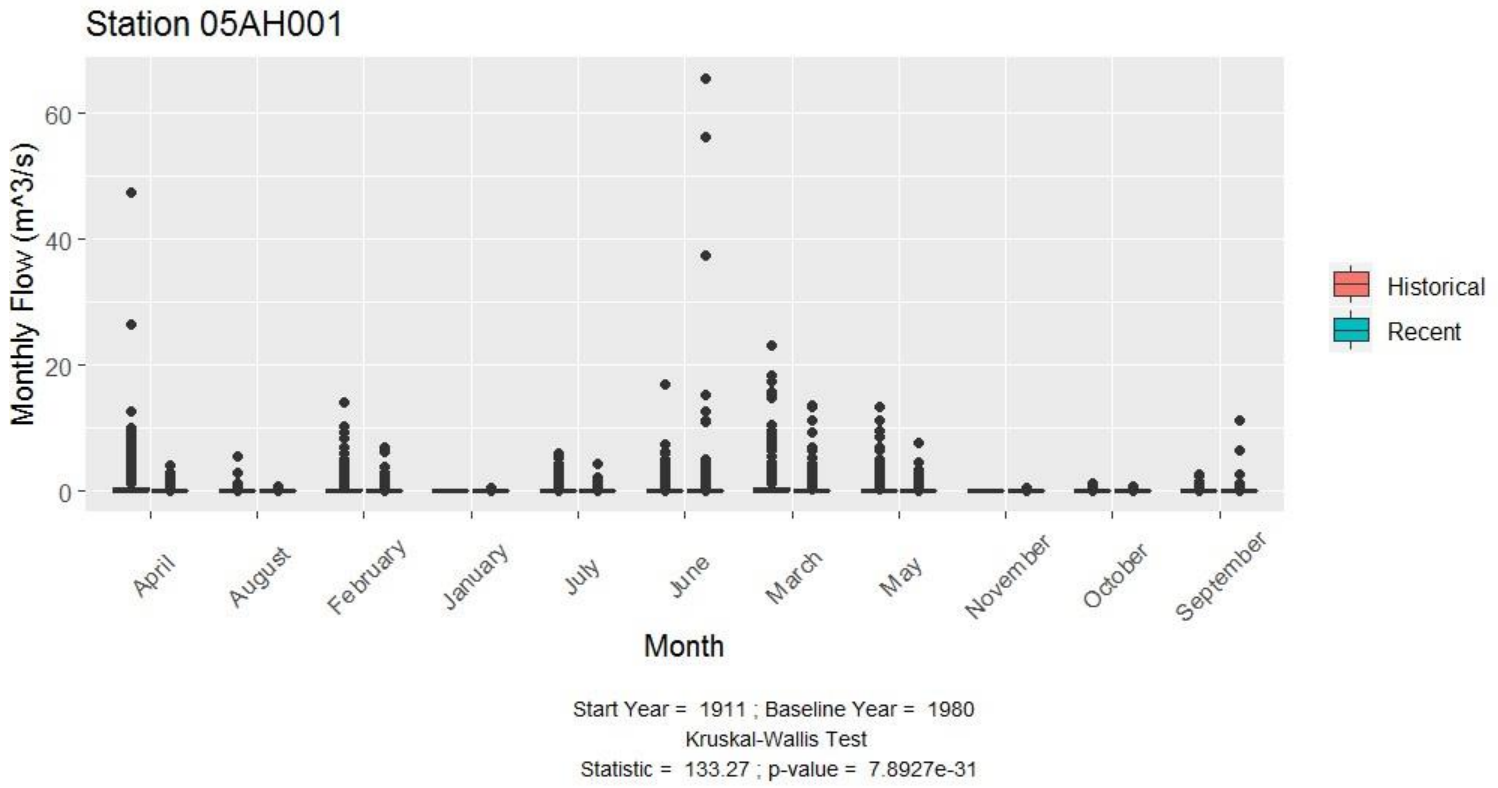


Start Year = 1927 ; Baseline Year = 1973
Kruskal-Wallis Test
Statistic = 216.62 ; p-value = 4.9432e-49



Start Year = 1902 ; Baseline Year = 1961
Kruskal-Wallis Test
Statistic = 236.73 ; p-value = 2.0296e-53

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.



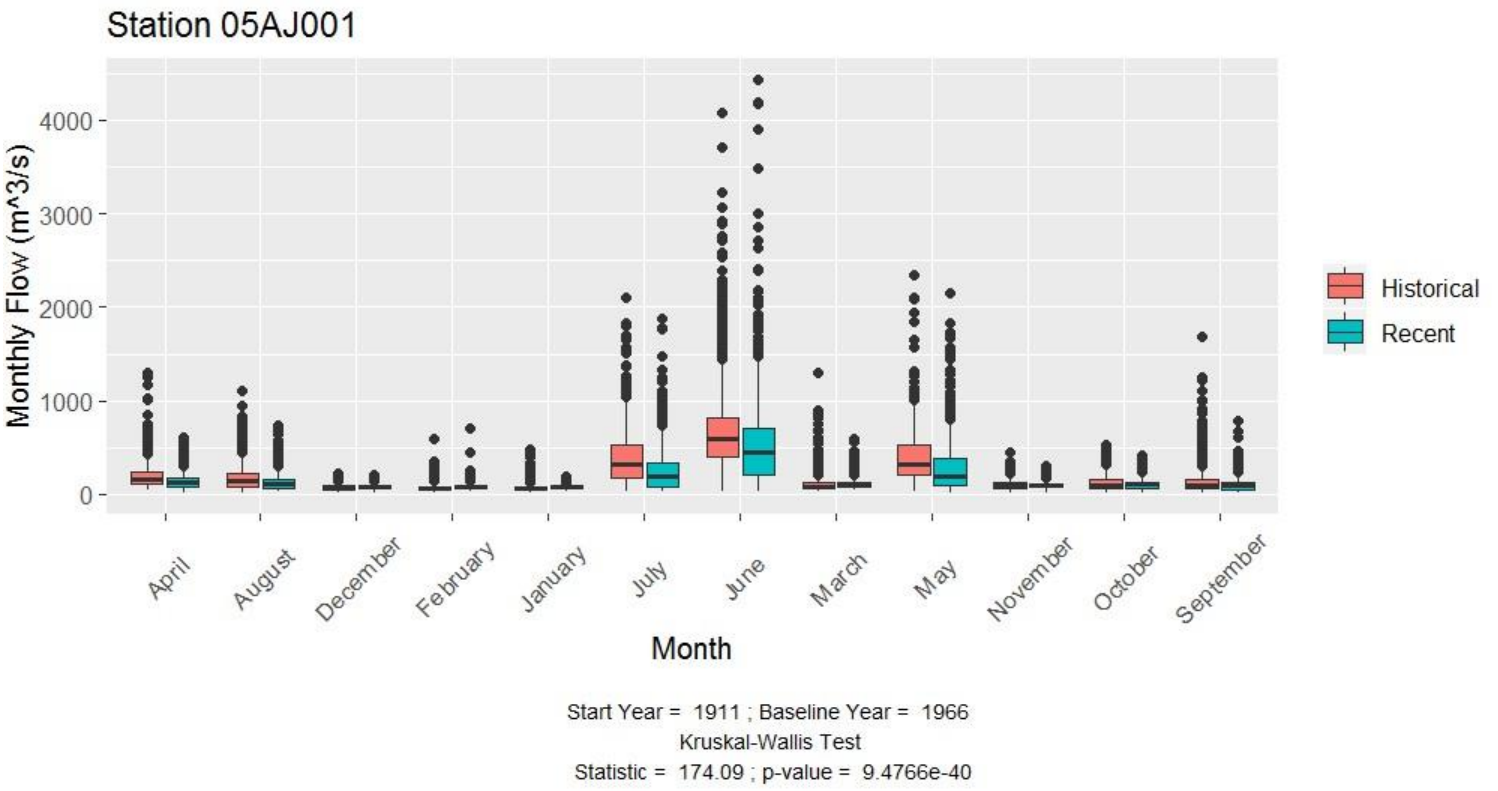
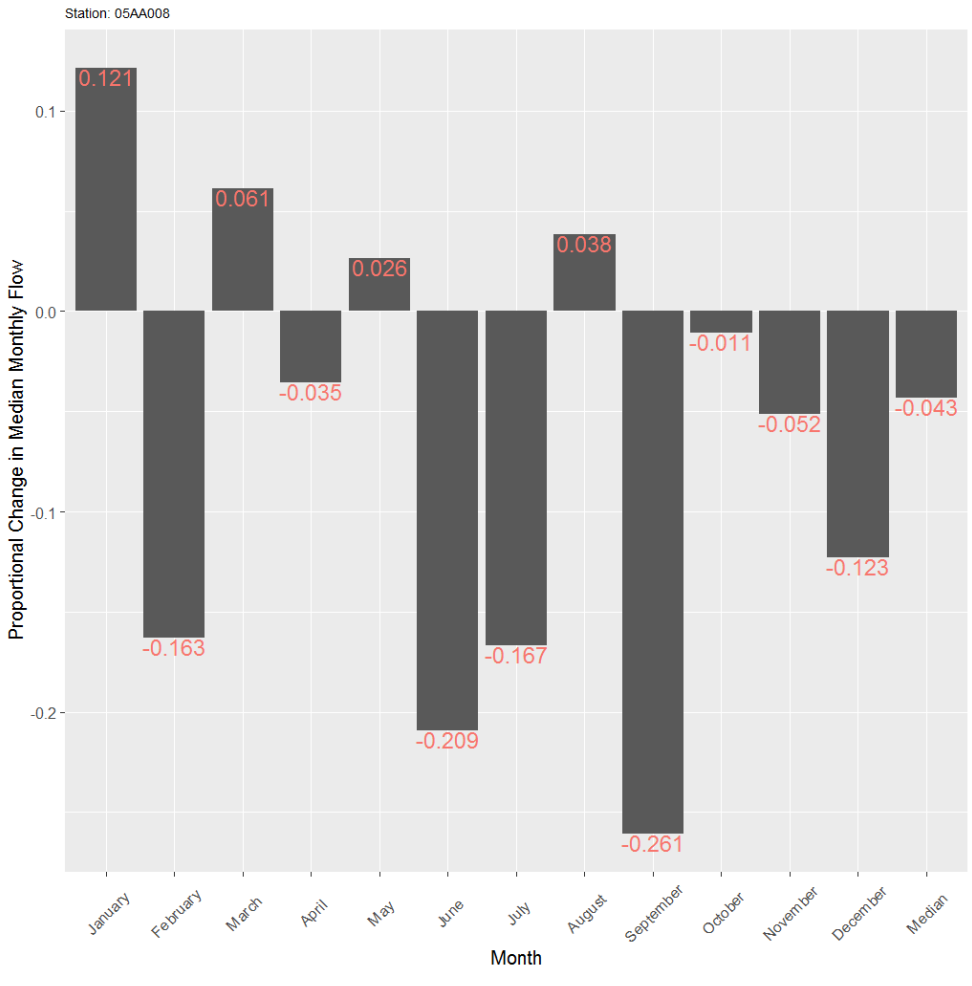
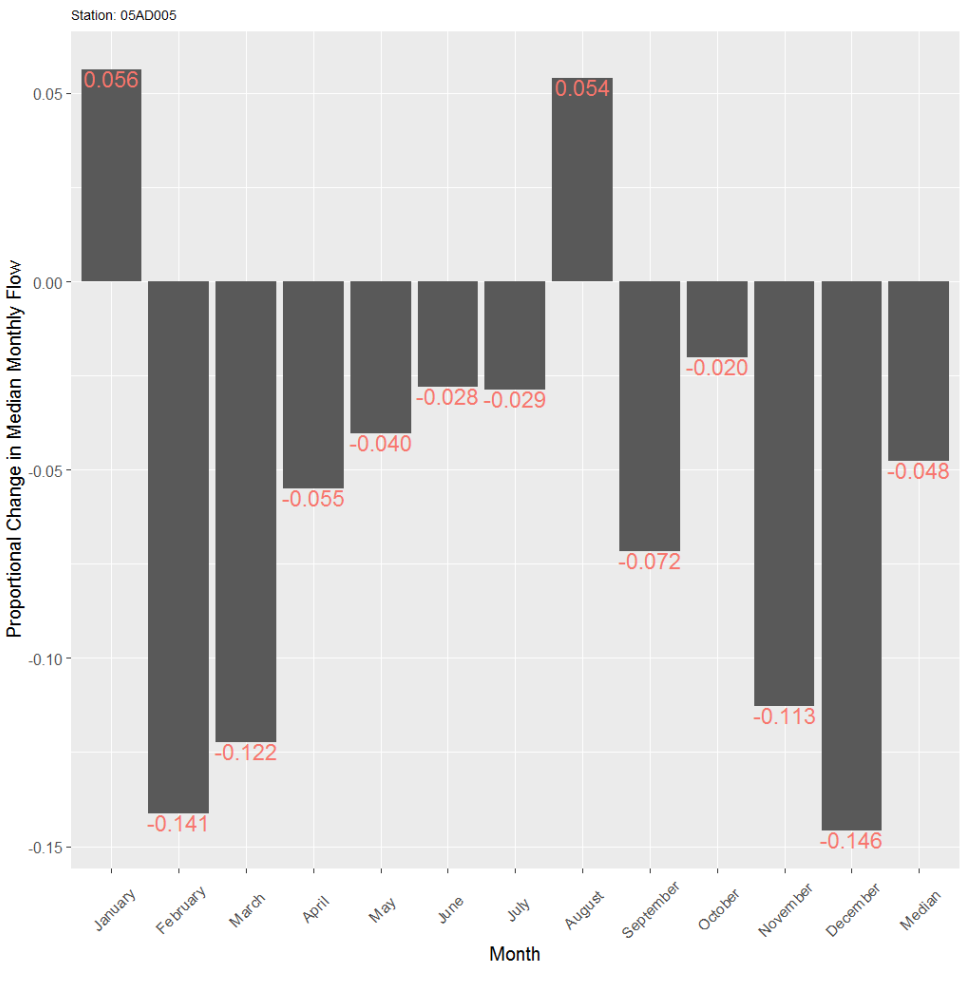
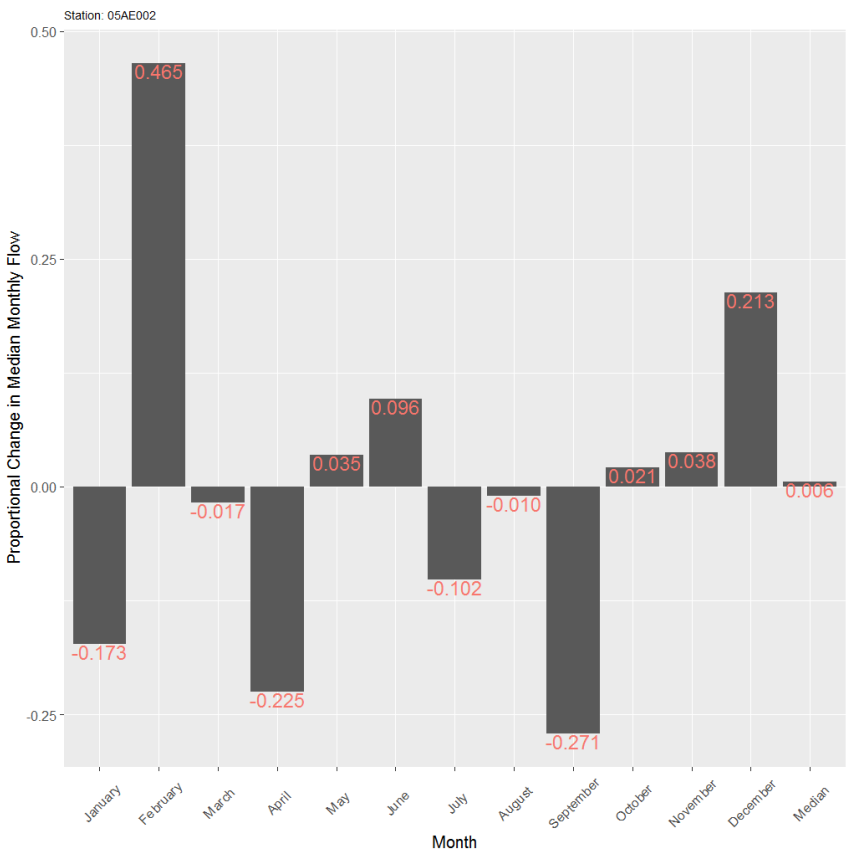


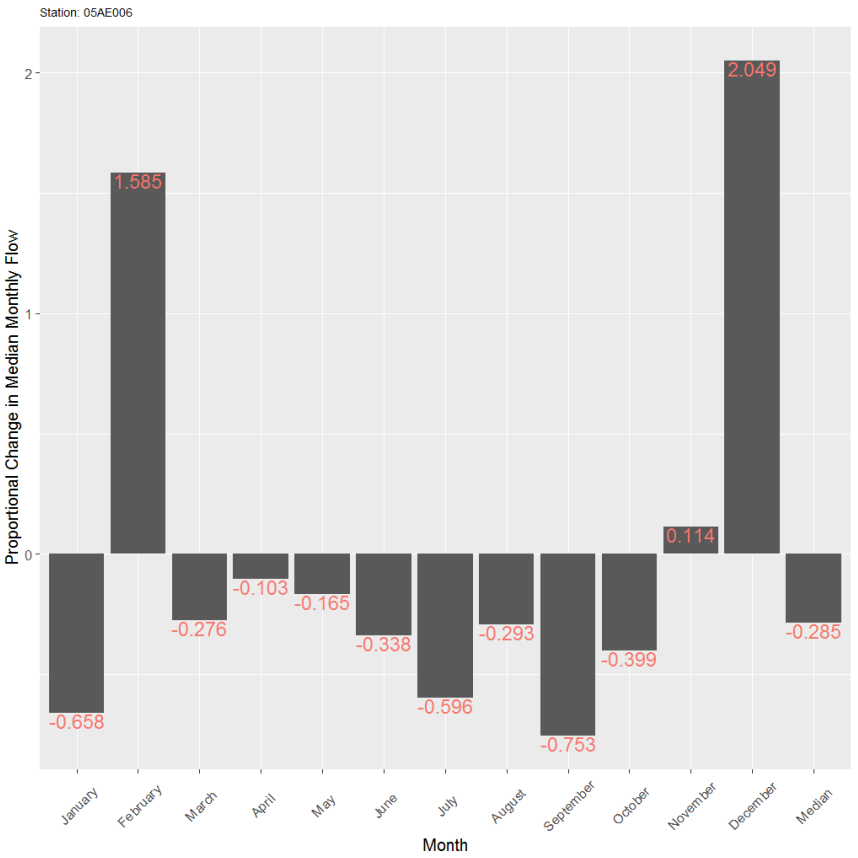
FIGURE. PERCENTAGE CHANGE IN MEDIAN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1945- VARIOUS) TIME PERIODS IN THE UPPER-SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.

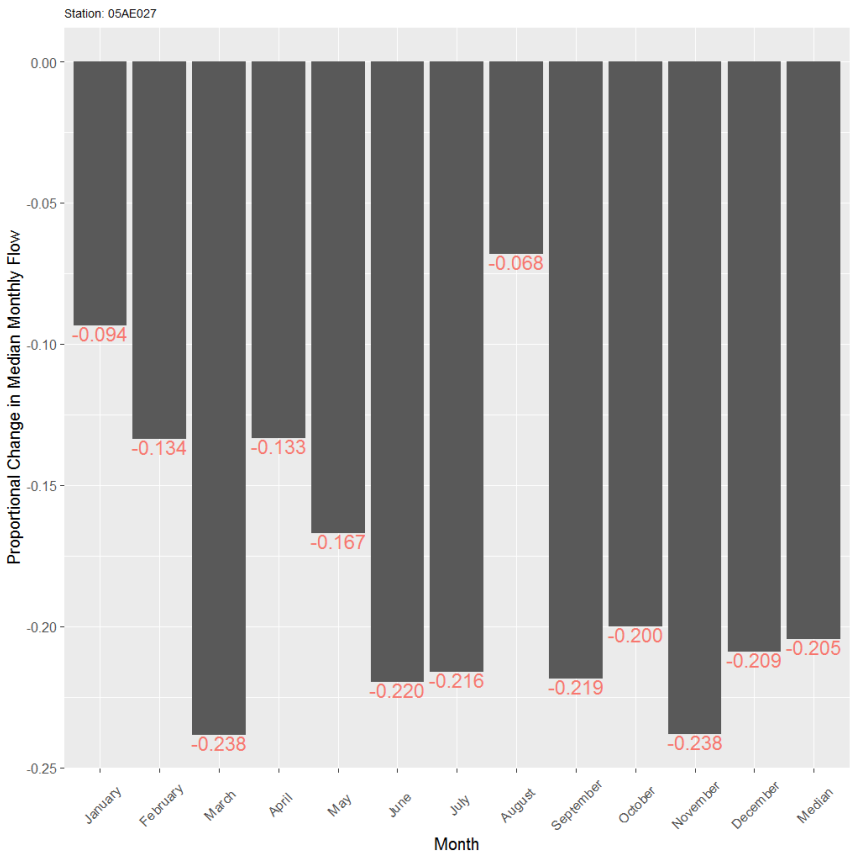


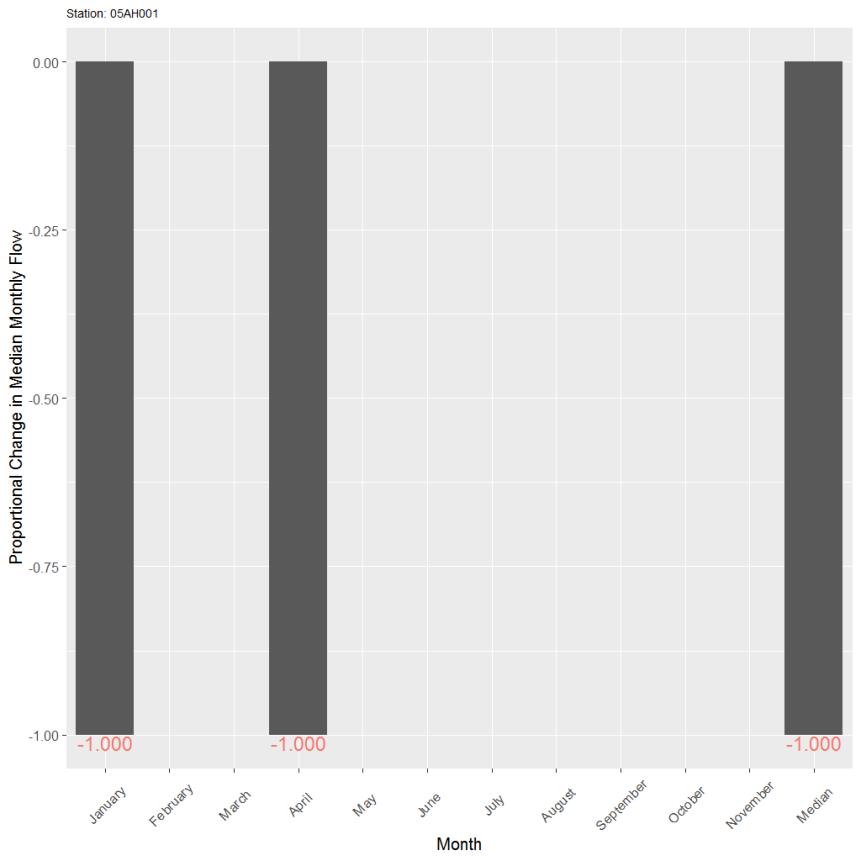


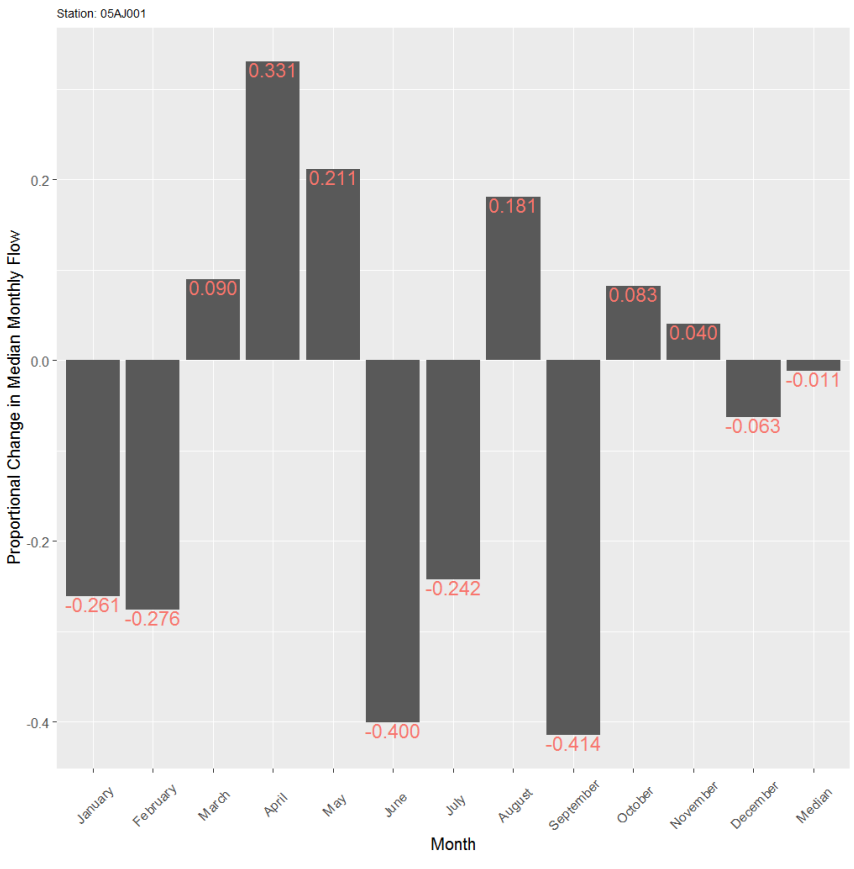
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.











Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. NON-PARAMETRIC COMPARISON OF VARIANCE FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951 - VARIOUS) MONTHLY FLOW IN THE BOW RIVER SUB-BASIN.

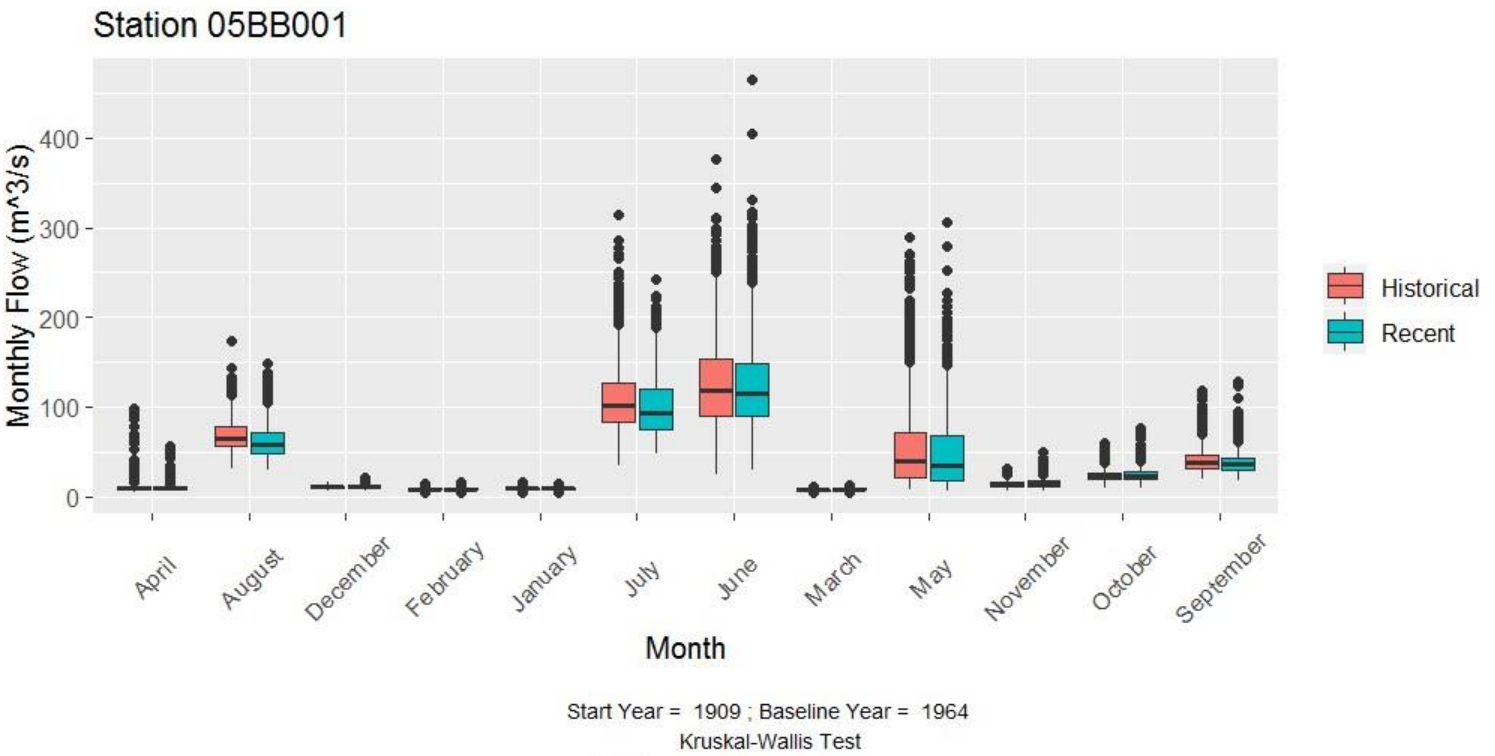
		Historic				Recent				Fligner-Killeen Test		Mann-Whitney Test					
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)	**Weighted average (%) across sub-watershed**
05BB001	January	1911	53	8.75	1.30	1964	54	9.27	1.26	3.60	0.06	1083505.5	0.00 ***	5.9	5	18.1	
	February	1911	53	7.84	1.13	1964	54	8.3	1.04	5.40	0.02 *	880932.5	0.00 ***	5.9			
	March	1911	53	7.48	1.08	1964	54	7.99	1.04	0.24	0.62	1001949	0.00 ***	6.8			
	April	1910	54	9.06	2.13	1964	54	9.06	1.84	25.71	0.00 ***	1269182.5	0.39				
	May	1909	55	40.2	33.80	1964	54	34.8	30.25	8.90	0.00 **	1521642	0.00 ***	13.4			
	June	1909	55	119	47.44	1964	54	115	42.40	11.29	0.00 ***	1352849.5	0.54				
	July	1909	55	101	30.54	1964	54	92.85	30.17	2.07	0.15	1638642	0.00 ***	8.1			
	August	1909	55	65.1	16.46	1964	54	57.2	15.86	0.45	0.50	1773207	0.00 ***	12.1			
	September	1909	55	38.5	11.42	1964	54	35.9	9.34	45.69	0.00 ***	1504200	0.00 ***	6.8			
	October	1909	55	22.7	5.04	1964	54	22.6	5.49	5.59	0.02 *	1429017	0.95				
	November	1909	55	14	3.71	1964	54	14.2	3.85	12.01	0.00 ***	1274587.5	0.19				
	December	1910	54	10.3	2.18	1964	54	10.6	2.12	3.82	0.05	1222582	0.00 ***	2.9			
05BC001	January	1911	53	3.74	1.35	1964	53	1.44	0.42	808.27	0.00 ***	2256816	0.00 ***	61.5	69	4.4	32.91
	February	1911	53	3.45	0.99	1964	53	1.36	0.40	561.39	0.00 ***	1870101.5	0.00 ***	60.6			
	March	1911	53	3.6	0.92	1964	53	1.33	0.40	486.09	0.00 ***	2238029.5	0.00 ***	63.1			
	April	1911	53	3.77	1.51	1964	53	1.6	0.49	772.10	0.00 ***	2124499	0.00 ***	57.6			
	May	1911	53	11.2	9.50	1964	53	3.09	1.69	1285.90	0.00 ***	2293953	0.00 ***	72.4			
	June	1911	53	34	26.24	1964	53	7	2.82	1401.98	0.00 ***	2254101	0.00 ***	79.4			
	July	1910	54	26.7	18.38	1964	53	5.55	2.02	1470.54	9.88E-322	2508555.5	0.00 ***	79.2			
	August	1910	54	16.2	7.86	1964	53	3.82	1.60	994.11	0.00 ***	2597199.5	0.00 ***	76.4			
	September	1910	54	11.6	4.14	1964	53	2.97	0.80	785.27	0.00 ***	2336242	0.00 ***	74.4			
	October	1910	54	8.16	2.89	1964	53	2.31	0.56	1162.48	0.00 ***	2310503	0.00 ***	71.7			
	November	1910	54	4.53	1.51	1964	53	1.55	0.43	921.86	0.00 ***	2284937.5	0.00 ***	65.8			
	December	1911	53	5.72	2.06	1964	53	1.87	0.49	939.43	0.00 ***	2109441	0.00 ***	67.3			
05BJ001	January	1911	52	2.97	1.01	1964	55	1.41	0.68	101.59	0.00 ***	2206223.5	0.00 ***	52.5	42	3.7	
	February	1911	52	3.11	0.96	1964	55	1.42	0.73	75.21	0.00 ***	1924293	0.00 ***	54.3			
	March	1911	52	3.23	1.10	1964	55	1.43	0.98	25.06	0.00 ***	2210800	0.00 ***	55.7			
	April	1910	54	4.59	2.15	1964	55	2.44	1.91	40.38	0.00 ***	1951077.5	0.00 ***	46.8			
	May	1908	56	11.9	10.38	1964	55	8.07	8.27	37.09	0.00 ***	1815086.5	0.00 ***	32.2			
	June	1908	56	20.7	13.34	1964	55	18	14.65	0.69	0.41	1564942.5	0.00 ***	13.0			
	July	1908	55	12.9	9.34	1964	55	7.56	6.14	110.91	0.00 ***	1965772	0.00 ***	41.4			
	August	1908	55	7.87	4.64	1964	55	4.45	3.81	96.68	0.00 ***	2154376	0.00 ***	43.5			
	September	1908	55	6.37	3.48	1964	55	3.62	2.98	87.89	0.00 ***	2046716.5	0.00 ***	43.2			
	October	1908	56	5.38	2.43	1964	55	3.32	2.46	16.27	0.00 ***	2107208.5	0.00 ***	38.3			
	November	1908	54	4.19	1.38	1964	55	2.85	1.90	2.81	0.09	1889357	0.00 ***	32.0			
	December	1910	53	3.4	1.01	1964	55	1.68	0.87	24.20	0.00 ***	2261551	0.00 ***	50.6			

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

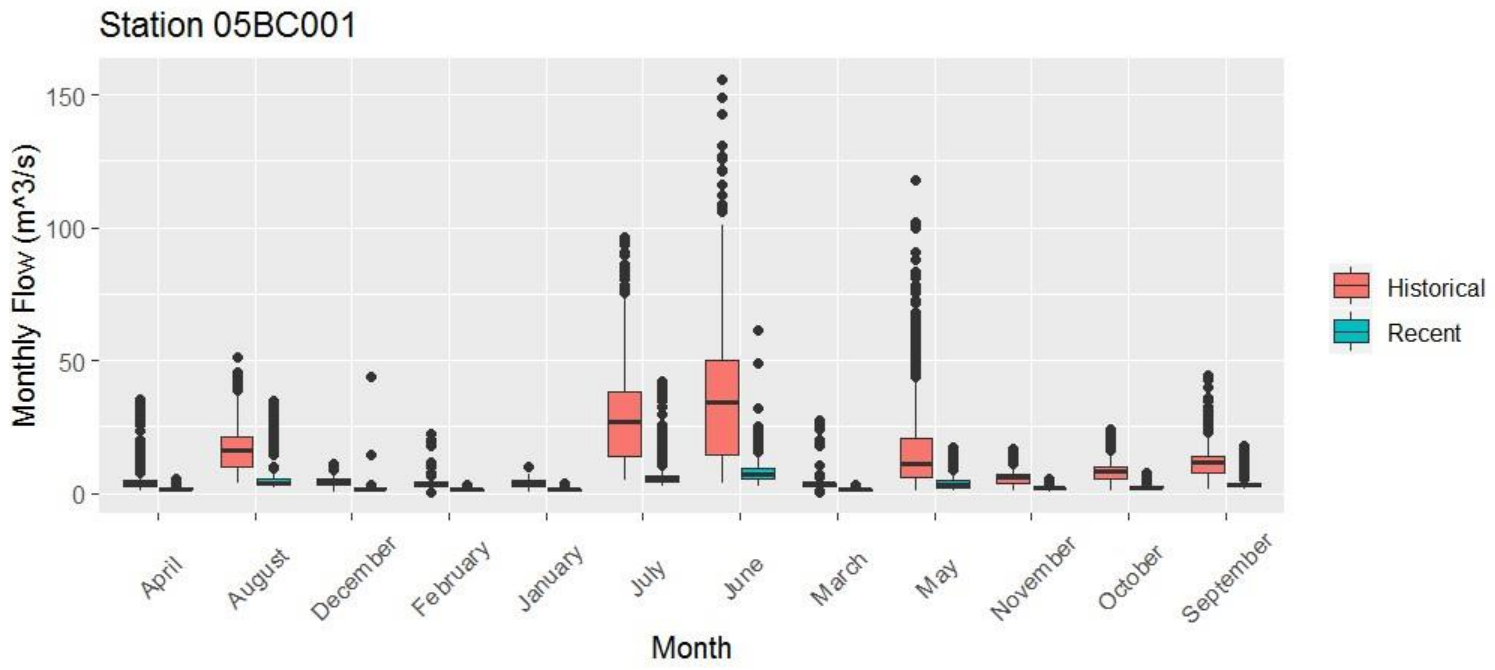
		Historic				Recent				Fligner-Killeen Test		Mann-Whitney Test				
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**	**Test Statistic**	**p-value**	**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)
05BL015	January	1913	19	0.04	0.06	1968	46	0.54	0.21	115.92	0.00 ***	73470	0.00 ***	1248.8	2648	0.8
	February	1913	19	0.03	0.05	1968	46	0.54	0.20	65.14	0.00 ***	76047	0.00 ***	1491.2		
	April	1911	53	0.00	0.00	1968	48	0.58	0.17	513.63	0.00 ***	189089	0.00 ***	19133.3		
	May	1911	53	0.04	0.06	1968	51	1.13	0.87	839.93	0.00 ***	349857.5	0.00 ***	2578.6		
	June	1911	51	0.11	0.17	1968	51	1.53	1.08	667.83	0.00 ***	363566.5	0.00 ***	1236.2		
	July	1910	51	0.36	0.41	1968	51	1.62	1.00	762.77	0.00 ***	235032	0.00 ***	355.7		
	August	1910	51	0.33	0.25	1968	51	1.10	0.47	223.71	0.00 ***	310746	0.00 ***	235.4		
	September	1910	51	0.24	0.23	1968	51	0.84	0.32	31.79	0.00 ***	425803	0.00 ***	242.6		
	October	1910	51	0.23	0.22	1968	51	0.65	0.21	8.19	0.00 **	505723	0.00 ***	184.7		
	November	1911	37	0.04	0.05	1968	50	0.61	0.20	22.07	0.00 ***	218733.5	0.00 ***	1543.2		
	December	1913	18	0.06	0.08	1968	48	0.56	0.20	12.27	0.00 ***	116916.5	0.00 ***	882.5		
05BM002	March	1951	9	70.80	10.08	1981	16	65.00	14.83	1.72	0.19	7196.5	0.14		12	94.7
	April	1951	23	74.80	25.65	1981	34	70.35	22.31	16.94	0.00 ***	254425.5	0.00 ***	5.9		
	May	1951	33	138.00	69.68	1981	34	97.00	63.90	0.43	0.51	639887	0.00 ***	29.7		
	June	1951	33	252.00	112.68	1981	34	233.00	151.97	29.35	0.00 ***	534658.5	0.00 ***	7.5		
	July	1951	33	179.00	84.51	1981	34	143.50	83.69	1.15	0.28	616752.5	0.00 ***	19.8		
	August	1952	33	108.00	48.48	1981	34	88.55	40.18	20.02	0.00 ***	596757	0.00 ***	18.0		
	September	1953	32	73.90	33.95	1981	34	74.10	35.58	1.72	0.19	492108.5	0.29			
	October	1957	32	73.50	30.84	1981	34	77.50	23.72	6.83	0.01 **	484447	0.01 *	5.4		
	November	1964	14	62.75	12.60	1981	15	73.55	14.01	0.40	0.53	3995	0.00 ***	17.2		
05BN002	May	1951	33	0.37	0.51	1981	34	1.16	1.68	343.11	0.00 ***	426845.5	0.00 ***	211.4	65	2.2
	June	1951	34	1.76	1.17	1981	34	2.77	1.73	75.45	0.00 ***	298438	0.00 ***	57.1		
	July	1951	34	1.81	1.24	1981	34	3.32	1.76	86.70	0.00 ***	248565	0.00 ***	83.1		
	August	1951	34	2.66	1.01	1981	34	3.27	1.42	55.33	0.00 ***	368554.5	0.00 ***	22.9		
	September	1952	33	1.70	0.73	1981	34	2.28	0.82	31.66	0.00 ***	332753.5	0.00 ***	34.1		
	October	1952	33	1.93	0.59	1981	34	1.50	1.26	230.43	0.00 ***	685679	0.00 ***	22.3		
	November	1956	23	0.74	0.50	1981	10	0.08	0.10	24.60	0.00 ***	6909	0.00 ***	89.0		
	April	1959	19	0.08	0.10	1981	17	0.03	0.04	1.17	0.28	9217	0.08			

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

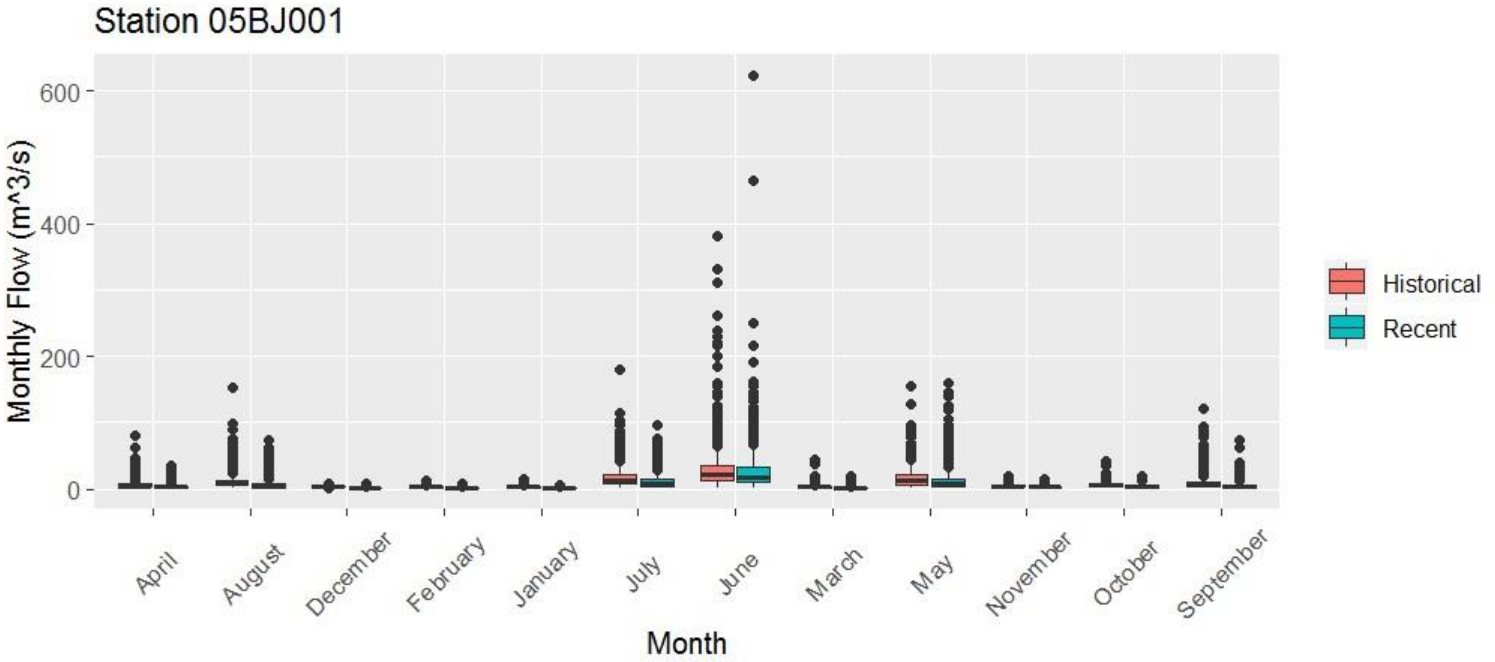
FIGURE. ANALYSIS OF VARIANCE IN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951- VARIOUS) TIME PERIODS IN THE BOW RIVER SUB- BASIN, BY STATION.



Start Year = 1909 ; Baseline Year = 1964
Kruskal-Wallis Test
Statistic = 0.31251 ; p-value = 0.57615

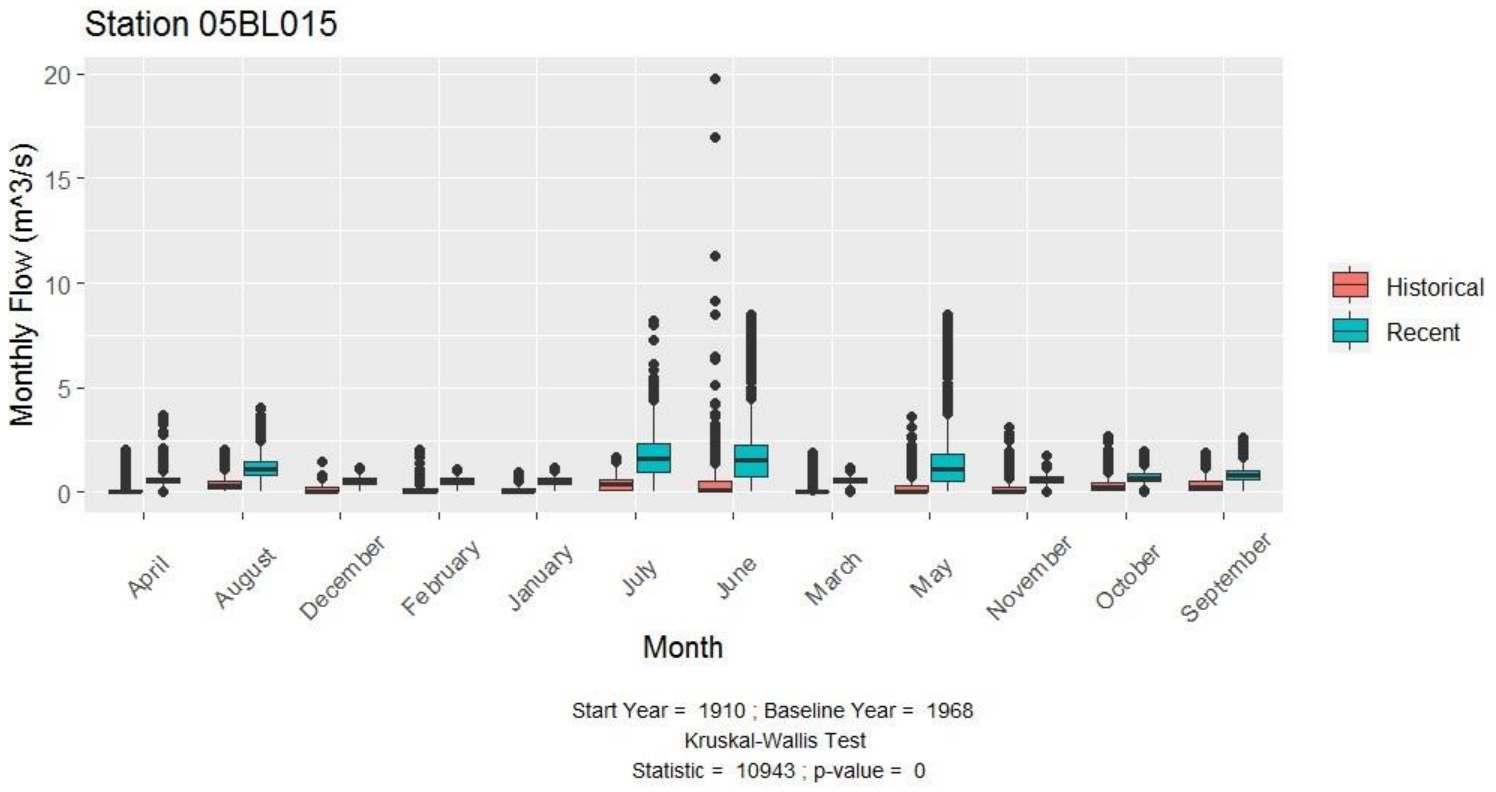


Start Year = 1910 ; Baseline Year = 1964
Kruskal-Wallis Test
Statistic = 9780.1 ; p-value = 0

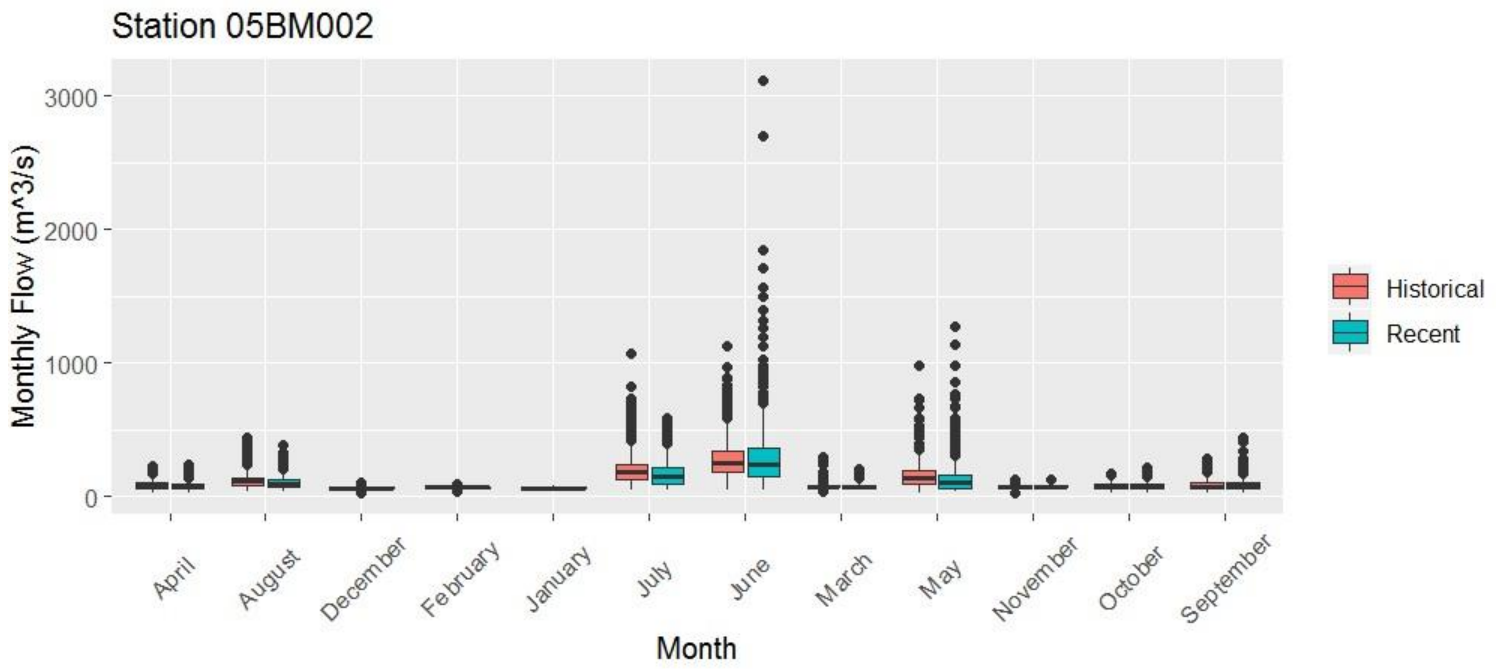


Start Year = 1908 ; Baseline Year = 1964
Kruskal-Wallis Test
Statistic = 3742.3 ; p-value = 0

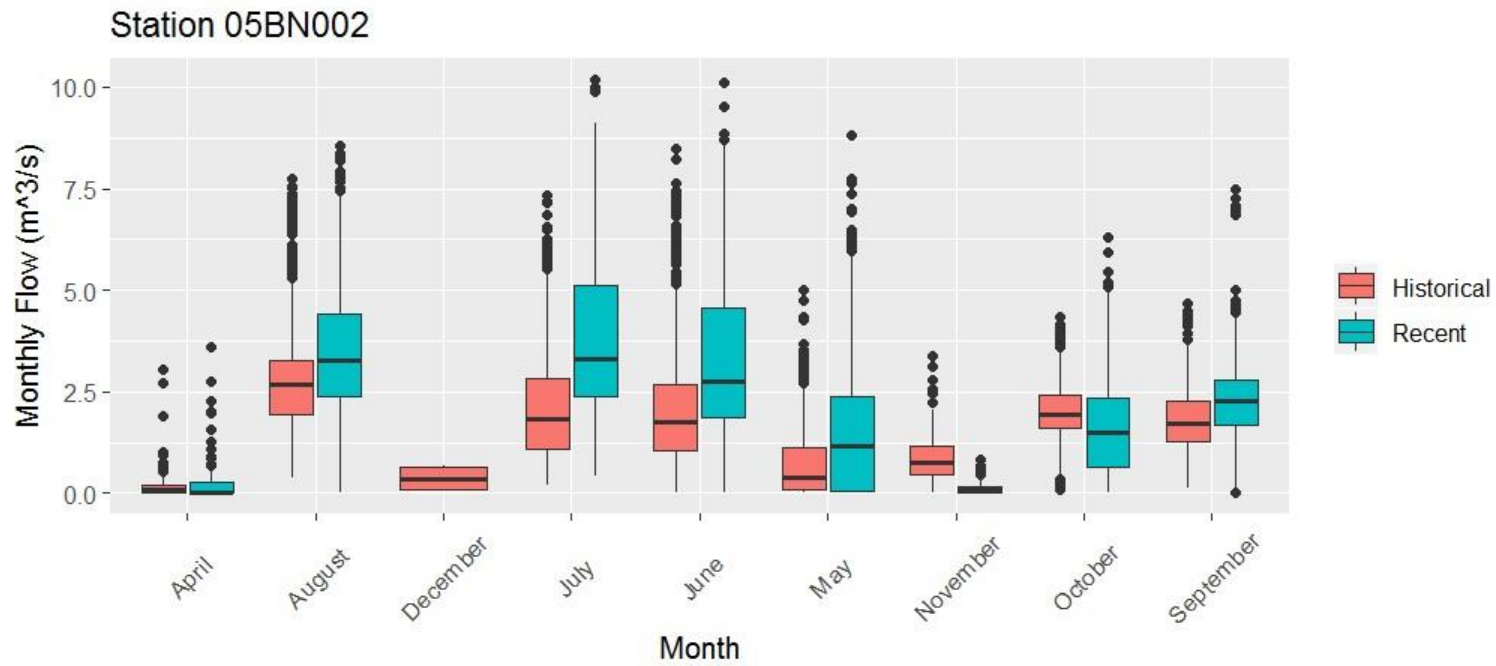
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.



Start Year = 1910 ; Baseline Year = 1968
Kruskal-Wallis Test
Statistic = 10943 ; p-value = 0



Start Year = 1910 ; Baseline Year = 1985
Kruskal-Wallis Test
Statistic = 67.52 ; p-value = 2.0859e-16



Start Year = 1951 ; Baseline Year = 1985
Kruskal-Wallis Test
Statistic = 633.84 ; p-value = 7.3238e-140

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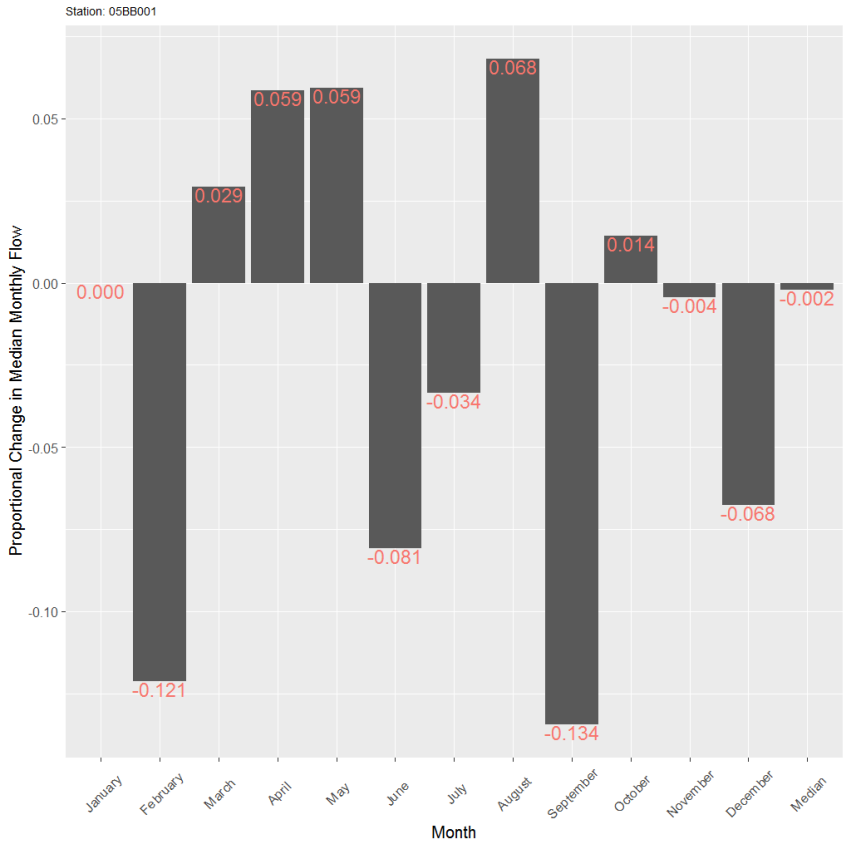
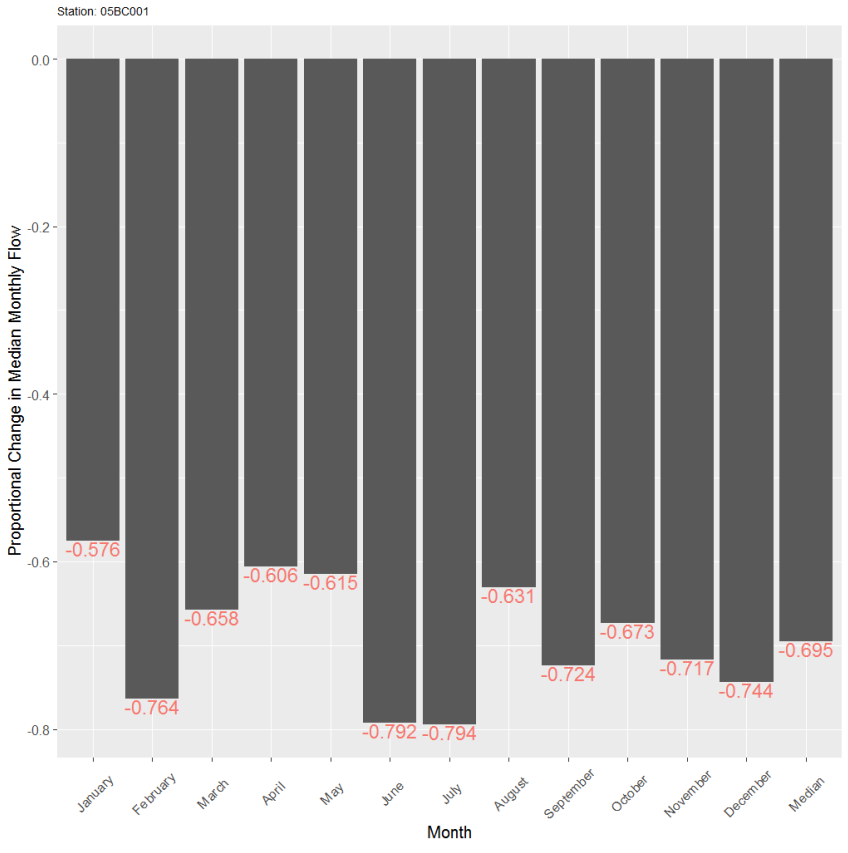
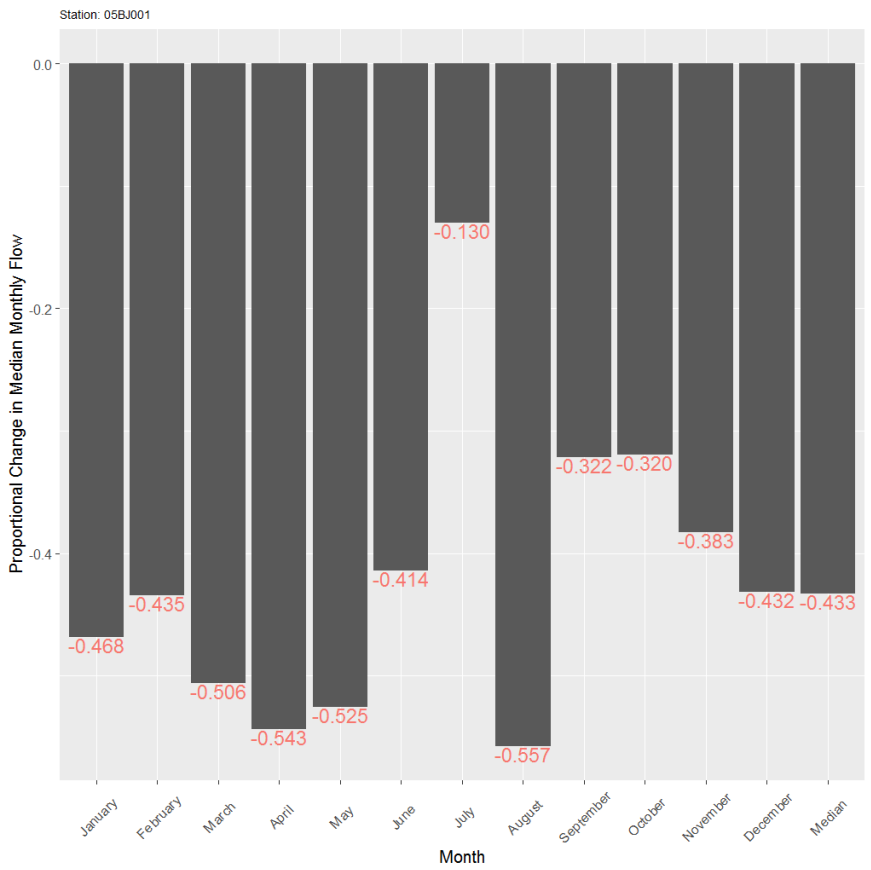
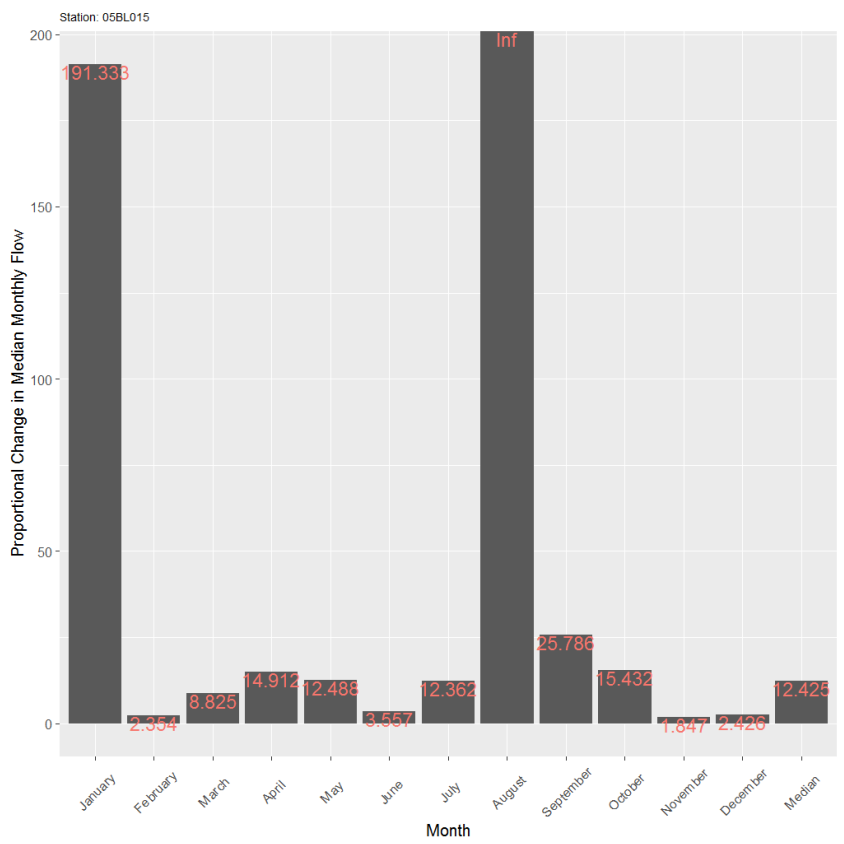
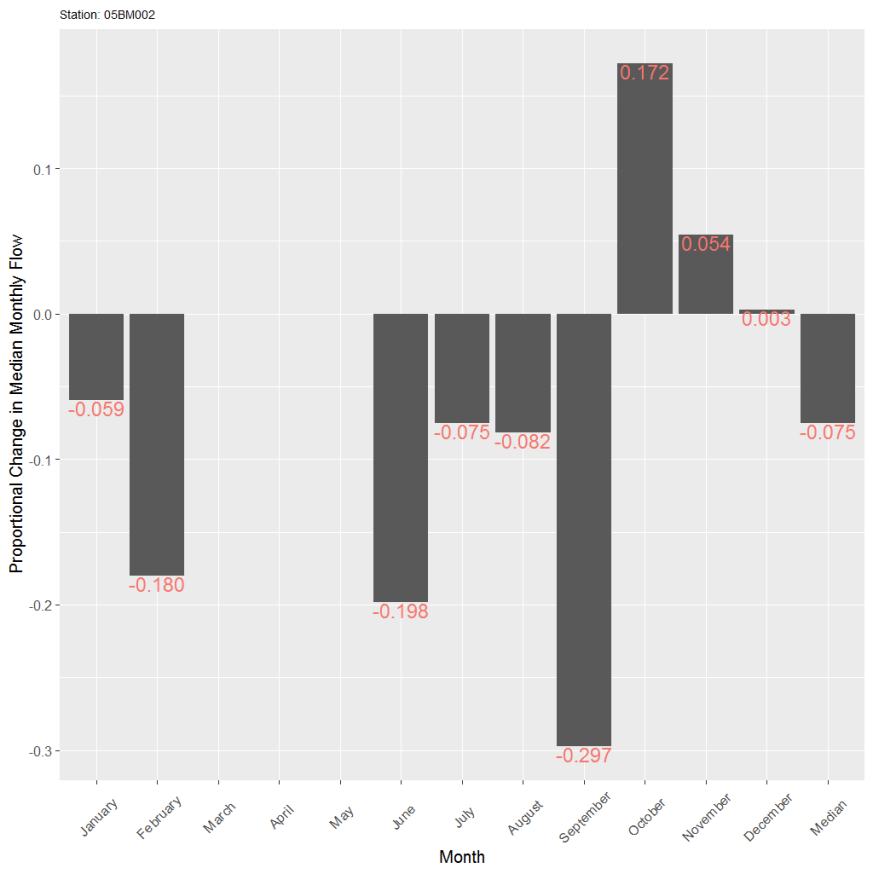
FIGURE. PERCENTAGE CHANGE IN MEDIAN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951- VARIOUS) TIME PERIODS IN THE BOW RIVER SUB-BASIN, BY STATION.











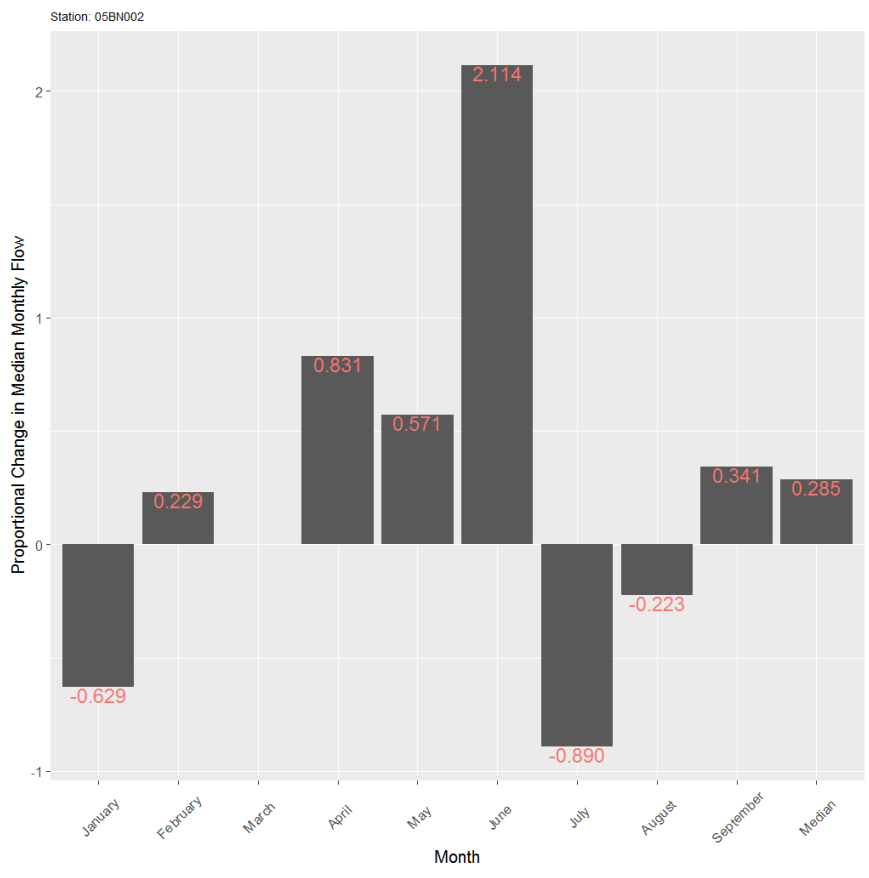


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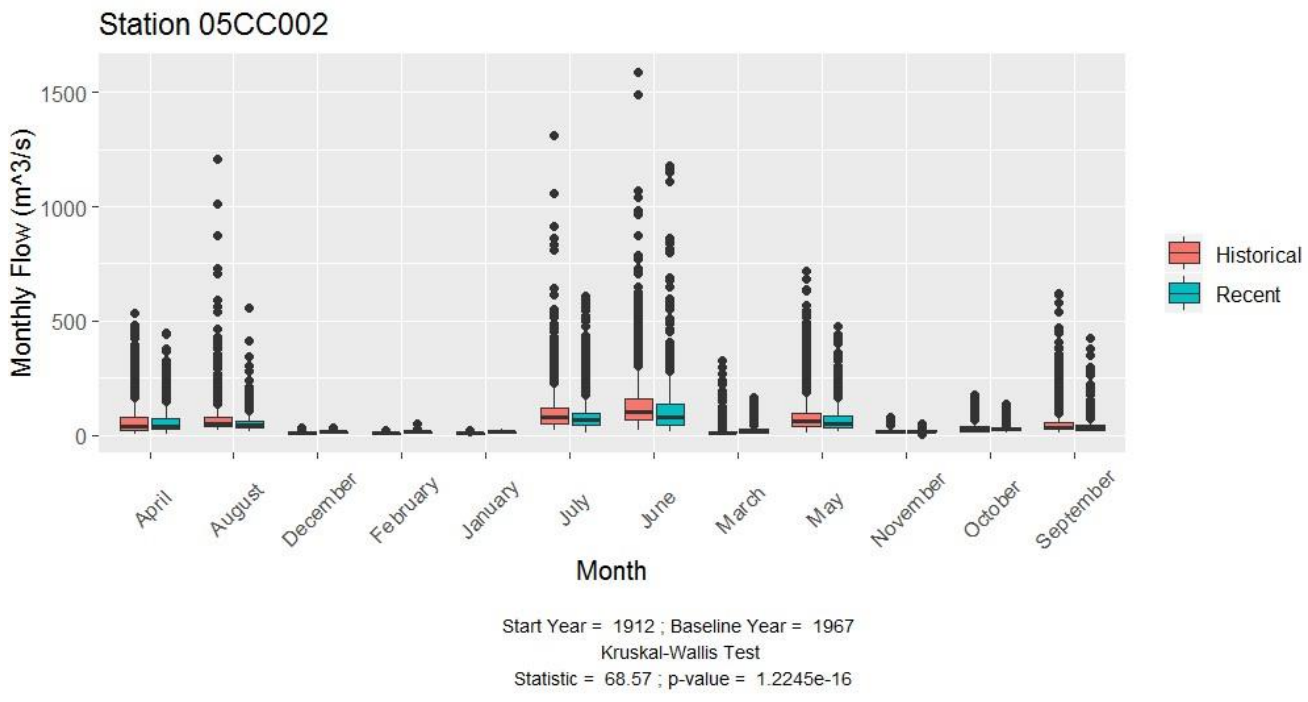
TABLE. NON-PARAMETRIC COMPARISON OF VARIANCE FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951 - VARIOUS) MONTHLY FLOW IN THE RED DEER RIVER SUB-BASIN.

		Historic				Recent				Fligner-Killeen Test			Mann-Whitney Test						
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**		**Test Statistic**	**p-value**		**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)	**Weighted average (%) across sub-watershed**
05CC002	January	1912	52	7.93	2.94	1967	52	15.40	4.15	96.73	0.00	***	499617	0.0	***	94.2	37.01	28	37.51
	February	1912	52	7.93	3.37	1967	52	15.40	4.00	97.42	0.00	***	357320.5	0.0	***	94.2			
	March	1912	52	10.30	4.94	1967	52	18.80	8.90	75.91	0.00	***	647925.5	0.0	***	82.5			
	April	1912	53	37.40	33.06	1967	52	39.95	28.39	20.23	0.00	***	1148721.5	0.0	***	6.8			
	May	1912	54	62.30	40.77	1967	52	52.10	36.92	16.55	0.00	***	1550523.5	0.0	***	16.4			
	June	1912	54	101.00	61.38	1967	52	81.65	59.90	1.25	0.26		1518880	0.0	***	19.2			
	July	1912	53	77.00	44.48	1967	52	67.70	36.92	25.63	0.00	***	1513891.5	0.0	***	12.1			
	August	1912	52	48.70	21.79	1967	52	44.75	20.53	40.53	0.00	***	1523245	0.0	***	8.1			
	September	1912	52	34.30	15.12	1967	52	31.85	12.82	39.01	0.00	***	1389934	0.0	***	7.1			
	October	1912	52	24.80	11.56	1967	52	25.10	7.34	164.50	0.00	***	1302417	0.9					
	November	1912	52	15.25	8.52	1967	52	18.70	4.00	218.47	0.00	***	1036271	0.0	***	22.6			
	December	1912	52	8.85	4.47	1967	52	16.00	4.45	0.46	0.50		703371	0.0	***	80.9			
05CE005	February	1968	5	0.11	0.06	1985	15	0.00	0.00	4.41	0.04	*	1268	0.0	***	99.1	51.99	2	
	March	1966	18	0.17	0.25	1985	34	0.58	0.84	71.65	0.00	***	223302.5	0.0	***	245.8			
	April	1963	18	2.12	2.30	1985	34	1.46	1.41	59.31	0.00	***	289082	0.0	***	31.1			
	May	1952	33	1.93	1.19	1985	34	2.00	1.26	2.14	0.14		518846	0.1					
	June	1951	34	2.47	1.22	1985	34	3.14	1.69	38.36	0.00	***	378844	0.0	***	27.2			
	July	1951	34	2.01	0.96	1985	34	2.62	1.32	29.18	0.00	***	411699	0.0	***	30.3			
	August	1951	34	1.91	0.80	1985	34	2.54	0.98	9.81	0.00	**	361487.5	0.0	***	33.0			
	September	1951	34	2.10	0.73	1985	34	2.50	0.85	4.41	0.04	*	395517	0.0	***	19.0			
	October	1951	34	0.98	0.76	1985	34	0.83	0.56	3.61	0.06		566567.5	0.1					
	November	1961	14	0.27	0.25	1985	12	0.36	0.10	4.74	0.03	*	897.5	0.0	*	34.3			
05CJ006	February	1973	5	0.10	0.14	1985	13	0.04	0.06	1.28	0.26		1064	0.0	**	60.0	28.61	1.7	
	March	1972	10	0.10	0.14	1985	34	0.15	0.20	0.50	0.48		146131.5	0.0	**	52.6			
	April	1956	22	0.26	0.26	1985	34	0.21	0.22	7.22	0.01	**	214745	0.0	**	18.5			
	May	1952	33	0.63	0.76	1985	34	0.75	0.66	1.20	0.27		429553.5	0.0	***	20.4			
	June	1951	34	2.62	1.23	1985	34	1.79	1.11	21.38	0.00	***	700776	0.0	***	31.7			
	July	1951	34	2.97	0.87	1985	34	1.75	0.80	7.22	0.01	**	894304.5	0.0	***	41.1			
	August	1951	34	2.92	1.02	1985	34	1.93	0.93	23.89	0.00	***	802382.5	0.0	***	33.9			
	September	1951	34	1.83	1.01	1985	34	1.67	0.70	76.81	0.00	***	540493	0.1					
	October	1951	34	1.76	0.73	1985	34	1.27	0.77	8.03	0.00	**	723317	0.0	***	27.8			
	November	1955	20	0.17	0.19	1985	9	0.15	0.10	16.62	0.00	***	13131.5	0.9					
05CK001	February	1970	9	0.00	0.00	1989	9	0.00	0.00	0.18	0.67		1339	0.0	**	25.0	45.54	0.01	
	March	1964	25	0.01	0.01	1989	28	0.01	0.00	50.27	0.00	***	417624	0.0	***	37.5			
	April	1912	26	0.01	0.01	1989	28	0.01	0.00	123.62	0.00	***	457085	0.0	***	54.5			
	May	1912	26	0.01	0.01	1989	28	0.00	0.00	307.03	0.00	***	477923.5	0.0	***	50.0			
	June	1911	26	0.01	0.00	1989	28	0.00	0.00	345.88	0.00	***	431438.5	0.0	***	50.0			
	July	1911	26	0.01	0.01	1989	28	0.00	0.00	323.34	0.00	***	488632	0.0	***	50.0			
	August	1911	27	0.01	0.01	1989	28	0.00	0.00	321.60	0.00	***	483111	0.0	***	50.0			
	September	1911	27	0.01	0.01	1989	28	0.00	0.00	365.92	0.00	***	466320.5	0.0	***	50.0			
	October	1911	26	0.01	0.01	1989	28	0.00	0.00	321.15	0.00	***	500593	0.0	***	42.9			

FIGURE. ANALYSIS OF VARIANCE IN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951- VARIOUS) TIME PERIODS IN THE RED DEER RIVER SUB-BASIN, BY STATION.



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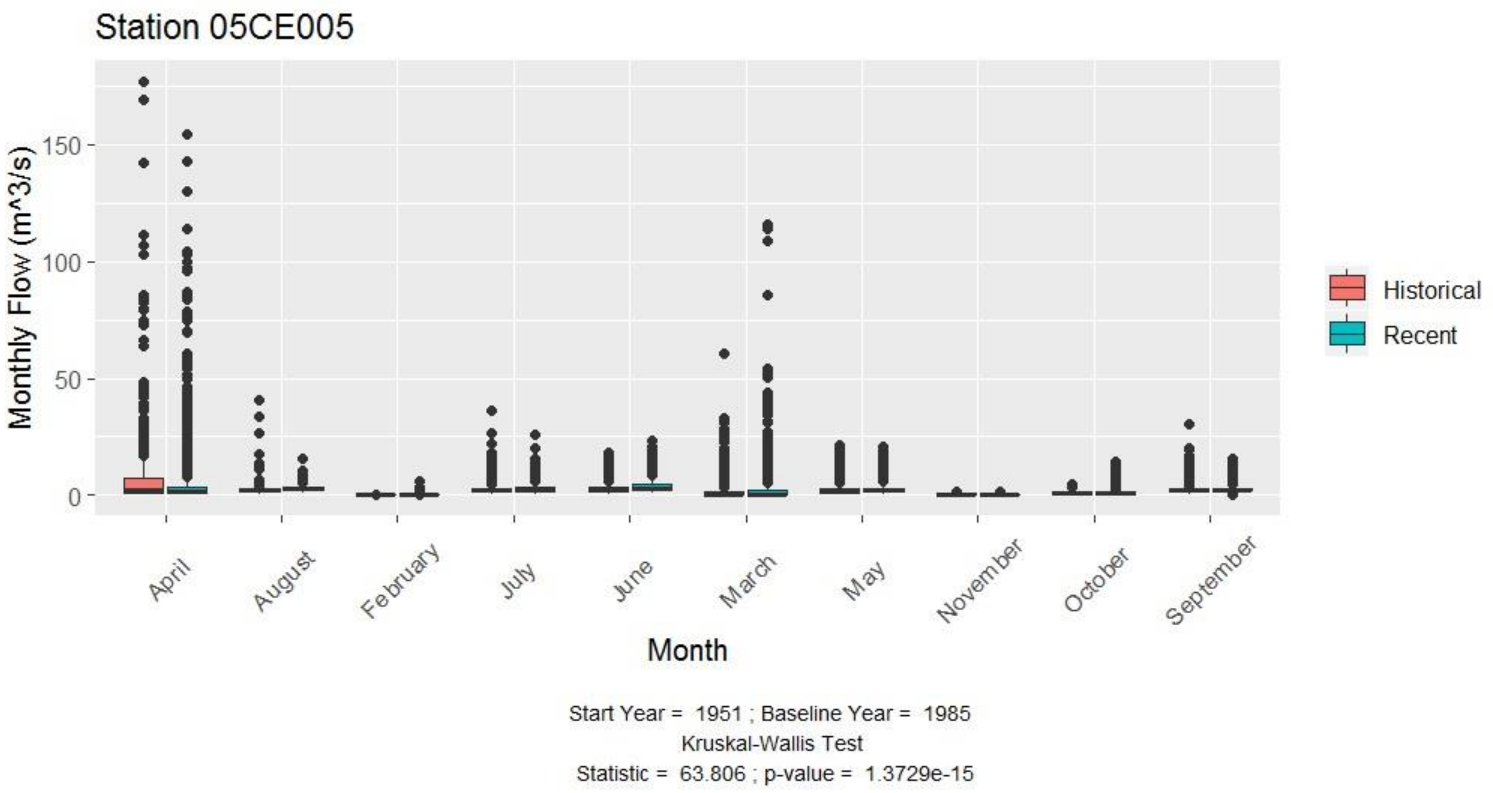

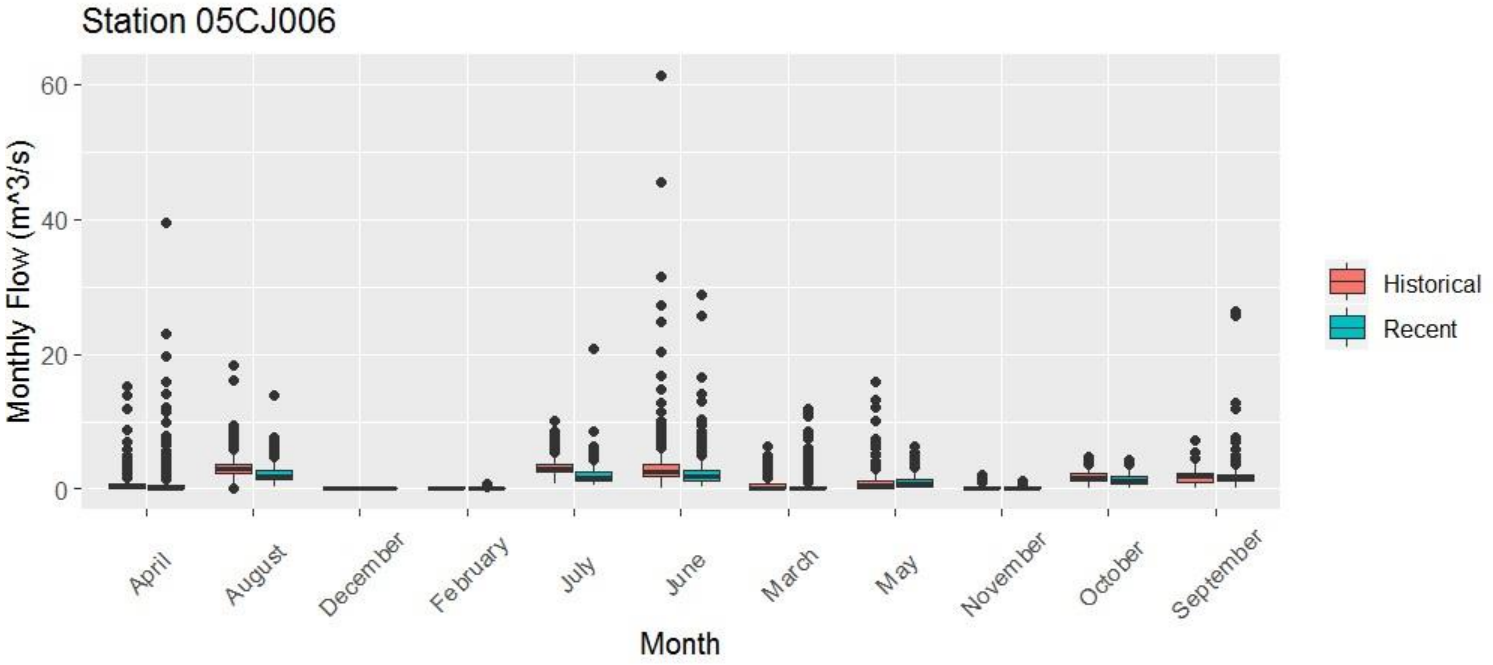

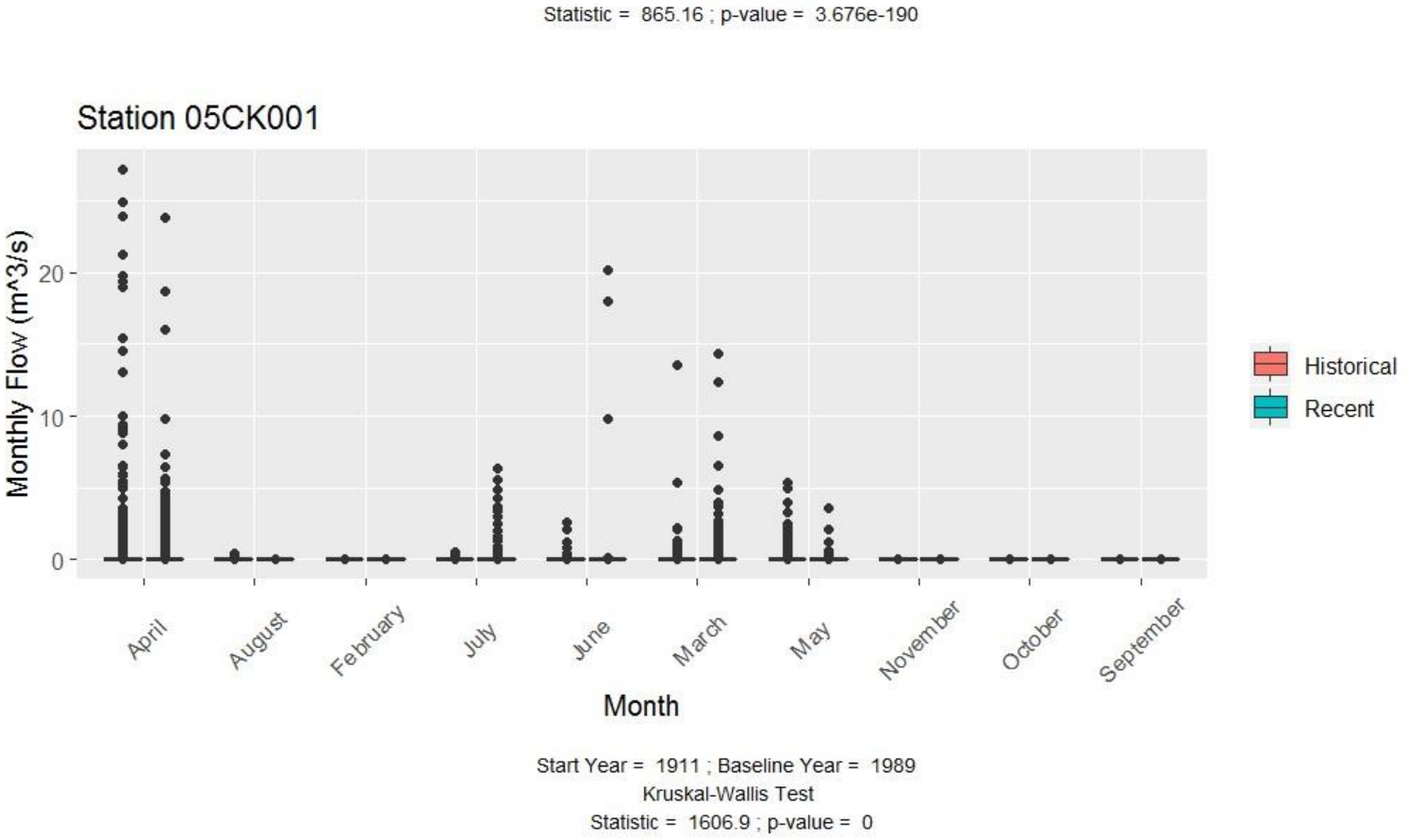

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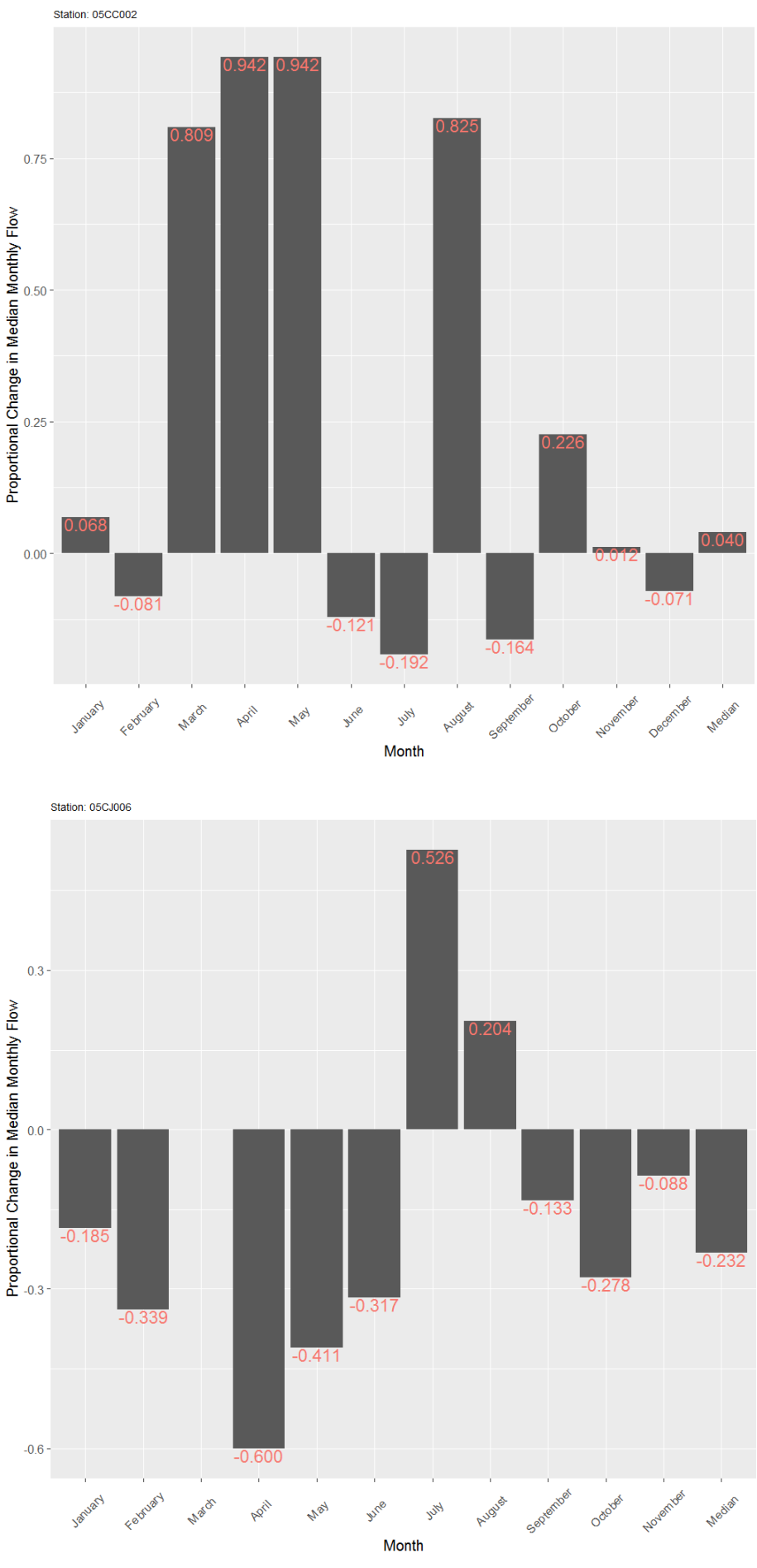
FIGURE. PERCENTAGE CHANGE IN MEDIAN MONTHLY FLOW FOR RECENT (VARIOUS - 2018) VS. HISTORICAL (<= 1951- VARIOUS) TIME PERIODS IN THE RED DEER RIVER SUB-BASIN, BY STATION.



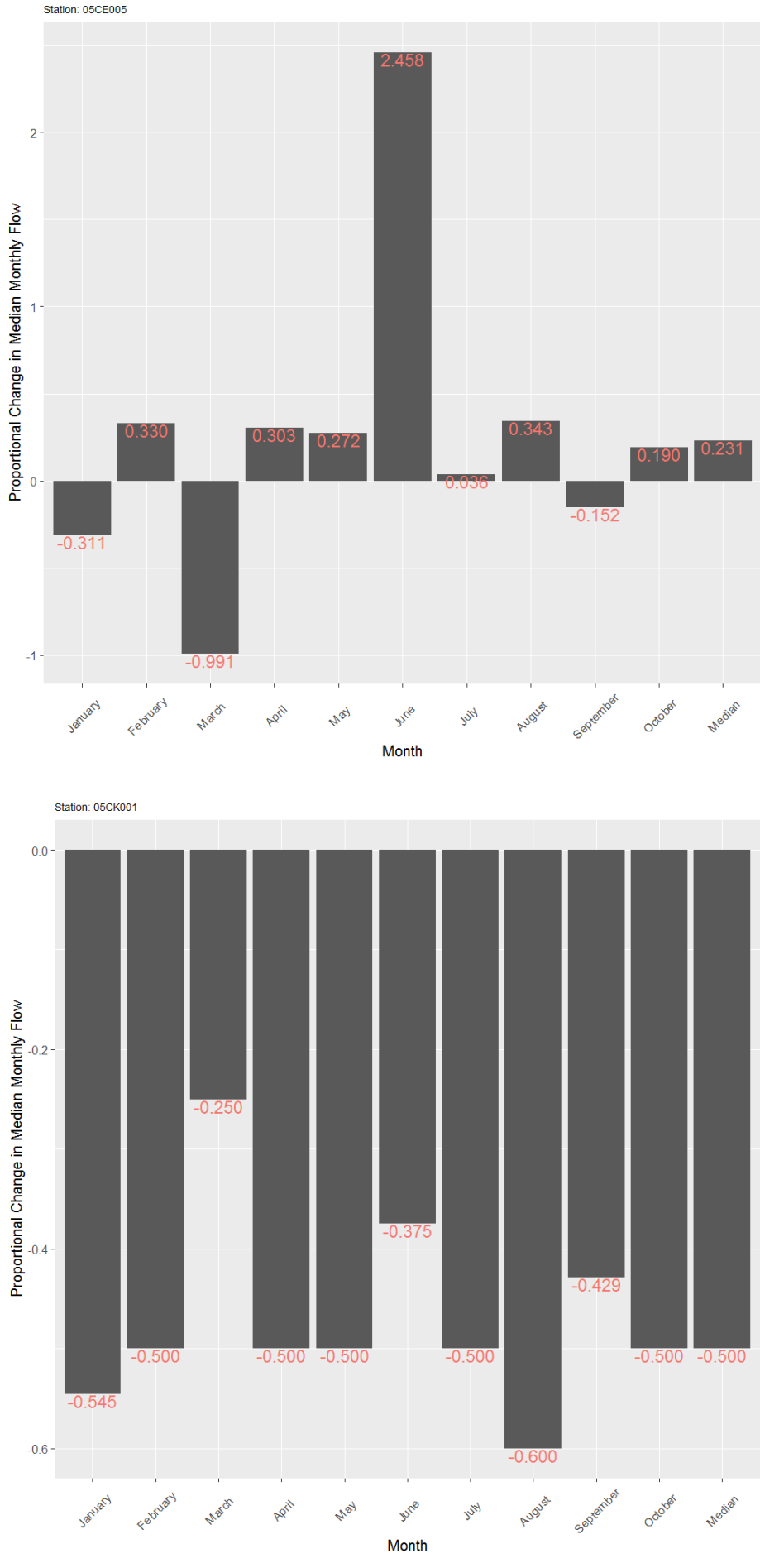


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TABLE. NON-PARAMETRIC COMPARISON OF VARIANCE FOR RECENT (1987 - 2018) VS. HISTORICAL (1955 - 1987) MONTHLY FLOW IN THE LOWER SOUTH SASKATCHEWAN RIVER SUB-BASIN.

		Historic				Recent				Fligner-Killeen Test			Mann-Whitney Test						
Station	**Month**	**Start Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Benchmark Year**	**Number of Years of Sampling**	**Median Monthly Flow (m^3/s)**	**Median Absolute Deviation in Monthly Flow (m^3/s)**	**Test Statistic**	**p-value**		**Test Statistic**	**p-value**		**Magnitude of Change in Monthly Flow (%)**	**Average Change Across Months (%)***	Median Annual Flow (m^3/s)	**Weighted average (%) across sub-watershed**
05HD036	January	1979	8	0.17	0.11	1987	32	0.21	0.15	8.83	0.00	**	97940.5	0.00	***	25.8	173	0.4	130.74
	February	1967	13	0.27	0.24	1987	32	0.29	0.19	11.65	0.00	***	111416.5	0.01	*	6.1			
	March	1955	32	1.05	1.35	1987	32	1.43	1.63	18.46	0.00	***	410355	0.00	***	36.2			
	April	1955	32	1.98	1.68	1987	32	1.71	1.04	112.74	0.00	***	511558.5	0.00	***	13.4			
	May	1955	32	0.92	0.64	1987	32	0.95	0.58	8.38	0.00	**	488837	0.80					
	June	1955	32	0.37	0.31	1987	32	0.62	0.49	87.97	0.00	***	324246.5	0.00	***	65.3			
	July	1955	32	0.14	0.16	1987	32	0.26	0.27	80.08	0.00	***	363306	0.00	***	86.6			
	August	1955	32	0.02	0.03	1987	32	0.12	0.17	351.31	0.00	***	310726.5	0.00	***	406.5			
	September	1955	32	0.01	0.02	1987	32	0.16	0.24	239.08	0.00	***	301416.5	0.00	***	1258.3			
	October	1955	32	0.23	0.18	1987	32	0.33	0.24	75.48	0.00	***	345415.5	0.00	***	45.8			
	November	1961	22	0.25	0.11	1987	32	0.42	0.21	106.51	0.00	***	66590.5	0.00	***	67.5			
	December	1978	9	0.16	0.07	1987	32	0.27	0.16	53.53	0.00	***	77681	0.00	***	69.4			

FIGURE. ANALYSIS OF VARIANCE IN MONTHLY FLOW FOR RECENT (1987 - 2018) VS. HISTORICAL (1955- 1987) TIME PERIODS IN THE LOWER SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.

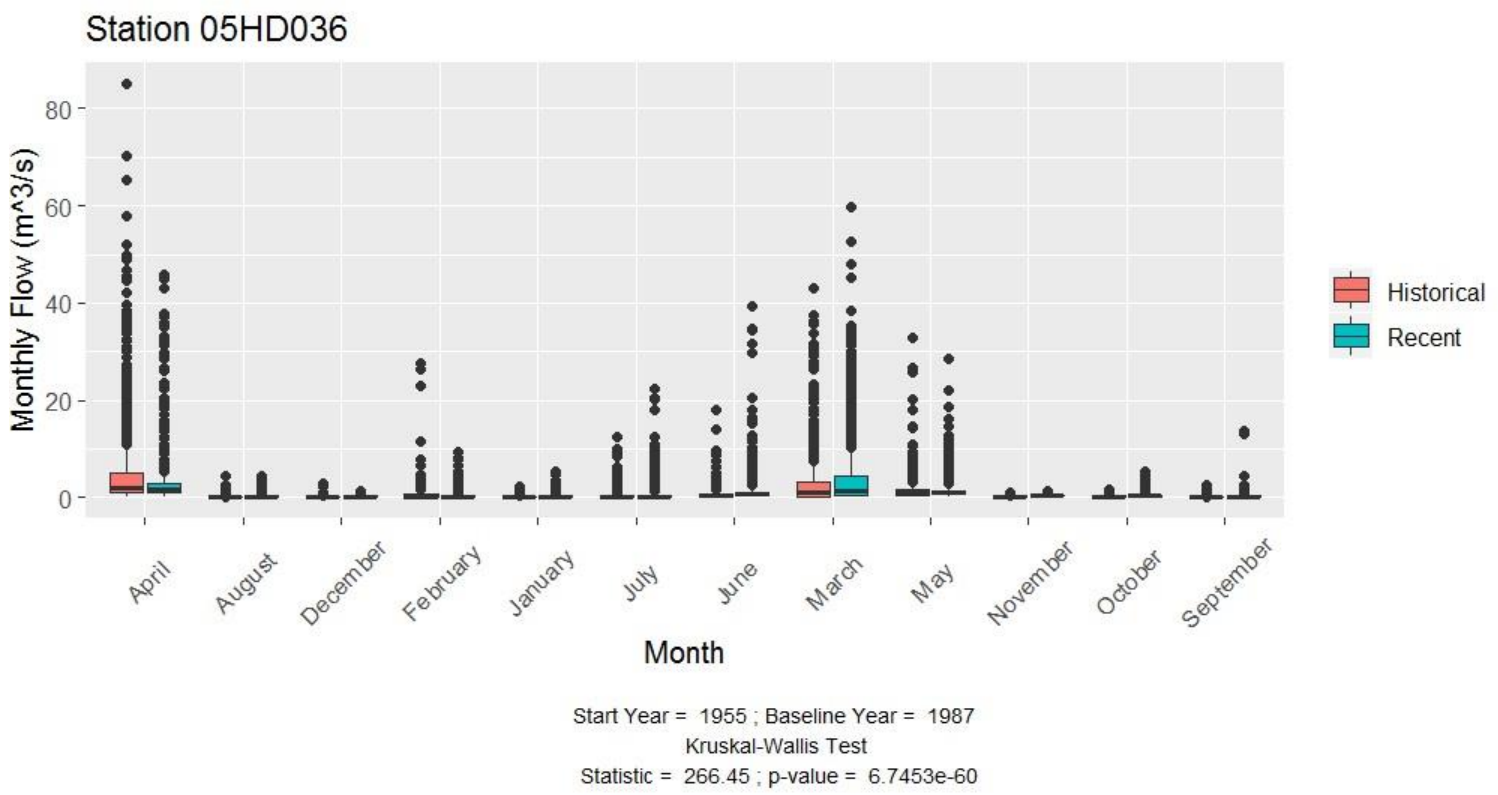
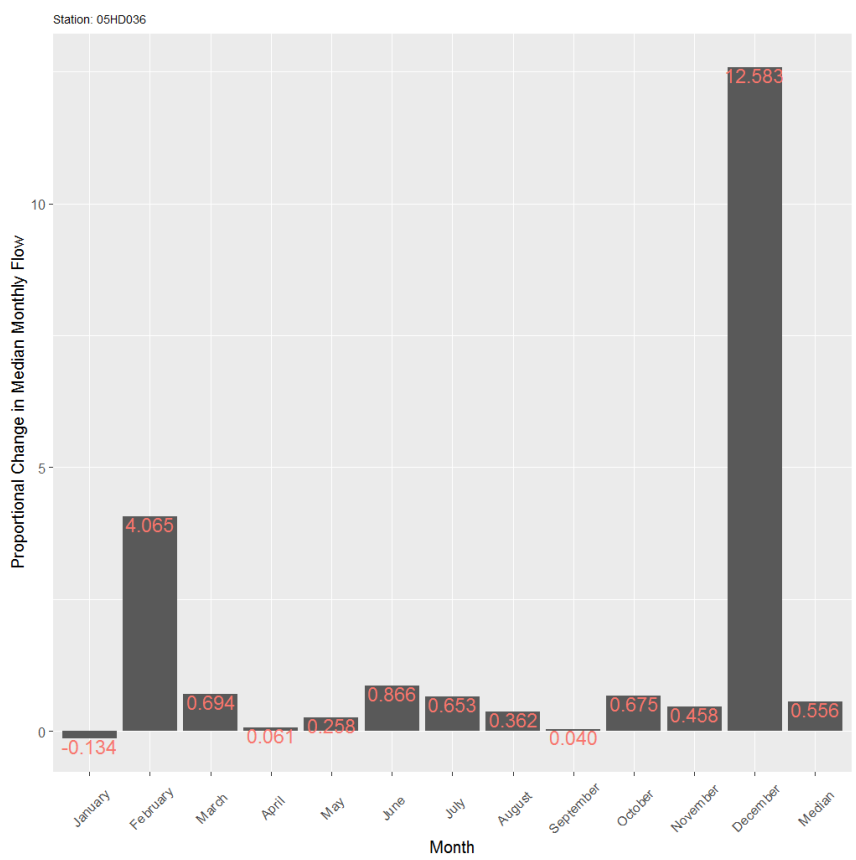


FIGURE. PERCENTAGE CHANGE IN MEDIAN MONTHLY FLOW FOR RECENT (1987 - 2018) VS. HISTORICAL (1955- 1987) TIME PERIODS IN THE LOWER SOUTH SASKATCHEWAN RIVER SUB-BASIN, BY STATION.



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OVERALL WATER QUALITY HEALTH SCORING

				Sub-Basin				*Basin*
	Indicator			05A - Upper South Saskatchewan	05B - Bow River	05C - Red Deer	05H - Lower South Saskatchewan	Value
Water Quality	Exceedance of water quality guidelines for aquatic life	Exceedance of water quality thresholds. Weighted average of exceedances of three thresholds: water quality guidelines,90th percentile and 77th percentile. Expressed as a proportion of total measurements. Reported for the last five years of monitoring.	*Year*	2016-2019	2016-2020	2016-2020	2016-2019	2016-2020
			Number of Stations	68	94	59	9	230
			Value	0.12	0.05	0.15	0.11	0.10
			Water Quality Health Category	Good	Very Good	Fair	Good	Good
			Water Quality Health Score	4	5	3	4	4
		Variance of annual water quality scores	*Value*	0.060	0.060	0.059	0.110	0.061
		Significant Mann-Kendal time-series test to determine directional trend in proportion of exceedance of water quality thresholds.	*Time Period*	1970-2020	1970-2020	1963-2019	1969-2019	1963-2020
			Trend	Significant declining trend in proportion of exceedance in Alberta	Significant declining trend in proportion of exceedance in Alberta	No trend	Significant declining trend in proportion of exceedance in Saskatchewan	Significant declining trend in proportion of exceedance

WATER QUALITY DATA SUFFICIENCY

		Sub-Basin				Basin
	Data Sufficiency Indicator	**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Water Quality	Total number of sub-sub-basins	10	13	10	8	41
	Year of earliest available monitoring	1970	1970	1963	1969	1963
	Number of monitoring stations available for earliest monitoring	1	1	1	1	1
	Number of sub-sub-basins with earliest available monitoring stations	1	1	1	1	1
	Year of most recently available monitoring	2020	2020	2019	2019	2020
	Number of monitoring stations available within last five years	68	94	59	9	230
	Number of sub-sub-basins within last five years	5	8	5	5	23
	Percentage of samples with at least 10 elements measured within last 5 years.	86.20%	44.00%	61.00%	37.14%	57%
	Number of years of sampling in last 10 years	10	10	9	9	10
	Overall Data Sufficiency Category	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient
	Data Sufficiency Score	1	1	1	1	1

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MAP. EXCEEDANCE OF WATER GUIDELINES MONITORING STATIONS IN THE SOUTH SASKATCHEWAN RIVER BASIN FOR THE FIVE MOST RECENT YEARS AVAILABLE.

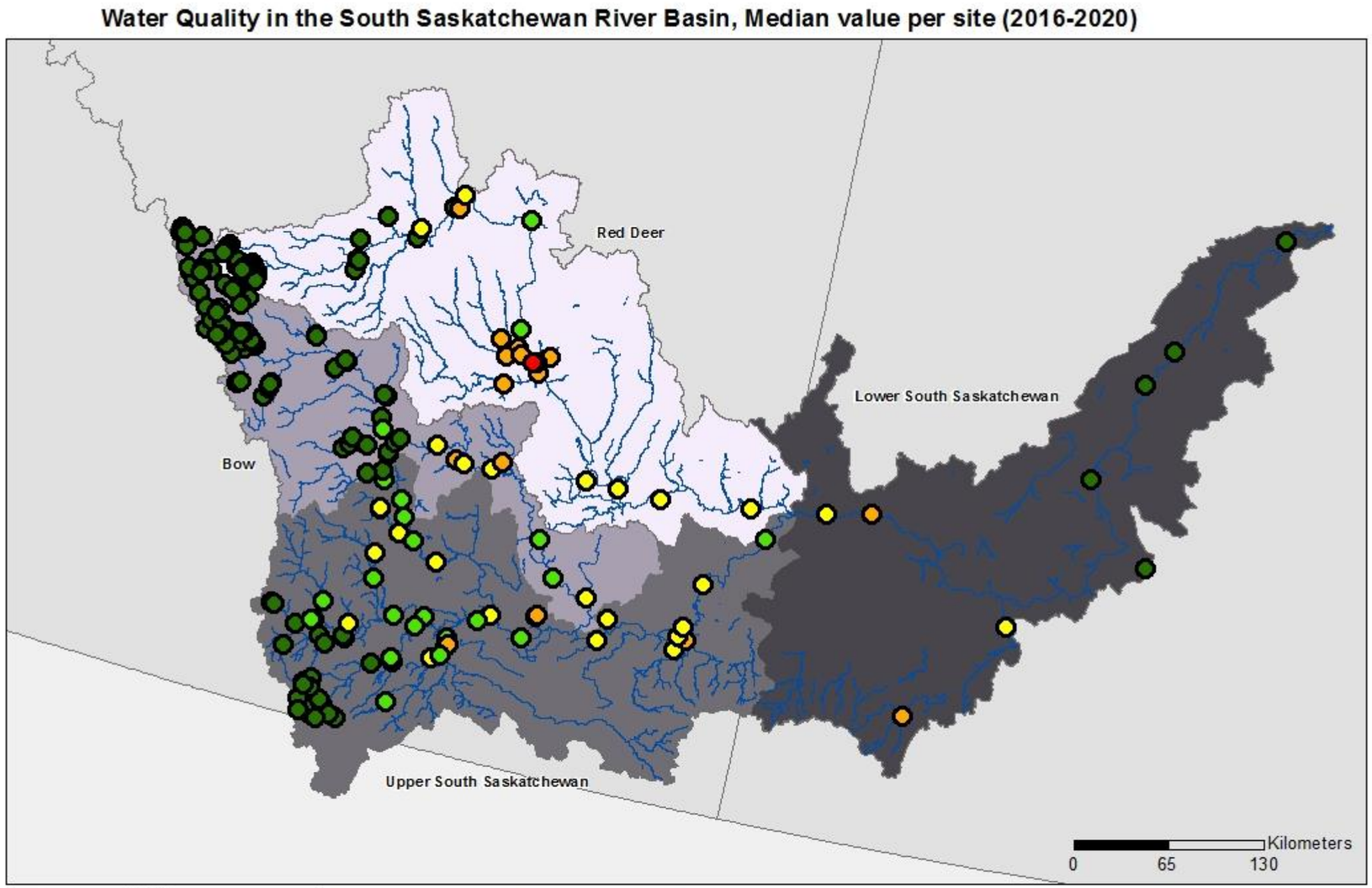

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FIGURE. WATER QUALITY IN THE SOUTH SASKATCHEWAN RIVER BASIN BASED ON PROPORTION OF EXCEEDANCE OF THREE THRESHOLDS: PROVINCIAL WATER QUALITY GUIDELINES, 75TH PERCENTILE OF HISTORICAL DISTRIBUTION, AND 90TH PERCENTILE OF HISTORICAL DISTRIBUTION. REPORTED BY SUB-BASIN AND DATA SOURCE.

Data Source	WSCSDA	Year	Number of Contaminants Measured	Total Number of Sites	Number of Measurements	Total Number of Guidelines Exceedances	Proportion of Guideline Exceedance	Total Number of 90th Percentile Exceedances	Proportion of 90th Percentile Exceedance	Total Number of 75th Percentile Exceedances	Proportion of 75th Percentile Exceedance	Weighted Average Exceedance	5-Years Weighted Average Exceedance by sub-watershed
AEP	**05A - Upper South Saskatchewan**	2020	18	5	195	20	0.10	15	0.08	34	0.17	0.11	0.12
AEP		2019	20	18	1628	175	0.11	79	0.05	283	0.17	0.10	
EC		2019	15	1	72	8	0.11	4	0.06	16	0.22	0.11	
AEP		2018	21	22	4388	630	0.14	425	0.10	1102	0.25	0.15	
CABIN - National Parks		2018	5	14	70	1	0.01	0	0.00	9	0.13	0.03	
EC		2018	19	3	255	34	0.13	24	0.09	57	0.22	0.14	
AEP		2017	21	22	4494	672	0.15	452	0.10	1300	0.29	0.16	
EC		2017	18	3	463	49	0.11	20	0.04	65	0.14	0.09	
AEP		2016	21	48	6018	923	0.15	358	0.06	1391	0.23	0.14	
CABIN - National Parks		2016	5	6	30	0	0.00	0	0.00	0	0.00	0.00	
EC		2016	18	3	409	36	0.09	19	0.05	56	0.14	0.08	
AEP	**05B - Bow River**	2020	18	20	949	113	0.12	111	0.12	219	0.23	0.14	0.05
AEP		2019	20	20	3850	290	0.08	235	0.06	616	0.16	0.08	
CABIN - National Parks		2019	5	35	112	0	0.00	0	0.00	4	0.04	0.01	
EC		2019	15	2	219	2	0.01	0	0.00	5	0.02	0.01	
Kananaski.ENSC.DataStream		2019	4	5	156	0	0.00	0	0.00	10	0.06	0.01	
AEP		2018	22	20	3828	443	0.12	356	0.09	889	0.23	0.13	
CABIN - National Parks		2018	5	30	123	0	0.00	0	0.00	3	0.02	0.00	
EC		2018	15	2	254	3	0.01	0	0.00	3	0.01	0.01	
Kananaski.ENSC.DataStream		2018	4	3	263	0	0.00	0	0.00	1	0.00	0.00	
AEP		2017	21	20	3866	410	0.11	335	0.09	913	0.24	0.12	
CABIN - National Parks		2017	5	22	89	0	0.00	0	0.00	2	0.02	0.00	
EC		2017	15	2	359	3	0.01	0	0.00	6	0.02	0.01	
Kananaski.ENSC.DataStream		2017	4	3	320	0	0.00	0	0.00	10	0.03	0.01	
AEP		2016	20	27	3372	330	0.10	229	0.07	678	0.20	0.11	
CABIN - National Parks		2016	5	34	140	0	0.00	0	0.00	1	0.01	0.00	
EC		2016	15	2	397	2	0.01	0	0.00	5	0.01	0.00	
Kananaski.ENSC.DataStream		2016	4	3	688	0	0.00	5	0.01	9	0.01	0.00	
AEP	**05C - Red Deer**	2019	18	17	697	60	0.09	54	0.08	150	0.22	0.10	0.15
CABIN - National Parks		2019	2	1	2	0	0.00	0	0.00	1	0.50	0.08	
EC		2019	15	1	66	3	0.05	7	0.11	12	0.18	0.09	
AEP		2018	21	23	4059	684	0.17	665	0.16	1451	0.36	0.20	
CABIN - National Parks		2018	4	1	4	0	0.00	0	0.00	0	0.00	0.00	
EC		2018	18	1	229	29	0.13	20	0.09	61	0.27	0.14	
AEP		2017	20	23	4427	893	0.20	1028	0.23	2051	0.46	0.26	
CABIN - National Parks		2017	4	3	8	0	0.00	0	0.00	0	0.00	0.00	
EC		2017	18	1	231	51	0.22	46	0.20	103	0.45	0.25	
AEP		2016	21	24	3782	727	0.19	758	0.20	1603	0.42	0.23	
CABIN - National Parks		2016	5	33	154	0	0.00	0	0.00	5	0.03	0.01	
EC		2016	15	1	216	49	0.23	37	0.17	104	0.48	0.25	
SaskH2O	**05H - Lower South Saskatchewan**	2019	6	6	157	12	0.08	6	0.04	48	0.31	0.10	0.11
SaskH2O		2018	5	1	17	0	0.00	0	0.00	1	0.06	0.01	
WSA		2018	14	8	265	41	0.15	35	0.13	76	0.29	0.17	
SaskH2O		2017	6	1	21	0	0.00	0	0.00	3	0.14	0.02	
WSA		2017	13	7	631	71	0.11	56	0.09	149	0.24	0.13	
SaskH2O		2016	8	6	230	14	0.06	3	0.01	49	0.21	0.07	

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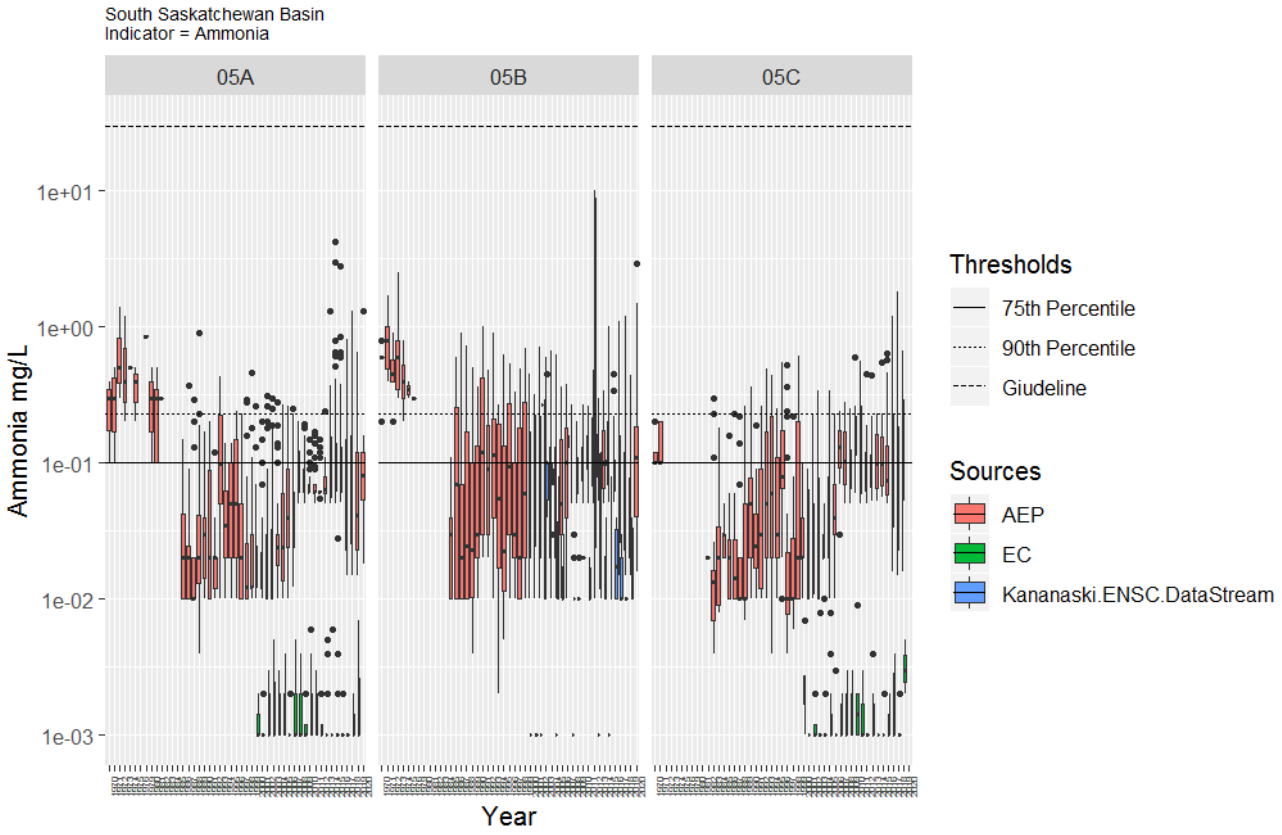
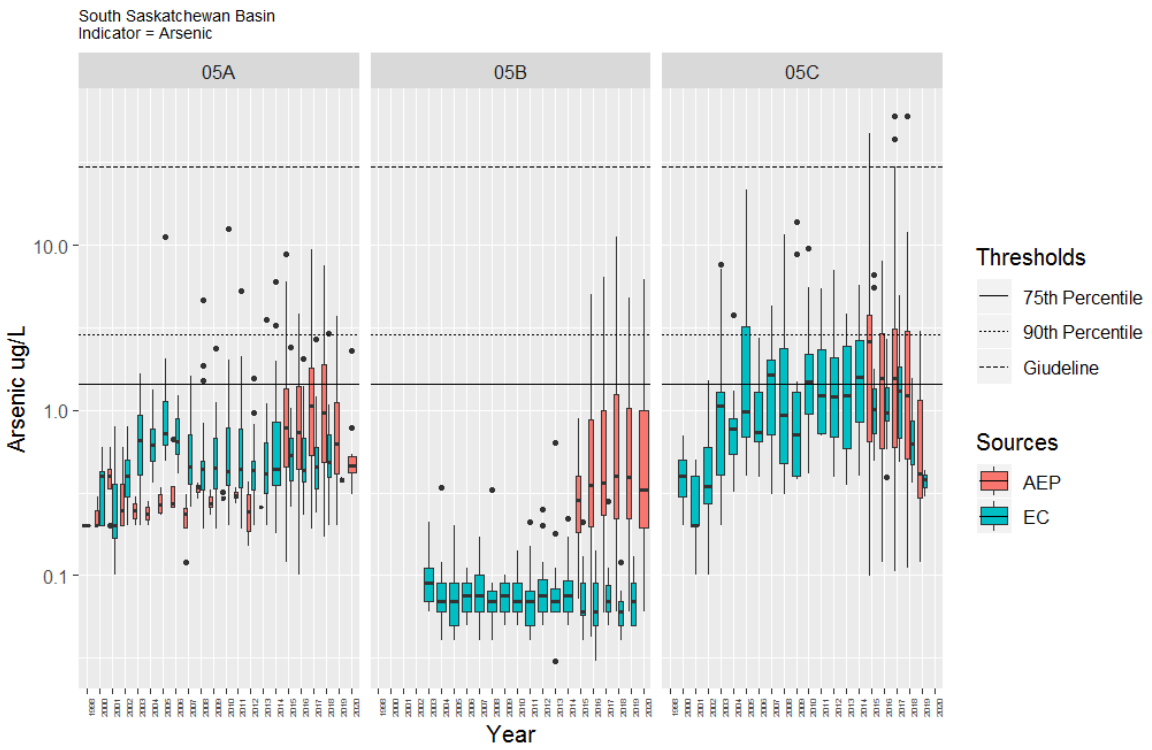
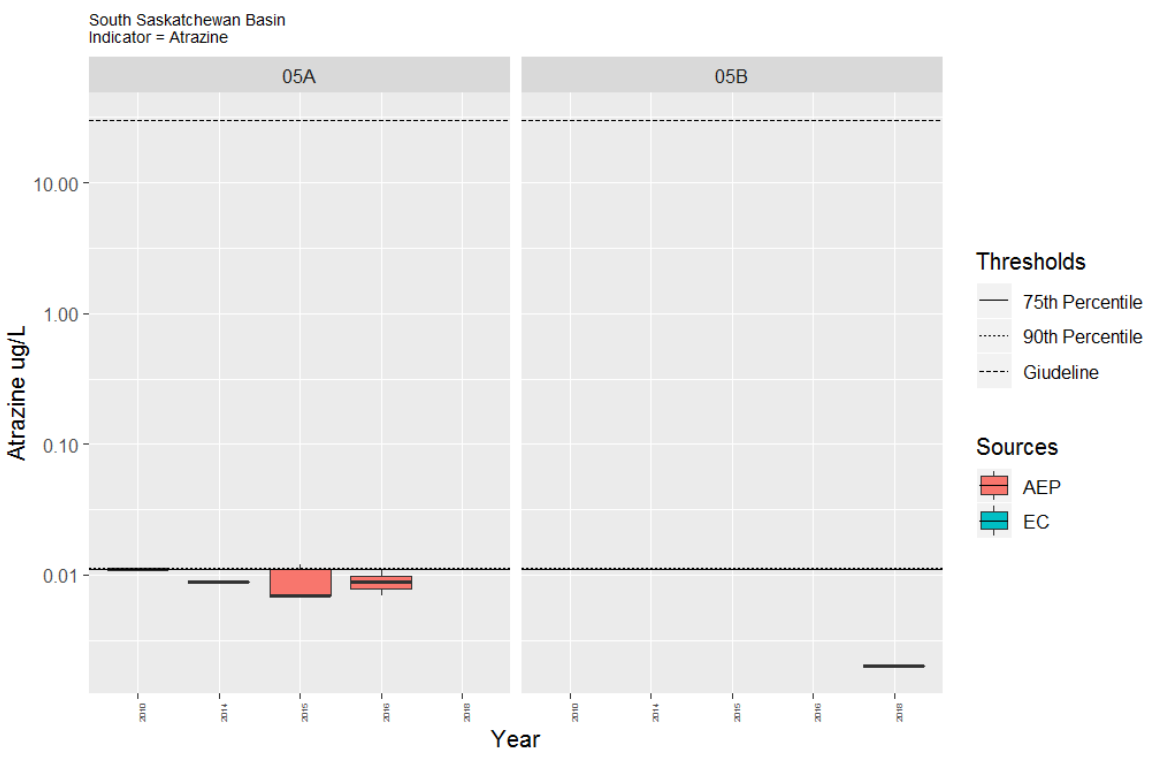
FIGURE. ANALYSIS OF VARIANCE IN EXCEEDANCE OF WATER QUALITY THRESHOLDS OVER TIME FOR MONITORING STATIONS IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY SUB-BASIN.

FIGURE. ANALYSIS OF VARIANCE IN EXCEEDANCE OF WATER QUALITY THRESHOLDS OVER TIME FOR MONITORING STATIONS IN THE ALBERTA PORTION OF THE SOUTH SASKATCHEWAN RIVER BASIN, BY CONTAMINANT.

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.







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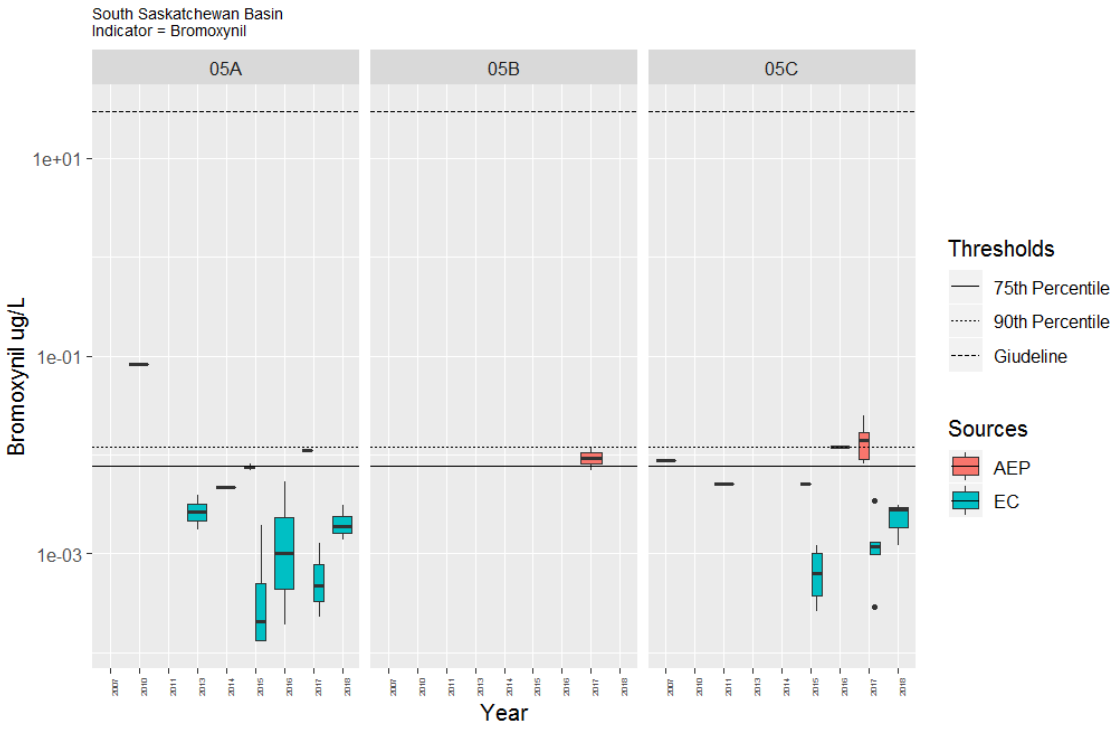

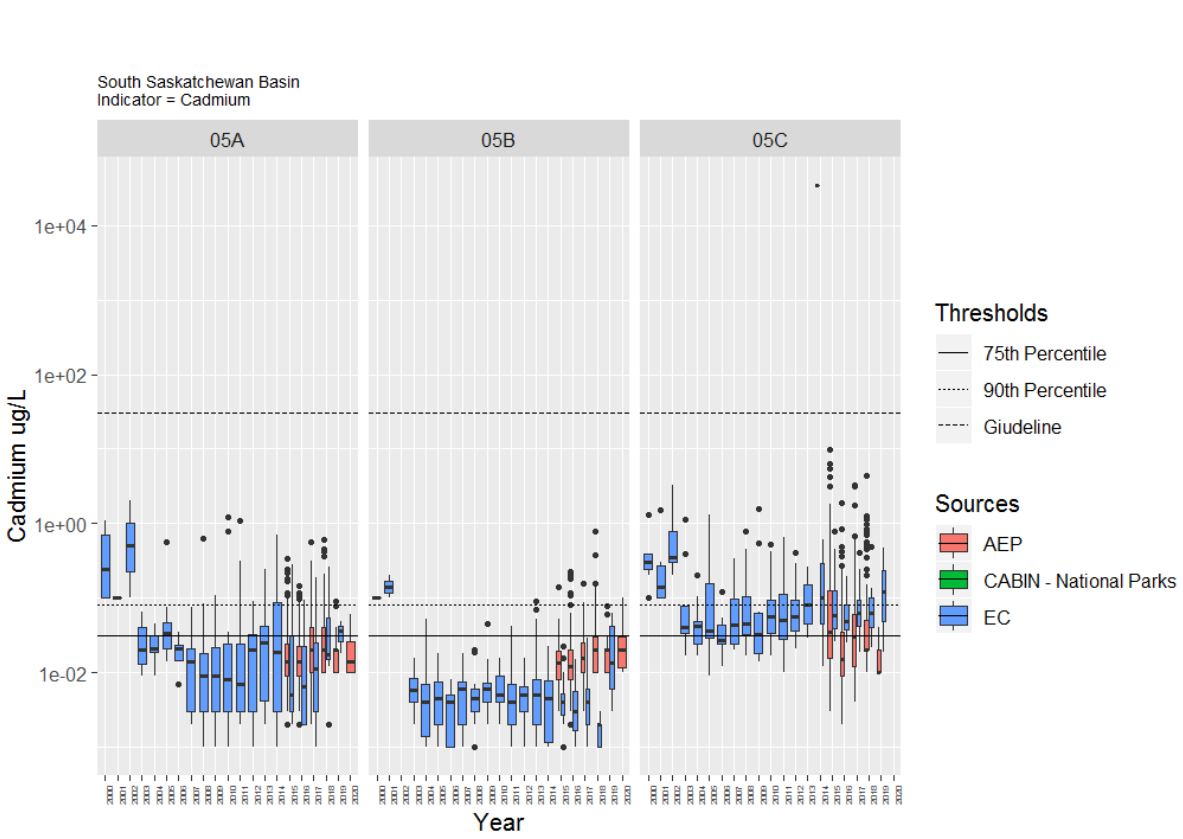

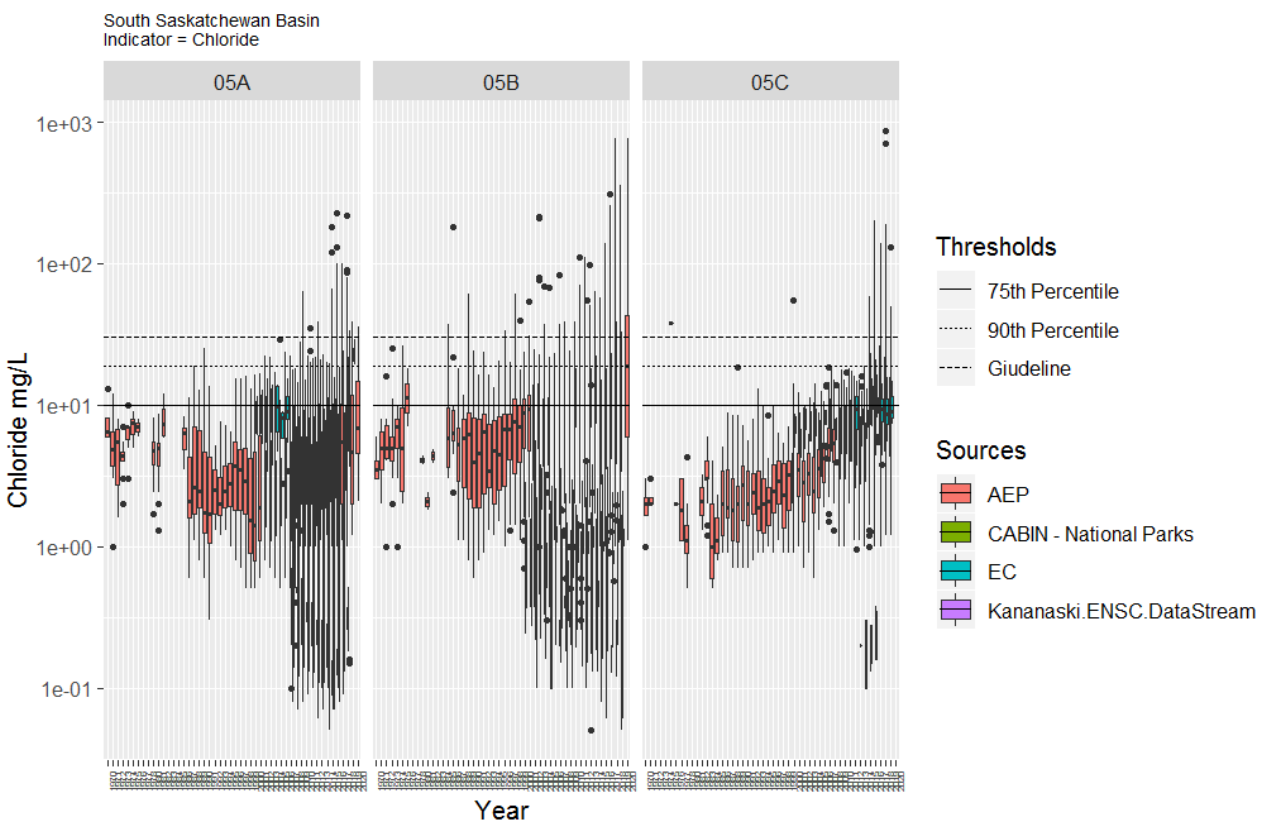

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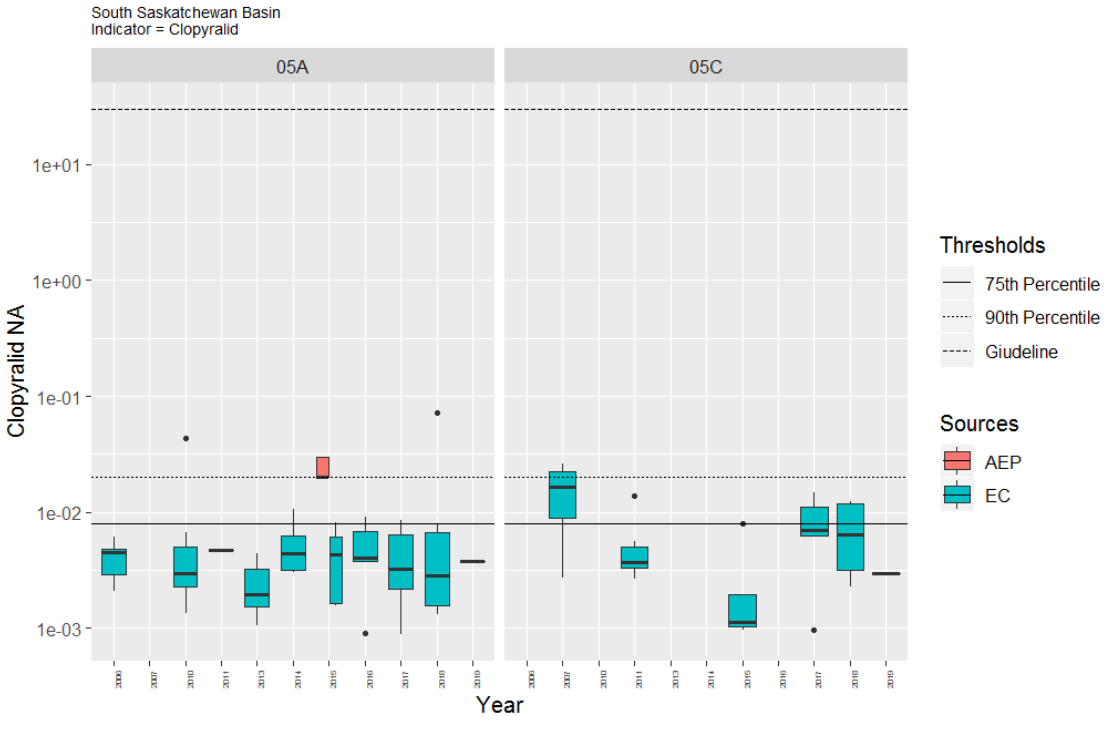

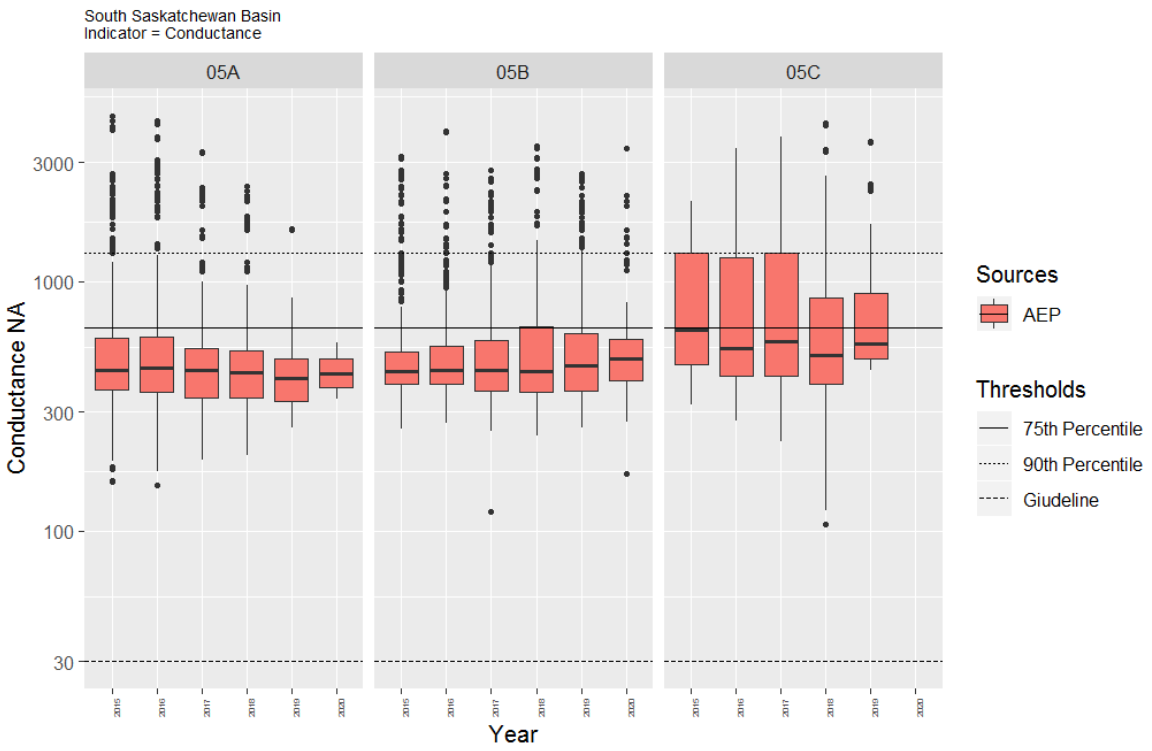

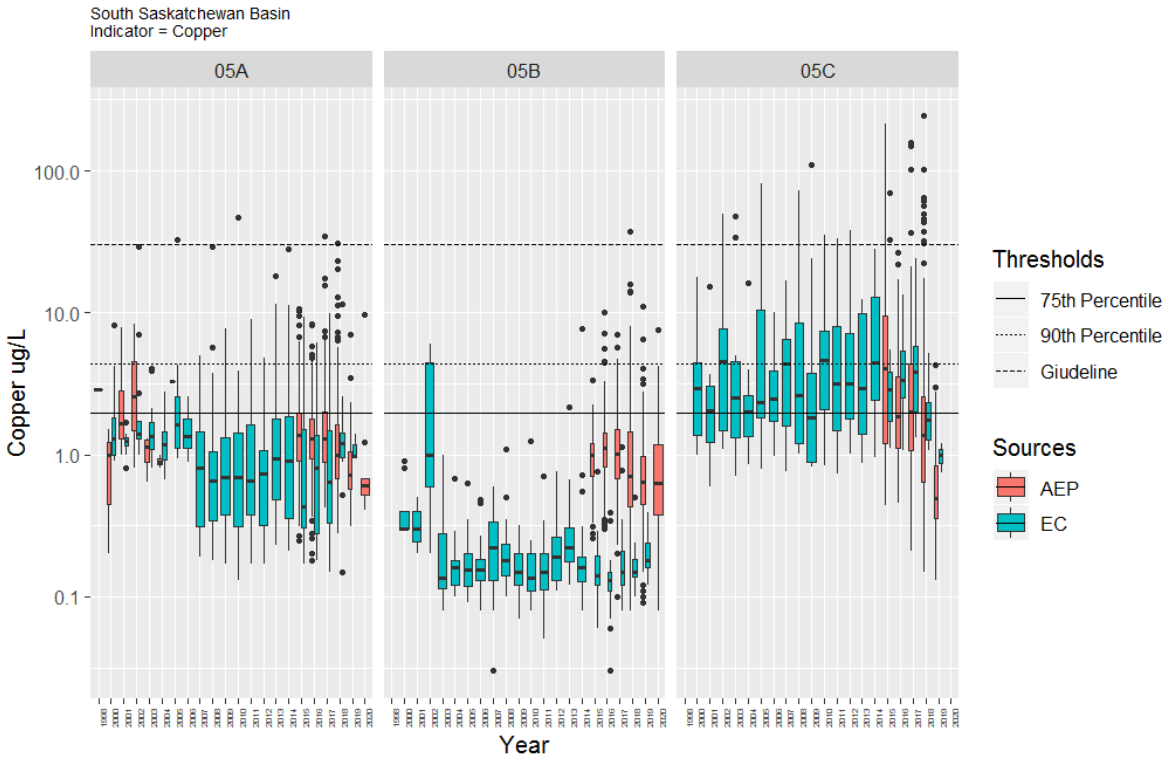

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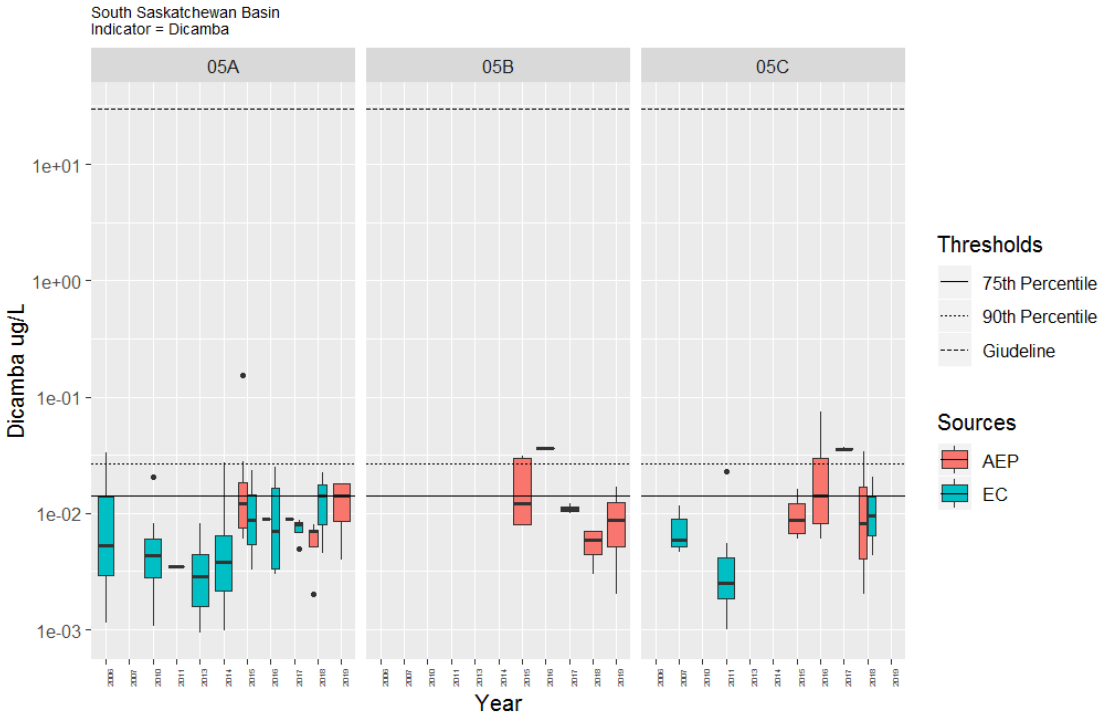

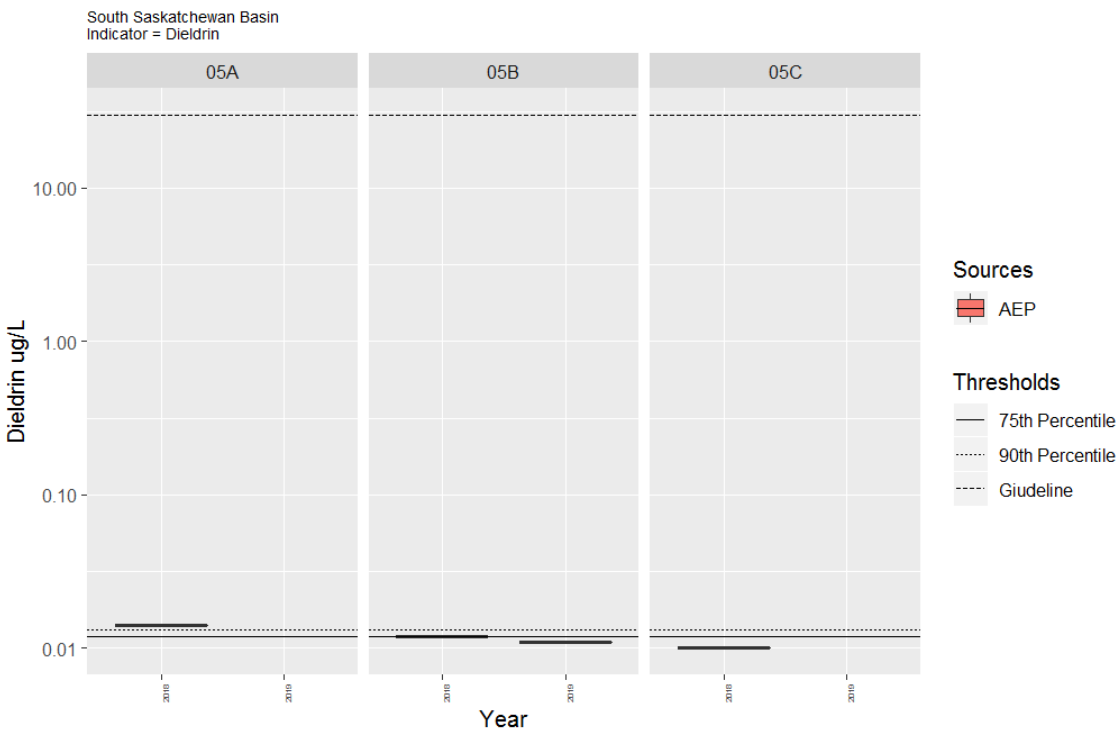

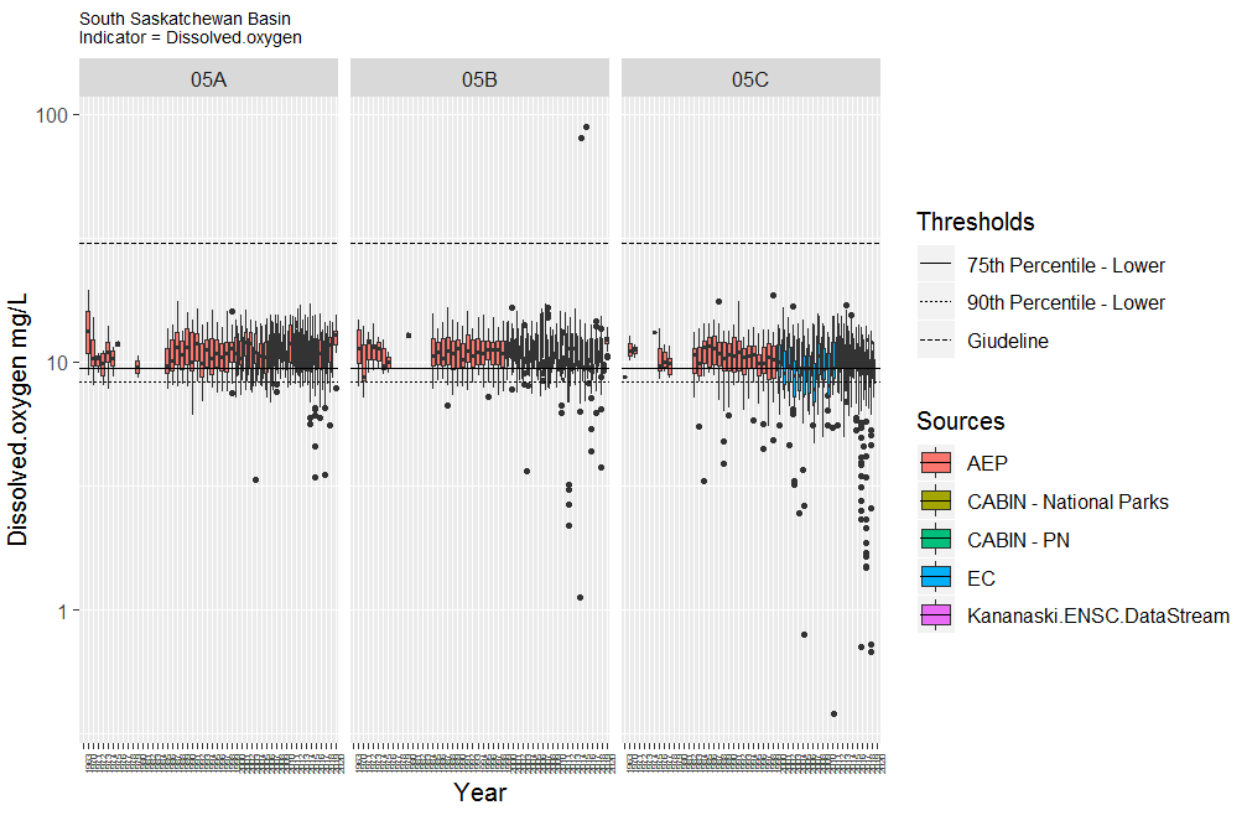

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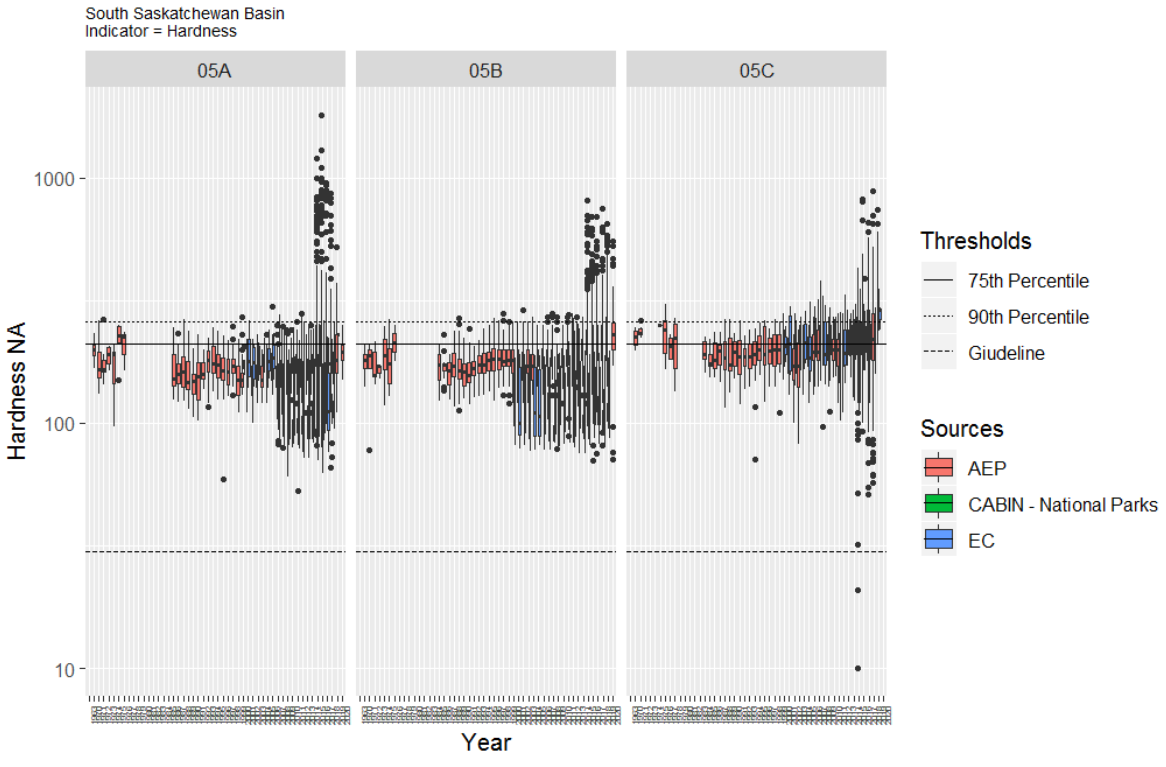

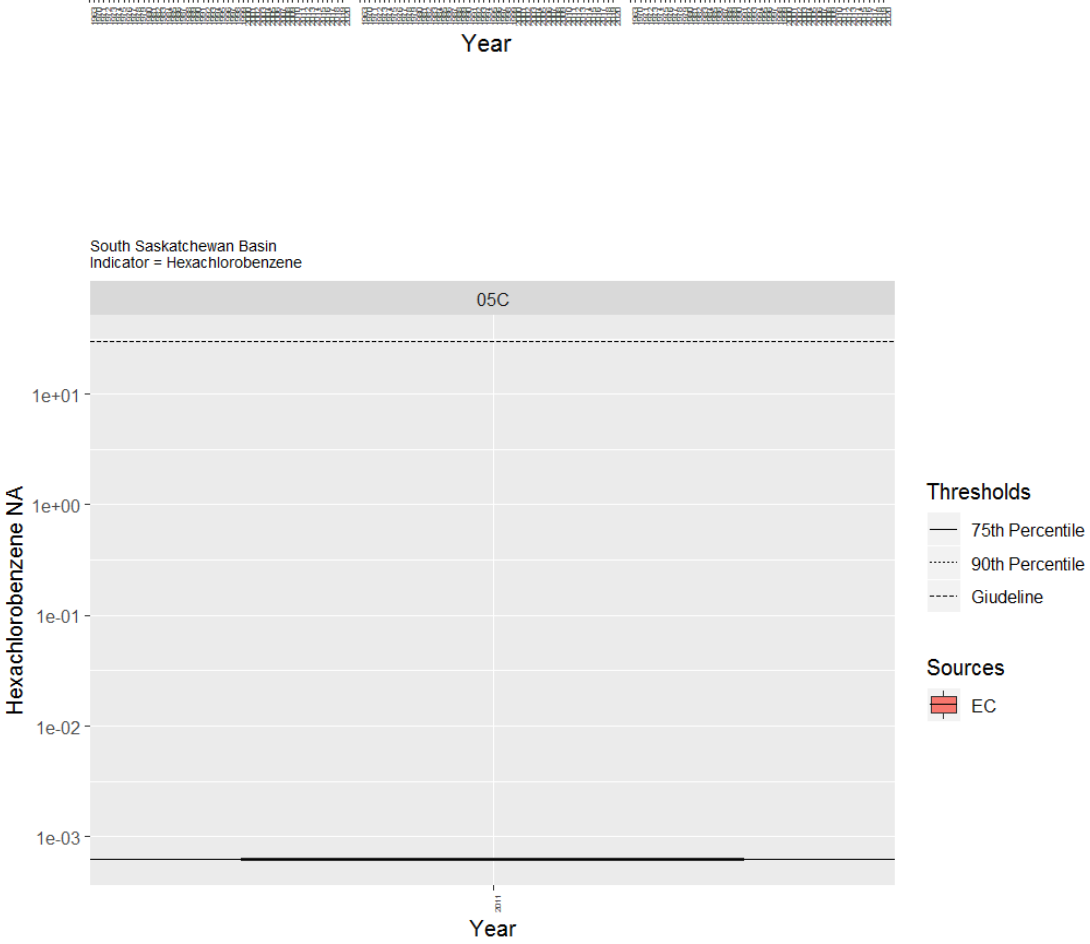

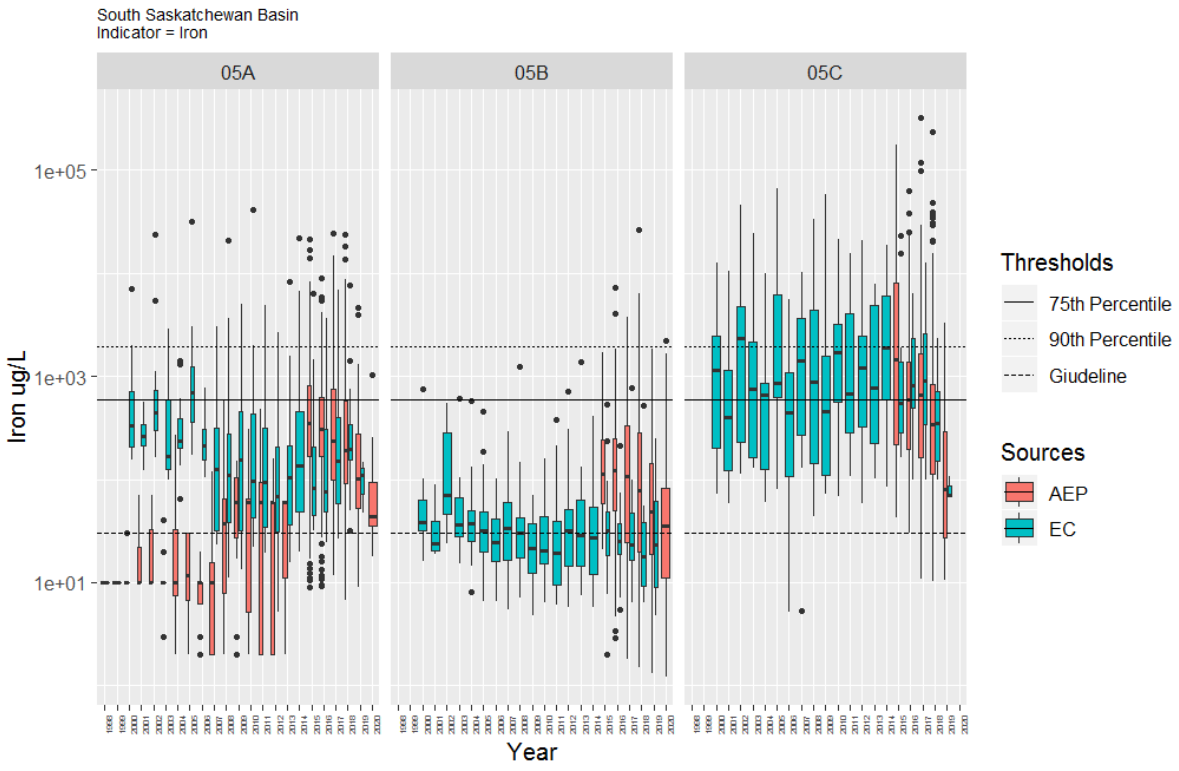

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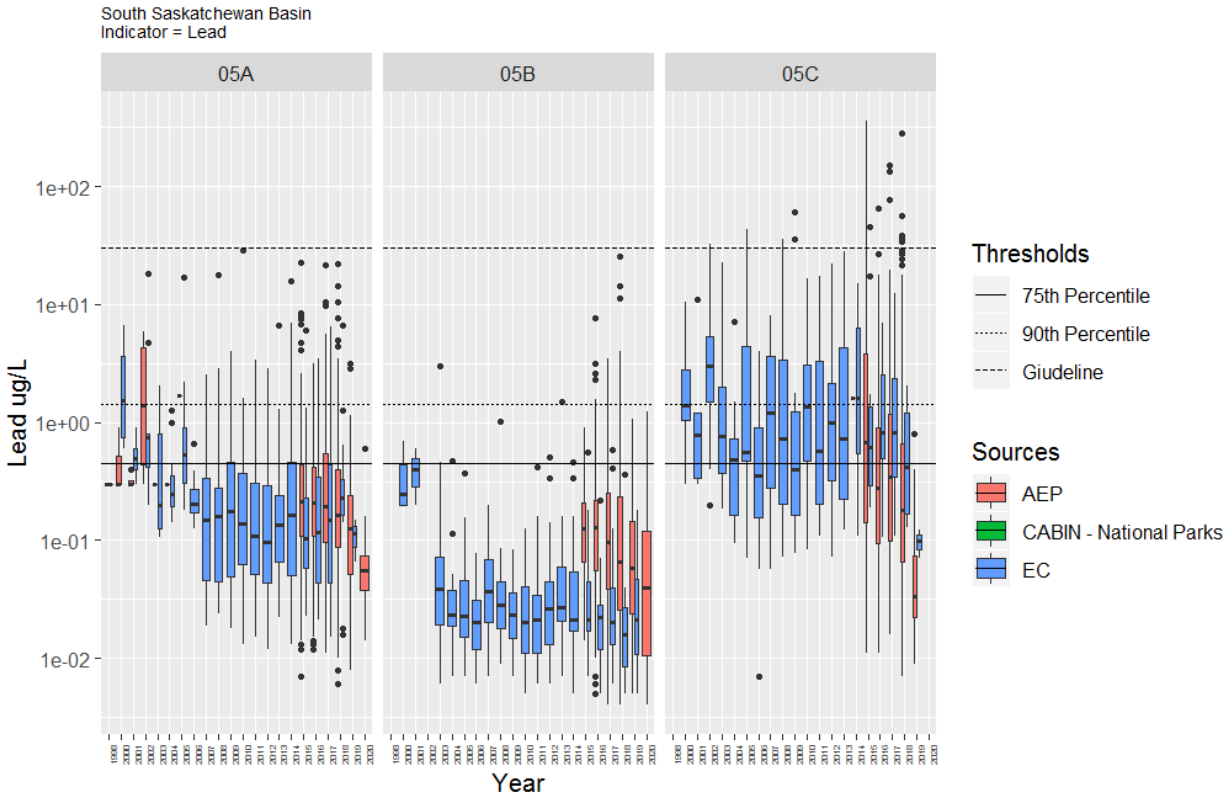
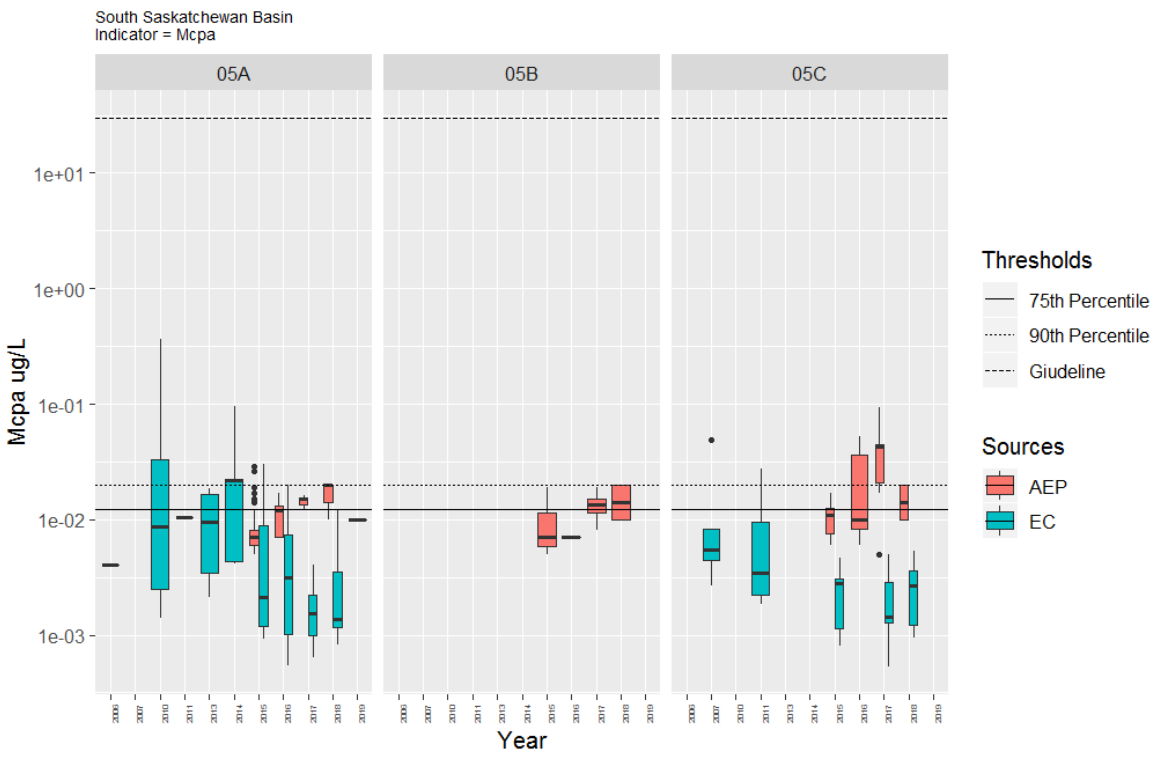
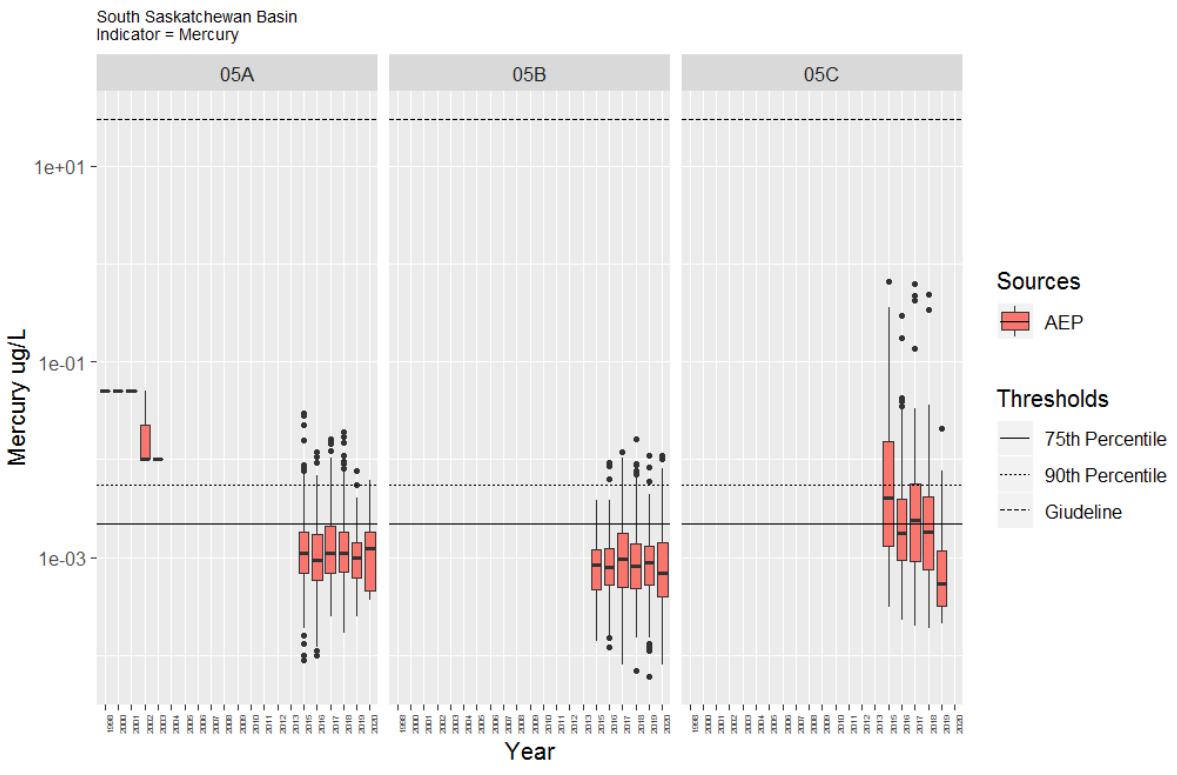
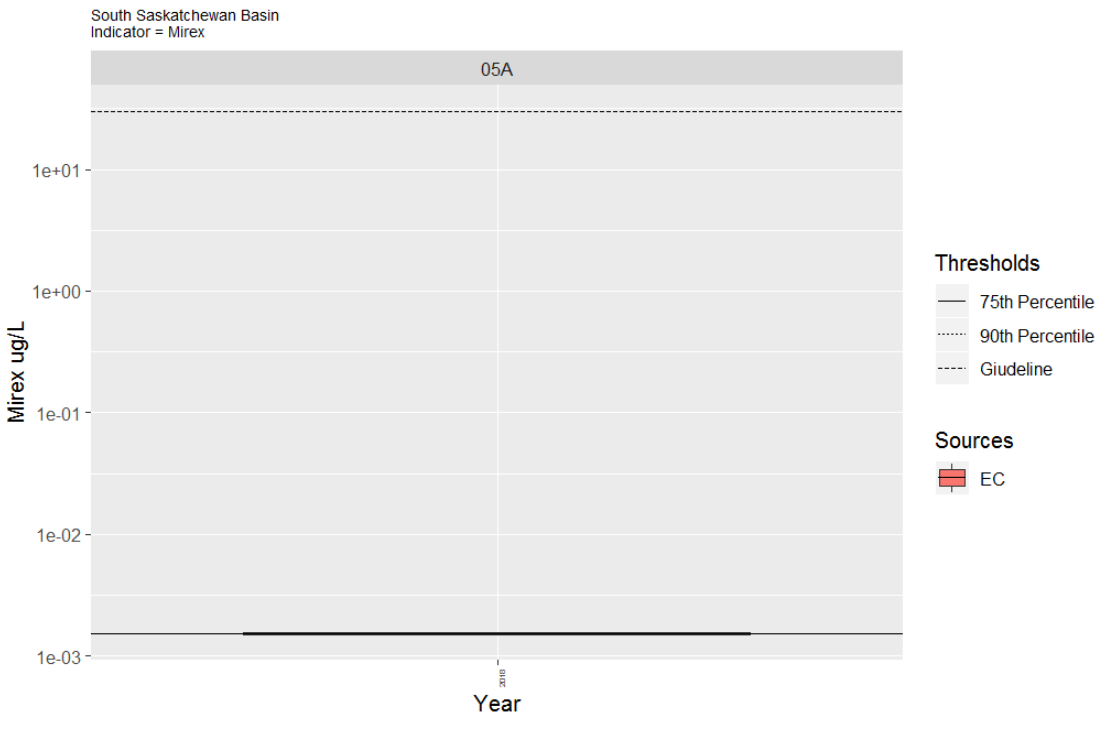
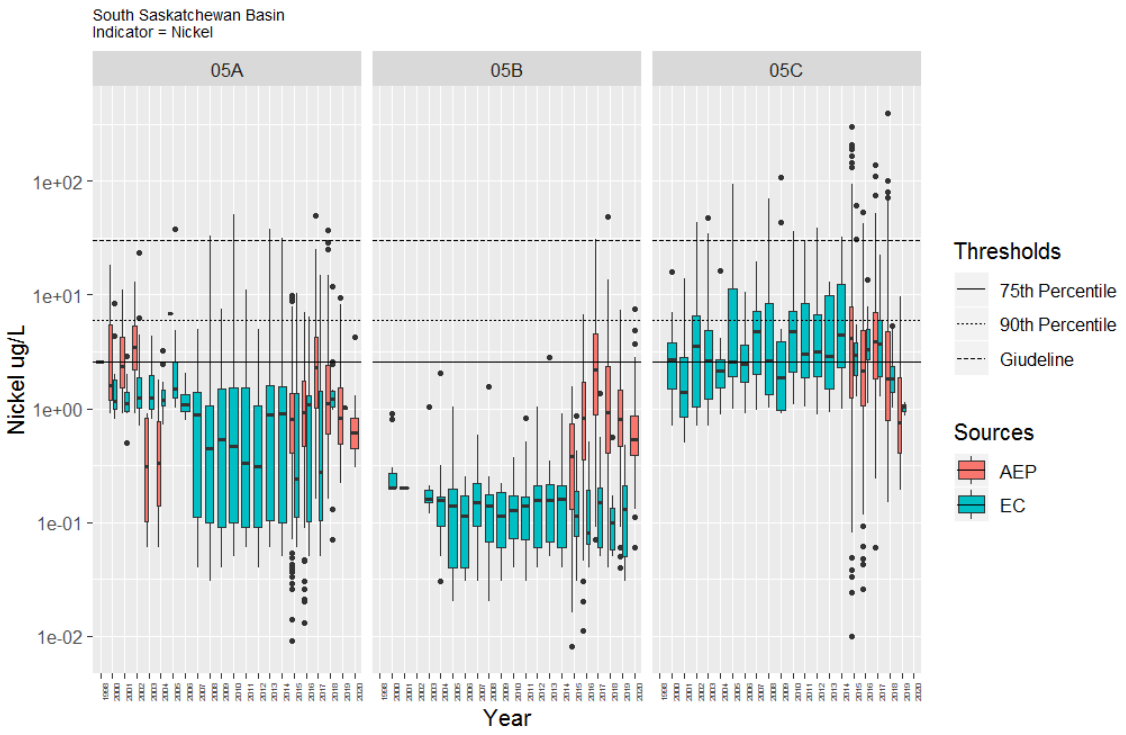


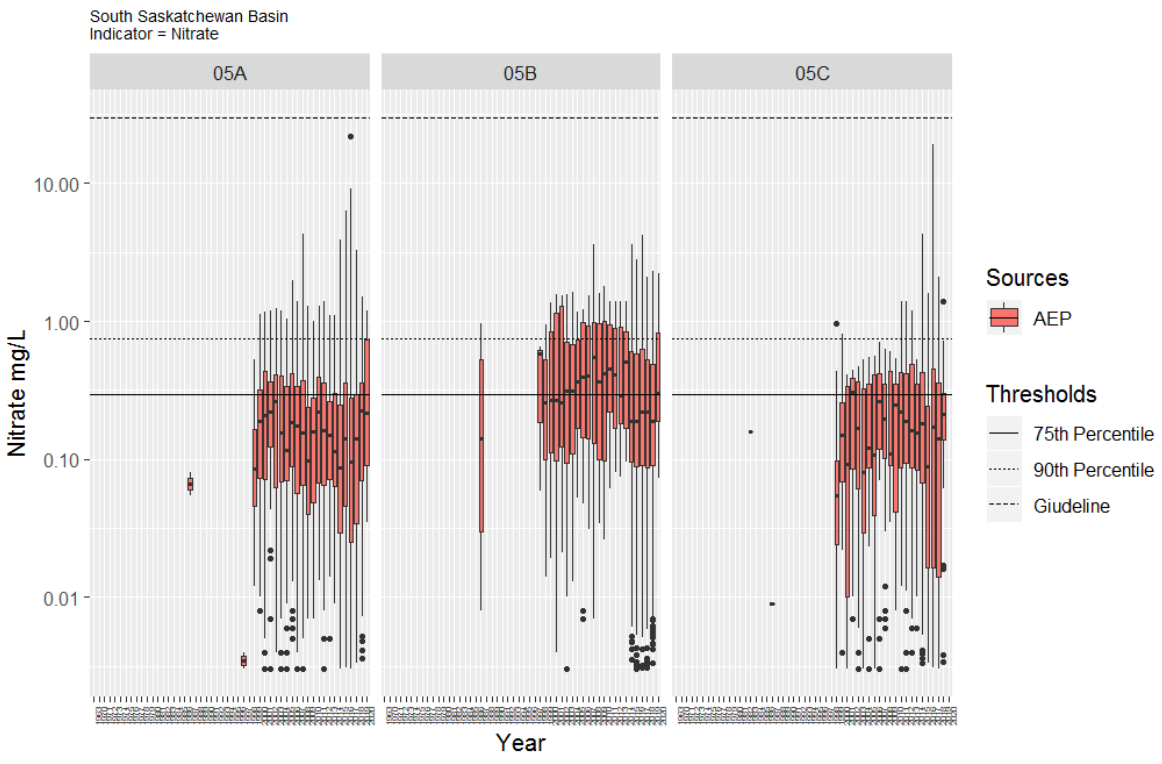




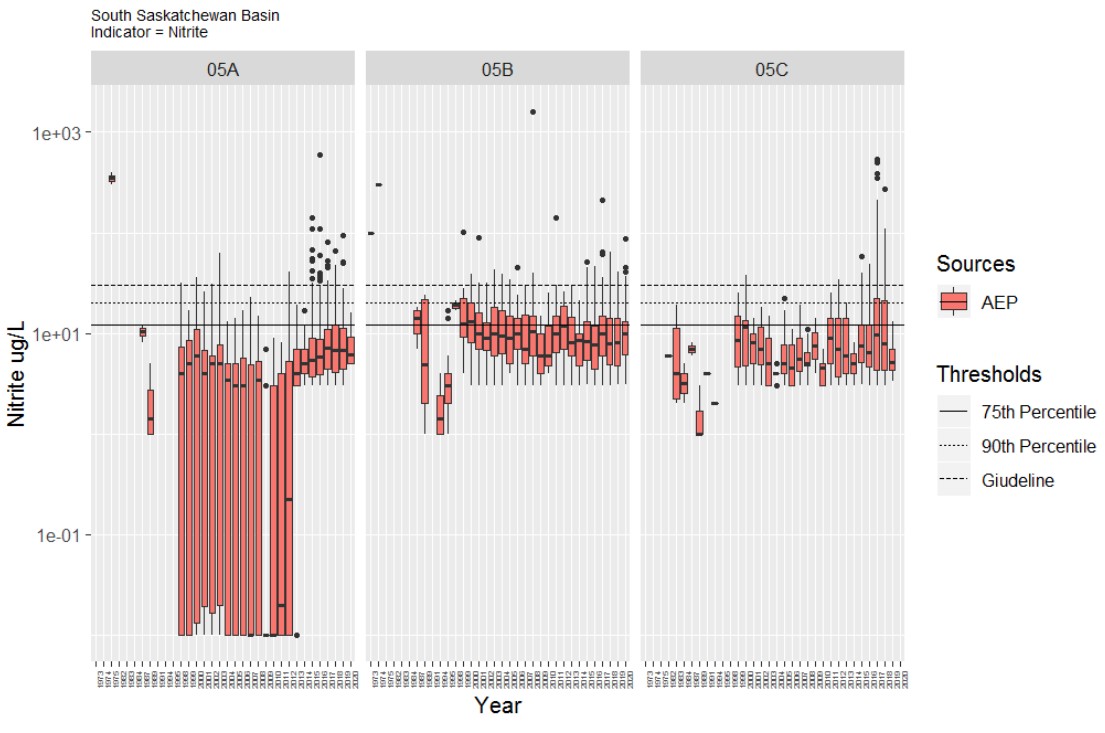
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

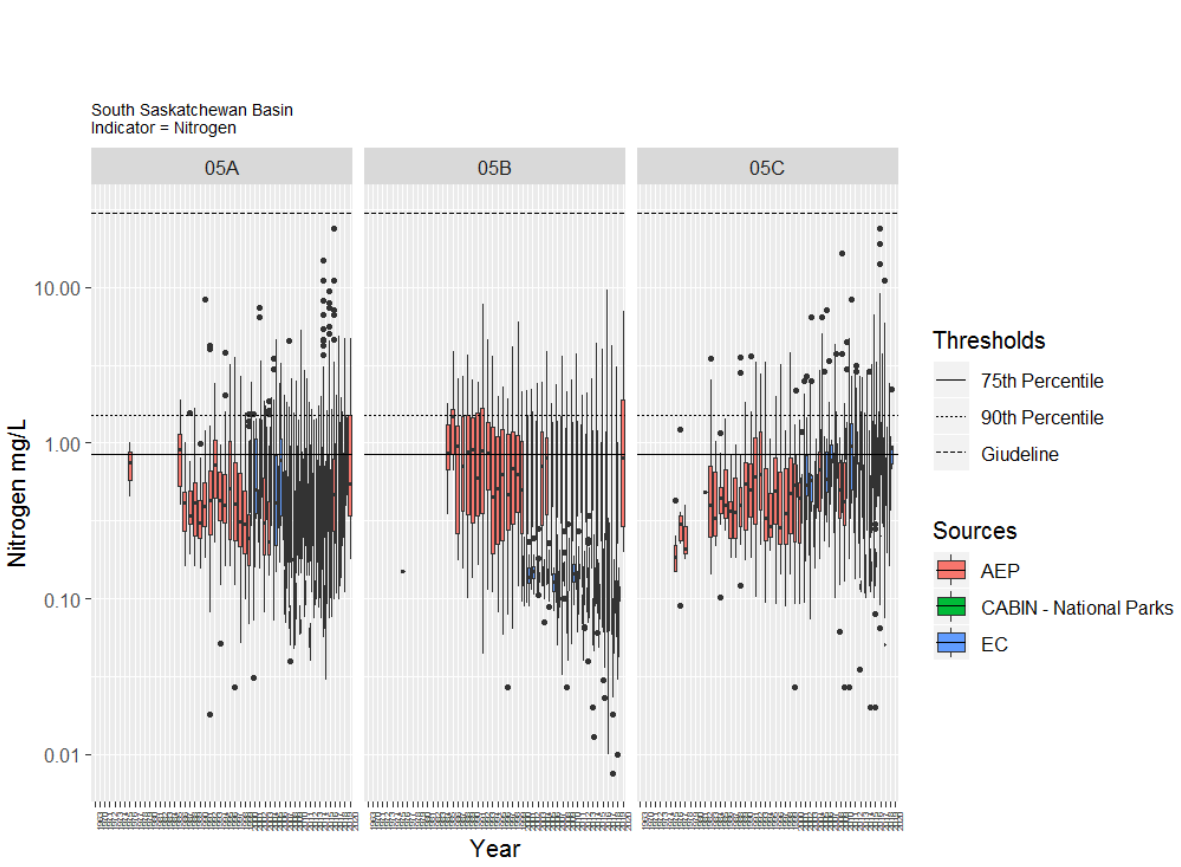


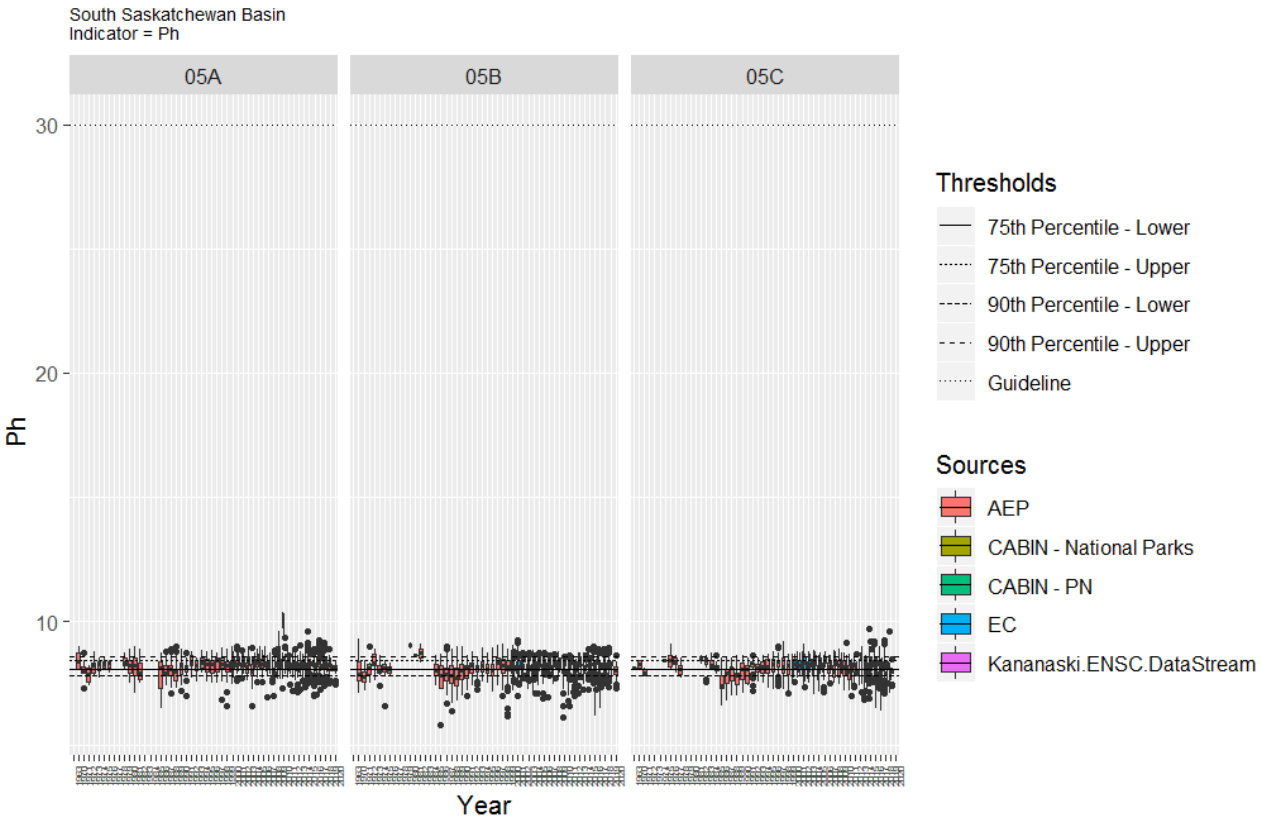




Disclaimer: This analysis reflects currently available and accessible data as of July 2020.







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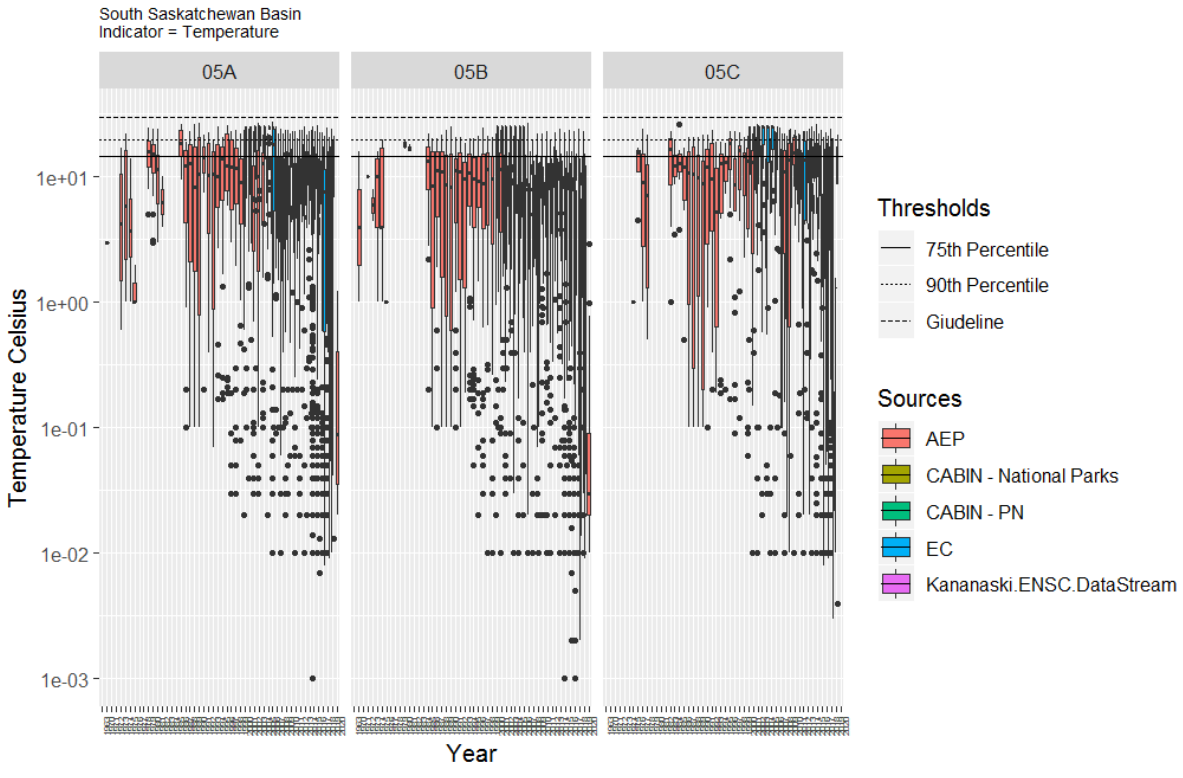

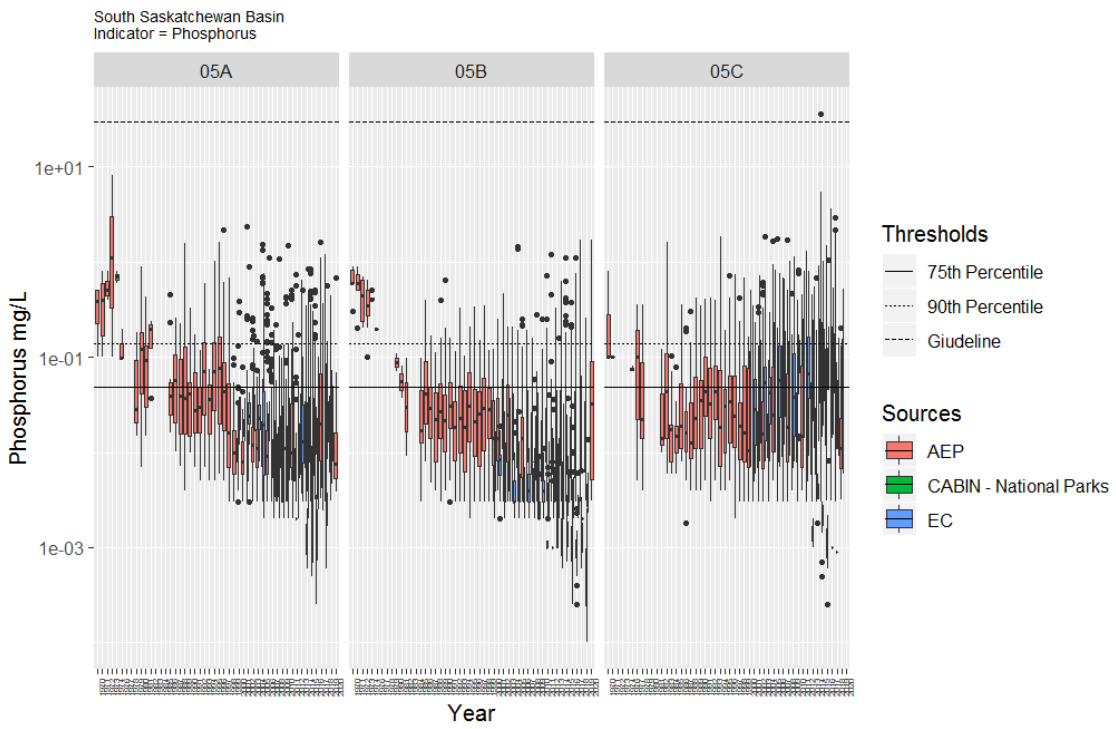

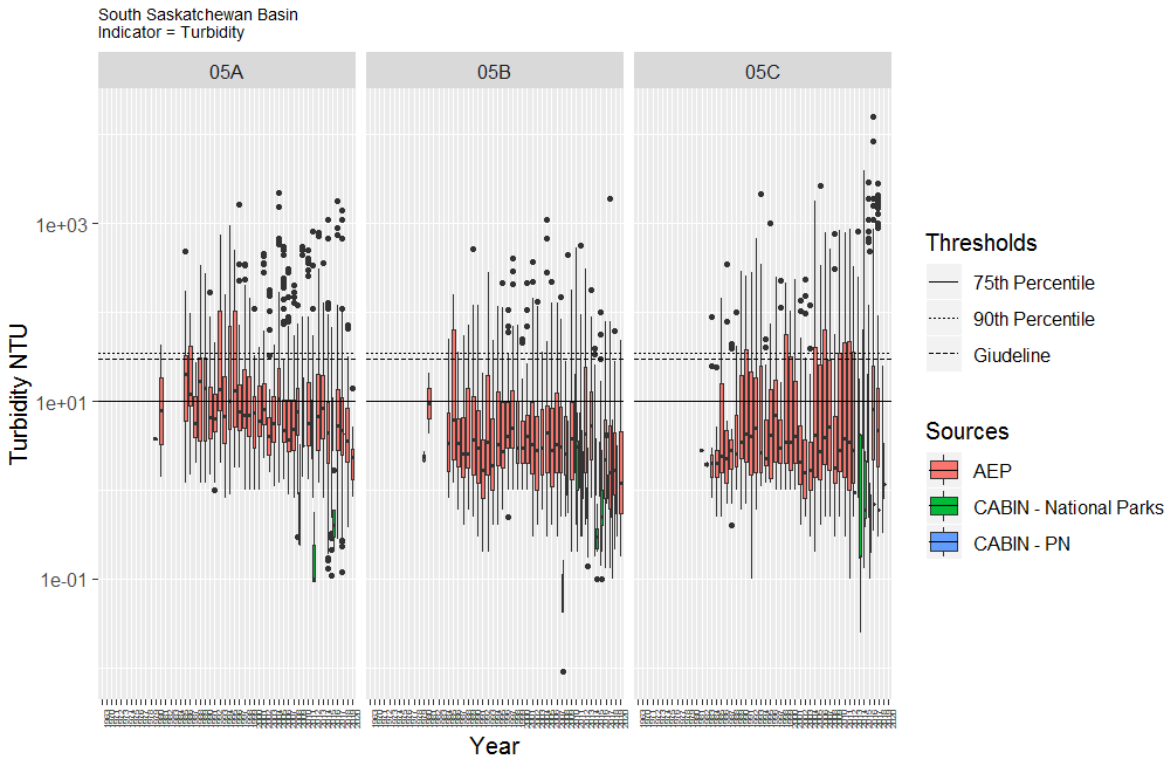

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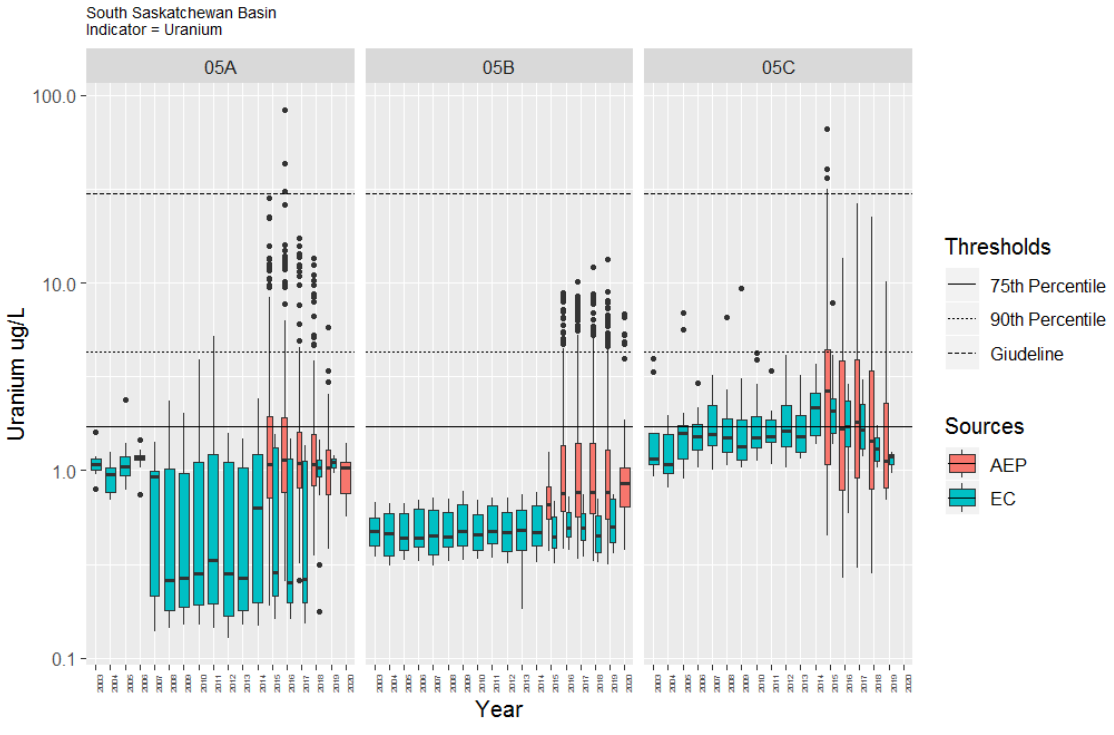

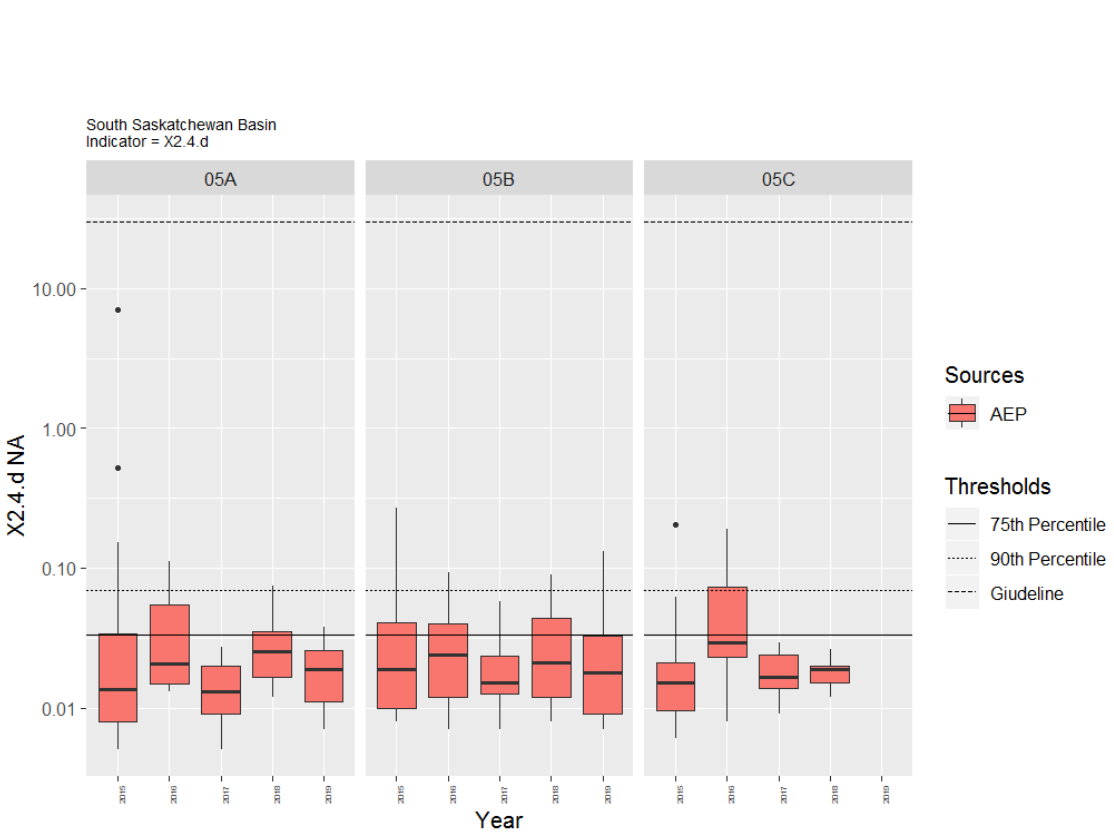

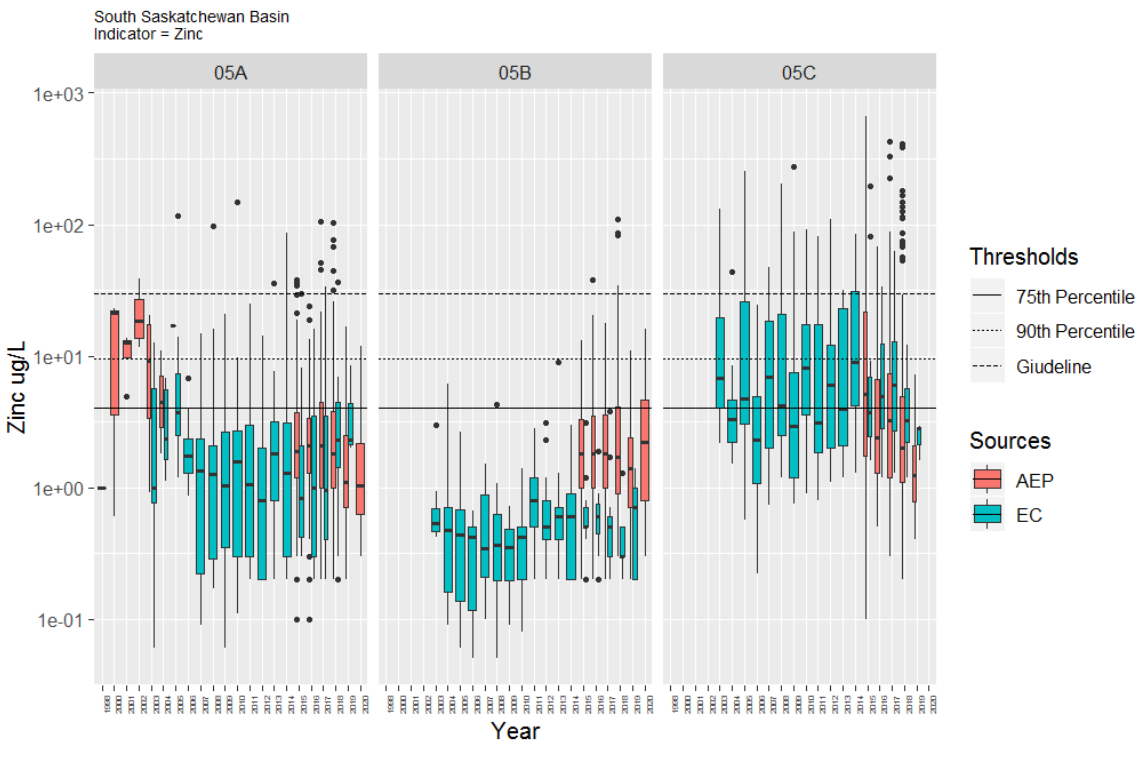

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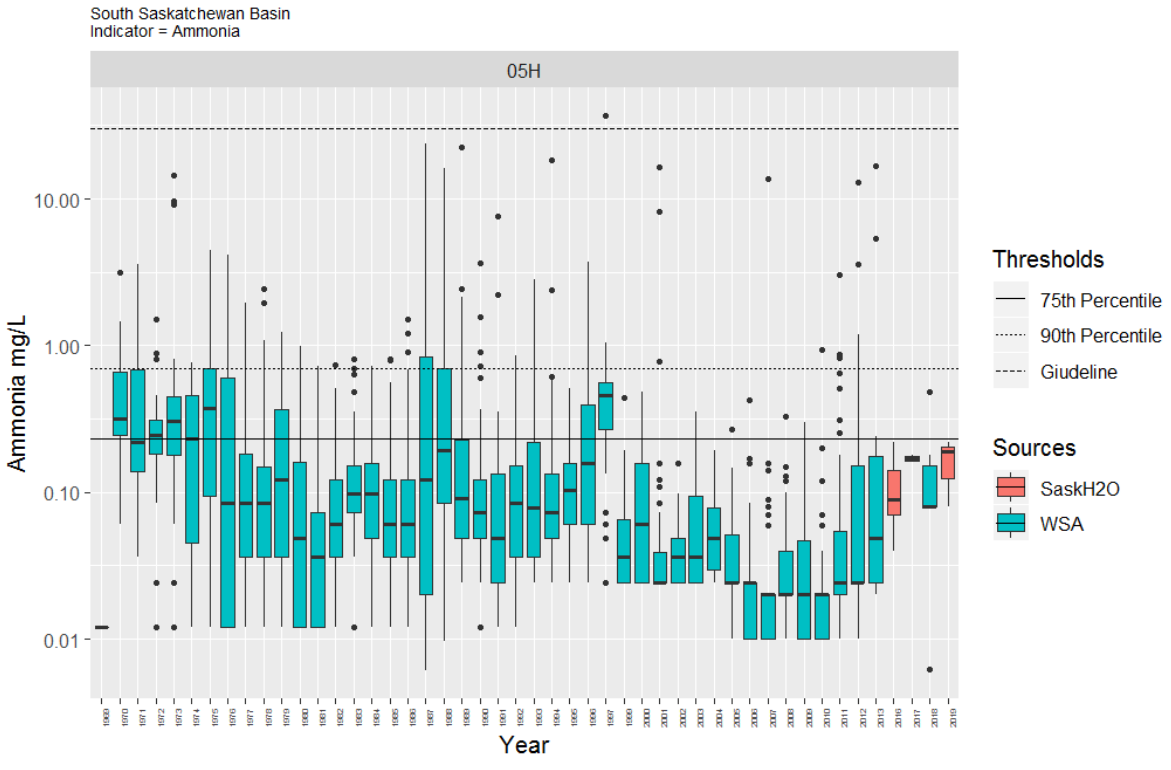
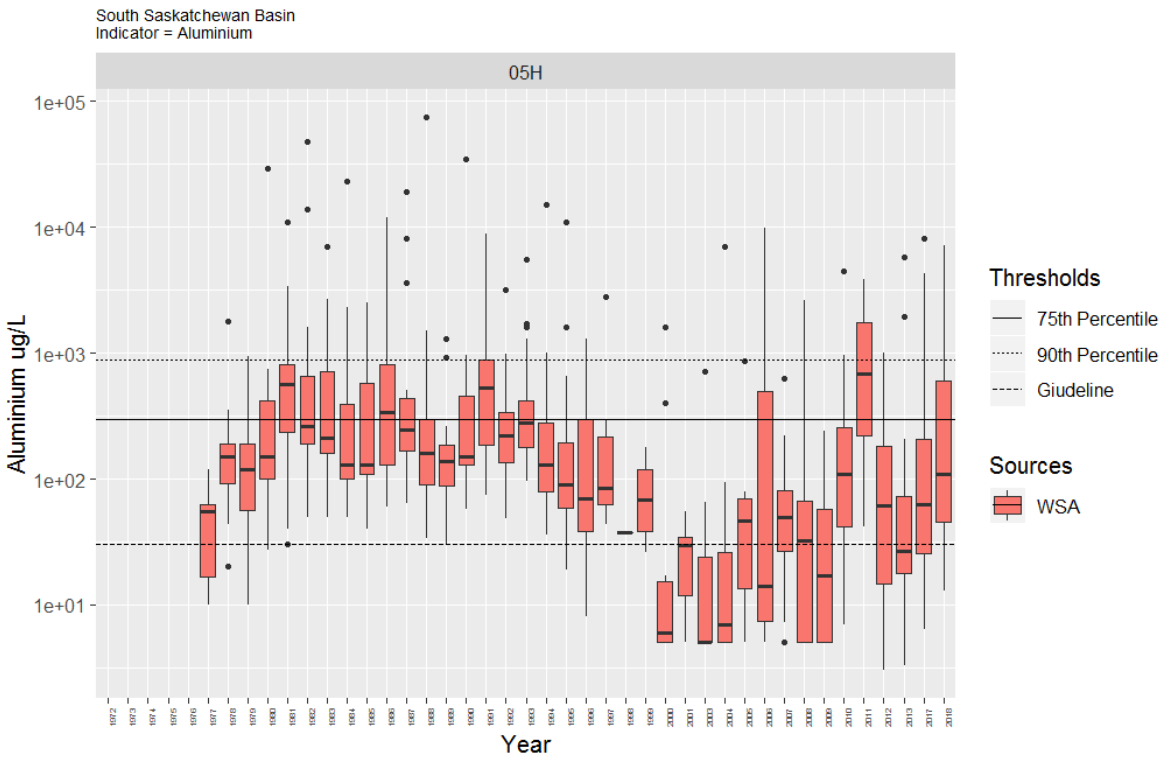
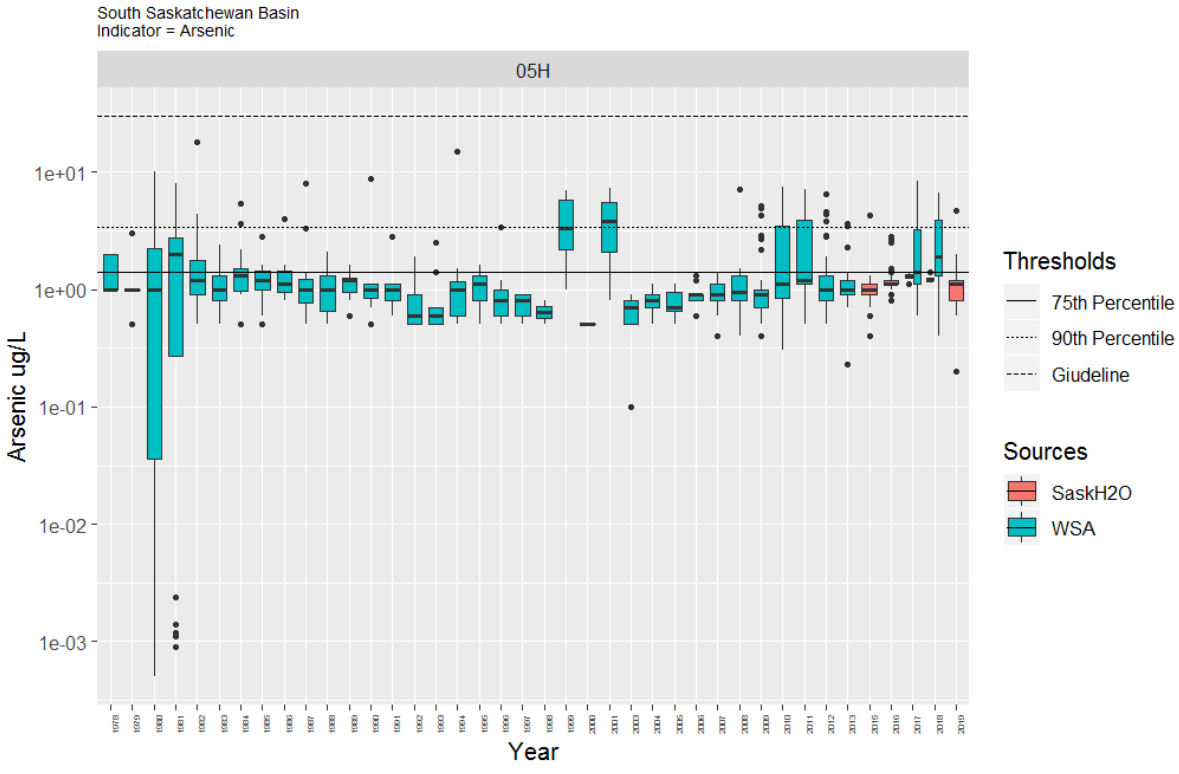
FIGURE. ANALYSIS OF VARIANCE IN EXCEEDANCE OF WATER QUALITY THRESHOLDS OVER TIME FOR MONITORING STATIONS IN THE SASKATCHEWAN PORTION OF THE SOUTH SASKATCHEWAN RIVER BASIN, BY CONTAMINANT.







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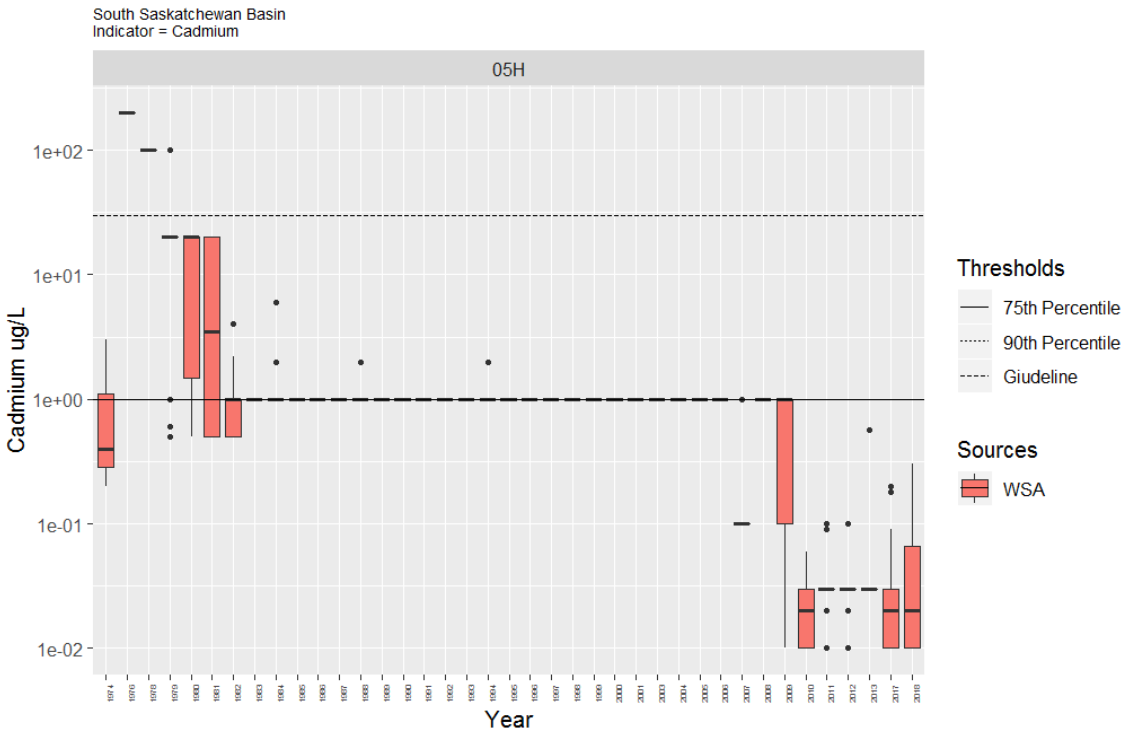

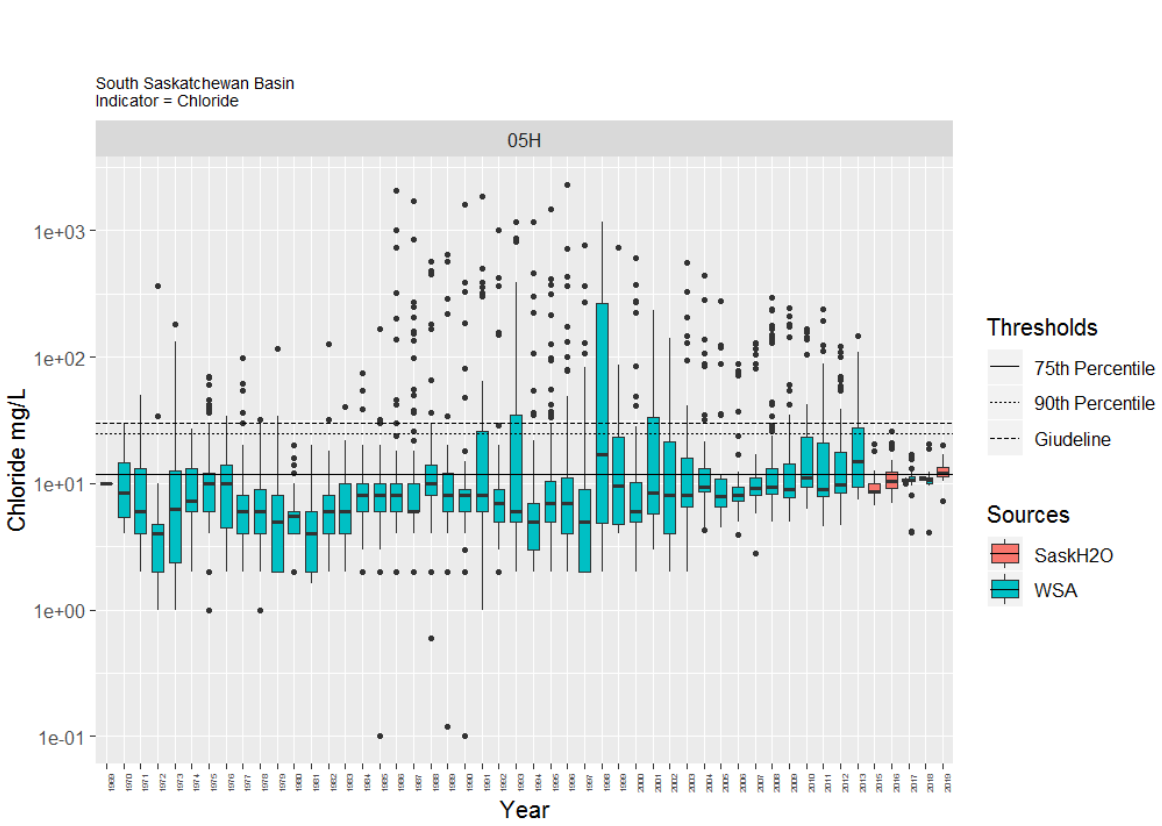

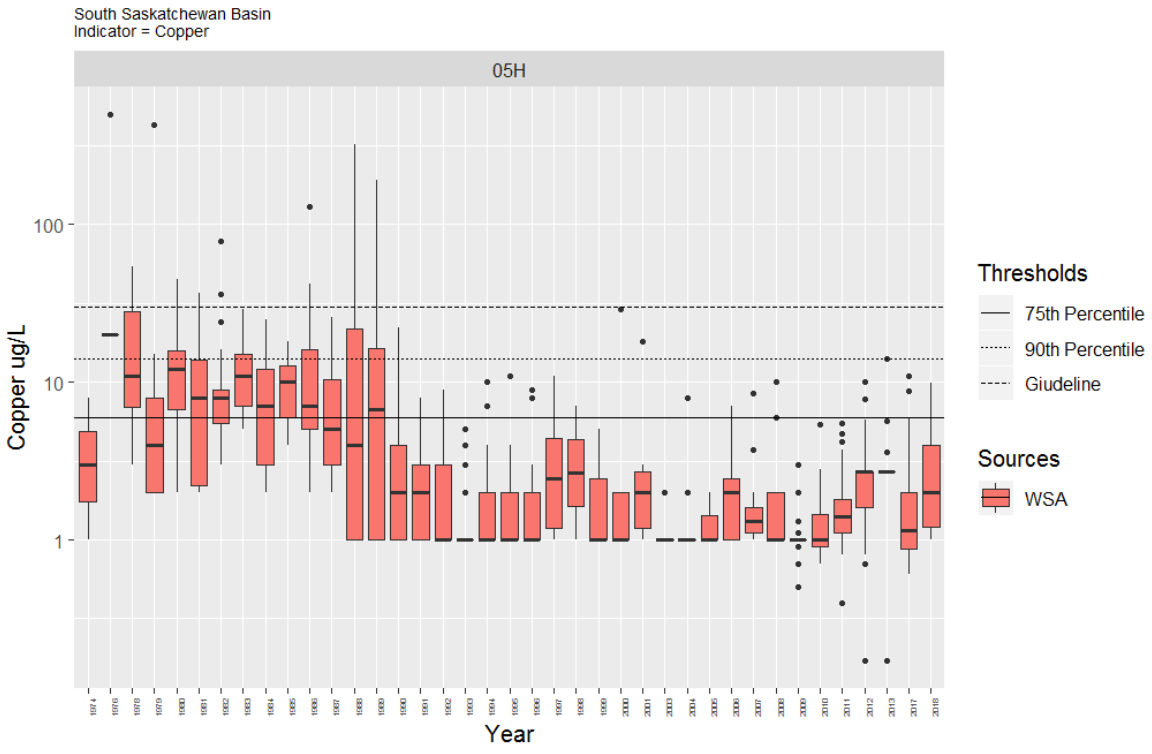

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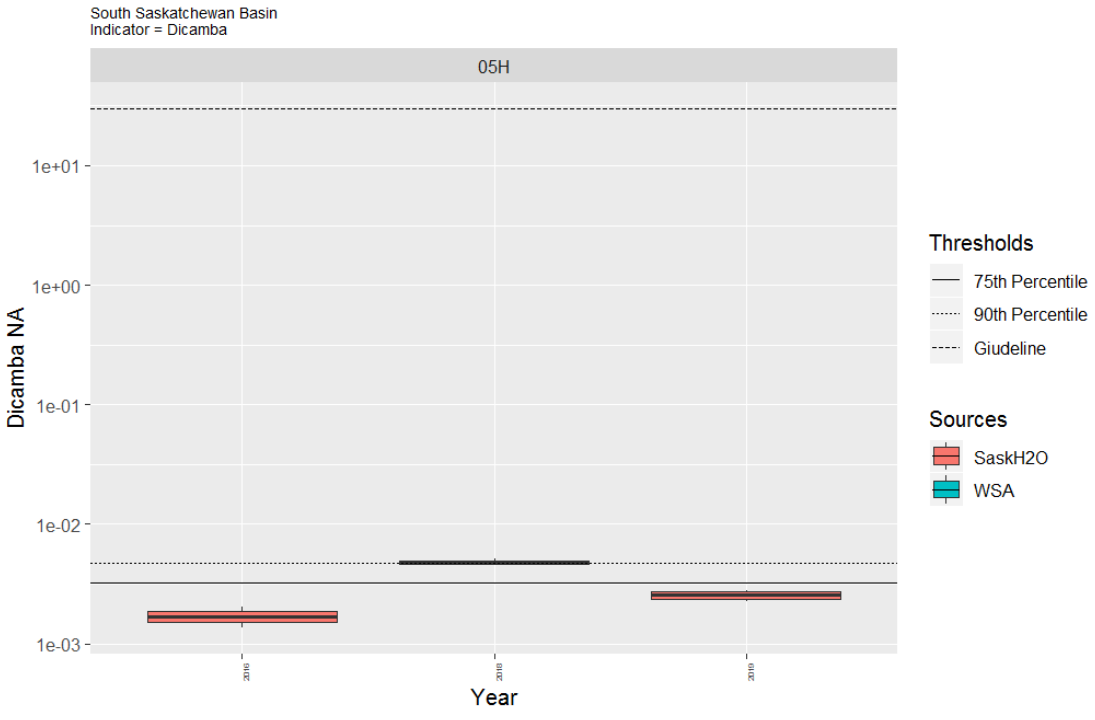

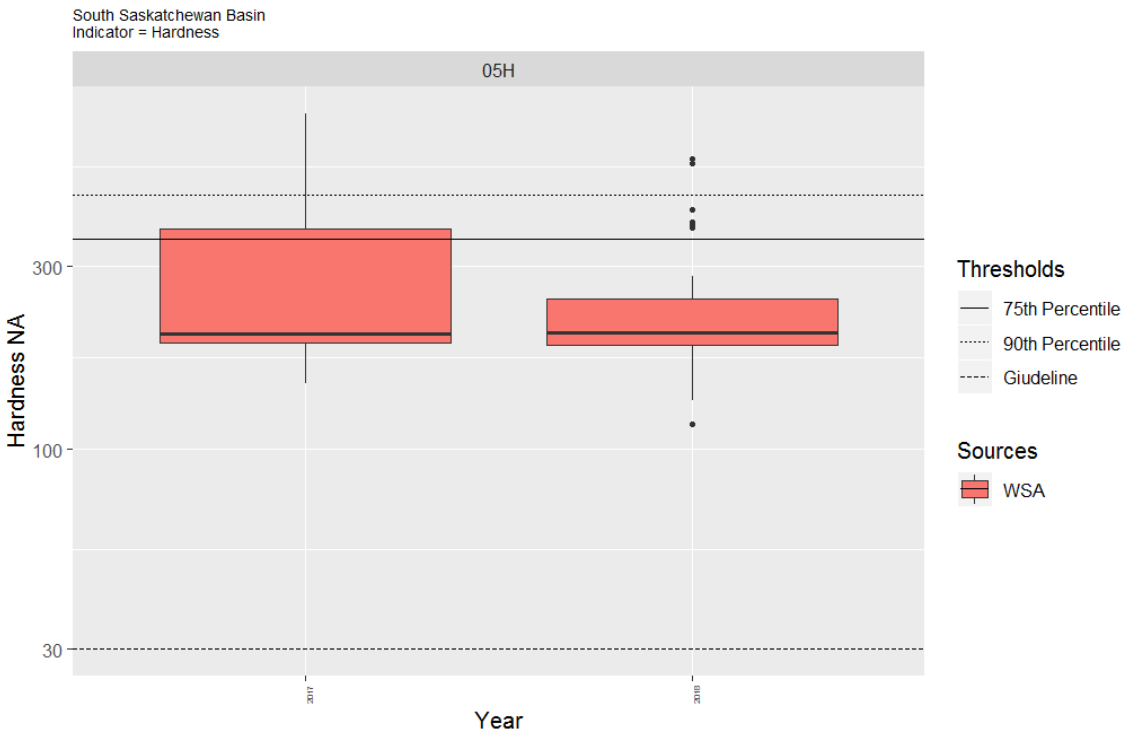

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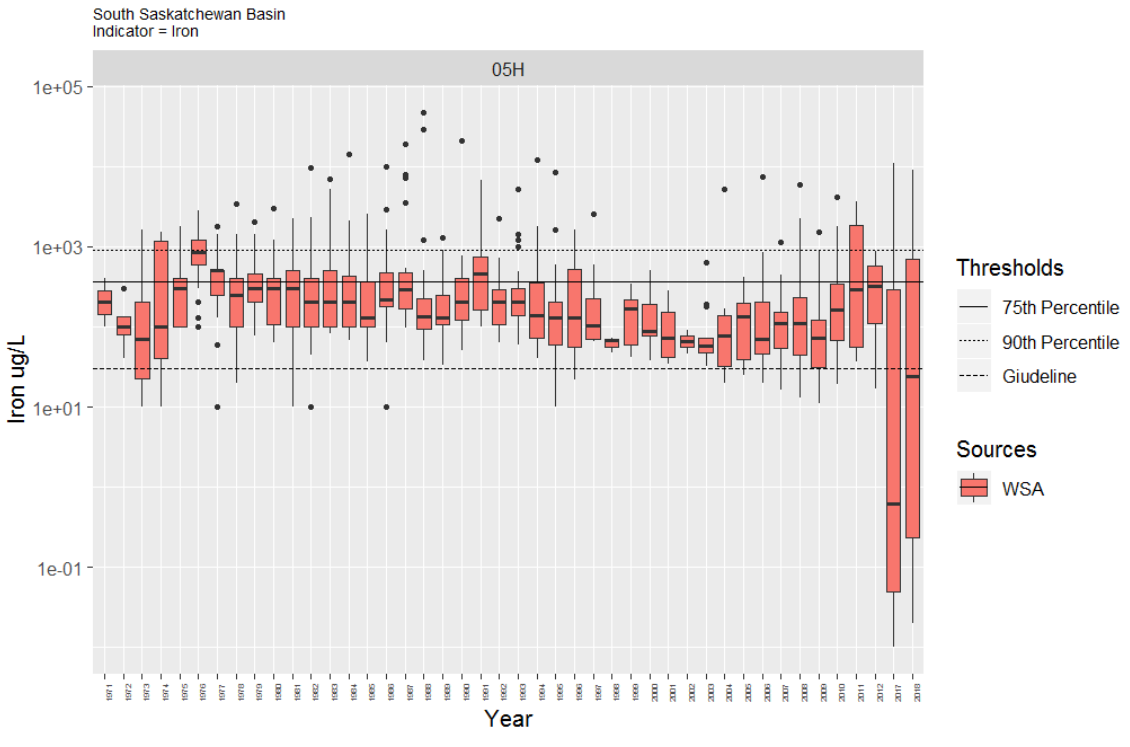

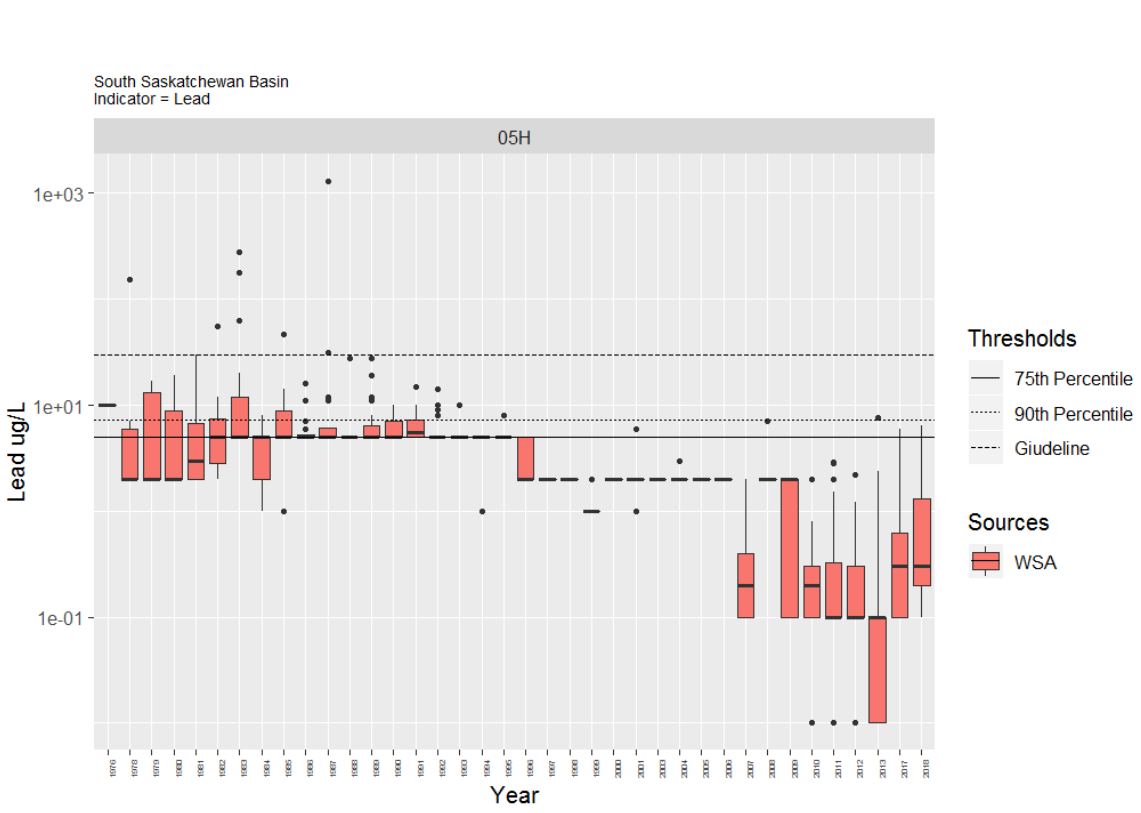

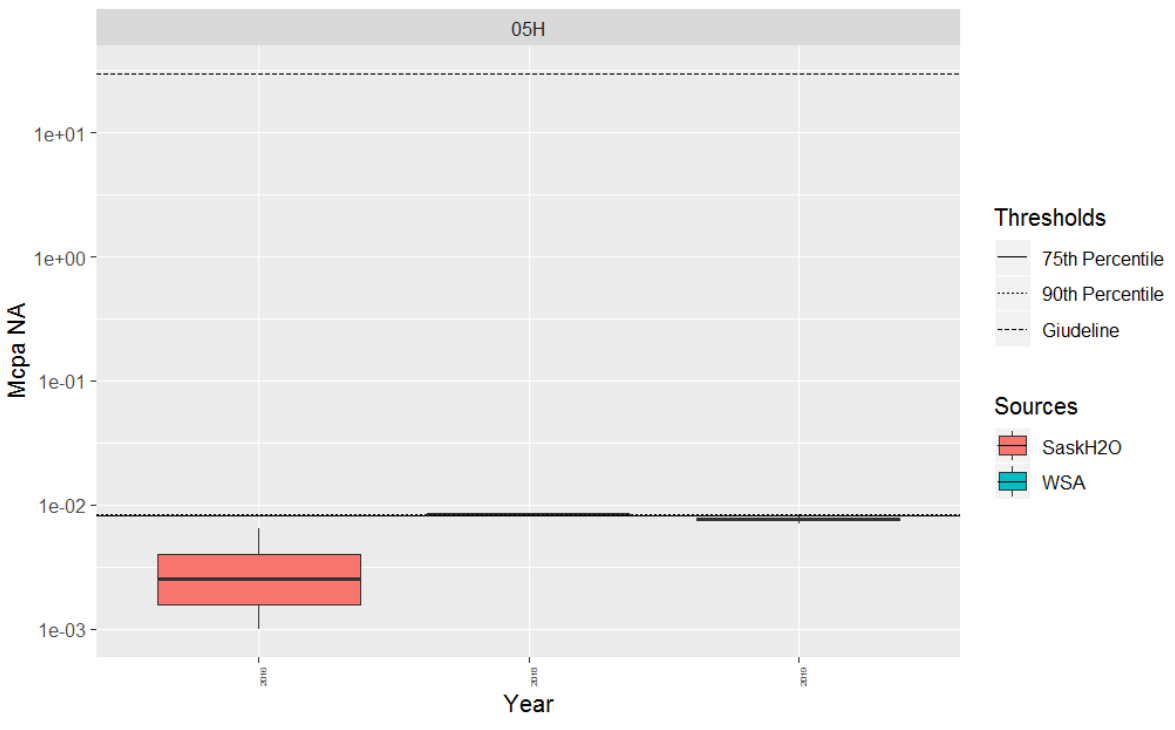

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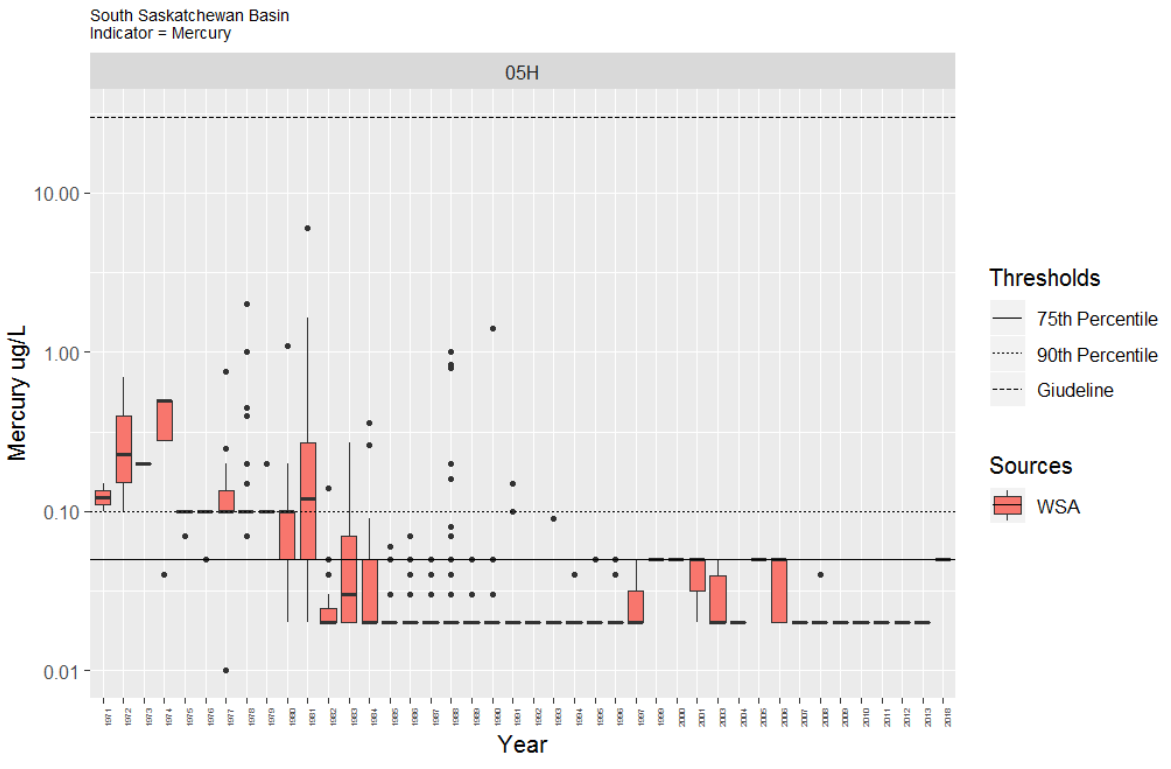

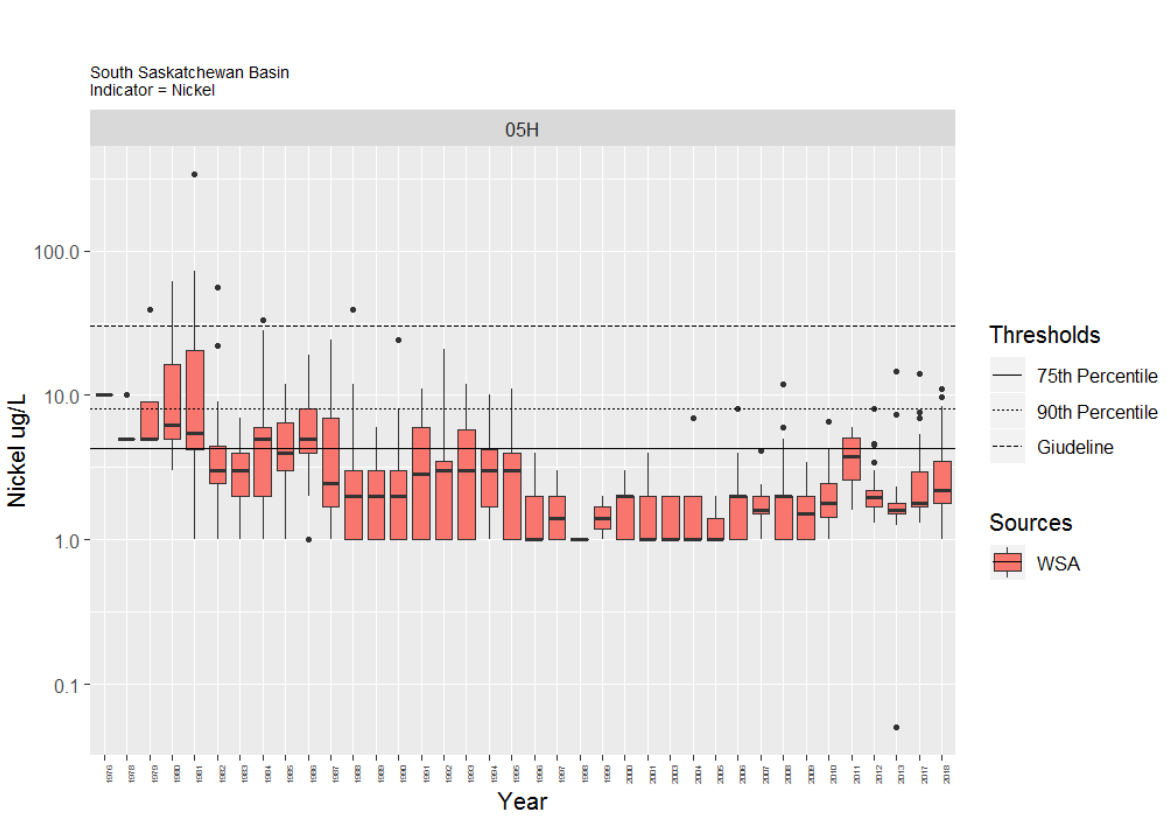

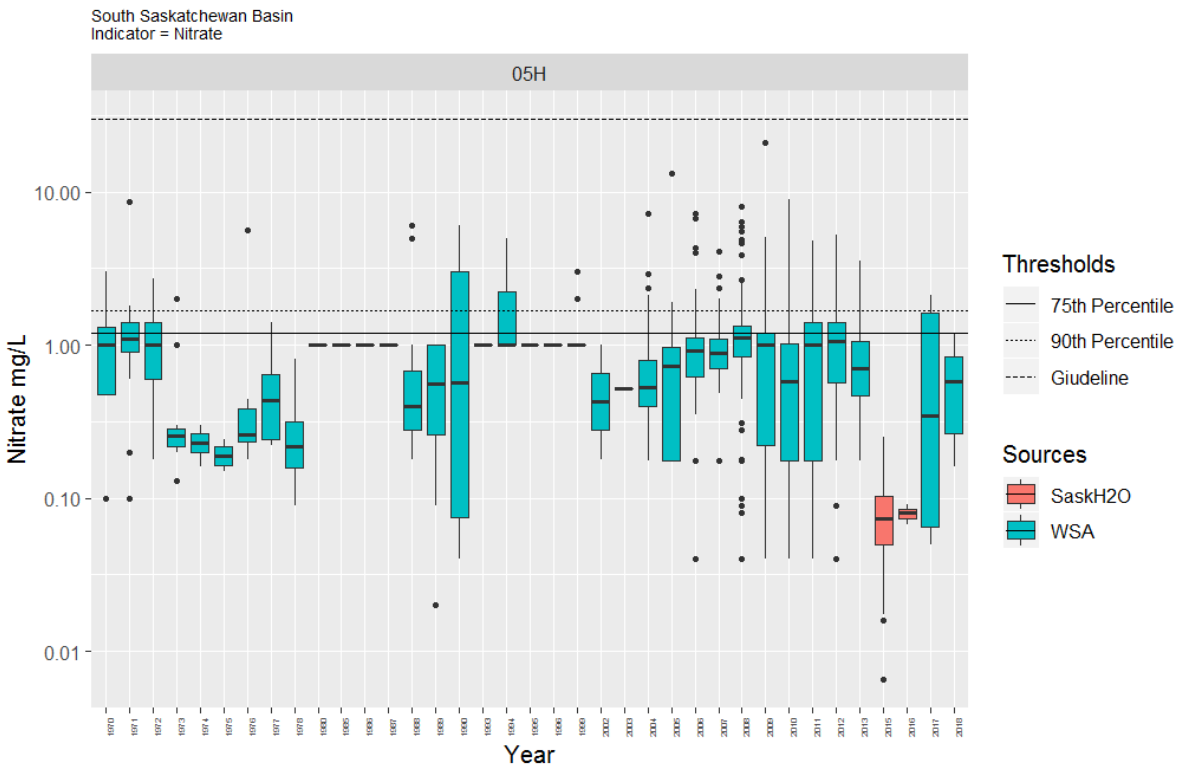

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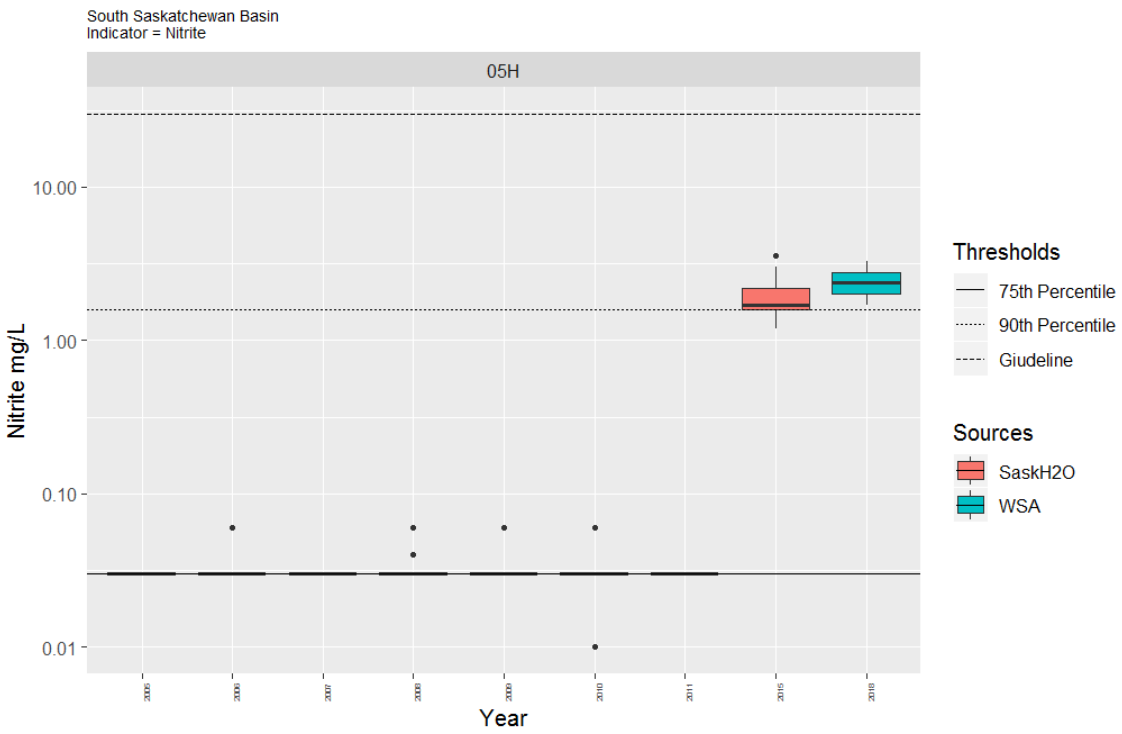

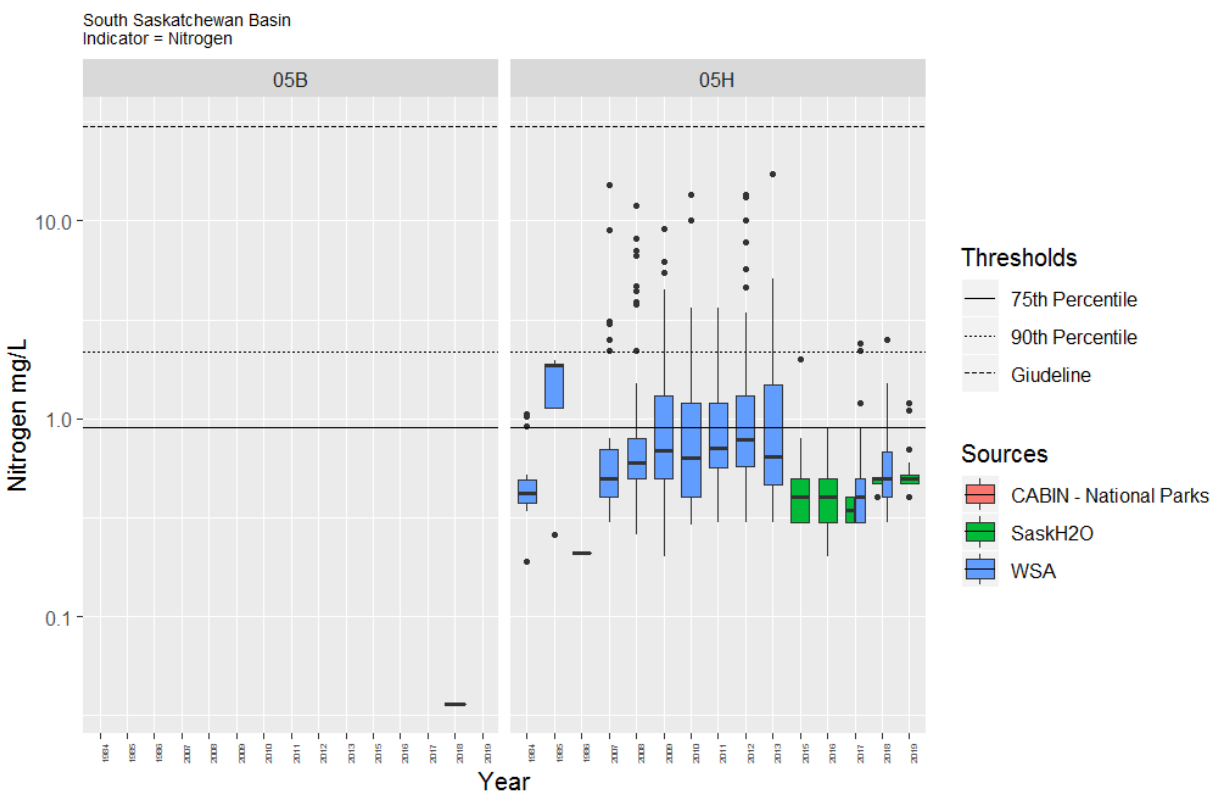

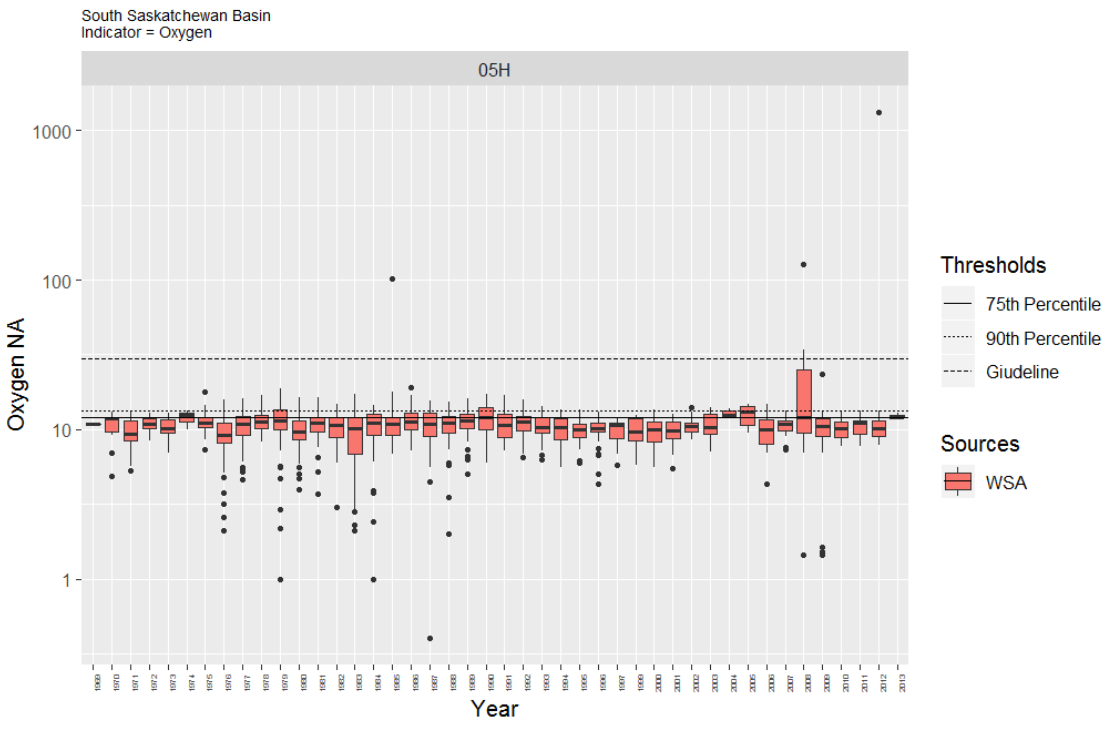

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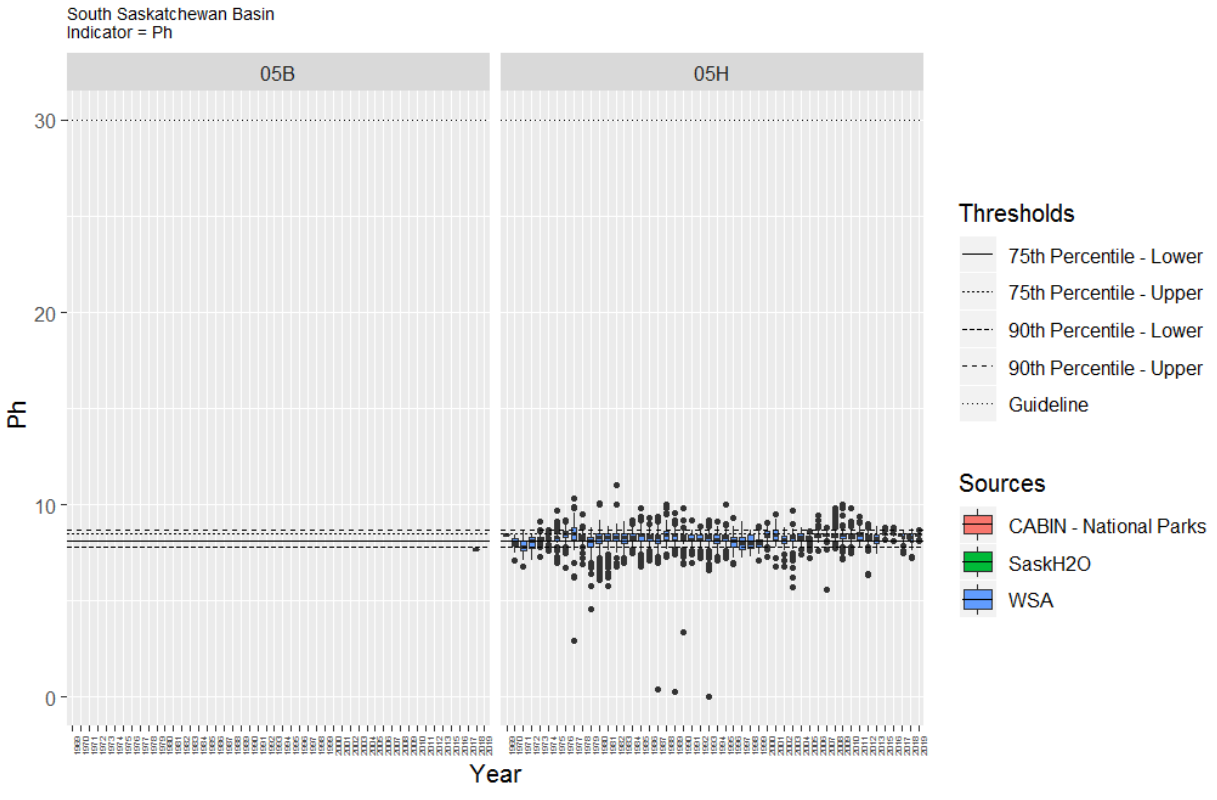

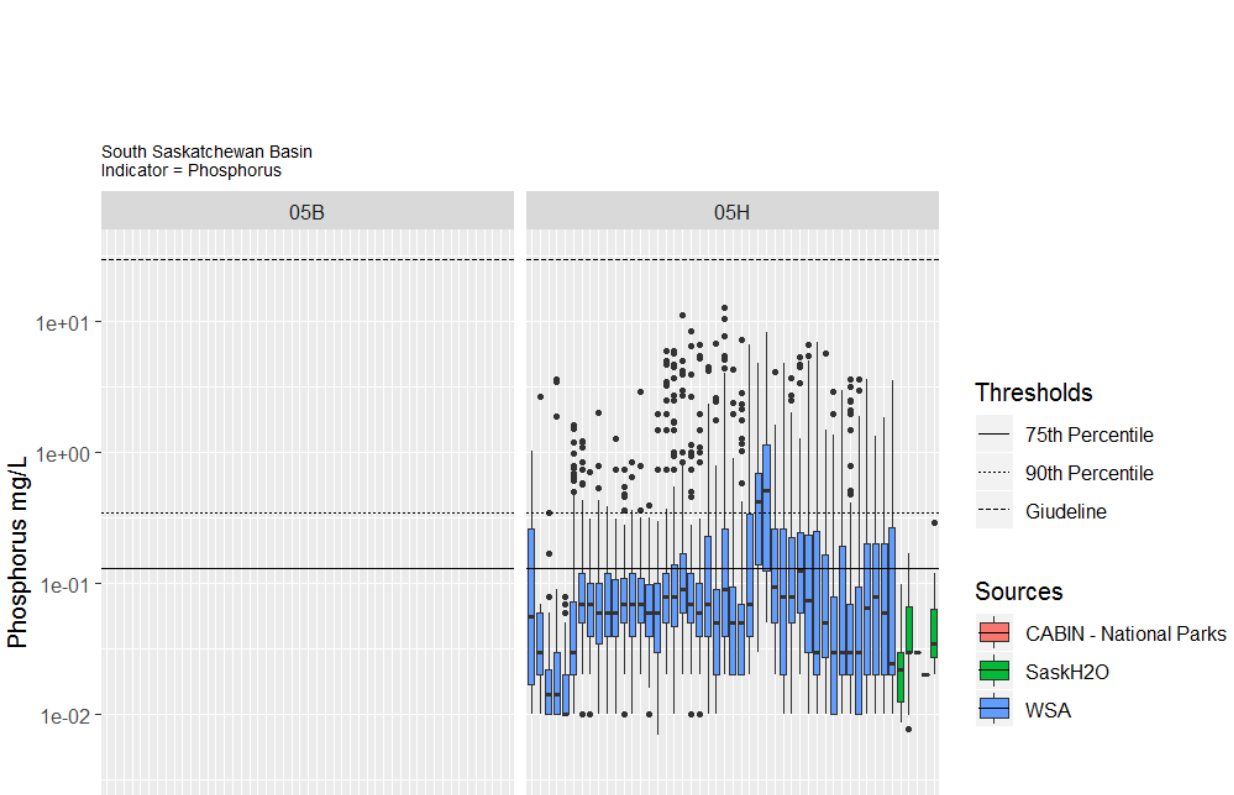

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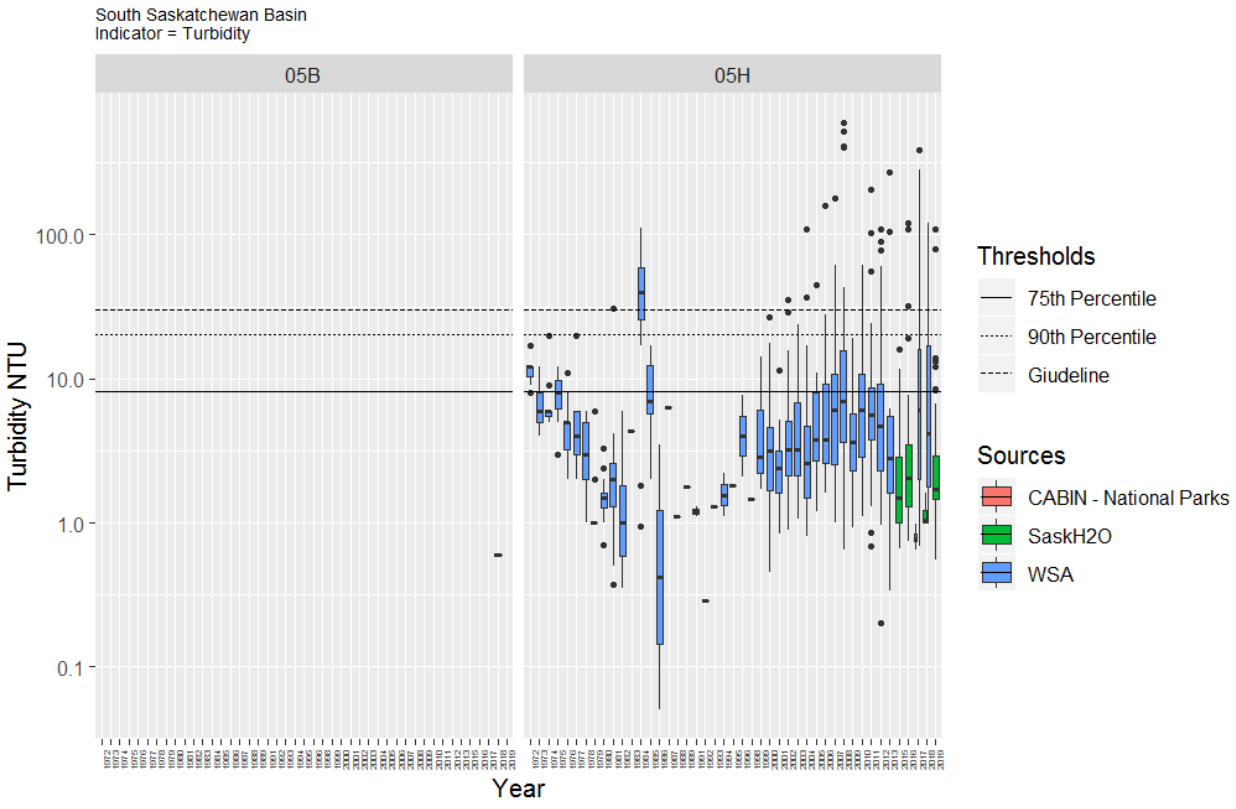

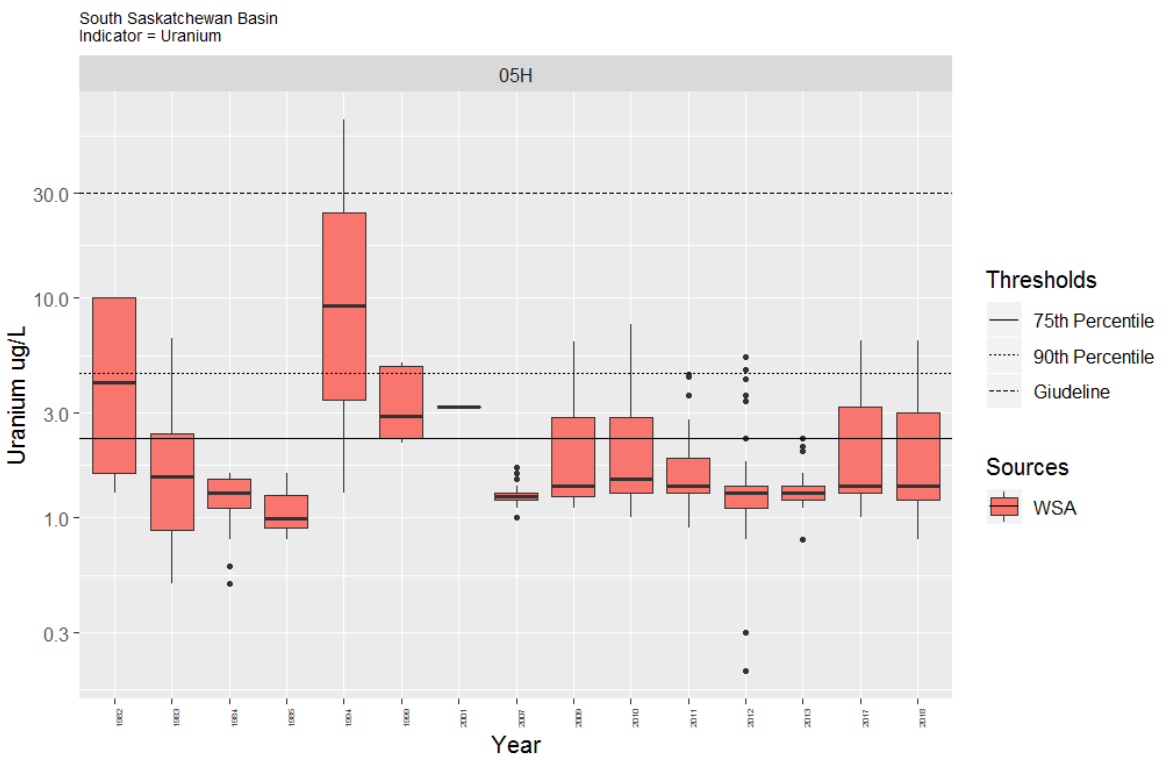

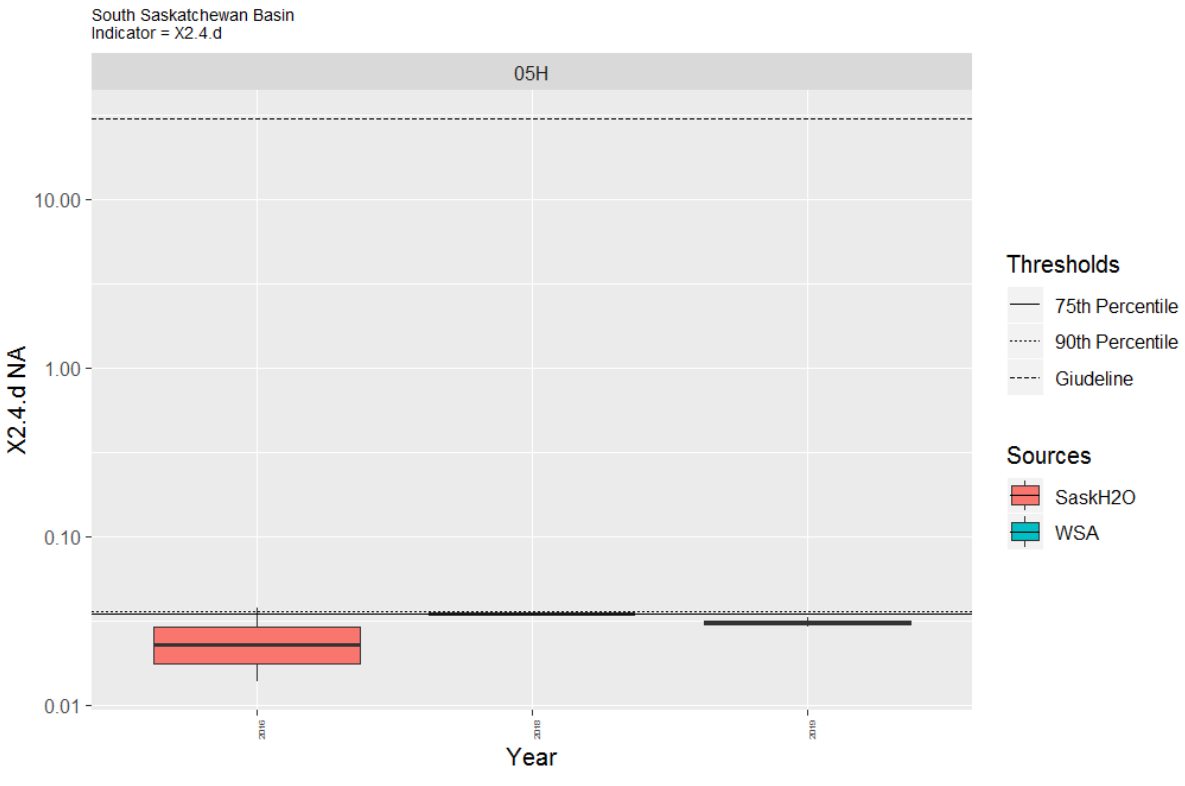

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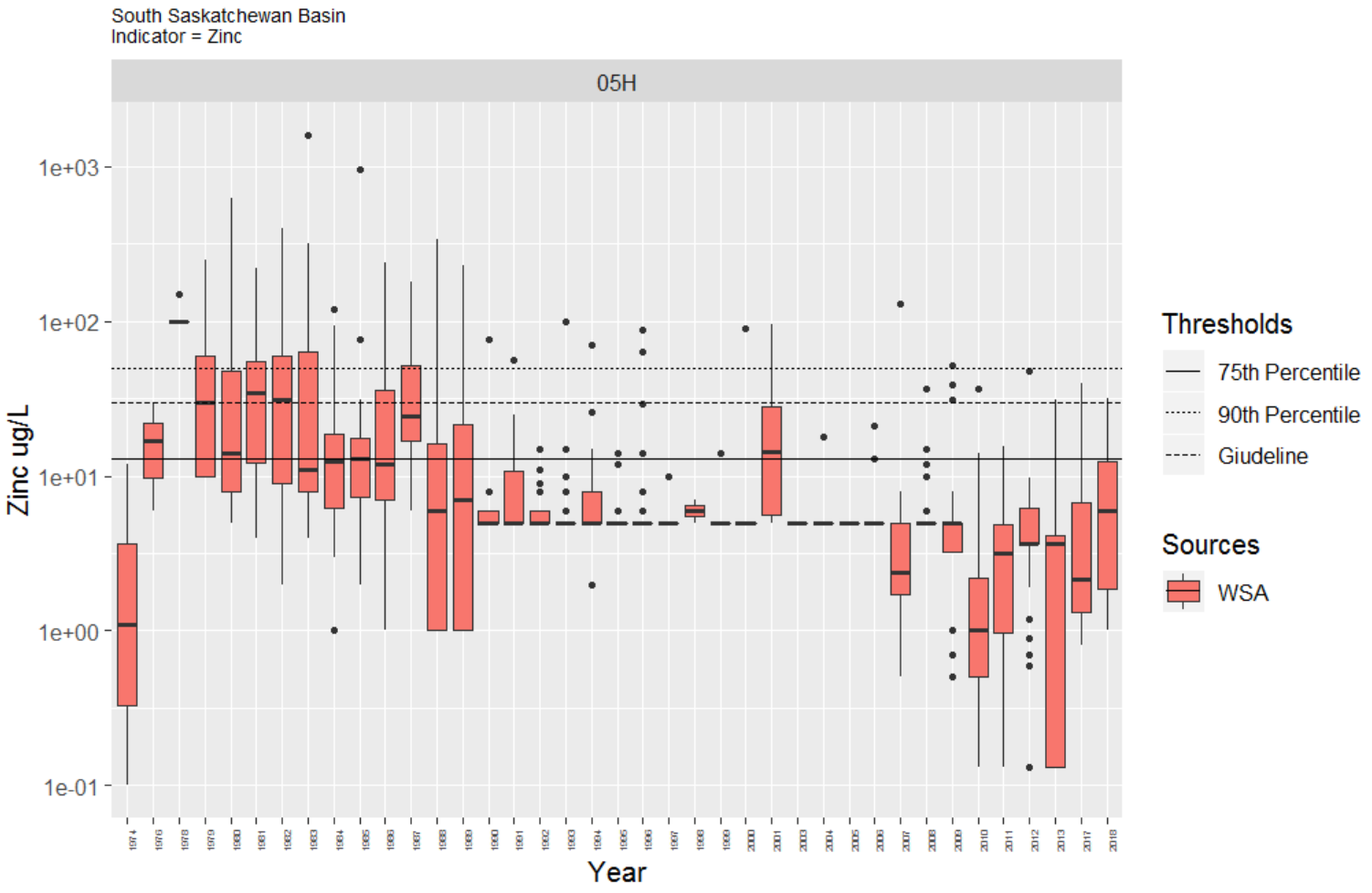


Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. RESULTS OF MANN-KENDALL NON-PARAMETRIC TREND ANALYSIS OF ANNUAL EXCEEDANCE OF WATER QUALITY THRESHOLDS OVER TIME FOR MONITORING STATIONS IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY SUB-BASIN.

Province	Source	Scale	Start Year	End Year	Number of Years	Number of Sites	Theil-Sen Slope	Mann-Ken Score	Mann-Ken p-value	
Saskatchewan	All	Saskatchewan portion of the South Saskatchewan Basin	1969	2019	50	163	0.00	-331	0.01	**
	SaskH2O		2015	2019	5	6	-0.01	-5	0.31	
	SWSA		1969	2018	47	162	0.00	-242	0.04	*
	All	05B	2018	2018	1	1	NA	NA	NA	
	CABIN - National Parks		2018	2018	1	1	NA	NA	NA	
	All	05H	1969	2019	50	162	0.00	-331	0.01	**
	SaskH2O		2015	2019	5	6	-0.01	-5	0.31	
	SWSA		1969	2018	47	162	0.00	-242	0.04	*
Alberta	All	Alberta portion of the South Saskatchewan Basin	1963	2020	52	307	0.00	-328	0.03	*
	AEP		1963	2020	52	116	0.00	-204	0.17	
	CABIN - National Parks		2007	2019	13	172	0.00	-7	0.56	
	EC		2000	2019	20	6	0.00	-73	0.02	*
	Kananaski.ENSC.DataStream		2002	2019	18	10	0.00	-74	0.01	**
	All	05A	1970	2020	46	110	0.00	-297	0.02	*
	AEP		1970	2020	46	62	0.00	-263	0.03	*
	CABIN - National Parks		2007	2018	11	42	0.00	-2	0.93	
	CABIN - PN		2010	2010	1	3				***
	EC		2000	2019	20	3	-0.01	-83	0.01	**
	All	05B	1970	2020	46	133	0.00	-423	0.00	***
	AEP		1970	2020	46	28	0.00	-117	0.35	
	CABIN - National Parks		2007	2019	12	93	0.00	-2	0.89	
	EC		2000	2019	20	2	0.00	-32	0.10	
	Kananaski.ENSC.DataStream		2002	2019	18	10	0.00	-74	0.01	**
	All	05C	1963	2019	45	64	0.00	182	0.21	
	AEP		1963	2019	45	26	0.00	155	0.29	
	CABIN - National Parks		2013	2019	7	37	0.00	1	1.00	
	EC		2000	2019	20	1	0.00	-18	0.58	

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FISH

OVERALL FISH HEALTH SCORING

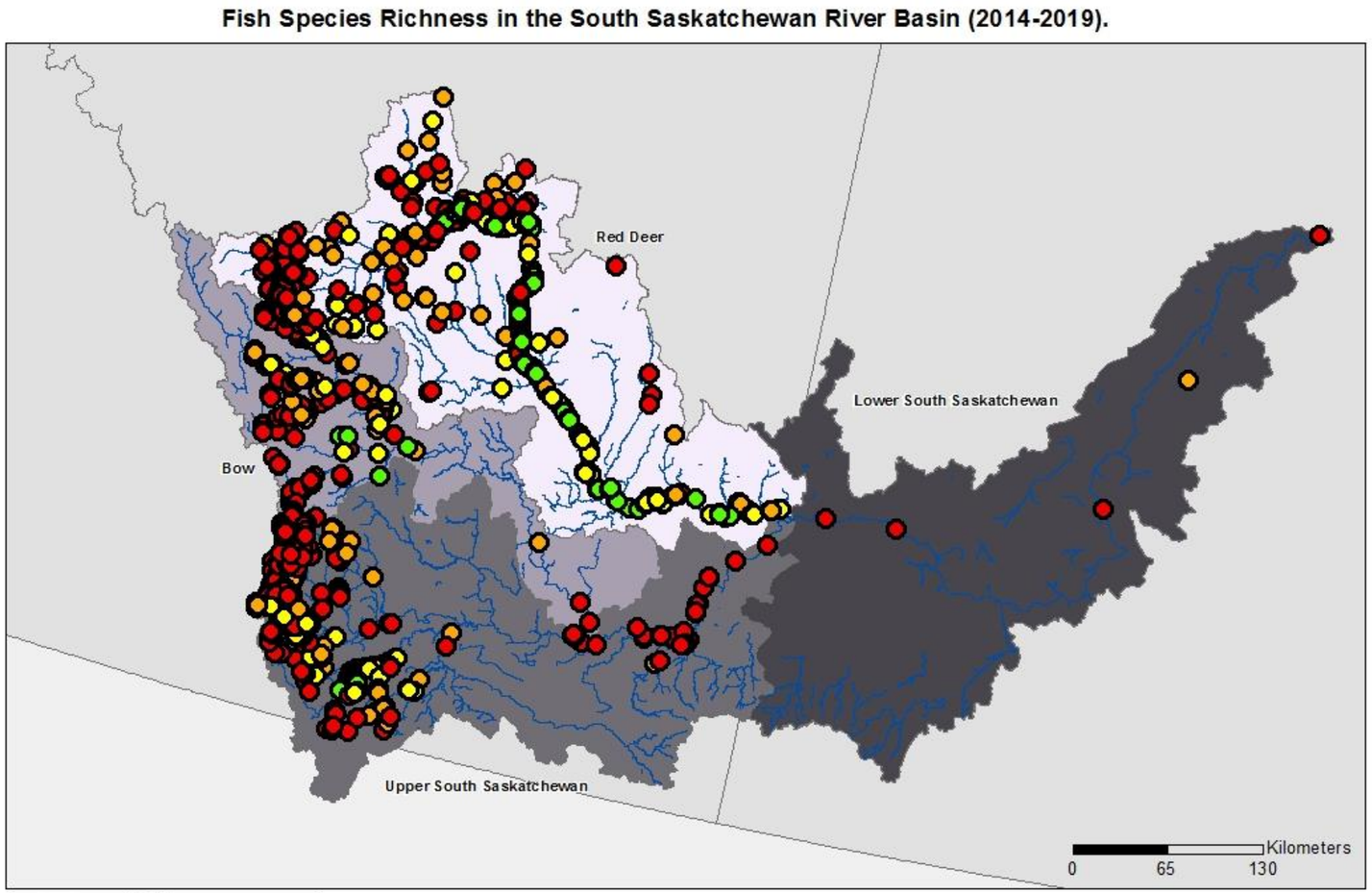
				Sub-Basin				Basin
	Indicator			**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Fish	**Change in Native Fish Species Richness**		*Period of Study*	1959-2019	1946-2019	1963-2019	1986-2017	1946-2019
			Number of Sites	5823	3468	2573	18	11882
		Presence of statistically significant decline in median species richness for the basin.	*Trend*	None	None	None	None	None
		Presence of statistically significant decline in total species richness for the basin.	*Trend*	None	None	None	None	None
			Fish Health Category	**Good**	**Good**	**Good**	**Good**	**Good**
			Fish Health Score	4	4	4	4	4

FISH DATA SUFFICIENCY

		Sub-Basin				Basin
	Data Sufficiency Indicator	**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
Fish	Total number of sub-sub-basins	10	13	10	8	41
	Year of earliest available monitoring	1959	1946	1963	1986	1986
	Number of sampling locations available for earliest monitoring	3	1	2	4	10
	Number of sub-sub-basins with earliest available sampling locations	1	1	1	1	3
	Earliest year of continuous monitoring	1979	1978	1977	2010	2010
	Number of sampling locations available for first year of continuous monitoring	1	64	1	1	3
	Number of sub-sub-basins for first year of continuous monitoring	1	4	1	1	3
	Year of most recently available monitoring	2019	2019	2019	2017	2019
	Number of monitoring stations available within last five years	470	202	494	5	1171
	Number of sub-sub-basins within last five years	8	9	9	4	30
	Number of years of sampling in last 10 years	10	10	10	5	10
	Overall Data Sufficiency Category	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient	Partially Sufficient
	Data Sufficiency Score	1	1	1	1	1

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

MAP. FISH SPECIES RICHNESS IN THE SOUTH SASKATCHEWAN RIVER BASIN (2014-2019).



Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FIGURE.NON-PARAMETRIC ANALYSIS OF VARIANCE IN FISH SPECIES RICHNESS IN THE SOUTH SASKATCHEWAN RIVER BASIN (1946-2019), BY SUB-BASIN.

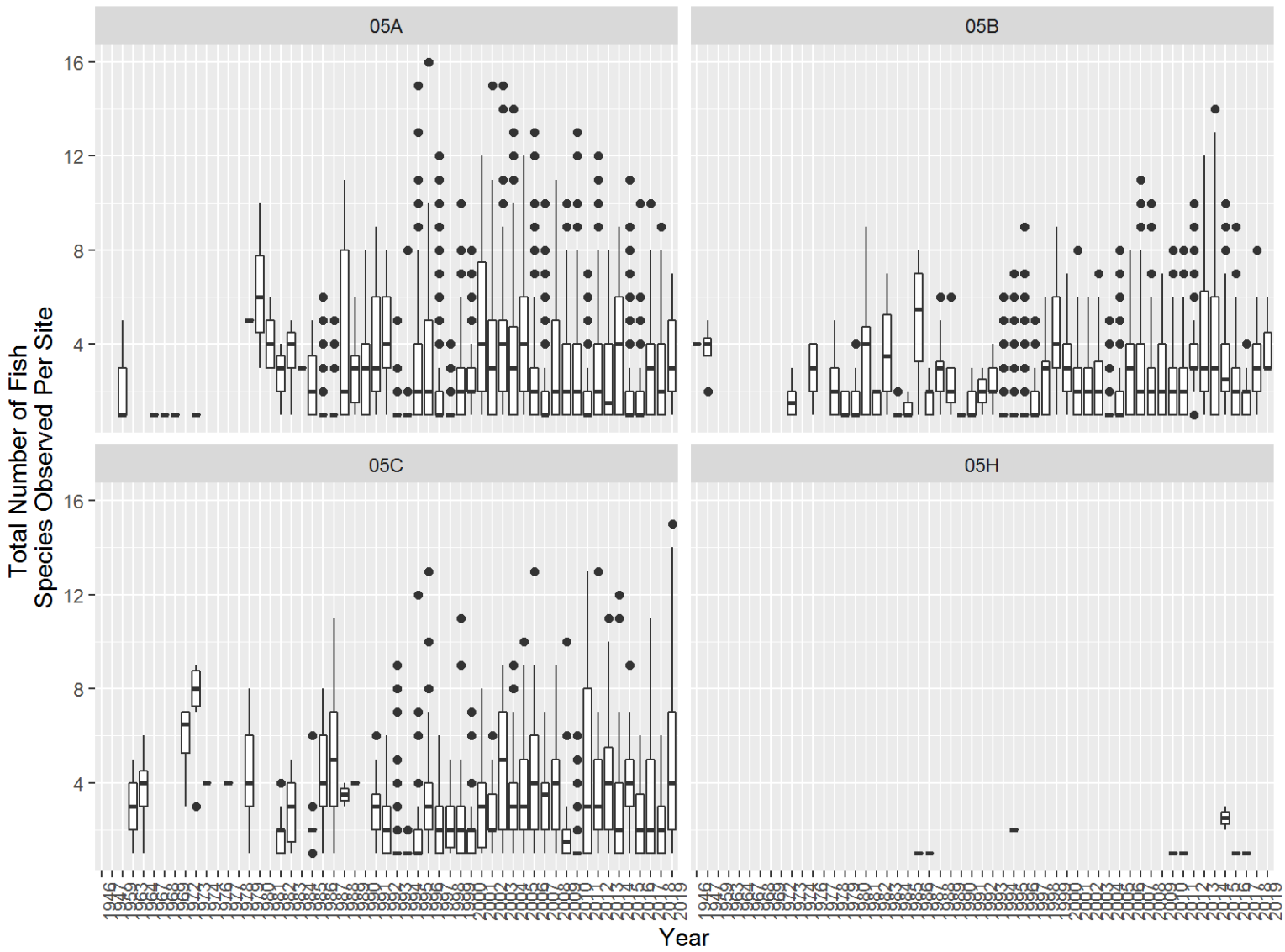
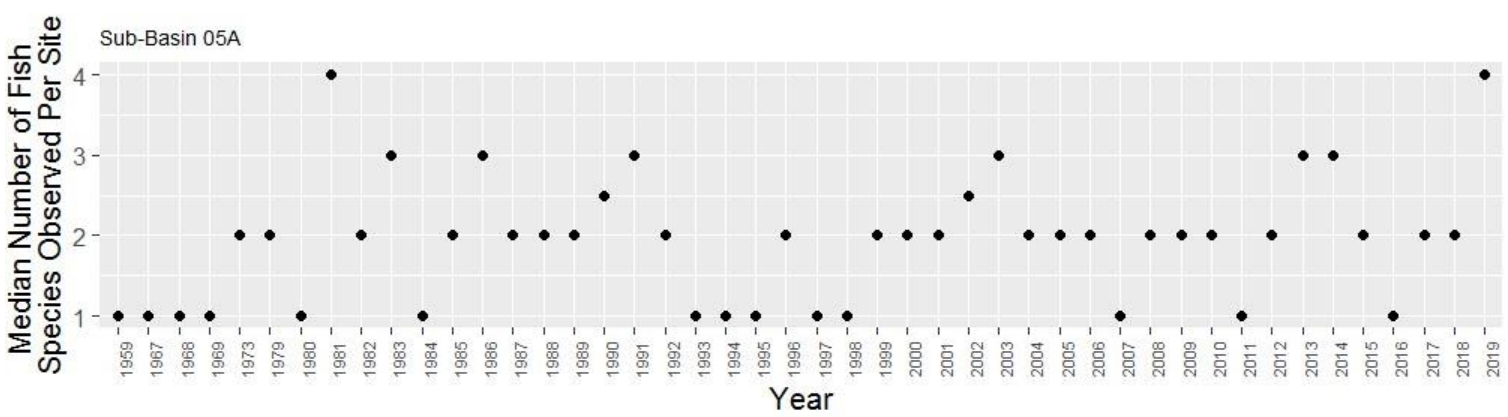
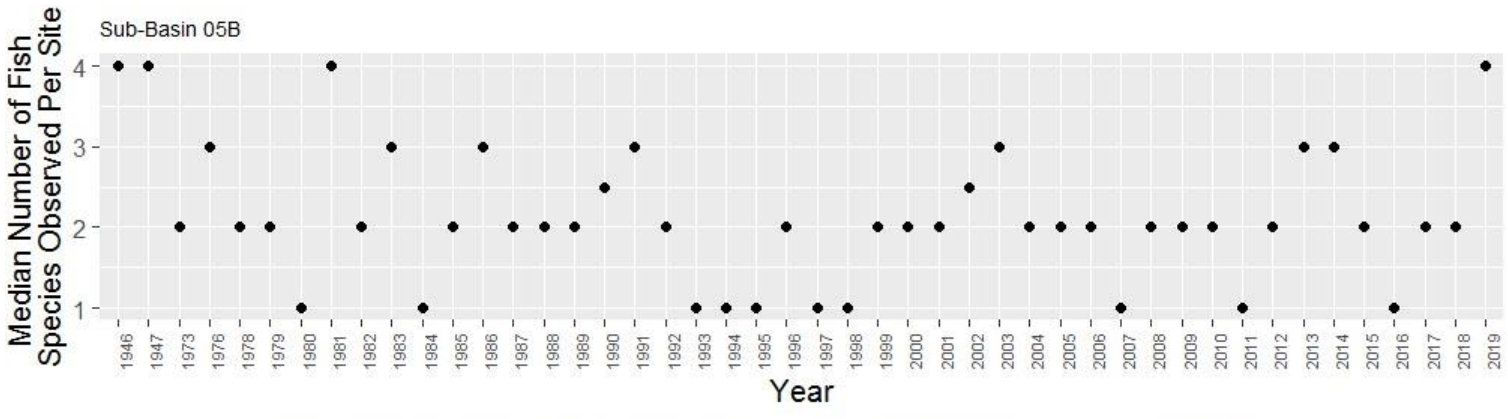


FIGURE.TIME-SERIES OF FISH SPECIES RICHNESS IN THE UPPER-SOUTH SASKATCHEWAN RIVER (05A) SUB-BASIN (1946 -2019).



Intercept = -19.13 ; Intercept STE = 13.46 ; Intercept T-Statistic -1.4212 ; Intercept p-value = 0.16052
Slope = 0.010549 ; Slope STE = 0.0067379 ; Slope T-Statistic 1.5656 ; Slope p-value = 0.1228
F-Statistic: 2.451 ; p-value: 0.1228
Theil-Sen Slope = 0 ; Mann-Kendal Score = 23 ; Mann-Kendall p-value = 0.88129
Data Source:FWMIS

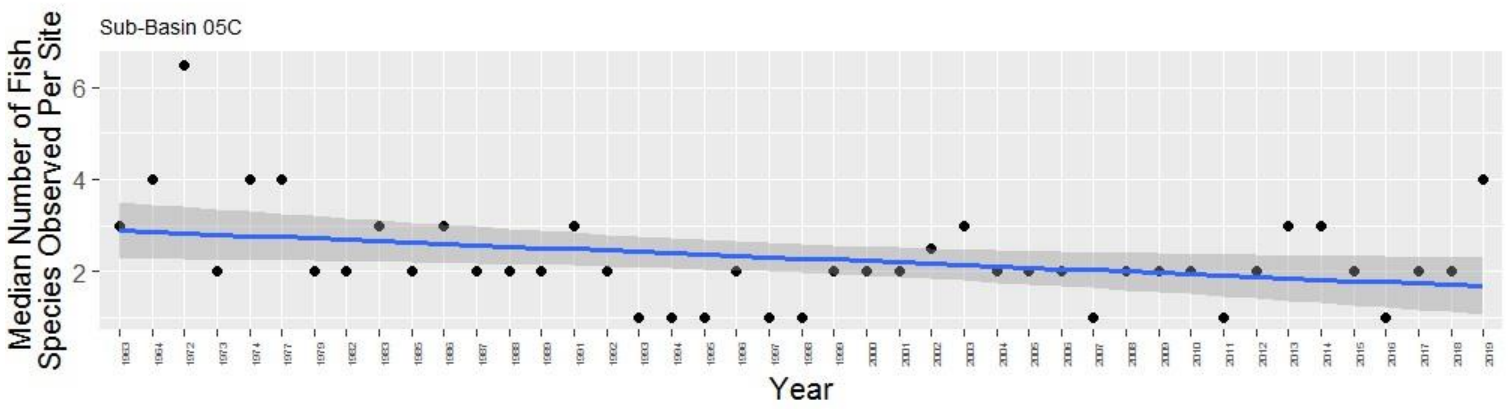
FIGURE.TIME-SERIES OF FISH SPECIES RICHNESS IN THE BOW RIVER (05B) SUB-BASIN (1946 -2019).



Intercept = 25.914 ; Intercept STE = 11.978 ; Intercept T-Statistic 2.1634 ; Intercept p-value = 0.03383
Slope = -0.01192 ; Slope STE = 0.0059958 ; Slope T-Statistic -1.988 ; Slope p-value = 0.050611
F-Statistic: 3.9523 ; p-value: 0.05061
Theil-Sen Slope = 0 ; Mann-Kendal Score = -30 ; Mann-Kendall p-value = 0.88167
Data Source:FWMIS

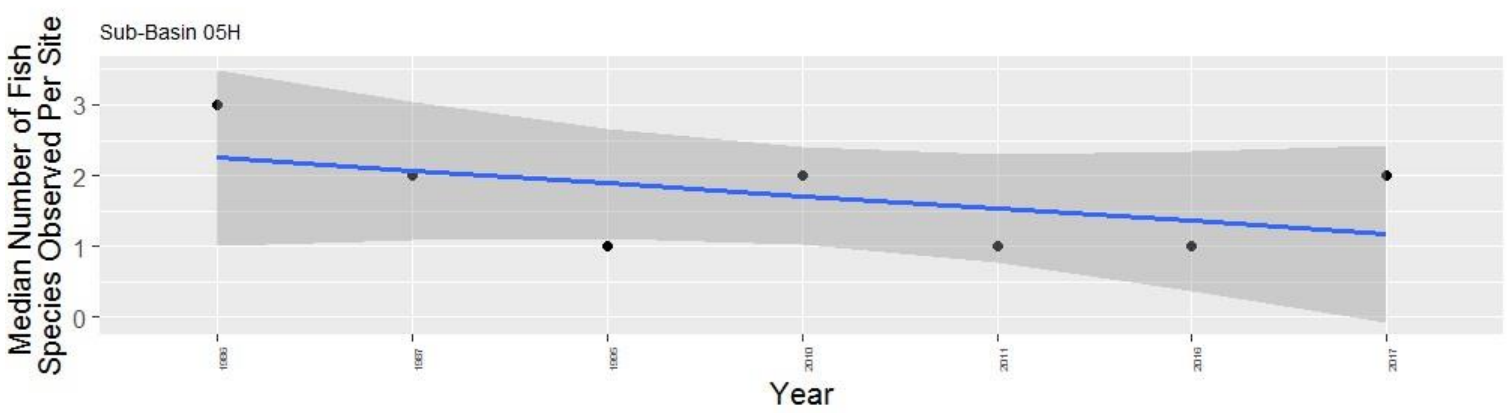
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FIGURE.TIME-SERIES OF FISH SPECIES RICHNESS IN THE RED DEER RIVER (05C) SUB-BASIN (1963 -2019).



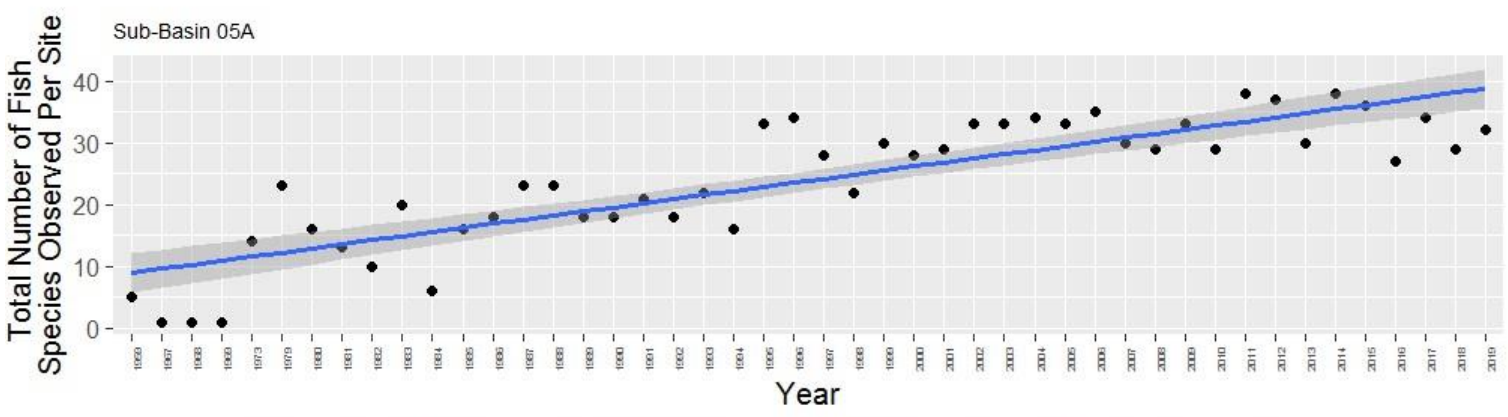
Intercept = 55.855 ; Intercept STE = 16.684 ; Intercept T-Statistic 3.3478 ; Intercept p-value = 0.0014748
Slope = -0.026857 ; Slope STE = 0.0083513 ; Slope T-Statistic -3.2159 ; Slope p-value = 0.0021789
F-Statistic: 10.342 ; p-value: 0.002179
Theil-Sen Slope = 0 ; Mann-Kendal Score = 97 ; Mann-Kendall p-value = 0.47048
Data Source:FWMIS

FIGURE.TIME-SERIES OF FISH SPECIES RICHNESS IN THE LOWER SOUTH SASKATCHEWAN RIVER (05H) BASIN (1986 -2017).



Intercept = 62.581 ; Intercept STE = 18.27 ; Intercept T-Statistic 3.4253 ; Intercept p-value = 0.0017995
Slope = -0.030401 ; Slope STE = 0.0091212 ; Slope T-Statistic -3.333 ; Slope p-value = 0.0022929
F-Statistic: 11.109 ; p-value: 0.002293
Theil-Sen Slope = 0 ; Mann-Kendal Score = 15 ; Mann-Kendall p-value = 0.80348
Data Source:FWMIS

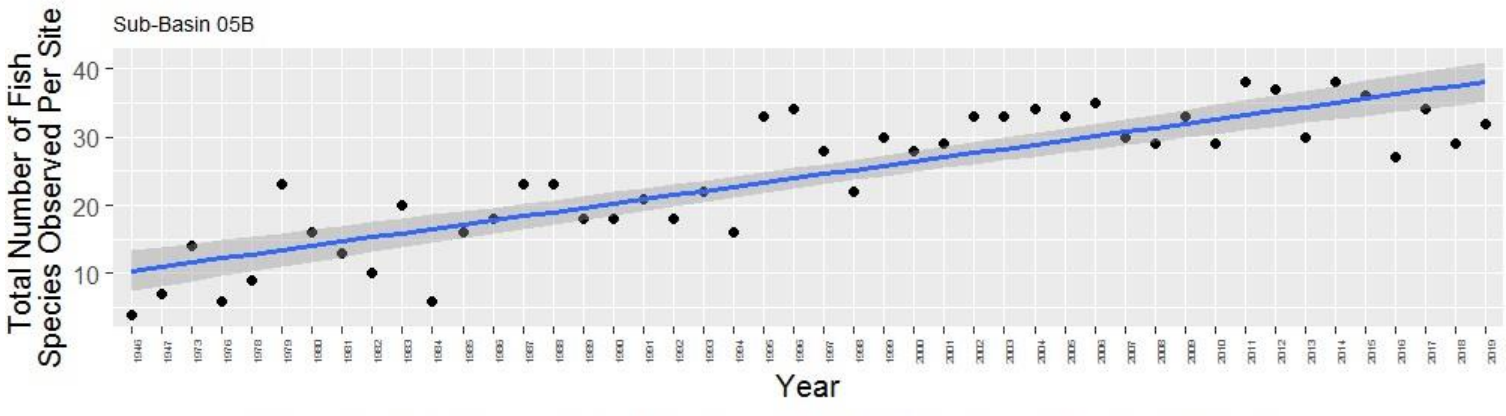
FIGURE.TIME-SERIES OF TOTAL FISH SPECIES RICHNESS IN THE UPPER-SOUTH SASKATCHEWAN RIVER (05A) BASIN (1946 -2019).



Intercept = -1163.9 ; Intercept STE = 92.753 ; Intercept T-Statistic -12.549 ; Intercept p-value = 2.6727e-18
Slope = 0.59552 ; Slope STE = 0.046429 ; Slope T-Statistic 12.826 ; Slope p-value = 1.0333e-18
F-Statistic: 164.52 ; p-value: 1.033e-18
Theil-Sen Slope = 0 ; Mann-Kendal Score = -56 ; Mann-Kendall p-value = 0.73111
Data Source:FWMIS

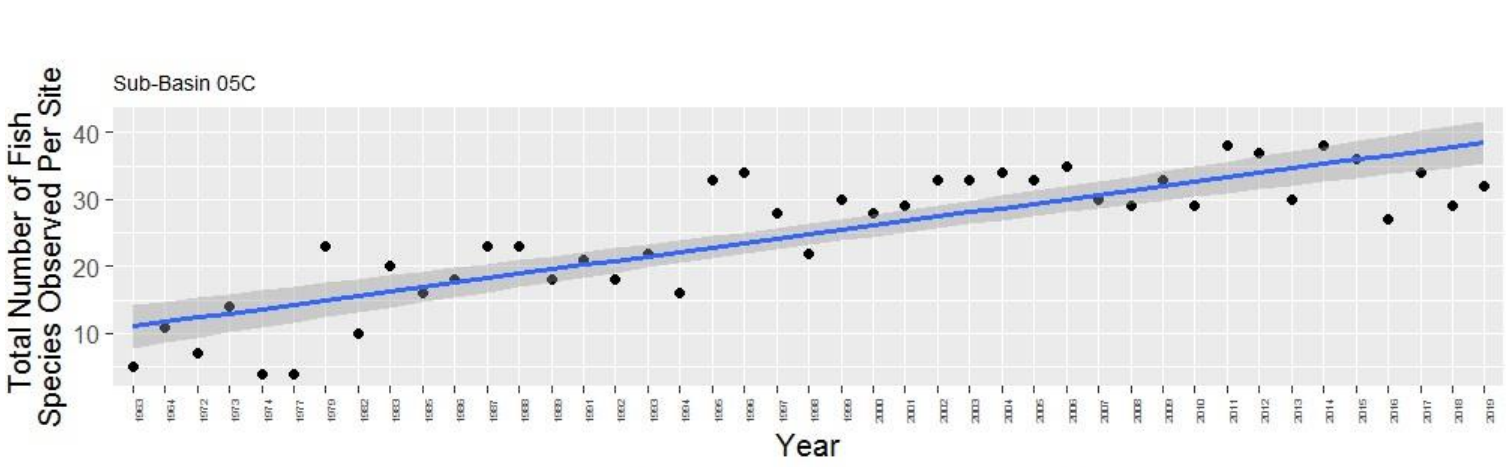
Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

FIGURE.TIME-SERIES OF TOTAL FISH SPECIES RICHNESS IN THE BOW RIVER (05B) BASIN (1946 -2019).



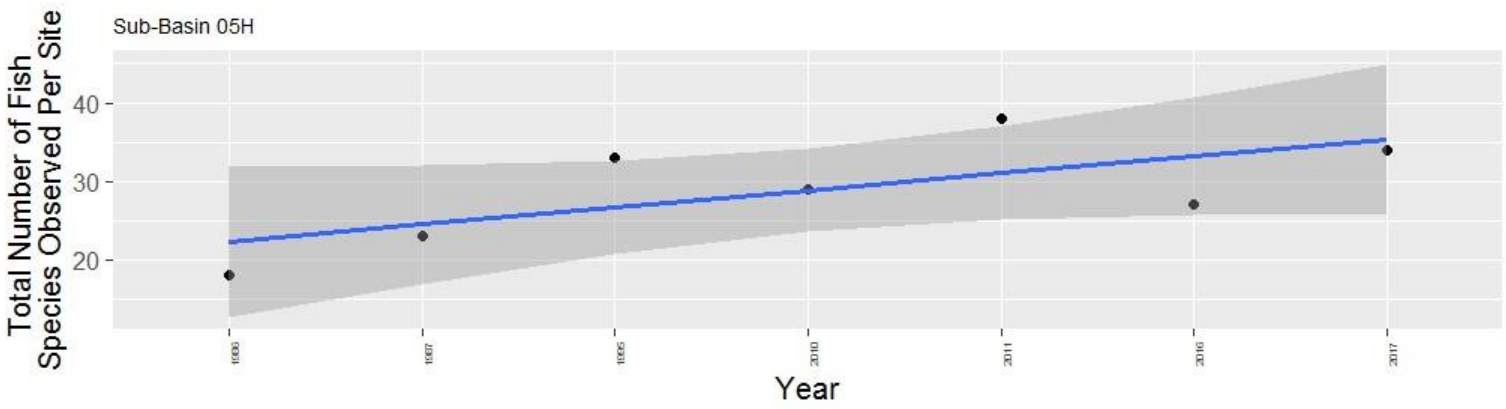
Intercept = -988.64 ; Intercept STE = 76.711 ; Intercept T-Statistic -12.888 ; Intercept p-value = 2.2303e-20
Slope = 0.50789 ; Slope STE = 0.038398 ; Slope T-Statistic 13.227 ; Slope p-value = 5.9447e-21
F-Statistic: 174.95 ; p-value: 5.945e-21
Theil-Sen Slope = 0 ; Mann-Kendal Score = -61 ; Mann-Kendall p-value = 0.77875
Data Source:FWMIS

FIGURE.TIME-SERIES OF TOTAL FISH SPECIES RICHNESS IN THE RED DEER RIVER (05C) BASIN (1946 -2019).



Intercept = -1077.3 ; Intercept STE = 88.046 ; Intercept T-Statistic -12.236 ; Intercept p-value = 2.5035e-17
Slope = 0.55229 ; Slope STE = 0.044072 ; Slope T-Statistic 12.531 ; Slope p-value = 9.4614e-18
F-Statistic: 157.04 ; p-value: 9.461e-18
Theil-Sen Slope = -0.1057 ; Mann-Kendal Score = -228 ; Mann-Kendall p-value = 0.11681
Data Source:FWMIS

FIGURE.TIME-SERIES OF TOTAL FISH SPECIES RICHNESS IN THE LOWER SOUTH SASKATCHEWAN RIVER (05H) BASIN (1986 -2017).



Intercept = -648.67 ; Intercept STE = 146.23 ; Intercept T-Statistic -4.4358 ; Intercept p-value = 0.00011393
Slope = 0.33827 ; Slope STE = 0.073006 ; Slope T-Statistic 4.6334 ; Slope p-value = 6.5471e-05
F-Statistic: 21.468 ; p-value: 6.547e-05
Theil-Sen Slope = 0 ; Mann-Kendal Score = -16 ; Mann-Kendall p-value = 0.80548
Data Source:FWMIS

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TABLE. RESULTS OF MANN-KENDALL NON-PARAMETRIC TREND ANALYSIS OF FISH SPECIES RICHNESS OVER TIME IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY SUB-BASIN.

Analysis	Source	WSCSDA	Start Year	Theil-Sen Slope	Mann-Ken Score	Mann-Ken p-value	
Total Species Richness	FWMIS	South Saskatchewan Basin	1946	0.00	13.00	0.96	
	FWMIS	05A - Upper South Saskatchewan	1946	0.00	-56.00	0.73	
	FWMIS	05B - Bow River	1946	0.00	-61.00	0.78	
	FWMIS	05C - Red Deer	1946	-0.11	-228.00	0.12	
	FWMIS	05H - Lower South Saskatchewan	1946	0.00	-16.00	0.81	
Median Species Richness	FWMIS	South Saskatchewan Basin	1946	0.00	56.00	0.78	
	FWMIS	05A - Upper South Saskatchewan	1946	0.00	23.00	0.88	
	FWMIS	05B - Bow River	1946	0.00	-30.00	0.88	
	FWMIS	05C - Red Deer	1946	0.00	97.00	0.47	
	FWMIS	05H - Lower South Saskatchewan	1946	0.00	15.00	0.80	

BENTHICS

OVERALL BENTHIC HEALTH SCORING

				Sub-Basin				*Basin*
	Indicator			**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	**Value**
Benthic Macro-Invertebrates	**Index of benthic community composition based on sensitivity to disturbance**	Median Hilsenhoff Biotic Index (HBI) score for the basin, based on the five most recent years of monitoring.	*Year*	2015-2018	2015-2019	2015-2019	2007-2008	2015-2019
			Number of Sites	21	60	34	0	115
			Value	2.89	3.03	2.27	-	2.78
			Benthic Health Category	**Data deficient**	**Very Good**	**Data deficient**	**Data deficient**	**Data deficient**
			Benthic Health Score	0	**5**	0	0	0
		Variance of annual HBI scores	*Value*	0.940	1.240	0.750	-	1.076
		Significant Mann-Kendal time-series test to determine directional trend in **HBI** over time.	*Time Period*	2007-2018	2006-2019	2007-2016	2007-2008	2006-2019
			Trend	None	Significant decline in HBI indicating improvement	None	-	Significant decline in HBI indicating improvement

BENTHIC DATA SUFFICIENCY

		Sub-Basin				**Basin**
Benthic Macro-Invertebrates	**Data Sufficiency Indicator**	**05A - Upper South Saskatchewan**	**05B - Bow River**	**05C - Red Deer**	**05H - Lower South Saskatchewan**	
	Total number of sub-sub-basins	10	13	10	8	41
	Year of earliest available monitoring	2006	2006	2007	2007	2006
	Number of monitoring stations available for earliest monitoring	3	4	2	10	19
	Number of sub-sub-basins with earliest available monitoring stations	3	2	2	2	9
	Year of most recently available monitoring	2018	2019	2016	2008	2019
	Number of monitoring stations available within last five years	21	60	34	0	115
	Number of sub-sub-basins within last five years	1	6	1	0	8
	Number of years of sampling in last 10 years	8	10	4	0	10
	Overall Data Sufficiency Category	Insufficient	Partially Sufficient	Insufficient	Insufficient	Insufficient
	Data Sufficiency Score	0	1	0	0	0

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

MAP. HILSENHOFF'S BIOTIC INDEX SCORES FOR BENTHIC MACRO-INVERTEBRATE COMMUNITIES IN THE SOUTH SASKATCHEWAN RIVER (2014 - 2019).

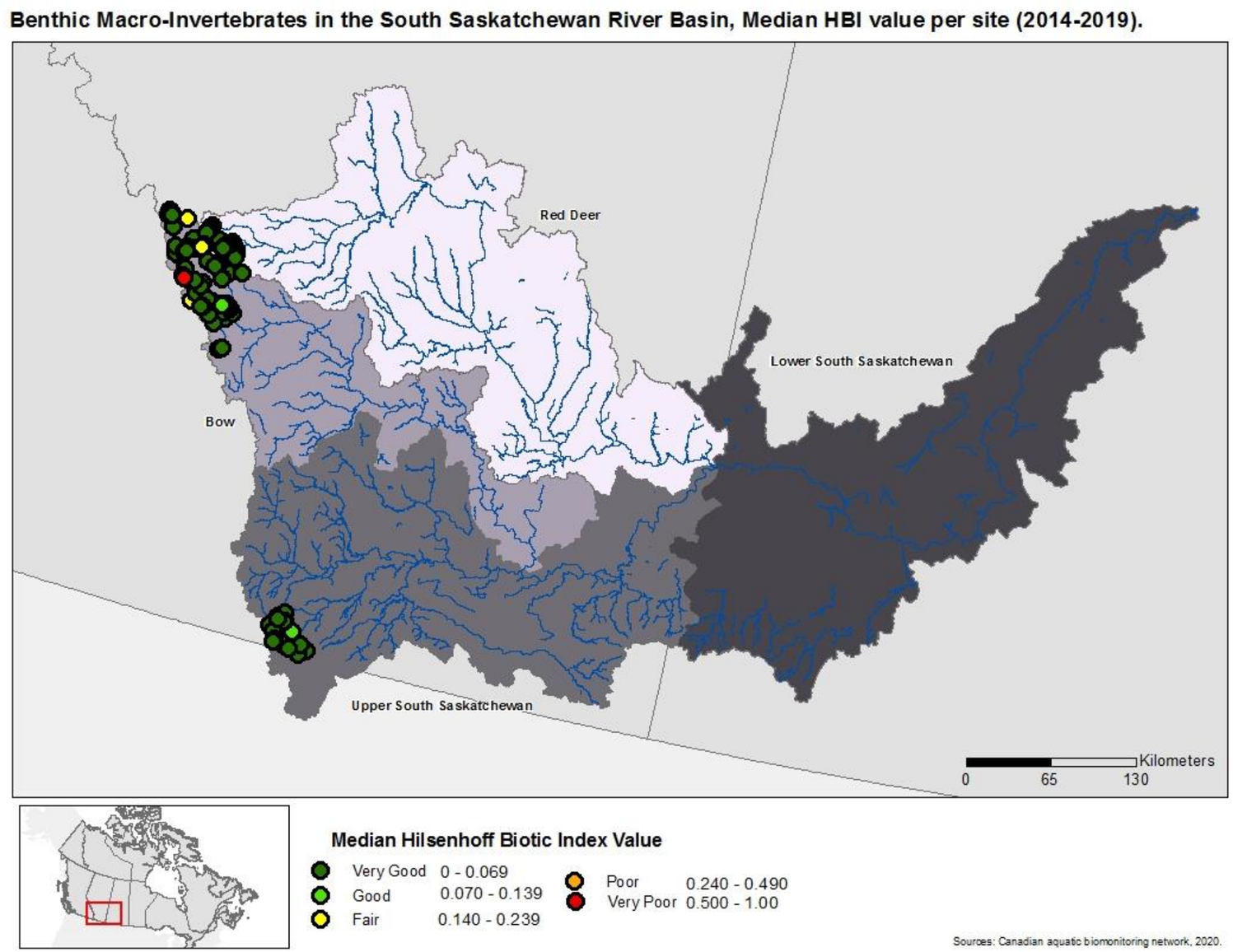

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FIGURE. ANALYSIS OF VARIANCE FOR HILSENHOFF'S BIOTIC INDEX VALUES FOR BENTHIC MACRO-INVERTEBRATE COMMUNITIES SAMPLED IN THE SOUTH SASKATCHEWAN RIVER BASIN.

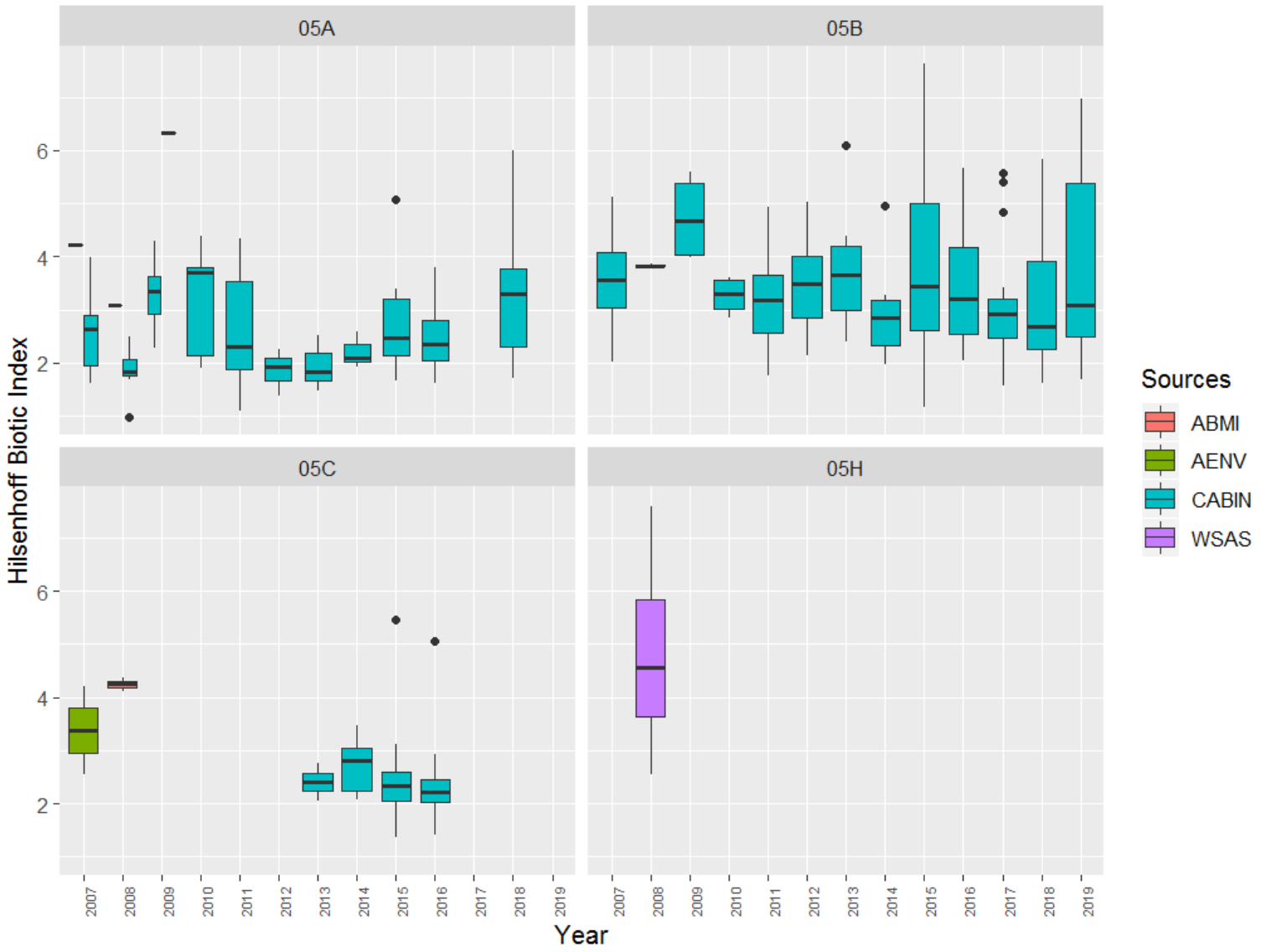


TABLE. HILSENHOFF'S BIOTIC INDEX VALUES FOR BENTHIC MACRO-INVERTEBRATE COMMUNITIES SAMPLED IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY YEAR, SUB-BASIN AND DATA SOURCE.

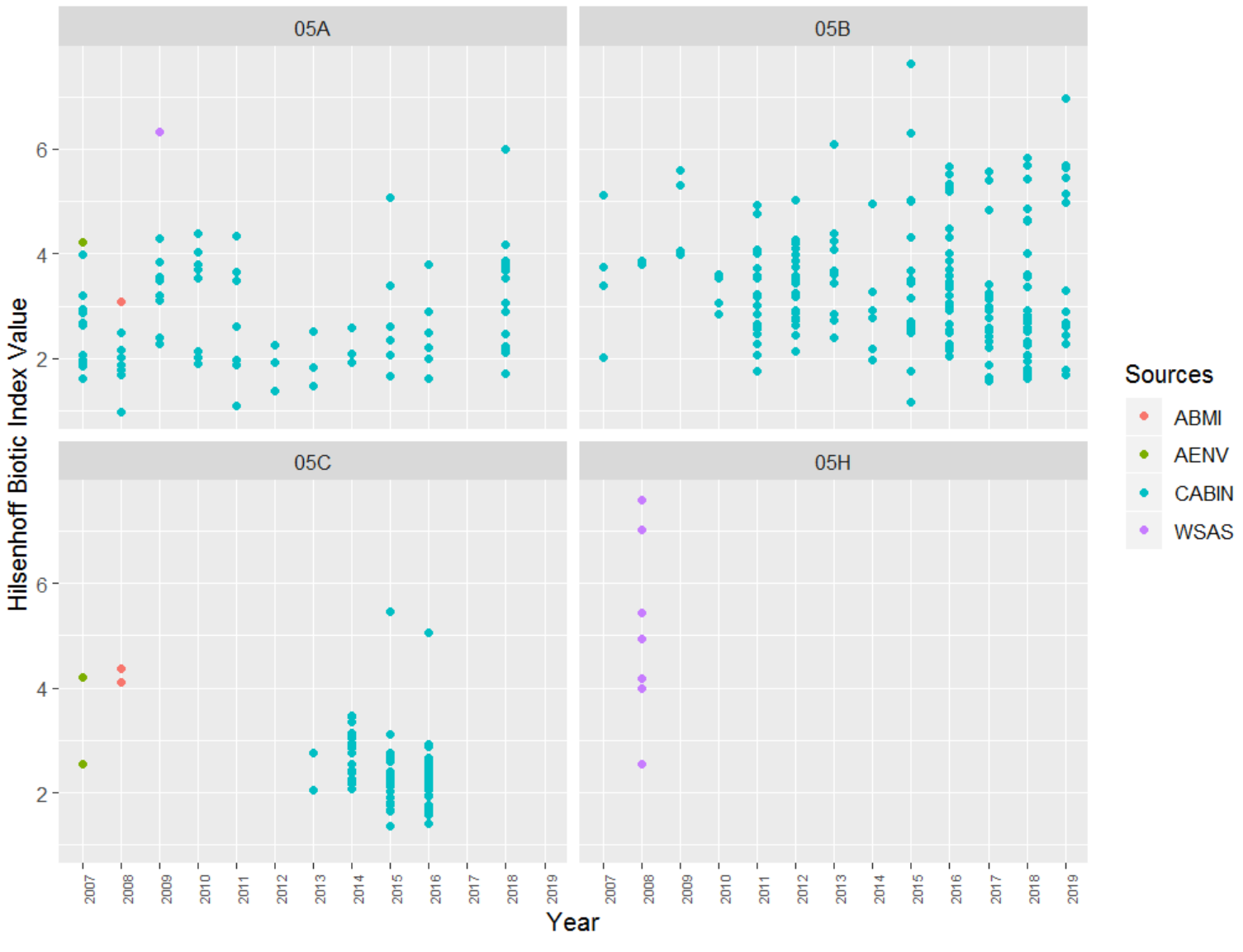
Sub-watershed	Year	Data Source	HBI Value	Number of Sites	5-Year HBI Weighted Average
05A - Upper South Saskatchewan	2018	CABIN	3.31	14	
	2016	CABIN	2.35	6	
	2015	CABIN	2.48	6	2.89
	2014	CABIN	2.10	3	
	2013	CABIN	1.84	3	
	2012	CABIN	1.93	3	
	2011	CABIN	2.29	8	
	2010	CABIN	3.69	9	
	2009	CABIN	3.35	9	
	2008	CABIN	1.83	9	
	2007	CABIN	2.63	12	
	2009	WSAS	6.34	9	
	2008	ABMI	3.09	9	
	2007	AENV	4.21	12	
05B - Bow River	2019	CABIN	3.09	14	
	2018	CABIN	2.69	30	
	2017	CABIN	2.91	23	
	2016	CABIN	3.19	35	
	2015	CABIN	3.43	17	3.03
	2014	CABIN	2.84	6	
	2013	CABIN	3.64	10	
	2012	CABIN	3.48	15	
	2011	CABIN	3.19	14	
	2010	CABIN	3.30	4	
	2009	CABIN	4.68	4	
	2008	CABIN	3.83	2	
	2007	CABIN	3.57	4	
05C - Red Deer	2016	CABIN	2.22	32	
	2015	CABIN	2.34	26	2.27
	2014	CABIN	2.81	24	
	2013	CABIN	2.40	2	
	2007	AENV	3.37	2	
	2008	ABMI	4.24	2	
05H - Lower South Saskatchewan	2008	WSAS	4.56	3	-

Disclaimer: This analysis reflects currently available and accessible data as of July 2020.

TABLE. RESULTS OF MANN-KENDALL NON-PARAMETRIC TREND ANALYSIS OF HILSENHOFF'S BIOTIC INDEX OVER TIME IN THE SOUTH SASKATCHEWAN RIVER BASIN, BY SUB-BASIN & DATA SOURCE.

Watershed	Data Source	Start Year	End Year	Number of sites	Theil-Sen Slope	Mann-Ken Score	Mann-Ken p-value	
South Saskatchewan Basin	All	2007	2019	187	-0.12	-34	0.04	*
	CABIN	2007	2019	178	-0.02	-8	0.67	
	WSAS	2007	2009	15	0.17	1	1.00	
05A - Upper South Saskatchewan	All	2007	2018	51	-0.12	-18	0.24	
05B - Bow River	All	2007	2019	94	-0.08	-42	0.01	*
05C - Red Deer	All	2007	2016	40	-0.07	-9	0.47	

FIGURE. TREND ANALYSIS FOR HILSENHOFF'S BIOTIC INDEX VALUES FOR BENTHIC MACRO-INVERTEBRATE COMMUNITIES SAMPLED IN THE SOUTH SASKATCHEWAN BASIN.



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SUMMARY

TABLE. OVERALL SCORING RESULTS FRESHWATER THREATS ASSESSMENT OF SOUTH SASKATCHEWAN WATERSHED, BY SUB-WATERSHED AND PEARSE WATERSHED

PEARSE BASIN	SUB WATERSHED SCORE			
	WSCSDA	SUB WATERSHED NAME	SCORE	FINAL SCORE (*MEDIAN*)
South Saskatchewan	05A	Upper South Saskatchewan	THREAT CLASSIFICATION	Very High
			SCORE	100
	05B	Bow	THREAT CLASSIFICATION	High
			SCORE	66.67
	05C	Red Deer	THREAT CLASSIFICATION	Very High
			SCORE	80
	05H	Lower South Saskatchewan	THREAT CLASSIFICATION	Very High
			SCORE	80
	OVERALL PEARSE BASIN SCORE			
			THREAT CLASSIFICATION	Very High
			SCORE	83.34

TABLE. SCORING RESULTS FRESHWATER THREAT INDICATORS OF SOUTH SASKATCHEWAN WATERSHED, BY SUB-WATERSHED AND PEARSE WATERSHED

PEARSE BASIN	SUB WATERSHED SCORE											
	WSCSDA	SUB WATERSHED NAME	INDICATOR	POLLUTION	CLIMATE CHANGE	ALTERATION OF WATER FLOWS	INVASIVE SPECIES	FRAGMENTATION	WATER USE	HABITAT LOSS	WATERSHED AREA (m2)	RELATIVE WATERSHED AREA
South Saskatchewan	05A	Upper South Saskatchewan	THREAT CLASSIFICATION	Very High	High	Moderate	Low	Very High	Very High	High	46,509,769,665	26.31%
			SCORE	100	100	60	40	100	100	80		
	05B	Bow	THREAT CLASSIFICATION	Very High	Moderate	Low	Moderate	Very High	Very High	Moderate	25,459,555,535	14.40%
			SCORE	100	66.67	40	60	100	100	60		
	05C	Red Deer	THREAT CLASSIFICATION	Very High	Moderate	Low	Low	Very High	Very High	High	49,894,331,903	28.22%
			SCORE	100	66.67	40	40	100	100	80		
	05H	Lower South Saskatchewan	THREAT CLASSIFICATION	Very High	Moderate	Moderate	Very low	High	Very High	Very High	54,943,216,863	31.08%
			SCORE	100	66.67	60	20	80	100	100		
	OVERALL PEARSE BASIN SCORE											
			THREAT CLASSIFICATION	Very High	High	Moderate	Low	Very High	Very High	Very High		
			SCORE	100	75.44	51.48	36.66	93.78	100	83.34		

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SUB-INDICATOR SCORES BY SUB-WATERSHED

POLLUTION

TABLE. SCORING RESULTS OF POLLUTION THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR																	
		Point Source Pollution			Pipeline incidents			Transportation Incidents			Agricultural Contamination								
		SUB-SUB-INDICATOR									Risk of Water Contamination by N			Risk of Water Contamination by Pesticides			Risk of Water Contamination by P		
WSCSDA	SUB WATERSHED NAME	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification
05A	Upper South Saskatchewan	54480.91	100	Very High	2.8E+07	80	High	2	20	Very Low	0.97	80	High	1.81	100	Very High	3.16	100	Very High
05B	Bow	436395.13	100	Very High	3.4E+07	80	High	42	60	Moderate	0.71	60	Moderate	1.33	80	High	1.32	80	High
05C	Red Deer	11917.36	80	High	5504.5	20	Very Low	89	100	Very High	0.97	80	High	1.78	100	Very High	2.1	100	Very High
05H	Lower South Saskatchewan	38996.41	100	Very High	9.6E+07	100	Very High	21	40	Low	1.01	80	High	1.71	80	High	1.27	80	High

CLIMATE CHANGE

TABLE. SCORING RESULTS OF CLIMATE CHANGE THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR											
		Spring Precipitation Anomaly			Summer Maximum Temperature Anomaly			Summer Precipitation Anomaly			Winter Mean Temperature Anomaly		
WSCSDA	SUB WATERSHED NAME	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification	Value	Score	Threat Classification
05A	Upper South Saskatchewan	0.38	100	Very High	-0.46	66.67	Moderate	0.18	33.33	Low	-0.08	66.67	Moderate
05B	Bow	0.27	66.67	Moderate	-0.44	66.67	Moderate	0.12	33.33	Low	-0.12	66.67	Moderate
05C	Red Deer	0.33	66.67	Moderate	-0.09	33.33	Low	0.1	33.33	Low	-0.05	66.67	Moderate
05H	Lower South Saskatchewan	-0.06	33.33	Low	-0.48	66.67	Moderate	0.28	66.67	Moderate	-0.09	66.67	Moderate

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ALTERATION OF WATER FLOWS

TABLE. SCORING RESULTS OF ALTERATION OF WATER FLOWS THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR		
		Area of Reservoirs/Dams		
WSCSDA	**SUB WATERSHED NAME**	Value	Score	Threat Classification
05A	Upper South Saskatchewan	161.6	60	Moderate
05B	Bow	69.4	40	Low
05C	Red Deer	46.7	40	Low
05H	Lower South Saskatchewan	417.9	60	Moderate

INVASIVE SPECIES

TABLE. SCORING RESULTS OF INVASIVE SPECIES THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR		
		Presence of Invasive Species		
WSCSDA	**SUB WATERSHED NAME**	Value	Score	Threat Classification
05A	Upper South Saskatchewan	11	40	Low
05B	Bow	17	60	Moderate
05C	Red Deer	8	40	Low
05H	Lower South Saskatchewan	3	20	Very Low

WATER USE

TABLE. SCORING RESULTS OF WATER USE THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR		
		Water Use		
WSCSDA	**SUB WATERSHED NAME**	Value	Score	Threat Classification
05A	Upper South Saskatchewan	N/A	100	Very High
05B	Bow	N/A	100	Very High
05C	Red Deer	N/A	100	Very High
05H	Lower South Saskatchewan	N/A	100	Very High

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FRAGMENTATION

TABLE. SCORING RESULTS OF FRAGMENTATION THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR					
		Fragmentation by dams			Fragmentation by roads and rail		
WSCSDA	SUB WATERSHED NAME	Value	Score	Threat Classification	Value	Score	Threat Classification
05A	Upper South Saskatchewan	0.99	100	Very High	0.01	100	Very High
05B	Bow	0.99	100	Very High	0.01	100	Very High
05C	Red Deer	0.99	100	Very High	0.01	100	Very High
05H	Lower South Saskatchewan	0.97	80	High	0.01	80	High

HABITAT LOSS

TABLE. SCORING RESULTS OF HABITAT LOSS THREAT BY SUB-INDICATOR AND SUB-WATERSHED

		SUB-INDICATOR					
		Land use/Land cover			Forest loss		
WSCSDA	SUB WATERSHED NAME	Value	Score	Threat Classification	Value	Score	Threat Classification
05A	Upper South Saskatchewan	48.3	80	High	5.48	60	Moderate
05B	Bow	30.18	60	Moderate	1.56	40	Low
05C	Red Deer	46.11	80	High	6.78	60	Moderate
05H	Lower South Saskatchewan	65.94	100	Very High	0.57	20	Very Low

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